LAB 1 Deliverables

1. **Problem Statement**

In Singapore, car ownership and maintenance is a hustle and compared to the world, expensive too. As a result, car renting has become an economical way for Singaporeans to get the experience of owning a car for a period of time without all the hassles that comes with car ownership. There are several growing platforms and companies where users are able to rent cars. Each company has its own way of charging users with various different prices. As a customer, we are always on the lookout for the cheapest and best price in the market and the same goes for renting cars. As such, our team intends on bridging this gap by helping users calculate the cheapest real time prices from different car rental platforms to compare and choose what is best for the user.

2. **Target User of Application**

Our target users of this application are residents of Singapore who would like to rent cars.

Demographics:
- People who have driving licence
- Families

3. Functional Requirements
1. Login Page
   1.1. User must be able to register for an account and login
   1.2. If user has forgotten their login credentials, they must be able to recover it
2. Home Page
   2.1. User must be able to view more information about our website
   2.2. User shall be able to visit the login page from the Home page
   2.3. User shall be able to register for a new account from the Home page
3. Search Page
   3.1. User shall be able to search for their current location or area to rent the car in the search bar, and results of the nearest car rental location should be shown
   3.2. User shall be able to get his current location using the GPS feature or manually input his current location using postal code
   3.3. User shall be able to enter type of car from the given suggestions
   3.4. User shall be able to enter the what time do they like to start renting the car and the time duration for the car rental
4. Map Page
   4.1. User shall be able to click on various car park locations and check the distance and time from their current location to the carpark clicked
   4.2. User shall be able to see the directions from their current location to the nearest car park they want to travel from
   4.3. Users shall be able to check the estimated time required for them to rent a car.
5. Compare Price
   5.1. User must be able to check the various prices of different car rentals for their travel
   5.2. System shall be able to be provided with the best deal according to the parameters set by the user
6. Weather forecast page (additional feature)
   6.1. Users shall be able to see the weather forecast of the locality they are currently in.
7. Suggestion of locations (additional feature)
   7.1. Users shall be suggested nearby areas to visit for the location they are travelling to. Eg - restaurants, cafes etc.

4. Non-functional Requirements
1. Usability
   1.1. System should display price up to 2 decimal points and in SGD currency
   1.2. System should use 12 hour clock to describe current time
   1.3. System should be able to show time in hour and minutes for time required in travel or time of duration for car rental
   1.4. System should show FAQ information in the local language according to the user's locale
   1.5. System must be able to display all the information in the language preferred by the user

    1.6.   Help message must be displayed in the local language according to the user's locale

    1.7.   User must not spend more than 10 minutes to create an account

    1.8.   If network connection is not available, the website must display and informative pop-up box telling the users to try again later

2. Performance

    2.1.   System must not be shut down for more than 10 hours in an year

    2.2.   System should be able to show the desired search in 15-30 seconds

    2.3.   On opening the website, it should be fully functional within 15 seconds

3. Supportability

    3.1.   The website must be able to run and are compatible with most web browsers

    3.2.   The website should be able to be tested, adapt, maintain, configure, scale and localise

4. Interface

    4.1.   System should interact with the API of google maps and other web-scraping websites.

5. Extensibility Requirements

    5.1.   Be able to customise an existing installation of the website application at runtime without recompiling or changing the original source code (for both the backend and frontend codes)

6. Overall Maintenance

    6.1.   Updating the database of the website regularly

    6.2.   Constant updates for website design or changes

    6.3.   Perform backups regularly and stored off site

    6.4.   Update website's software and plugins

   6.5.   Checking and removing spam review, comments and user accounts

5. Data dictionary

Created by	Li jiaqian
Date created	29 January 2023
API	API stands for Application Programming Interface, which is a set of protocols for two or more computer programs to communicate with each other
User account	A means by which app users can get access to the platform. It includes a username as an identification set by user and an registered email address or contact number where the platform will send OTP for users to log in. The users can also log in with the password they set when registering.
Database	A spreadsheet that contains all the users' accounts including username, registered emails or phone numbers, passwords and their Favourite Starting Point etc.
Starting point	A box where users can enter their starting location. They can directly select their current position or their favourite starting point.
Favourite starting point	A location that is most often selected by a user. Platform will record the starting points a user has selected and sort them by number of times. The most often selected one will be marked as Favourite starting point and provided to users to select without entering location in detail
Nearest rental points	A set of rental points that belong to different renting companies and are closest to the starting point entered by users.
Rating	A scaling system implemented by our platform for users to rate and review for their car-renting experience. The scale is from one star to five stars. More stars stand for better user experience. The rating of a renting company is the average of the users' rating. The rating system will be offered to a user after a renting service.

