Title of the Project: Car Rental Service.

Group Number:02

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Introduction: The project is all about making a system where user can rent a car for different purposes. Like, they can choose between different car renting option also it will allow user to select from available cars. There will be renters, car owners, drivers and admin as primary and secondary actors.

Motivation: We have selected this topic because this topic has a huge analysis area. Analyzing this topic will enhance our software design and analysis skills which is very important to have in this competitive world. Also, we have introduced some unique feature in the system which is not available in the existing service available in Bangladesh.

Project Scenario: This project is a car rental service. This project will be used by three types of users/actors. There will be two primary actors one is renter and the other one is car provider. Provider class is divided into driver and owner in a parent child relation. Renters will be considered as new renter after signup till his first rent. And a new renter will have a 300-taka voucher applicable for his first ride. For the admin there will be two class as well one is information desk other one is helpline desk. Information desk will look after the data security, new car registration, self-drive registration, drivers' profile, rating, issue related to data. Helpline desk will track car, response to issue raised by the user, drivers and renter's emergency issues etc. All the tree types of actors will have different user interface. To provide a car in the service firstly provider has to create an account then he needs to request car registration. After that a form will be there on his screen which he needs to fill up and attach all the required documents and submit that form. Then the information desk admin will review all the paper and response accordingly. If his papers meet all the requirement he will be approved and notified and if don't he will be notified with the reason of not getting approved. After the approval he will get a driver id which driver will use to start the system. Divers can confirm pickup, destination arrival cash payment, and get the best route suggestion by the system. Now about renting a car renters will login then his home screen will have previous rent checking, user review, his profile and available renting option button. He can only update his contact info with OTP verification. If he wants to rent a car, he needs to select any available renting option from inside Dhaka, outside Dhaka, Day long (14 hour maximum), long time period or long tour package, self-driving option, emergency Ambulance. Then he will select car. If he chose any option except self-drive, he needs to share pickup location and his destination then system will calculate the estimated fare based on the service type, car, traffic condition, demand of car. Then he has to select payment method and confirm. After confirming driver will do his part as mentioned earlier. Then after finishing ride renters just need to make payment digitally or manually. After payment confirmation his ride will be finished and he will be asked for review the system and the driver. He can submit or can ignore too. If he submits then it will be updated in the system database and will be visible to all users. If anyone chose self-drive there is one extra step which is to submit his driving license, NID, Bank statement and sign a digital agreement paper. Then if he got approved by the admin, he needs to schedule his rent and make the payment advance. The other process will be same like other renting option.

System Request for **Car Rental Service**

Project Sponsor: Avik Anwar.

Business Need: The main Target of this project is to reach out to people who need a car at any purpose just in one app. Also, the people who want to use their car as an earning source with live tracking and helpline service for 24 hours in the lowest commission rate.

Business Requirement:

1. Different interface for car renters and providers.
2. Only admin can approve car registration in the car inventory.
3. Keep renters and provider information for security reason which only can be accessed by the admin.
4. Have AI system for traffic update.
5. Car service for different purpose like inside Dhaka, outside Dhaka, Day long (14 hour maximum), long time period or long tour package, self-driving option, emergency Ambulance.
6. Allow mobile banking, card and cash payment.
7. 24-hour tracking and monitoring system with emergency helpline.
8. Have option of choosing between available car before hiring.
9. Have agreement policy in case of hiring car without drivers or self-driving (Renters driving license, Bank statement, NID and digital agreement will be reviewed by admin before approval)
10. Customers can give their feedback or review and every registered user can view it after the admin approval.

Business Values:

   Tangible:

   - We will take 15% commission from car provider for each hirings.

   - Possible to earn minimum 300-700 taka from each car's commission.

   - 2000-5000 is the possible earning on average from each Self-Drive Service per 24 hours.

   Intangible:

   - Renters will be charged additionally if they cause any major harm to the car.

   - Will provide voucher for new and regular renters to attract them in our service.

   - Will save people time and money by smart traffic system.
   - Company has high chance to earn more on a special occasion like festival, national days and tour season.

Special Issue: An additional fund will be raised for any un expected situation. Also, it is expected that our emergency service will run properly. 24-hour monitoring will ensure security for both car and renters. There will be legal agreement and car fitness will be tested, Driver profile will be reviewed so we can keep safety at highest priority.

