



Independent University, Bangladesh

Department of Computer Science & Engineering

CSE 307: System Analysis and Design

Summer 2022

Term Project



HornPolice

A system that ensures a peaceful environment

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Section 1:

1. Introduction

HornPolice is a system that would help in reducing sound pollution and bring out a favorable environment. The main objective of the system is to charge drivers if they surpass a specific number of horns so that they do not use horns unnecessarily. The system is installed in the cars and every car must be registered into the system so that the purpose can be carried out efficiently. The documents of car registration and the license of drivers, car owners are verified and they would have an option to see if their documents have been approved or not. Moreover, the ownership of an existing car can be changed if someone sells their car. In that case, the documents need to be verified again which can be viewed by the car owner. The system requires the bank account number of the car owners so that they can be charged and they would be given a due date by which they need to pay. If payment is not made by the due date, the system notifies the user that their car would be taken away in 4 days.

2. History leading to project request

The most populous country in the world, according to some estimates, is Bangladesh. It began with noise pollution and has grown into a major issue. People find the constant loudness of the cars to be annoying.

In some places, there are numerous sign poles warning against using horns. But maintaining every sector in a city is not that simple. With that in mind, this method may serve as a means of ensuring environmental harmony for all. Nowadays, drivers are not as cautious while driving and frequently honk their horns at other vehicles or pedestrians. As a result, there are more accidents. So, if we limit the availability of giving horns, they can only be used when essential.

3. Problems, Opportunities

Problems and Solutions:

Problems	Solution
Excessive sound pollution causes environmental and health distortion.	Before the automobile starts, the program should begin counting the number of horns it will blow, and it should continue doing so until it hits the limit, which should not be fewer than 10. This is just so it can be considered an obligatory requirement.

Patients suffer from the negative effects of all these sound pollution. Although it is forbidden to blow horns on any roadways close to hospitals, people nonetheless do it because they are not paying attention.	Unique limitations on the amount deducted increased when around hospitals such that persons are being sufficiently mindful of the environment and their lives, too.
Sound pollution near schools	The amount deducted will increase when vehicles are near schools so that excessive sound pollution is avoided.
The dependent variable distance will be taken into account.	It will determine the cost for extending the limit based on the kilometers traveled.

Opportunities:

- The system will reduce the charge if the car departs from a place and travels no more than 500 meters.
- If someone goes over the limit after the trip is over, their bank account will be charged.
- The amount that will be taken away from them needs to be increased significantly to encourage people to live responsibly and protect the environment.
- Government can use the data to research how much the reduction of sound pollution is before and after implementing the system.

4. Project Goals and Objectives

This system has a very clear objective. This system is an attempt to educate those responsible for environmental pollution about the growing problem of sound pollution. The system ensures a successful method of reducing the number of drivers that beep their horns practically constantly without cause. It will be built and changed in such a way that if the drivers start the car and blow the horn more than the permitted number of times, it will begin gradually charging them and bill them after they stop the car. This structure will be altered to accommodate all modes of transportation and systems, ensuring that they remain fixed to never honk their horns.

Section 2:

5. Product Description

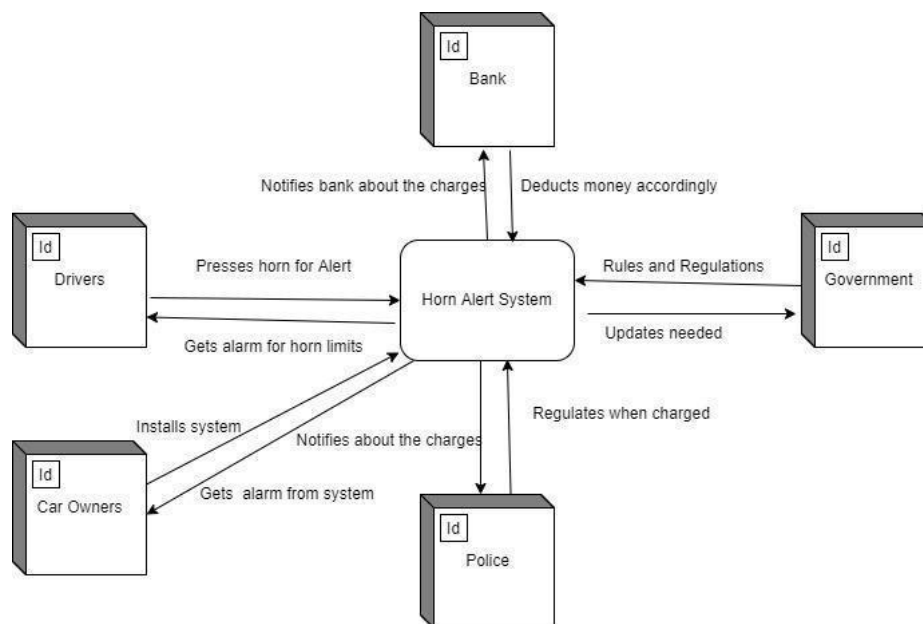
a. Product Summary

A better standard of living will need the adoption of this worldwide system. The systems' major goal is to ensure that everyone will keep the peace in the nation. If more people use it, there will be significantly reduced noise pollution in the streets that are lined with homes, hospitals, and educational institutions. Moreover, the system would help in future research about sound pollution in Bangladesh.

b. Product Stakeholders:

- Drivers
- Car owners
- Government
- Bank

6. System Context diagram



7. Hardware detail (Include Rich Picture)

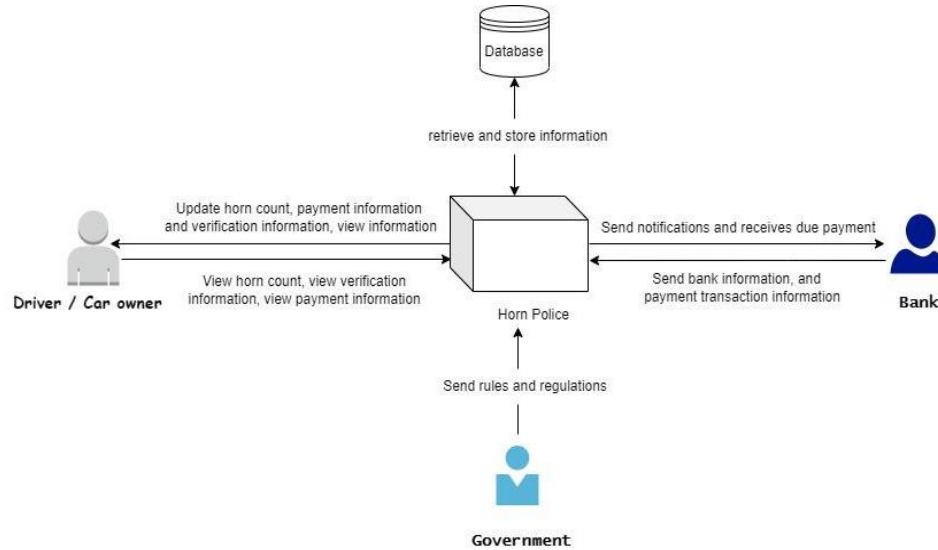
Frontend:

- Smartphone, laptop, PC or tablet.
- Internet connection capable of smooth browsing experience.
- A Web Browser or an app (Android/iOS)

Backend:

- Servers capable of handling at least 1000 users concurrently hosted by a cloud service provider.
- At least 200MB of storage allocated per user.
- A relational database e.g MySQL, sqlite, etc.
- A language that is capable of handling thousands of requests every second (e.g. C++, Python, Java, etc).