One time password (OTP)	A six-digit number which will be sent to a user's email address or phone number via email or SMS for the user to log in the platform. An OTP will expire in 3 minutes and the user can request another OTP after 1 minute.
Destinations	A series of boxes where users can enter the locations where they want to go in order. If the number of boxes provided is not enough, users can also add more boxes for them to enter their destinations
Calculated time spent	The time that is calculated by using Google Maps by summing the time needed to reach destinations. Since the companies in our platform only provide "from A to A" service, the return time is also counted.
Estimated lease time	The time that is estimated by users themselves. They should refer to the calculated time and then include other time they will spend.
Estimated renting fee	The fee that is estimated through multiplying the estimated lease time offered and unit price of a company.
Filter	A selection bar where users can choose the car by filtering price, categories,types and features

7. Use case model
7.1. Use case diagram
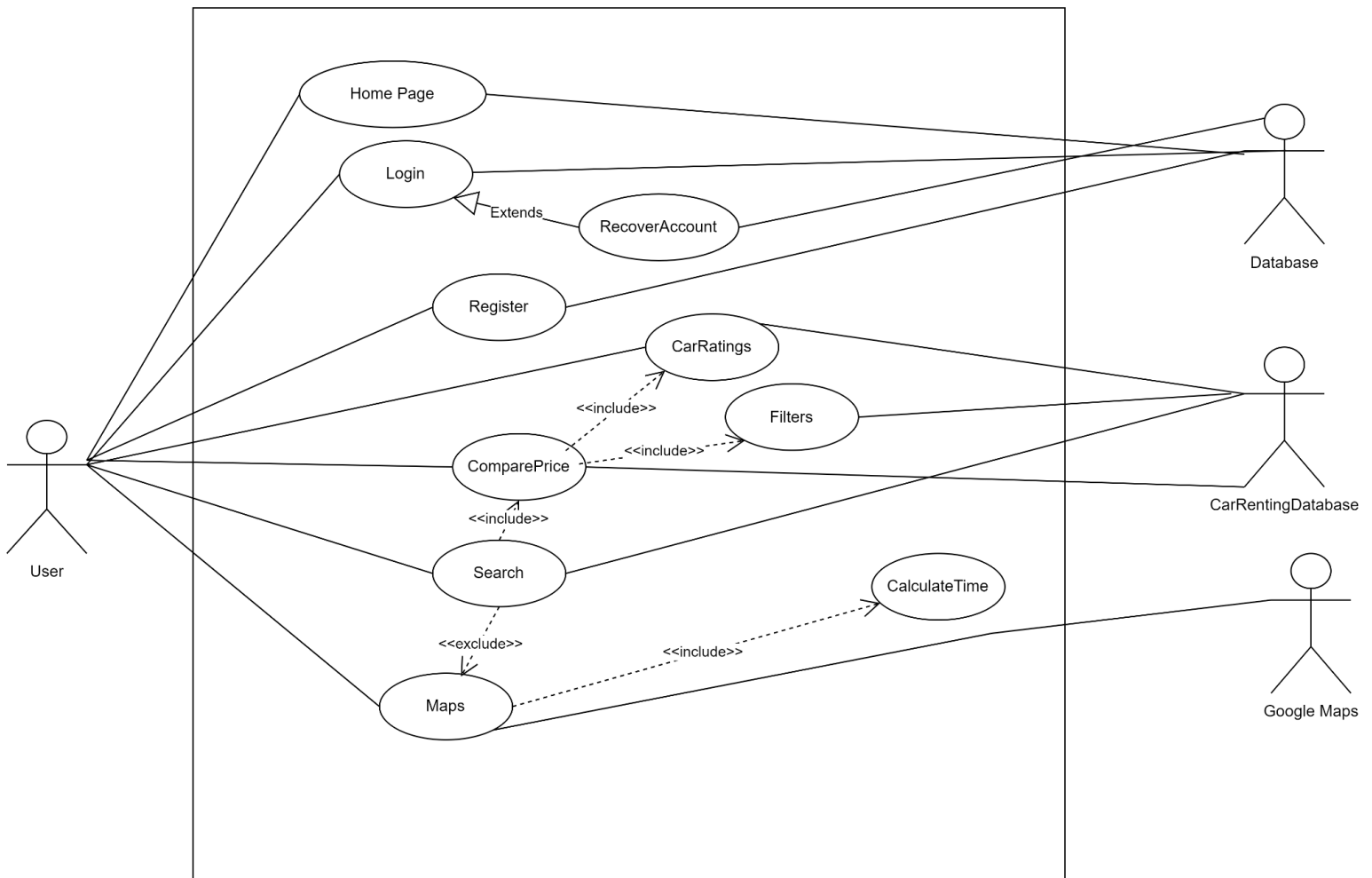
7.2.   Use case descriptions

Use Case ID:	001		
Use Case Name:	Register		
Created By:	Lim Ke En	Last Updated By:	Lim Ke En
Date Created:	29 January 2023	Date Last Updated:	29 January 2023

Actor:	User (Initiating Actor), Database
Description:	First time users can register for an account to create their account.
Preconditions:	1. The user must be connected to the internet 2. The user has do not have an account prior to registration 3. The user has navigated to the login interface
Postconditions:	1. The user has successfully registered an account for the application with a unique username and password and their account is added into the system database. Or 2. The user is notified of the reason(s) why the registration of the account is unsuccessful.
Priority:	
Frequency of Use:	
Flow of Events:	1. At the home page of the website, the user can click onto the "Login" button and the system will redirect the user to the login page. 2. Since the user is a new user, he would need to register for a new account. 3. The user can click on "Register as a new user" and he will be redirected to the registration page. 4. The user would then need to input a valid email address, username, birth date, a valid mobile phone and all other respective fields. 5. The user will need to input a valid password that contains at least 8 characters which includes an upper-case, lower-case letter, numerical digits and a special character. 6. The user will also need to input the password once more to confirm his password. 7. At the end of the registration form, the user would need to check the checkbox of "I agree to the Terms of Use and Privacy Policy". 8. The user will click on the "Sign up" button to register their account. 9. The system validates if there is an identical email existing in the system 10. The system will verify if the password satisfies all requirements