Requirement analysis of Car Rental Service

1. User Interface for different user groups:

Functional Requirement:

FR1.1: Admin has an interface of reviewing information and approval option with managing car inventory with tracking.

FR1.2: Car provider has an interface with car registration, Payment info, and his car tracking window with helpline, Ai based traffic details.

FR1.3: Renter's interface includes hiring packages, available car status, drivers rating, approximate rent amount. Available offers and vouchers.

Non-Functional Requirement:

NFR1.1: System should automatically detect user's group while signing in.

NFR1.2: System should reload car location in every 10 second.

NRF1.3: Automatically assign an admin for helpline calls.

2. Information management:

Functional Requirement:

FR2.1: Only Admin has access to any information provided by the users.

FR2.2: Users can only edit contact information, payment information, password.

FR2.3: Renters can View driver contact number, user ratings and car location after hiring and vice versa.

Non-Functional Requirement:

NFR2.1: System Should give a unique id to everyone to keep their record.

NFR2.1: Admin can use filter for searching.

NFR2.2: Users should be sorted based on their total hiring amount.

NFR2.3: OTP verification for editing contact and payment info, new signup, Password update.

NFR2.4: System Should record Admin id who approved car in the service.

3. Car inventory management:

Functional Requirement:

FR3.1: Only admin can approve car registration in the inventory after reviewing all the paper and fitness condition of the car.

FR3.2: Provider can choose the rent type like which purpose of hiring he wats to serve (inside Dhaka, outside Dhaka, Long time period or all).

Non-Functional Requirement:

NFR3.1: Admins can monitor and track car movement during service.

NFR3.2: Admin can Block any car from the service.

NFR3.3: System should categorize car in 4 category based on the information of car engine cc, seat capacity, car's old, driver's rating.

4. Hiring and Payment process management:

Functional Requirement:

FR4.1: System should only show cars available in 2 K.M distance from the user.

FR4.2: User can choose between different service type like inside Dhaka, outside Dhaka, Day long, long tour packages, self-driving, Ambulance.

FR4.3: Total fair should be determined and calculated by the system based on car category, service type, time, distance, demand of cars.

FR4.4: System will allow digital payment and verify cash payment from the driver.

FR4.5: System should allow user to rate driver after the ride and provide feedback or can share experience to the system which will be visible to all user after admin approval.

Non-Functional Requirement:

NFR4.1: Should temporarily block a car if his rating becomes <=3.5 after each 10 rides and assign to an admin. Admin can allow them again once after an agreement.

NFR4.2: System should send voucher notification to user if he/she got any.

NFR4.3: System will ask for additional papers or info for self-driving and emergency hirings (Admin Will Response within 2 min for emergency).

Non-Functional:

1. Operational:

1.1. The application will be available in both app and web version.

1.2. Will notify users about any update.

1.3. Automatically reload the map in every 10 second.

1.4. Suggest best possible rout using ai based traffic system.

2. Performance:

2.1. System Will be able to handle a mass number of users at a time.

2.2. Available for 24-hour service.

2.3. Suggest car according to user preference to save times within 2 to 3 sec.

2.4. Searching filters for admin and user.

2.5. Assign admin for helpline within 5 second.

3. Security: User information will be accessed by the admin only. Credit or debit card information will cannot be accessed by admin directly. Car location will be monitored by admin. Immediate action for any emergency issues like accident. All drivers have signed agreement to follow every traffic rule.

4. Cultural & Political:

1. System will allow both Bangla and English as default language.

2. System will allow payment only in Taka.

3. System will provide voucher on Eid, Puja, victory day etc.

4. Will maintain all the rules of online business and the rules of BRTA.

Use Case Diagram Description: This Use case diagram of a car rental service Have 3 primary actors which are renter, provider and driver, there are two type of renters and they are new and old. For each new signup a renter will get 300 TK voucher for his first Ride. All the renters can choose Between multiple cars renting options. Only for self-driving they need admin approval after submitting necessary documents. Car provider will submit all the required documents and after admins ensure that the documents fulfill all the requirements, He will add it to the inventory. Drivers will only have renters contact no, report issue and traffic update option. Admins Have two different sectors Where information desk will have Control over all the information and only, they can approve all the requests. Help desk Admins Will check the issues only and response accordingly.