Rich Picture:



8. Key Technical Features of Software

- JavaScript is the main frontend language since it is compatible with Android and iOS.
- Backend uses Django for ease of maintainability.
- User authentication code system to ensure sensitive data is not revealed.
- OTP 2FA used for signup/login.

Section 3:

9. Information Gathering methods (At least three methods)

- Questionnaires

- Interview
- JAD (Joint Application Development)

Analyzing the project objectives and goals it has come to a compelling state to follow the steps of the project view. As our project is an installing system, the illustrative sample of the user is quite closed. Therefore to gather all the necessary information for this project, following methods have been used.

Questionnaires:

Before initiating the project based works, questionnaires are the way of gathering preparatory information about the needs and requirements. As the project consists of a very small number of users so the process is going to be physical rather than emailing a soft copy or documental form.

<i>Are you an owner of a vehicle?</i>
• YES
• No
<i>If yes, what kind of vehicle do you own?</i>
• Car
• Bus
• Pick-up Van
• Motor Bike
• Truck
• Auto Rickshaw
<i>How much money do you spend on your vehicle per month?</i>
• Tk 6000- 4000
• Tk 3000- 2000
• Tk 1500-1000
• Tk 1000-800
• Tk 800-500
<i>Do you agree that 90% of the sound pollution is caused by motor vehicles on the road?</i>
• Agree
• Strongly Agree
• Disagree
<i>To what extent do you think the new noise reduction system is helpful for the environment? On a scale of 1-10.</i>

<i>How well will you maintain the rules of the system?</i>
● Considerably
● Slightly
<i>If not, do you drive for any service transportation platform? (Like: Uber, Pathao, Obhai etc)</i>
● Uber
● Pathao
● Obhai
● Shohoz

Interview:

Various viewpoints were recorded with different perspectives while our interview was conducted in an open setting. The questions we pose are entirely impartial, even though our system will deal with the public, citizens, and transportations. Starting with members of the working class and moving on to those who live along the street, we will be interviewing city residents- the people who live in the homes near the streets and major thoroughfares. The concerns and viewpoints expressed by hospital staff on behalf of their patients will also be noted. Interviews will be conducted with both the automobile owners and the drivers.

[Interview Questions with Public:](#)

1) How is the noise pollution in the cities of Bangladesh? Especially Dhaka city.
2) How long have you been living in the cities?
3) How much do you think sound pollution is affecting health?
4) Do you believe that there should be limits in the horns of the vehicles?
5) What do you think about the new system?
6) Do you agree that people will maintain the rules?
7) Do you think that this system will reduce noise pollution?

[Interview Questions with Vehicle owners?](#)

1) Do you believe that vehicle noise is one of the main causes for sound pollution?
2) How long have you been a car owner?
3) What do you think will help reduce the contamination?
4) What do you think about the new system?
5) Will you maintain all the rules of the system?

Interview Questions with drivers?

1) How long have you been a vehicle driver?
2) Do you think one of the major reasons behind sound pollution is due to the horn of vehicles?
3) What are the possible ways to reduce this?
4) What do you think about the new system?
5) Will the money reduction bring awareness to a limited number of horns?

JAD:

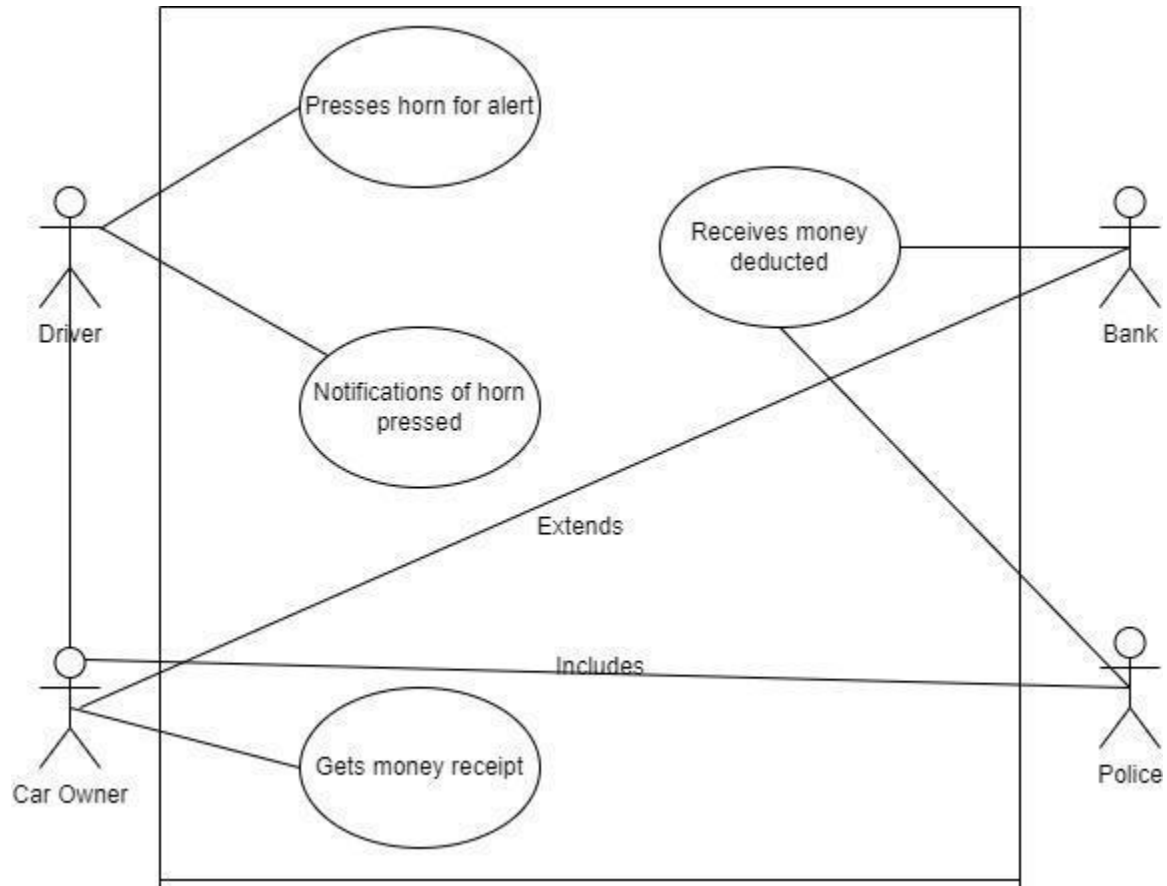
Using the JAD technique, the analyst can perform requirement analysis and jointly design the user interface with a group of users. We have reached a stage where the requirements are satisfied for the use of JAD support after multiple iterations. All the features and requirements have been compiled by the IS analyst, users, and observers.