	11. For further verification, the system will automatically generate a One-Time Password (OTP) in which the user will need to input the OTP.
	12. The system will verify if the user inputs the correct OTP.
	13. Upon verification, the system will store all information in the database securely.
	14. Once registration is successful, the system will automatically help the user to log into his account.
Alternative Flows:	AF-S5: The user inputs a password that does not satisfy all the requirements set. 1. The system displays the message "Password does not meet all requirements, please try again!" under the password field. 2. The system returns to Step 5 and waits for inputs from the user. AF-S6: The user inputs a mismatched password. 1. The system displays the message "Passwords do not match, please try again!" below the password field. 2. The system returns to Step 5 and waits for inputs from the user. AF-S7: The user did not check the checkbox of "I agree to the Terms of Use and Privacy Policy." 1. Upon clicking on the "Sign up" button, the system will display the message "Please check the checkbox for acknowledging the Terms of Use and Privacy Policy!" at the top of the registration form. 2. The system will return to Step 4 and wait for input from the user. AF-S8: The user did not complete all of the input fields. 1. Upon clicking on the "Sign up" button, the system will display the message "Please check that all fields are filled up!" at the top of the registration form 2. The system will return to Step 4 and wait for user to complete all inputs. AF-S9: The user inputs an email address that had already been registered. 1. The system displays the message "Email address has already been registered, please input another email address!" under the email address field. 2. The system returns to Step 4 and waits for input from the user. AF-S12: The user inputs an incorrect OTP

	1. The system displays the message "Incorrect OTP! Please try again!" at the top of the registration form
	2. The system will re-generate a new OTP and sent it to their email address.
	3. The system returns to Step 4 and waits for the user to input again.
Exceptions:	EX-1: The user did not receive the OTP in his email.
	1. Users can click on the "Resend OTP" button that is made available after 60 seconds.
	2. Once the user clicks on the "Resend OTP" button, a new OTP will be generated by the system and sent to the email address.
	3. The system will return to Step 4 and wait for the user to input again.
	EX-2: The user request for more than three OTP request.
	1. On the fourth time the user requests to generate a new OTP, the system will generate the message "Please try again with a different email" at the top of the registration form.
	2. The system returns to Step 4 and waits for input from the user.
Includes:	
Special Requirements:	
Assumptions:	
Notes and Issues:	

Use Case ID:	002		
Use Case Name:	Login		
Created By:	Lim Ke En	Last Updated By:	Lim Ke En
Date Created:	29 January 2023	Date Last Updated:	29 January 2023

Actor:	User (Initiating Actors), Database
Description:	The user can login to his/her account with the correct credentials that are inputted when users register.
Preconditions:	1. The user must be connected to the Internet.
	2. The user has a registered account.
Postconditions:	1. The User has successfully logged into his/her own account.
	OR

	2. The user is notified of the reason(s) why he is unable to login into his account. Eg. You have input the wrong email address/password
Priority:	
Frequency of Use:	
Flow of Events:	1. At the home page of the website, the user can click onto the "Login" button and the system will redirect the user to the login page. 2. At the login page, the system requests the input of both the email address and password. 3. The user inputs his registered email address and his password. 4. The user clicks on the "Login" button 5. The system verifies the credentials (Email and Password) provided with the database using the included use case *VerifyCredentials* 6. If the Email and Password are correct and verified, the user will be directed into his account.
Alternative Flows:	AF-S4: The user left the input field blank. 1. Upon clicking onto the "Login" button, the system displays the following message "Please ensure that all fields are filled up!". 2. The system will prompt the user to fill up all the fields. 3. The system returns to Step 3 and waits for the user to fill in all the fields. AF-S5: The user inputs an incorrect email address or password. 1. Upon clicking onto the "Login" button, the system displays the following message: "Invalid email address and/or password!" at the top of the login page using the exclude use case *LoginError*. 2. The system returns to Step 3 and waits for the user to fill in the fields again.
Exceptions:	EX-1: The user inputs incorrect email address and password for more than five times 1. After five attempts, the system will display the message "More than five tries, please try again after 10 minutes or click on forget your password" 2. The system will only accepts registration hence returning to Step 3 after 10 minutes EX-2: The user forgets his username and/or password 1. The user clicks on "Forget Password" that is situated below the login button. 2. The user can recover his/her account using the extended use case *RecoverAccount*
Includes:	

Excludes	
Extends	*RecoverAccount*
Special Requirements:	
Assumptions:	
Notes and Issues:	

Use Case ID:	003		
Use Case Name:	RecoverAccount		
Created By:	Lim Ke En	Last Updated By:	Lim Ke En
Date Created:	29 January 2023	Date Last Updated:	29 January 2023