Drive Link:
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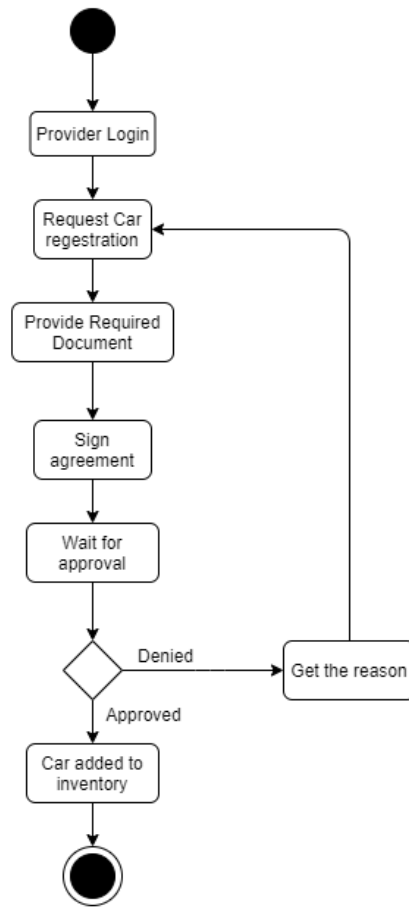
Use case Diagram of a Car Rental Service

Activity Diagram Description: For The normal activity diagram we have shown the activity from the car providers perspective how he will request car registration by simply submitting the paper. If admin approve his car will be added to the inventory and if admin deny then he will be notified about the reason and after solving his issue he can apply again.