Due to the high number of users in our project who are of the same type, there will be a management of satisfaction at all working levels. The budget and cost, the system's dependability, the amount of people required working on it, and certain future difficulties were all reviewed in accordance with the requirements. All of the functional and non-functional needs were met while keeping everything in mind and the next course of action was chosen. The required case study and use case diagrams were created for the final prototype.

10. Major functionalities offered by the system

- Charges car owners based on the amount of horn numbers they have exceeded from the honking limit.
- Verifies car documents provided.
- Verifies information about drivers.
- Signup, Login of users.
- Allows transfer of ownership of vehicles.
- Validates transfer of ownership of vehicles.
- Charges more while passing through some specific area.

11. Use case diagram



12. Normal and Alternate Scenarios

User case name: Billing payable amount	Unique ID:
Area: System screen	
Actor(s): System, Driver, Car Owner	

Stakeholder: Bank, Government

Description: The total money deducted after the car exceeds the limit.

Trigger event: An amount of money will be shown on the screen.

Trigger type: Horn count

Steps performed

Information for steps

1. After the vehicle reaches the limit, the counter will start adding money to be deducted.
2. The total money will be summed up and shown on the screen.

1. The driver needs to cross the limit and after that the counter will start counting.
2. The car needs to stop first and then the system will show the total amount.

Preconditions: The system needs to be installed.

Post conditions: The system can make a total amount of money to be deducted.

Assumptions: Payable amount with due date.

Success guarantee: A correct amount of money will be shown.

Minimum guarantee: Counting will be multiplied with the deduction rate.

Requirements met: Total money with rewards.

Outstanding issues: Will the extra charge for the exceptions be shown?

Alternative scenario: User will get notification from the bank.

User case name: Count number of horns	Unique ID:
Area: System screen	
Actor(s): System	
Stakeholder: Bank, Government	
Description: The system will count the number of horns the car has made	
Trigger event: The sound will activate the system counter	
Trigger type: Horn pressed	
Steps performed	Information for steps
<ol style="list-style-type: none"> 1. The driver presses the horn. 2. System is activated with the sound made by car. 3. The counter starts counting. 4. Will alarm after reaching the limit. 	<ol style="list-style-type: none"> 1. Steering wheel 2. System installation 3. System will start counting with each car honk. 4. A limit that will be fixed already, is started to monitor and therefore will give an alarm after reaching the exceeding point.
Preconditions: Vehicle needs to have the system installed.	
Post conditions: Users will be able to see the system working.	

Assumptions: Details about the vehicle and other information will be there.
Success guarantee: System will count and work properly.
Minimum guarantee: Vehicle details and distance recording to be saved.
Requirements met: Users cannot turn it off or modify or change anything.
Outstanding issues: Will the user be able to see the horn counts?
Alternative scenario: User can install the system again and get to see the record.

13. Functional Requirements:

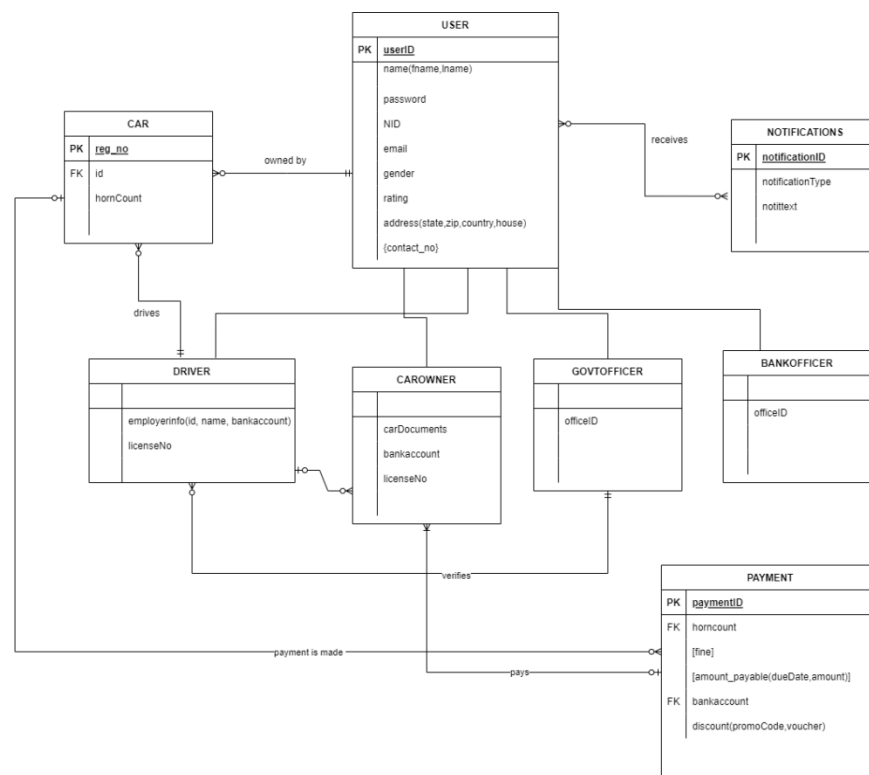
1. The limited users answer the questions in the interview and complete the questionnaire.
2. Install system in the vehicle.
3. All the necessary information of the user: NID (National Identity Number), Driving license number, and other personal information.
4. Information of the vehicle in which the system will be installed.
5. If the payment is to be done via bank: Bank details and other information.
6. If the payment is to be done via Bkash: Bkash number should be provided.
7. If none of the payment options are available, the money will be collected by the nearest police box.
8. The money notification list will be given to the police.

Non Functional Requirements:

1. Security of the system is very important which is available as the owner of the car will be in charge of all the monitoring.
2. Reliability is also one of the attributes and can be guaranteed to be activated anywhere, any time.
3. System performance is very important and thus can be acquired from the counting and calculation.
4. Maintenance of this system is quite insignificant as it is automated so no further frets.