Actor:	User (Initiating Actors), Database
Description:	The user can request for help if he forgets his password and this use case can help to recover the account.
Preconditions:	1. The user must be connected to the internet 2. The user has forgotten his/her login credentials
Postconditions:	1. The user has successfully recovered his/her account by changing his password. OR 2. The user has sought further assistance and support from the customer service.
Priority:	
Frequency of Use:	
Flow of Events:	1. The user clicks on "Forget your password" on the login page 2. The system displays the recover account page 3. User will input the registered email address and clicks on "Recover Account" 4. The system will verify the email address to ensure that the email address exist 5. The system then automatically generates a One-time Password (OTP) and emails it into the user's inbox. 6. User will input the OTP. 7. Upon successful inputs of the OTP, the system will redirect users to a page where users can type in their new password with certain requirements. 8. The system then validates and verifies the new password and updates into the database. 9. Once the password is changed successfully in the database, users will be informed of the change in password and be redirected back to the login page.
Alternative Flows:	AF-S4: The user inputs the incorrect email address and email address is not registered

	1. The system will display the following message: "Not a registered email, Please try again!" at the top of the page.
	2. The system will returns to Step 3 and waits for user to input the registered email address
	AF-S7: The user inputs an incorrect OTP
	1. The system displays the message "Incorrect OTP! Please try again!" at the top of the registration form
	2. The system will re-generate a new OTP and sent it to their email address.
	3. The system returns to Step 4 and waits for the user to input again.
	AF-S8: The user inputs a password that does not satisfy all the requirements set.
	1. The system displays the message "Password does not meet all requirements, please try again!" under the password field.
	2. The system returns to Step 7 and waits for inputs from the user.
	AF-S8: The user inputs a mismatched password.
	1. The system displays the message "Passwords do not match, please try again!" below the password field.
	2. The system returns to Step 7 and waits for inputs from the user.
Exceptions:	EX-1: The user forgets his registered email
	1. The user clicks on "Contact Support" button
	2. The system will show the support email address
	3. The user will then contact the support via email to recover his/her email address
	EX-2: The user did not receive the OTP in his email.
	1. Users can click on the "Resend OTP" button that is made available after 60 seconds.
	2. Once the user clicks on the "Resend OTP" button, a new OTP will be generated by the system and sent to the email address.
	3. The system will return to Step 4 and wait for the user to input again.
	EX-3: The user request for more than three OTP request.
	1. On the fourth time the user requests to generate a new OTP, the system will generate the message "Please try again with a different email" at the top of the registration form.

	2. The system returns to Step 4 and waits for input from the user.
Includes:	
Extends	
Special Requirements:	
Assumptions:	
Notes and Issues:	

Use Case ID:	004		
Use Case Name:	Search		
Created By:	Lim Ke En	Last Updated By:	Lim Ke En
Date Created:	30 January 2023	Date Last Updated:	30 January 2023

Actor:	User (Initiating Actor), CarRentingData (System)
Description:	Users will be able to search for the location they want to rent the car, pick up time, drop off time as well as filter the type of car that the users prefer
Preconditions:	1. Users must have logged in 2. Users must be connected to an internet
Postconditions:	Users will obtain a list of car renting services that is sorted from the lowest price to the highest price.
Priority:	
Frequency of Use:	
Flow of Events:	1. Users can navigate through the navigation bar and click onto the "Start Searching" button 2. Users can first type in their postal code of the current location 3. After that, users can enter the date of renting the car, start time of renting, drop off time, type of car (e.g. 5 seater car, electric car) depending on their preference 4. The system will retrieve the information of the preferred choice. 5. The system will display the results of the car renting services sorted from the lowest price to the highest price using the ComparePrice use case.
Alternative Flows:	AF-S2: Users key in invalid postal code of their location 1. The system will generate the following message: "Please enter a valid postal code" at the bottom of the text box for the location 2. The system will return back to step 2 and wait for further input from the user.

	AF-S3: Users did not field in all the blanks of input
	1. The system will generate the following message: "Please input all the fields" at the bottom of the text box
	2. The system will return back to step 2 and waits for further input from the user
	AF-S3: Users do not know the amount of time they need in renting the car
	1. Users can click on the "Need estimate time?" button below the drop off time section.
	2. System will then redirect the users to the Maps page where users can input the starting location and their destination of travel using the Maps use case
Exceptions:	
Includes:	ComparePrice
Excludes	Maps
Extends	
Special Requirements:	
Assumptions:	
Notes and Issues:	

Use Case ID:	005		
Use Case Name:	Maps		
Created By:	Lim Ke En	Last Updated By:	Lim Ke En
Date Created:	30 January 2023	Date Last Updated:	30 January 2023

Actor:	User (Initiating Actor), Google Maps
Description:	Users will use the google maps API to input the locations they are travelling to and the system will calculate the total estimated travelling time users require.
Preconditions:	1. Users are logged into the account 2. Users must be connected to an Internet 3. Users must have searched for the nearest renting location and set it as the starting point.
Postconditions:	Users will obtain the total estimated travelling time and are able to estimate the total amount of time needed to rent the car.
Priority:	
Frequency of Use:	