Swimlane Activity Diagram Description: In the swim lane activity diagram we have shown the activity of renting a car and how the activity moves between driver, renters and admin. Like all the other diagram after renter login he can chose between the renting option. If he chose self-drive there is a review activity for admin. On the other cases after renter confirms the rent driver will confirm pickup, drop and cash payment.
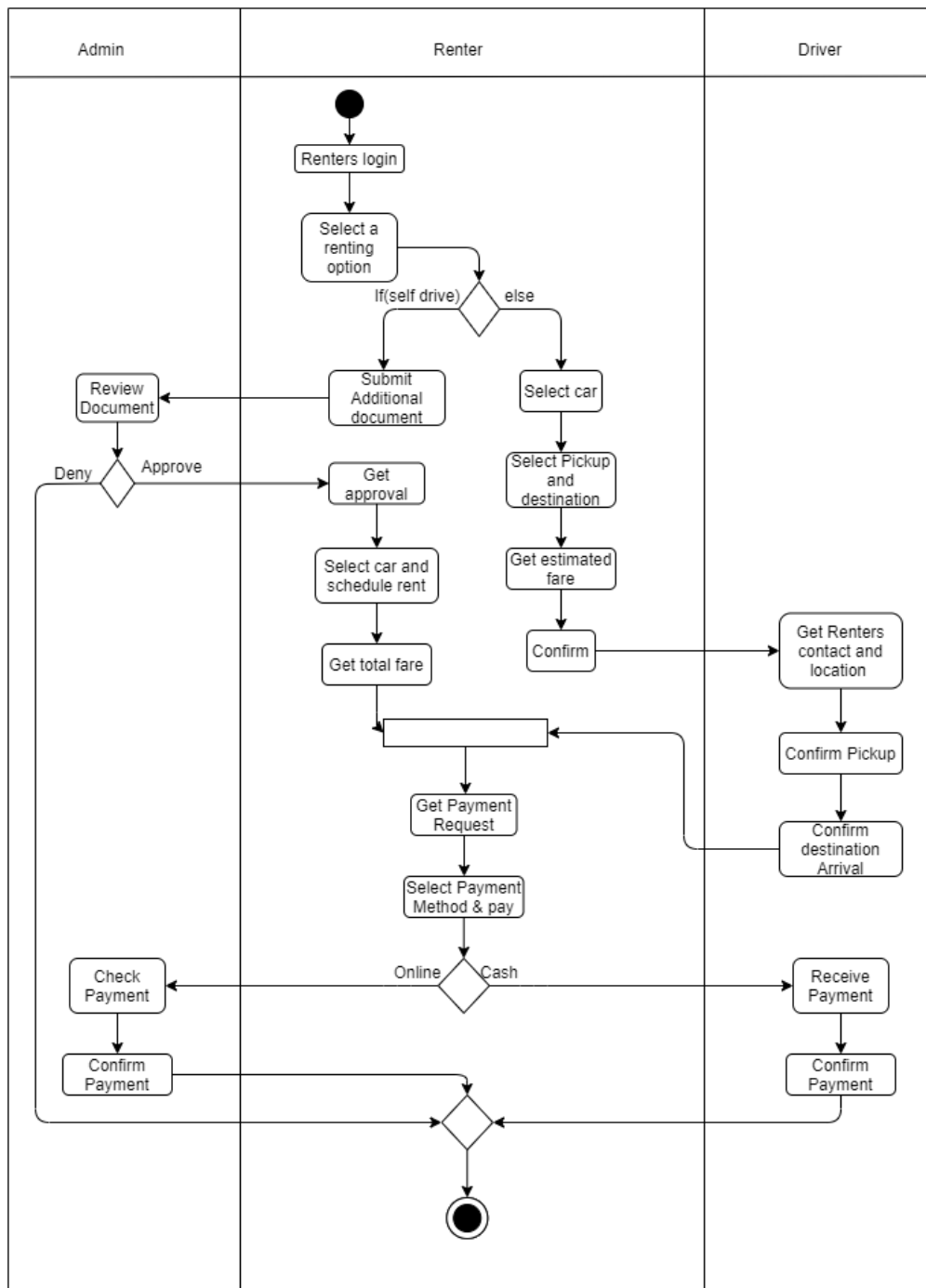
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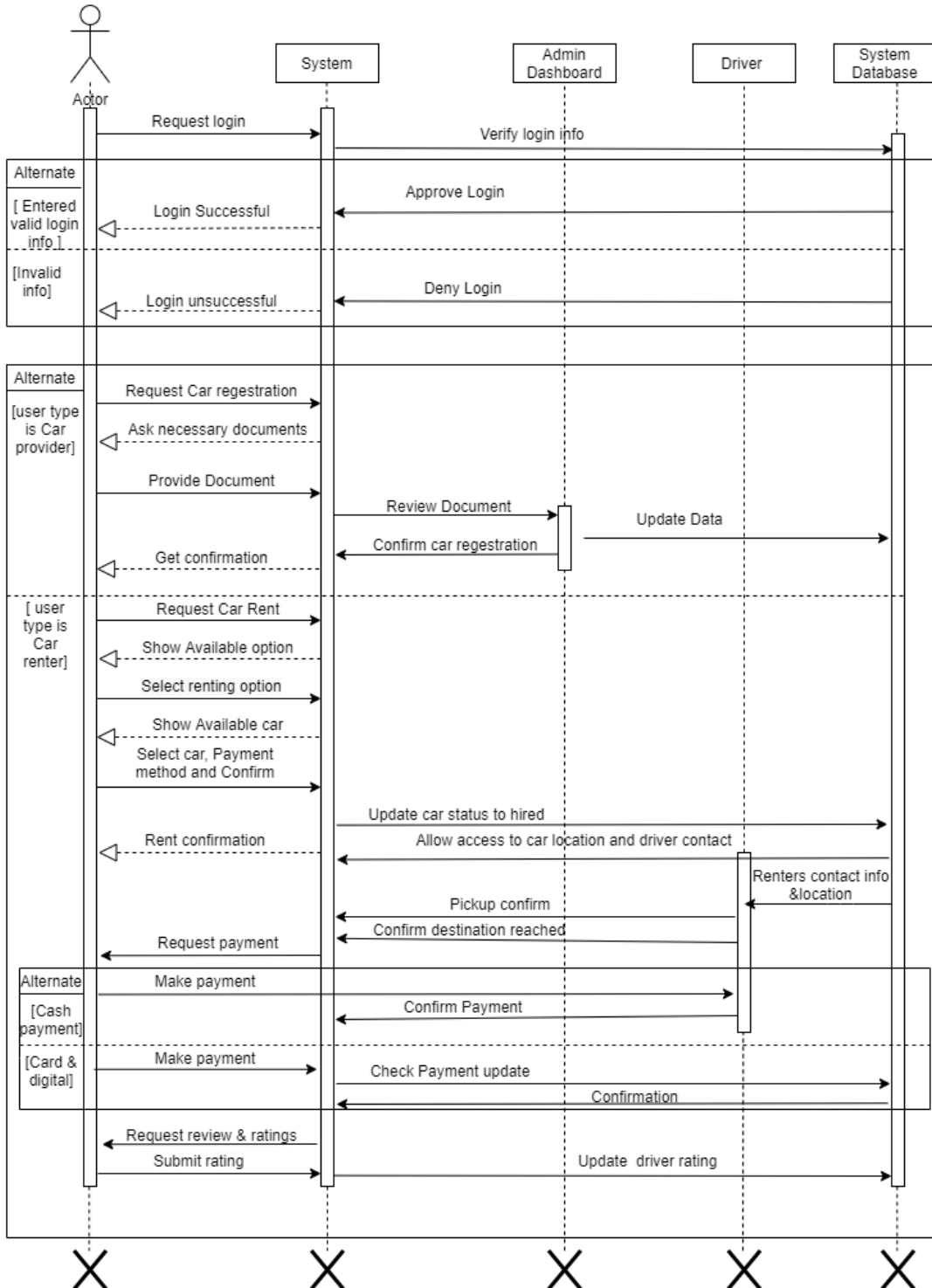**https://drive.google.com/drive/folders/1a49CZbhlgZmIeBysNbDj3KOFe0kOju0w?usp=sharing**