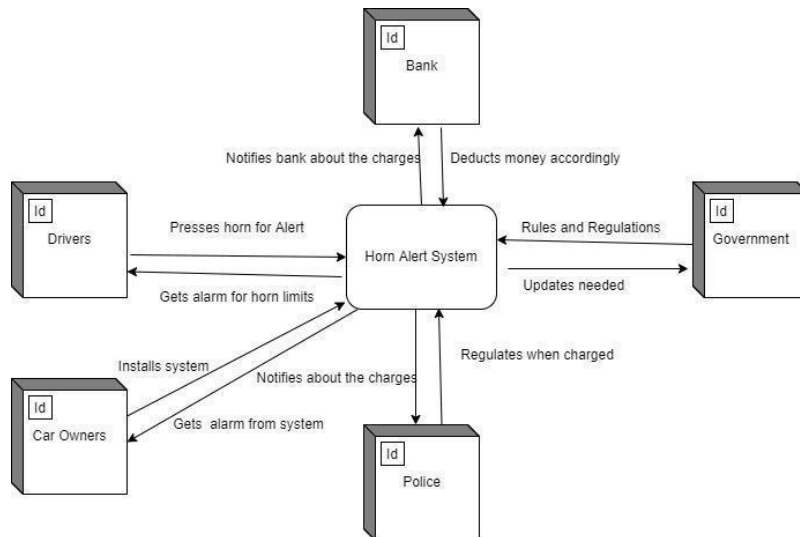
Section 4:

14. Entity Relationship Diagram

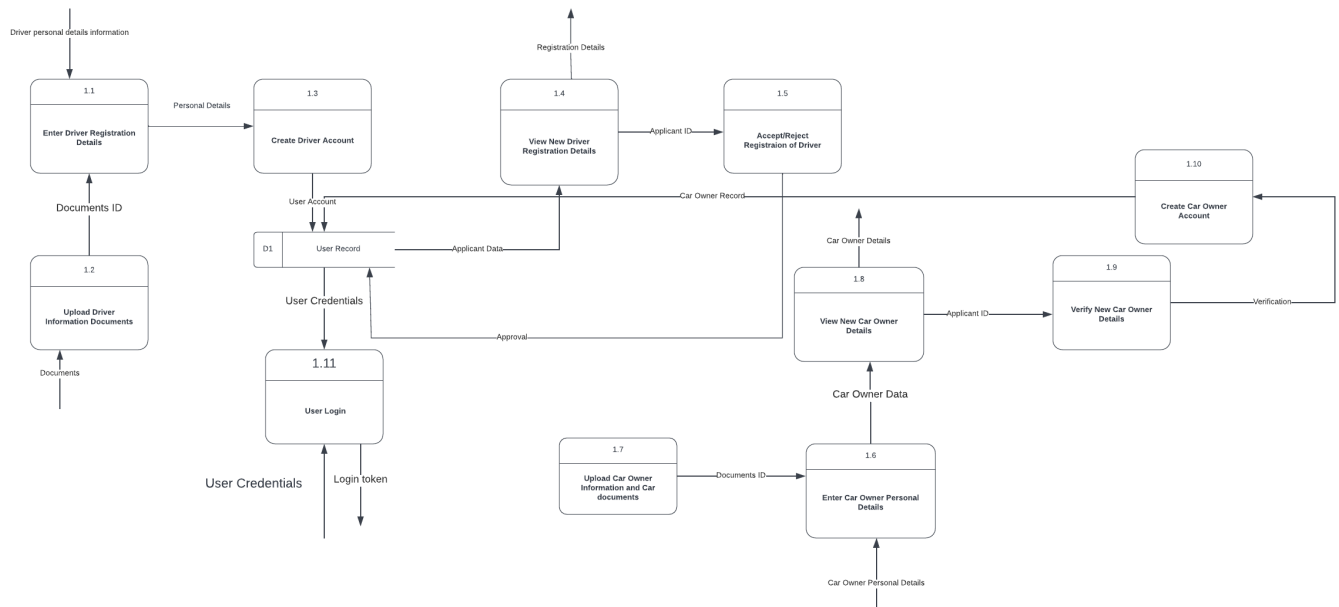


15. Logical Data Flow Diagram

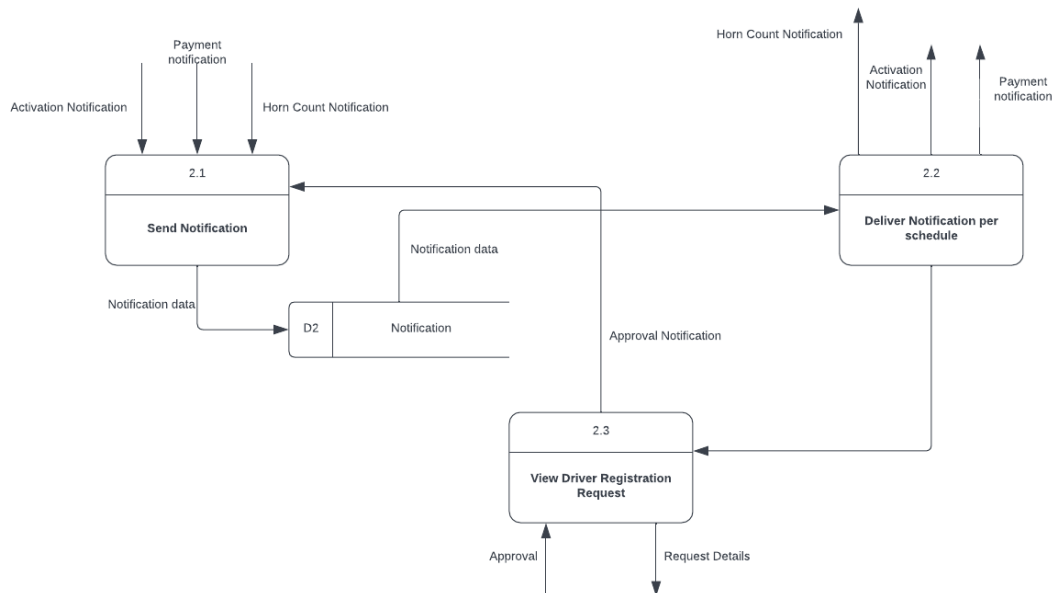
Diagram 0:



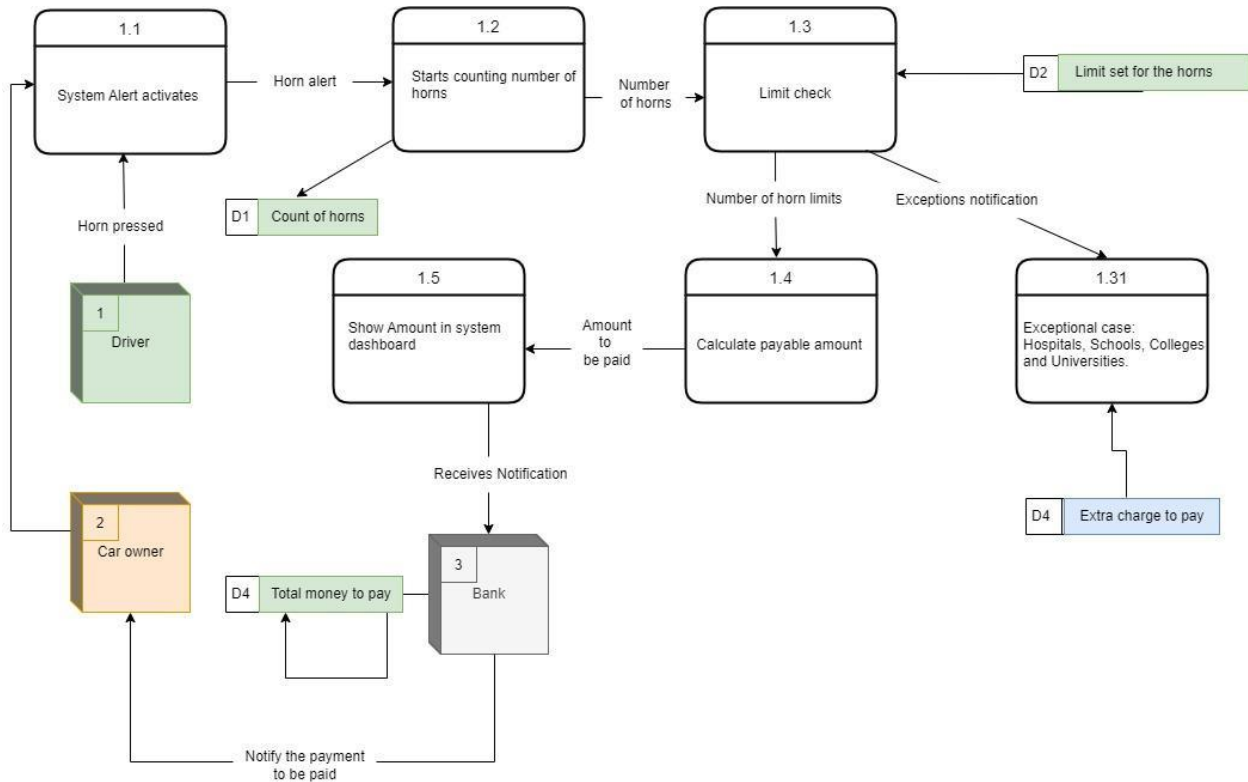
User Registration:



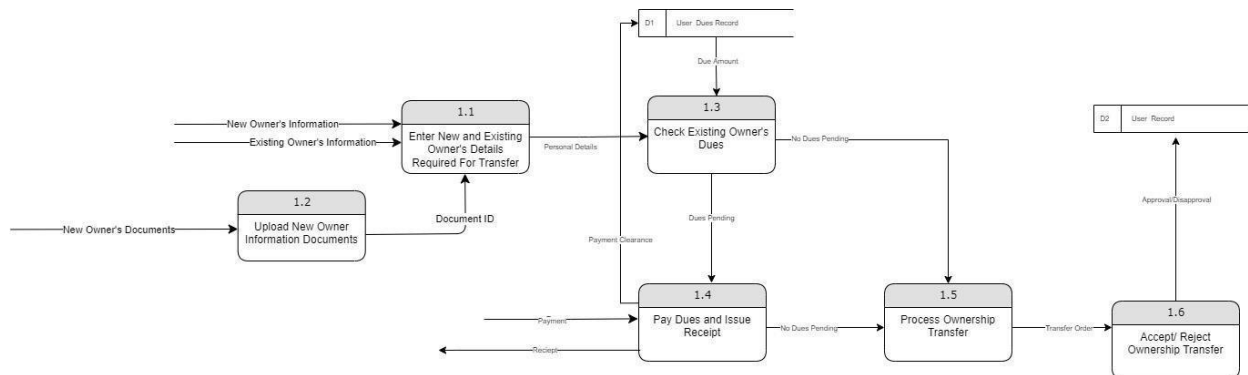
Notification:



Payment:

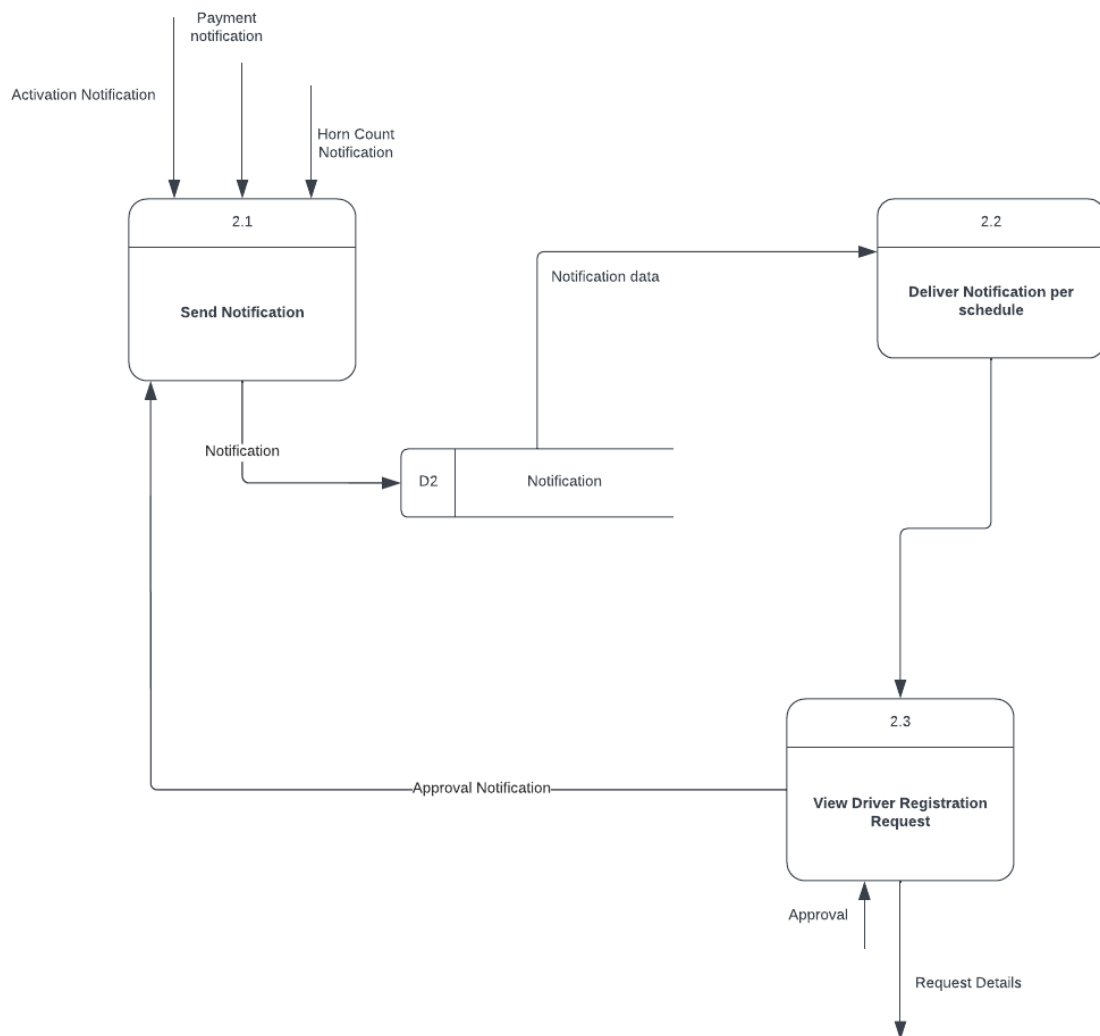


Transfer of Ownership:

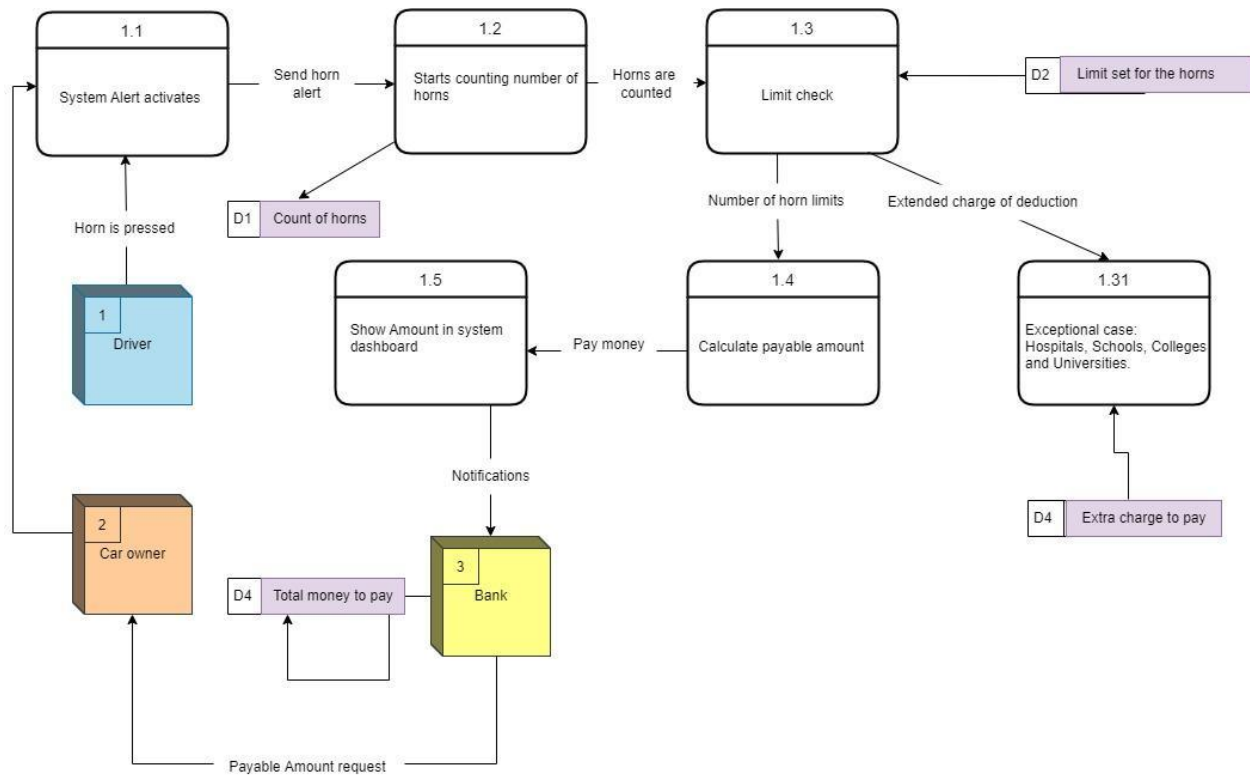


16. Physical Data Flow Diagram

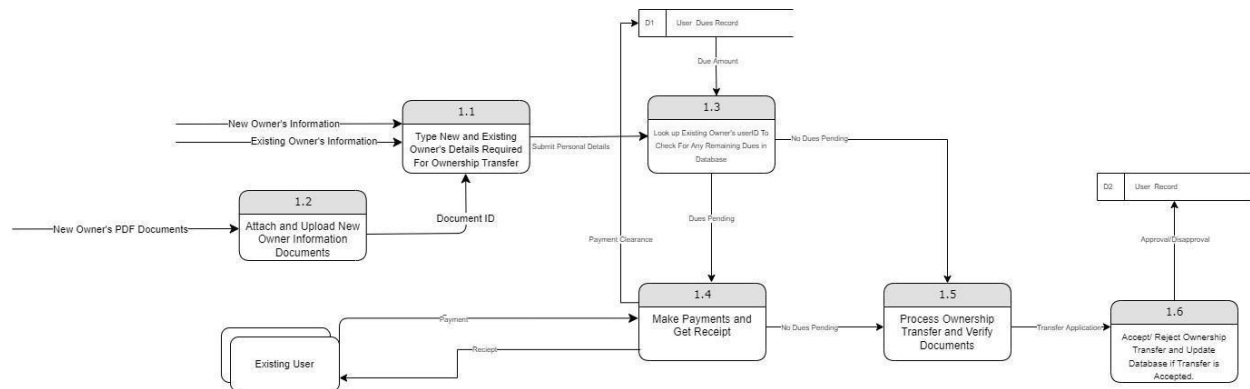
User Registration:



Payment

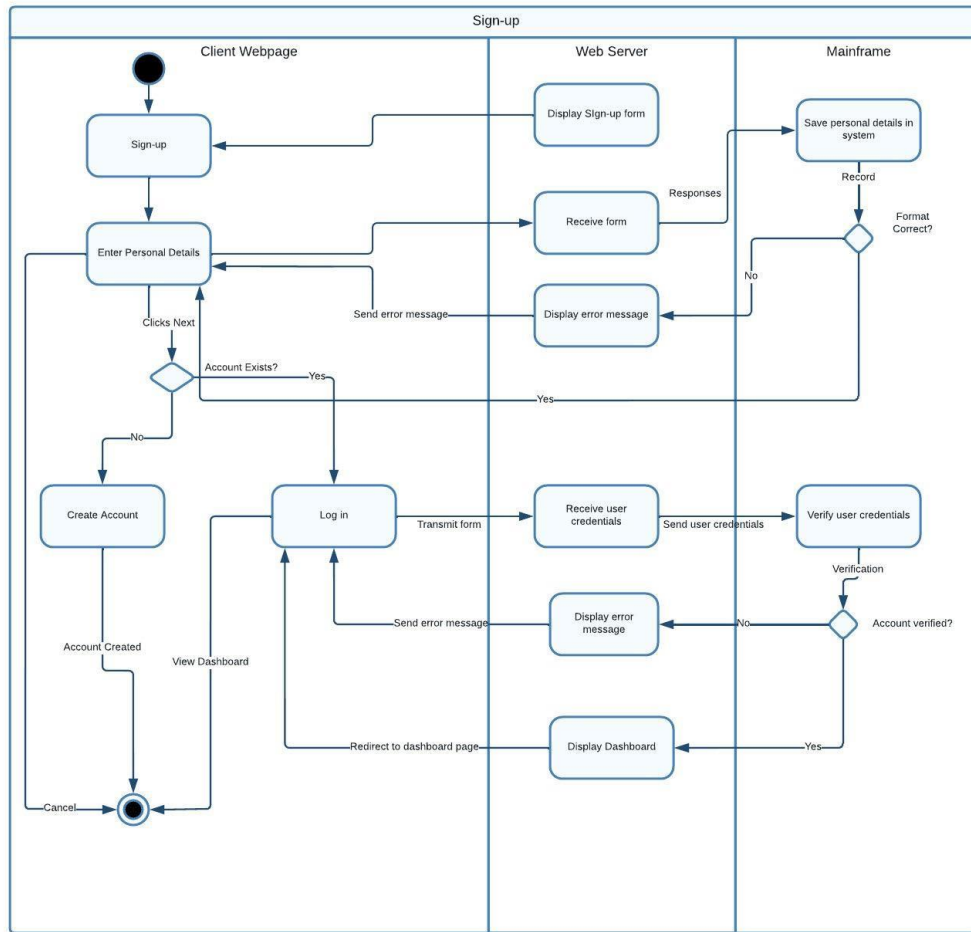


Transfer of Ownership

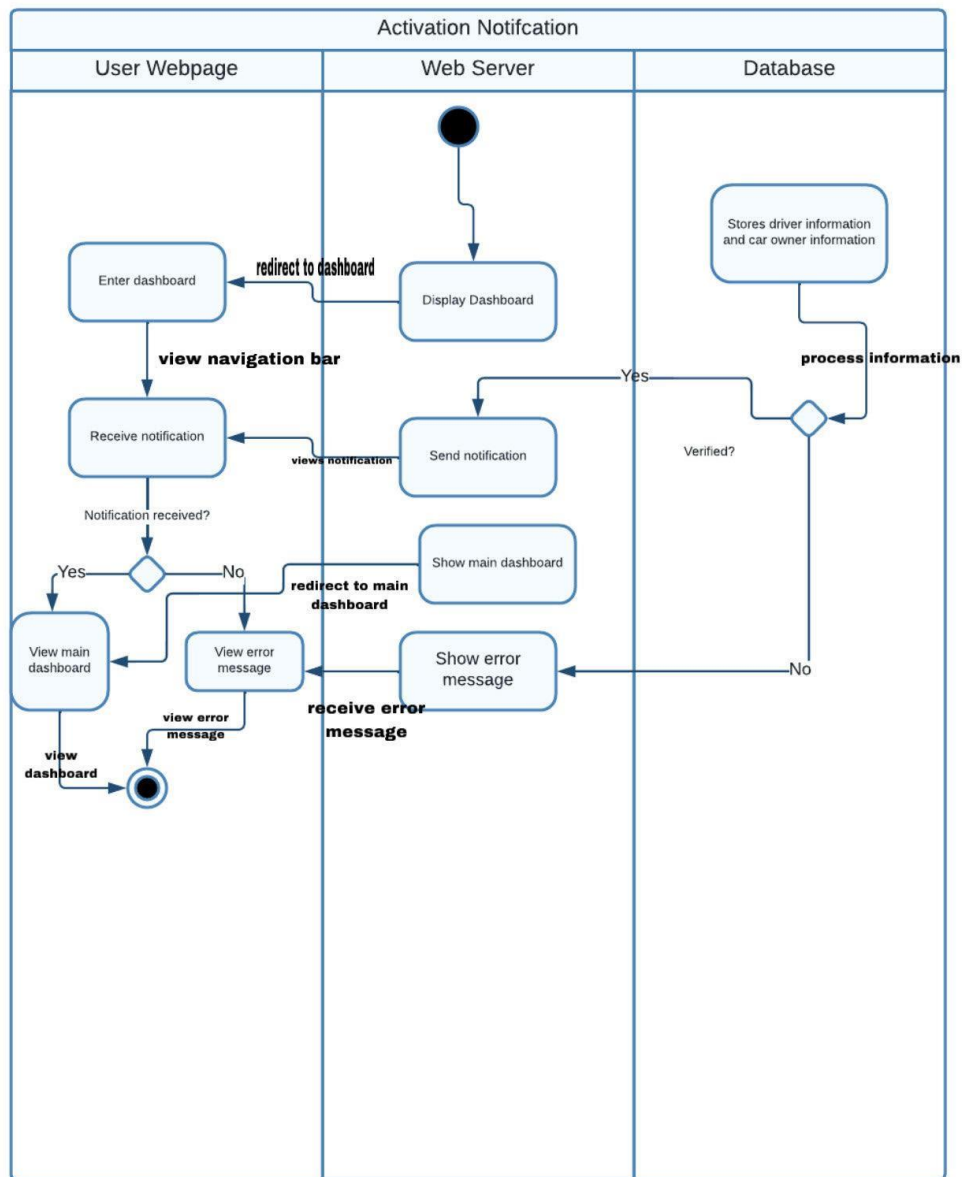


17. Activity Diagrams