Flow of Events:	1. After searching or knowing the start location, users will input the number of locations they will be travelling to.
	2. Users will then input all the addresses of the location.
	3. The system will then compute the total estimated travelling time using the CalculateTime use case, this will allow users to estimate the amount of time they require to rent the car.
	4. The system will then display the total amount of estimated travelling time.
Alternative Flows:	AF-S2: User inputs an invalid address
	1. The system will display the following message "Please enter a valid address" under the invalid address
	2. The system will return to step 2 and wait for further inputs from the user.
Exceptions:	NIL
Includes:	CalculateTime
Extends	
Special Requirements:	
Assumptions:	
Notes and Issues:	

Use Case ID:	006		
Use Case Name:	CalculateTime		
Created By:	Lim Ke En	Last Updated By:	Lim Ke En
Date Created:	30 January 2023	Date Last Updated:	30 January 2023

Actor:	User (Initiating Actor), Google Maps
Description:	Based on the locations where the users inputted, the google maps will provide estimated travelling time by car and compute the total amount of travelling time needed.
Preconditions:	1. The google maps can be access and is online
	2. The user is connected to the internet
	3. The user has login into their registered account
	4. The users know or have searched for the starting address of renting the car
Postconditions:	Users will be able to estimate the total amount of time they require to rent the car on that particular day
Priority:	
Frequency of Use:	
Flow of Events:	1. Users will first input all the addresses of the location they are planning to visit.

	2. The system will then compute the total estimated travelling time using the CalculateTime use case, this will allow users to estimate the amount of time they require to rent the car.
	3. The system will then display the total amount of estimated travelling time.
	4. The system will provide a dropdown box where users can select the estimated amount of time they require to stay at each location during that particular day.
	5. The system will then compute the total amount of time and suggest the amount of time users need to rent the car for.
	6. The suggested amount of time will be displayed.
Alternative Flows:	AF-S1: Users enter an invalid address
	1. The system will display the following message "Please enter a valid address" under the invalid address
	2. The system will return to step 1 and wait for further inputs from the user.
	AF-S4: Users did not enter the amount of time they required to stay at each location
	1. The system will prompt the user to input the data by displaying the following message "Please select the amount of time"
	2. The system will return back to step 4 for further inputs from the user.
Exceptions:	
Includes:	
Extends	
Special Requirements:	
Assumptions:	
Notes and Issues:	

Use Case ID:	007		
Use Case Name:	ComparePrice		
Created By:	Lim Ke En	Last Updated By:	Lim Ke En
Date Created:	30 January 2023	Date Last Updated:	31 January 2023

Actor:	User (Initiating Actor), CarRentingData
Description:	Users will be provided with the results that is sorted from the lowest to the highest price
Preconditions:	1. Users is connected to the internet
	2. Users have login to their registered account
	3. Users have used the search use case to search and filter about their preference

	4. System shall be able to calculate the renting prices from all three companies
Postconditions:	Users will be provided with the list of cheapest rental service and users can make informed decision
Priority:	
Frequency of Use:	
Flow of Events:	1. Users will be directed to a page where the system will display the information according to user's preference that is sorted from lowest to highest price 2. The system will display information such as location of the car renting place, total rental amount, colour of car and type of car 3. The system will also show the rating of the car where users can refer to those ratings that is shown in the CarRating use case 4. At the side panel, users can filter more information such as the inclusivity of fuel using the filter use case
Alternative Flows:	AF-S4: User can choose not to select any filter. 1. The system will show all results sorted from the lowest to the highest price without applying any filter.
Exceptions:	
Includes:	*filter*
Extends	
Special Requirements:	
Assumptions:	
Notes and Issues:	

Use Case ID:	008		
Use Case Name:	CarRatings		
Created By:	Lim Ke En	Last Updated By:	Lim Ke En
Date Created:	30 January 2023	Date Last Updated:	30 January 2023

Actor:	Users (Initiating Actor), Database
Description:	Users will be able to read reviews from other users about the different car renting companies and users can add reviews if they want
Preconditions:	1. Users is connected to the internet 2. Users have login to the registered account
Postconditions:	1. Users have read about the reviews from other users which can help them in making more informed choices

	OR
	2. Users have added their reviews and ratings for the different car renting companies.
Priority:	
Frequency of Use:	
Flow of Events:	Reading Reviews
	1. System will display the top 5 reviews
	2. Users can read about the reviews and see the rating of the car renting company
	3. If users wants to read more about the company, the link to the car renting company will be included in the reviews page
	Adding Reviews
	1. Below the reviews section, the system will display a comment bar where users can add in their review of the car renting company
	2. Users can add in their reviews and add their rating towards the company
	3. After users are ready to add their review and rating, users can press the "Submit" button
	4. The system will store the reviews and ratings in the database
Alternative Flows:	AF-S2 (Adding Reviews): Users left the fields blank and press the "Submit" button
	1. The system will generate the following message: "Please enter text into the fields" at the bottom of the page
	2. The system will return to step 2 and wait for further inputs from the users.
Exceptions:	EX-1: No reviews about the car renting company
	1. System will show the following message: "No reviews added" at the reviews section
Includes:	
Extends	
Special Requirements:	
Assumptions:	
Notes and Issues:	

Use Case ID:	009		
Use Case Name:	Filter		
Created By:	Lim Ke En	Last Updated By:	Lim Ke En
Date Created:	31 January 2023	Date Last Updated:	31 January 2023