<u>Sequence Diagram description:</u> This sequence diagram shows the login, Renting process of cars from the system. Along with the renting it also shows the car providing process to the system. In the beginning it shows the login process that verify the username and password. After login System automatically recognize the user type. If the user type is provider, then he can request car registration in the system then system will ask for necessary documents and after admin update the information in the database approve registration the provider will be notified about successful registration. Then for renters they can pick a renting option and choose available cars and get the rides accordingly. Then There is payment option Which allow both digital and cash. If cash driver has to confirm payment. And then people can add review as well.

Drive Link:

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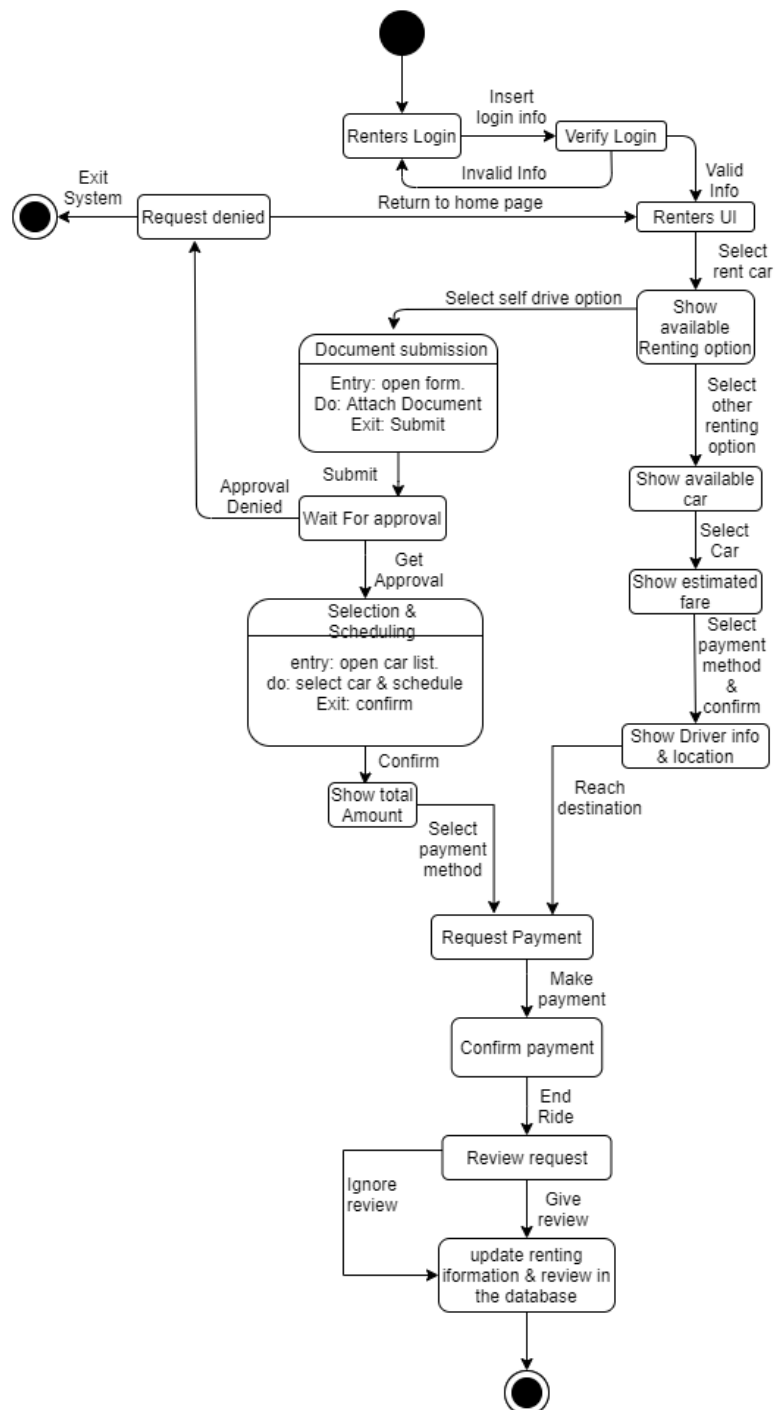
Sequence Diagram of Car Rental Service

State machine diagram description: This Diagram only shows all the changes of states from login to payment of a complete ride from a renter's perspective. First of all, it verifies login and then it shows the available renting option. If renters select self-drive option, then system ask for sum additional documents and when an admin approve, he can select car and schedule rent and get the total amount that he has to pay advance. On the other hand, if renters choose any other renting option, then after selecting car and destination he will get to know about the estimated fare and after the ride is finished, he will be requested to make payment. At the end of the ride system will ask for a review which he/she can ignore too.

Drive Link:

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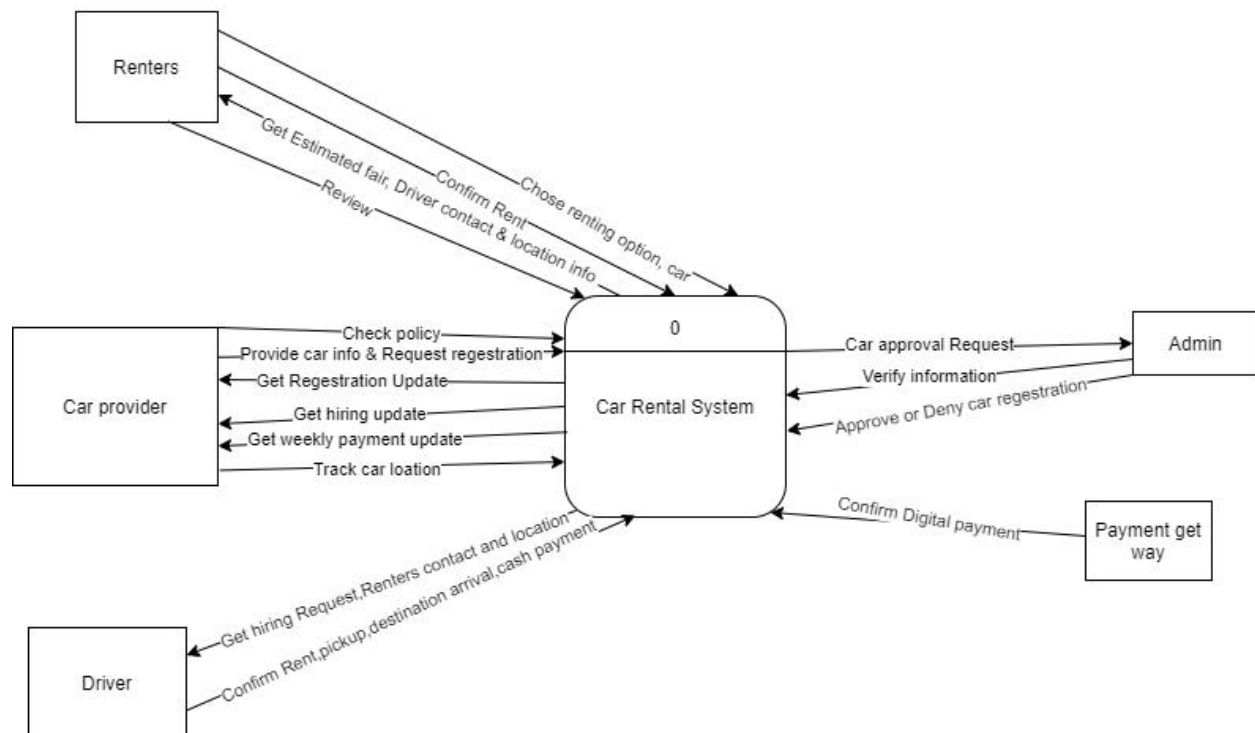
State Machine diagram

Level 0 Diagram description: In this level 0 diagram we have 5 actors for our car rental system.