Actor:	Users (Initiating Actor), Database
Description:	Include filters that filter choices such as inclusivity of fuel as well as if you can travel to malaysia.
Preconditions:	1. Users is connected to the internet 2. Users have login to the registered account 3. Users have used the search use case to search 4. Users have view the list of prices in the comparePrices use case
Postconditions:	Users will be able to filter their choices according to their preference for a more filtered list of suggestion
Priority:	
Frequency of Use:	
Flow of Events:	1. At the side panel, users can tick onto the check box that are applicable to their choices 2. The system will regenerate the choices as follows 3. The system will generate a new list of choices according to the filtered choice 4. Users can now view the more detailed list according to their own preference
Alternative Flows:	
Exceptions:	
Includes:	
Extends	
Special Requirements:	
Assumptions:	
Notes and Issues:	

9. UI MOCKUP
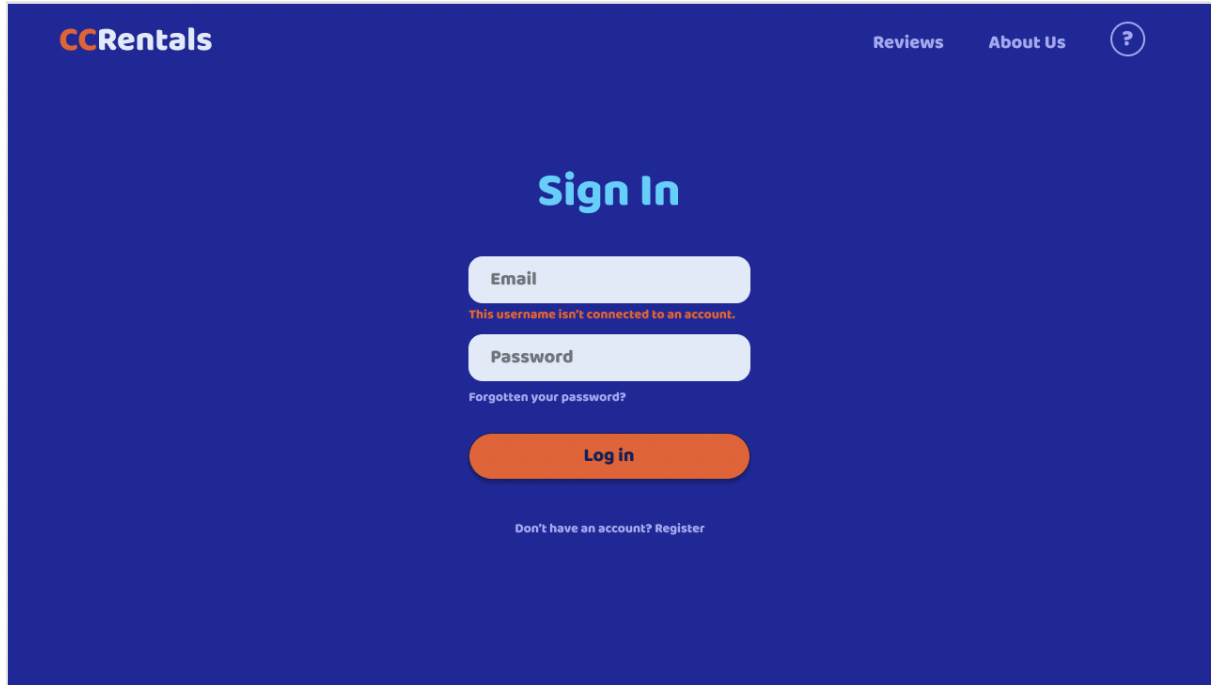
- Home page
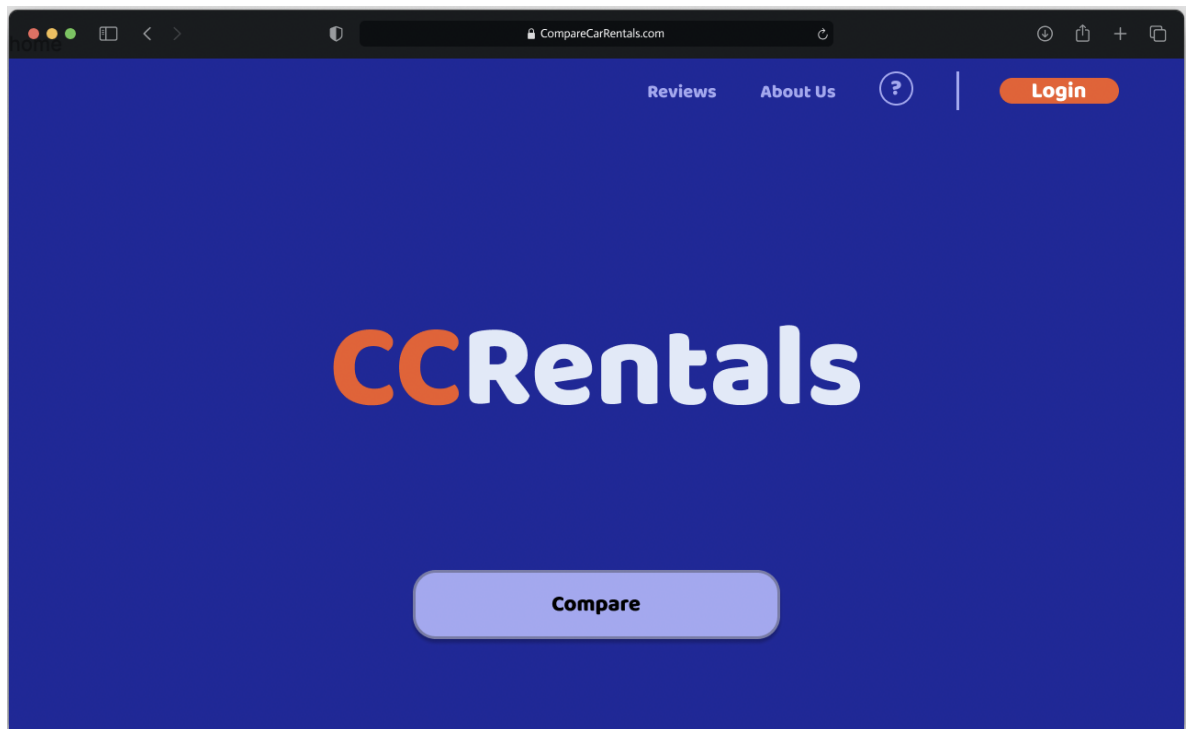
- Login Page
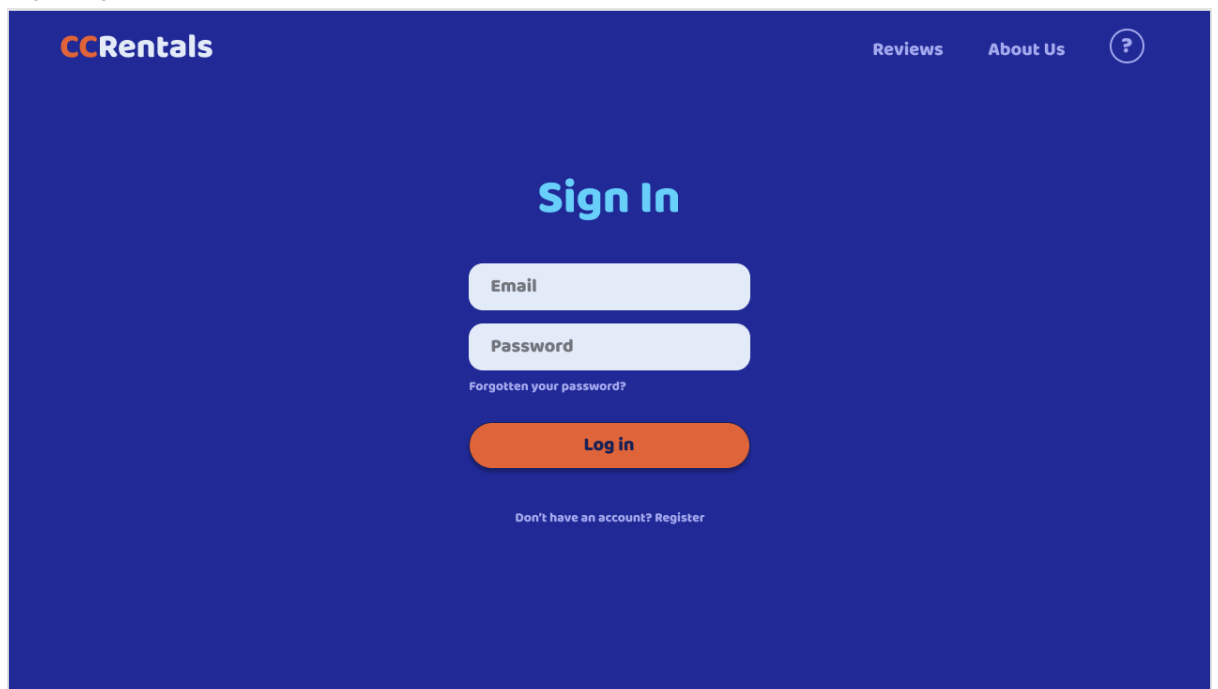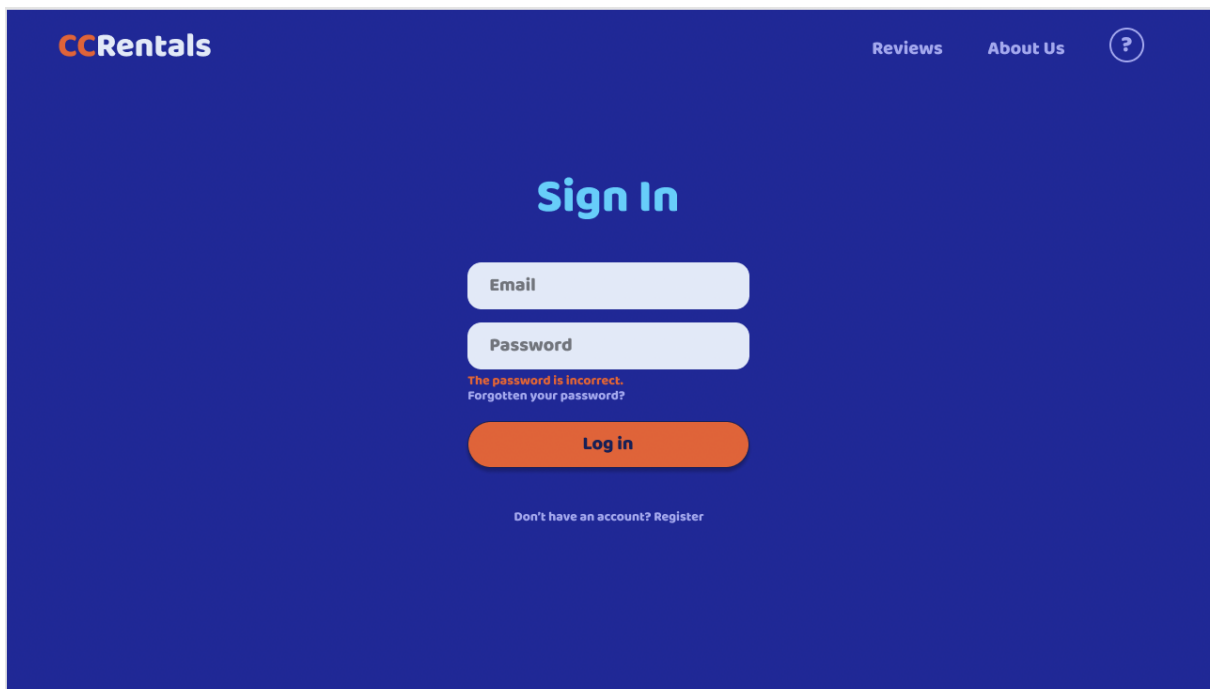
- Sign in with incorrect username
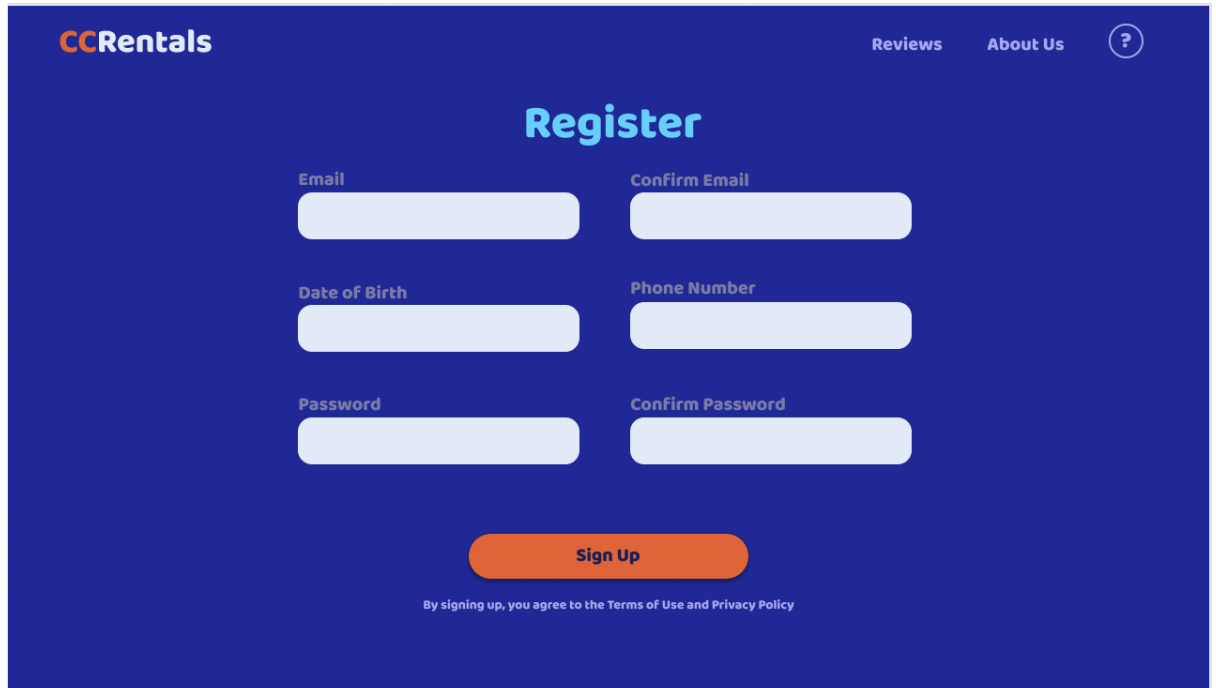
- Sign in with incorrect password

● Register Page

● OTP Page

- Search Page

- Calculate duration Map page

● Results Page

CCRentals

Reviews   About Us   Profile   Saved Places   ?

Pick Up Location
Location

Pick Up Time
Date   Time

Type of Car
Type

Estimated Duration
Time   calculate

Search

Filter by: clear   Sort By: Low Price

Fuel Type
☐ Electric
☐ Petrol
☐ Gas

Car Condition
☐ Brand New
☐ Good Condition
☐ Moderate Condition

Mini Cooper 1.6   📍Location   Price
Seats: 4   Service: CarLite   Nanyang Avenue 24, 639811   SGD 45
Fuel Type: Petrol   Color: Red   0.6km from pick-up location   View

Honda Civic   📍Location   Price
Seats: 4   Service: CarLite   Nanyang Avenue 24, 639811   SGD 54
Fuel Type: Petrol   Color: Red   0.6km from pick-up location   View

Urus   📍Location   Price
Seats: 4   Service: CarLite   View