Here renters are the one who can chose renting option, car and then system will show him the estimated car fare. Also, renter can add review of their experience to the system. Providers can check policies and provide their car information for verification and review after admin verify all the document his car will be added to the inventory. Also, provider will get car hiring update, weekly payment update and can track car. Drivers will get hiring calls and then he can confirm pickup, reach destination, and cash payment. Admin can review papers of car and add them to the inventory.

Drive Link:

https://drive.google.com/drive/folders/1a49CZbhlgZmIeBysNbDj3KOFe0kOju0 w?usp=sharing

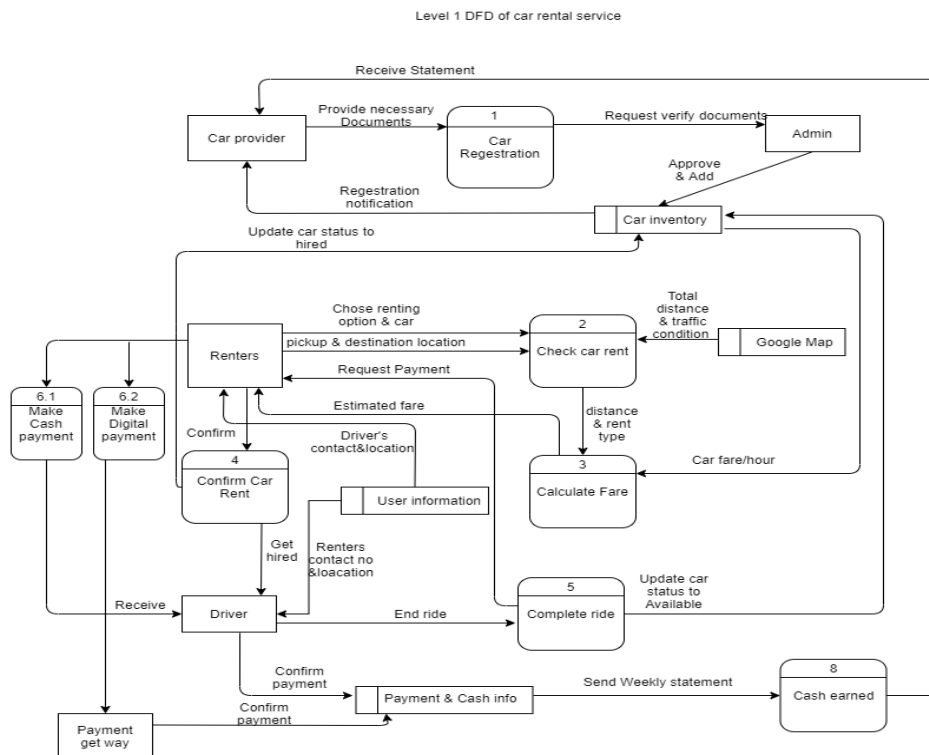Level 0 DFD of car rental service

Level 1 Diagram description: This diagram shows some details breakdown of the process. When the car provider provides necessary documents to register his car then system assign an admin to review & verify all the information. Then admin add cars to the inventory. After the car is registered the provider will be notified. The renters can pick any renting option, car and destination. After that system will calculate the estimated fare based on distance, traffic condition, car fair/hour and rent type. Then renters can confirm their ride and whenever renters confirm the driver will be notified and both driver and the renter will get location and contact info of each other from the user info database. Also, the car status will remain hired and unavailable for other users in the inventory. Once the ride is finished that car will be available again for hiring. For payment driver will confirm cash payment to the system. For card or online payment bank is the get way which will confirm payment. System will keep track of collected money for each car then it will send a weekly statement to the car owner.

Drive Link:

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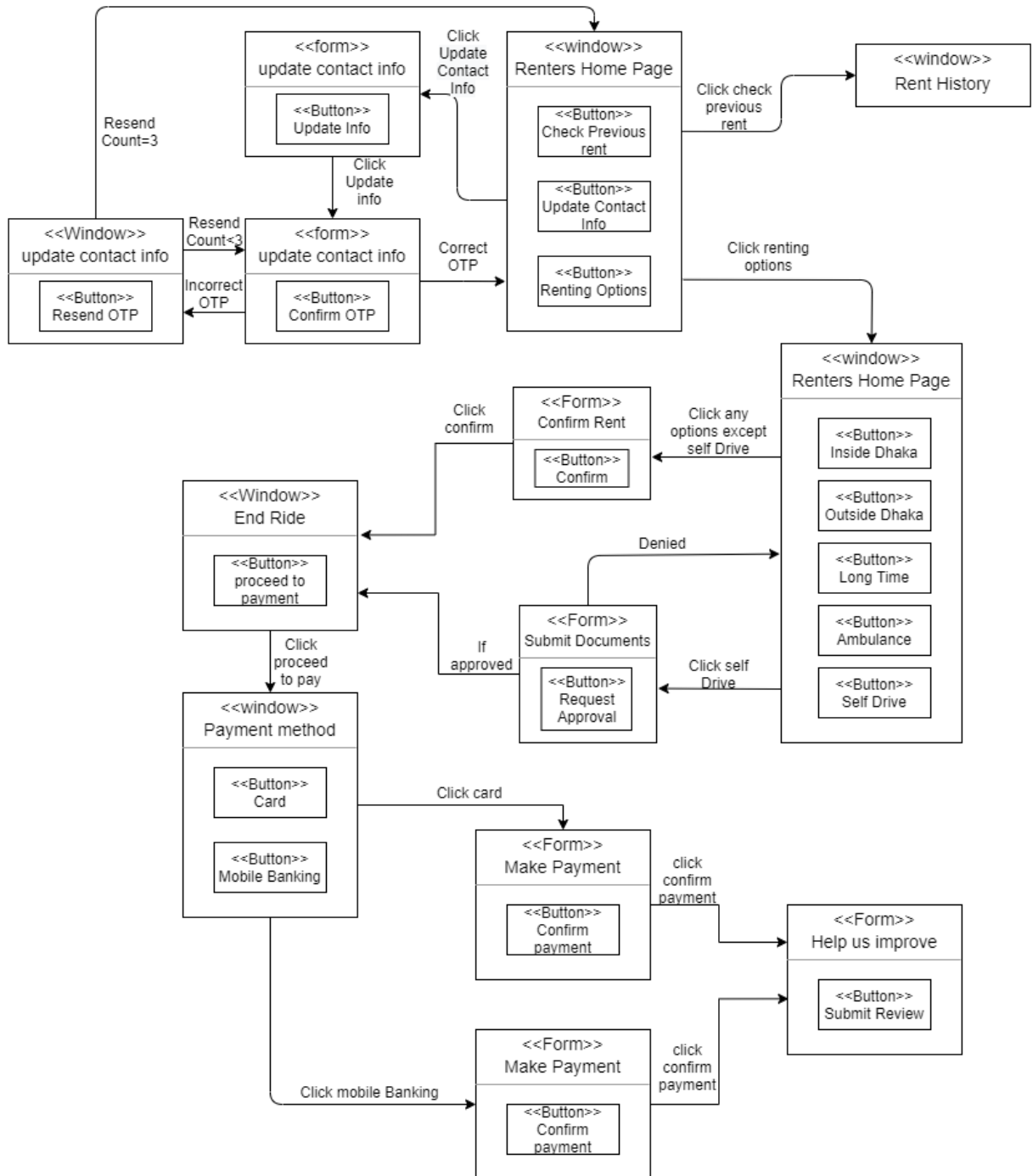

Level 1 DFD of car rental service

Window navigation Diagram: In this diagram we have shown the renters window from his home page, How the window changes when he tries to rent car. After rent confirmation there is directly payment window as in the middle the renters don't need to do anything because those part will be done in the drivers UI. Then if renters want to update his contact info, he need to verify using OTP that is also shown in the diagram. Submitting wrong OTP more than twice will take renter to the home page again and he need to go through the process again.

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Assignment for CSE471

Window Navigation Diagram

Conclusion: This system will be a great opportunity in car rental service of Bangladesh. It will create a new experience to the users with multiple cars renting options where a user can fulfill his dream by renting the car he wants to ride. It will create a profitable source for the people who wants to use the car for earning. Despite of having some drawbacks, competition our system will add a new dimension to the car ren industry with so many unique features.