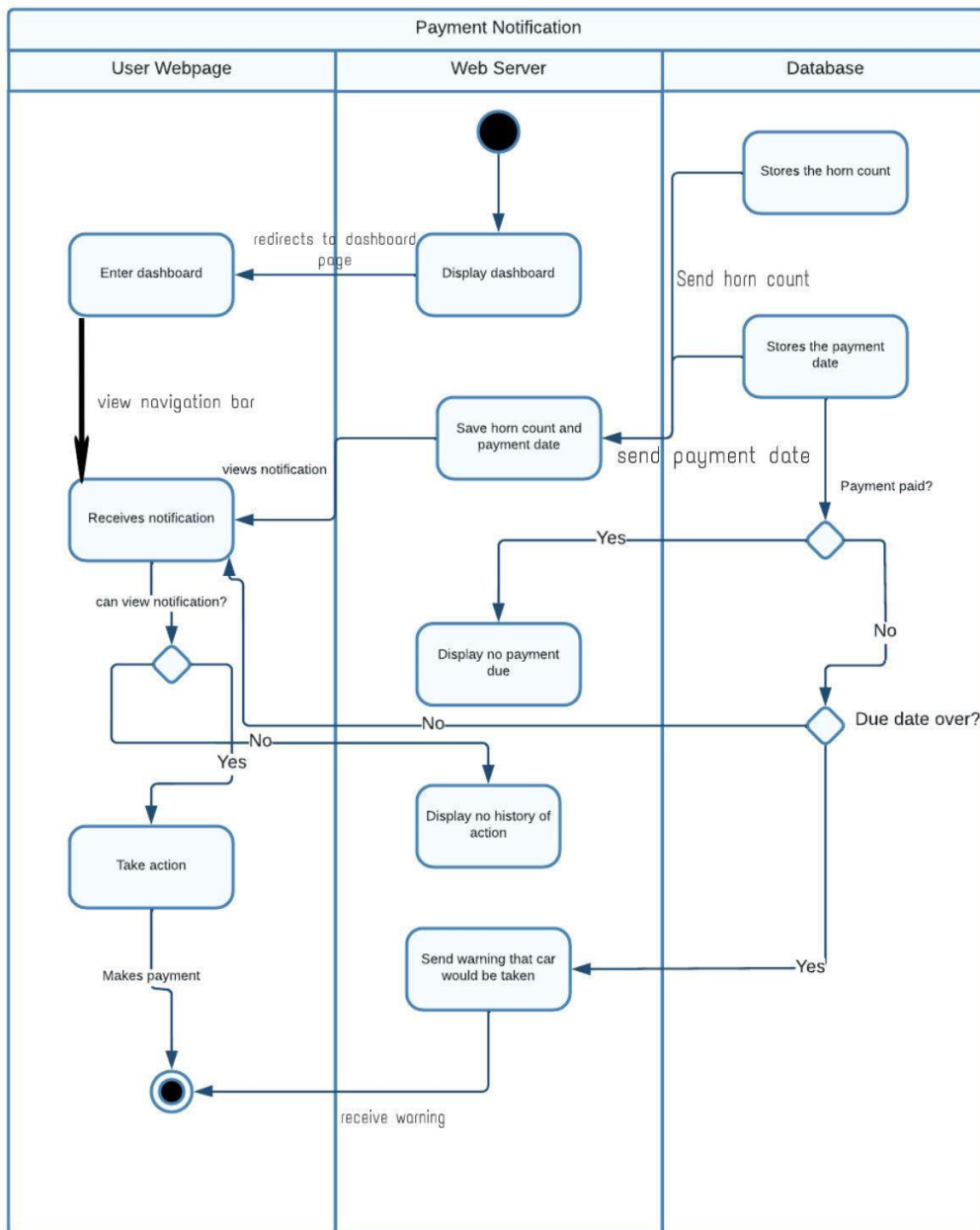
Activity: User Registration



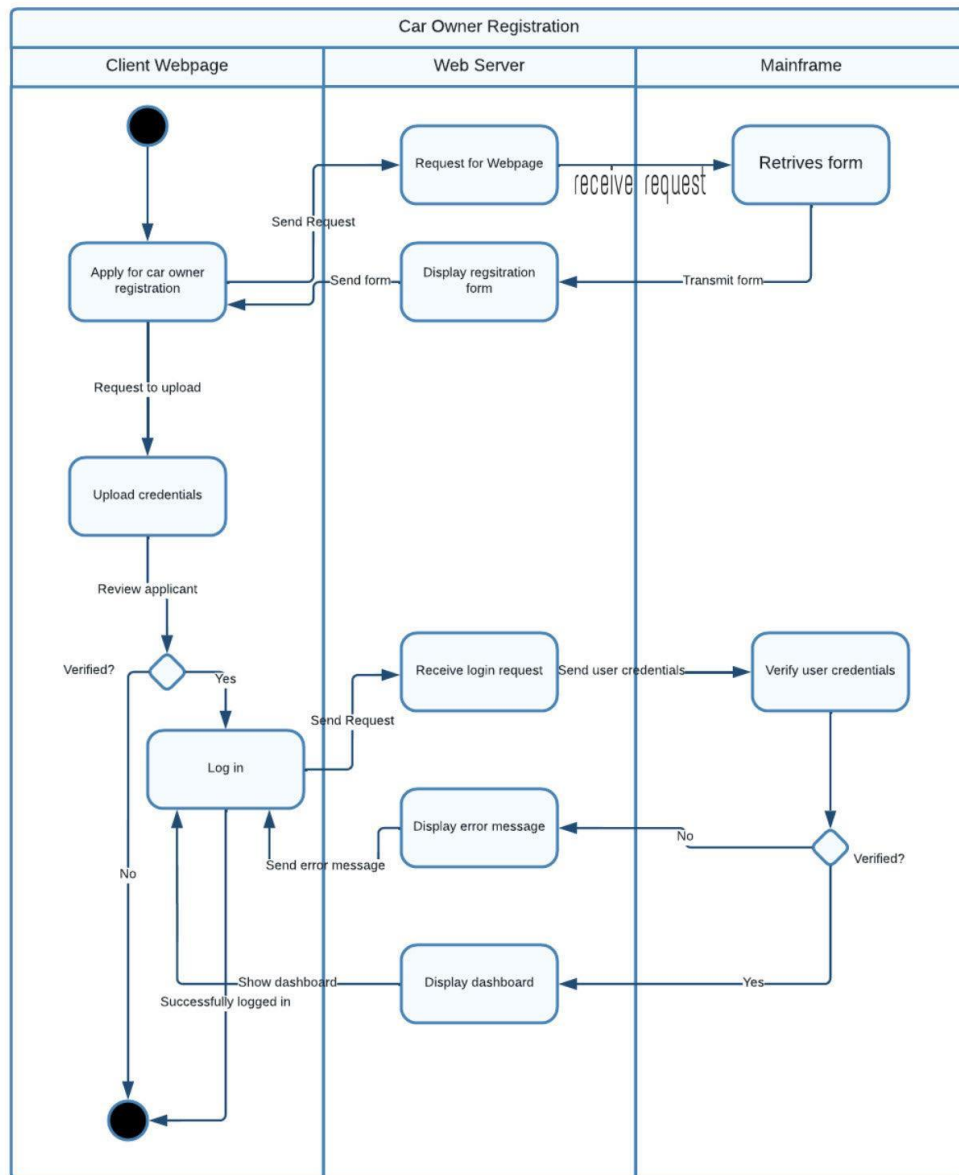
Activity: Activation Notification



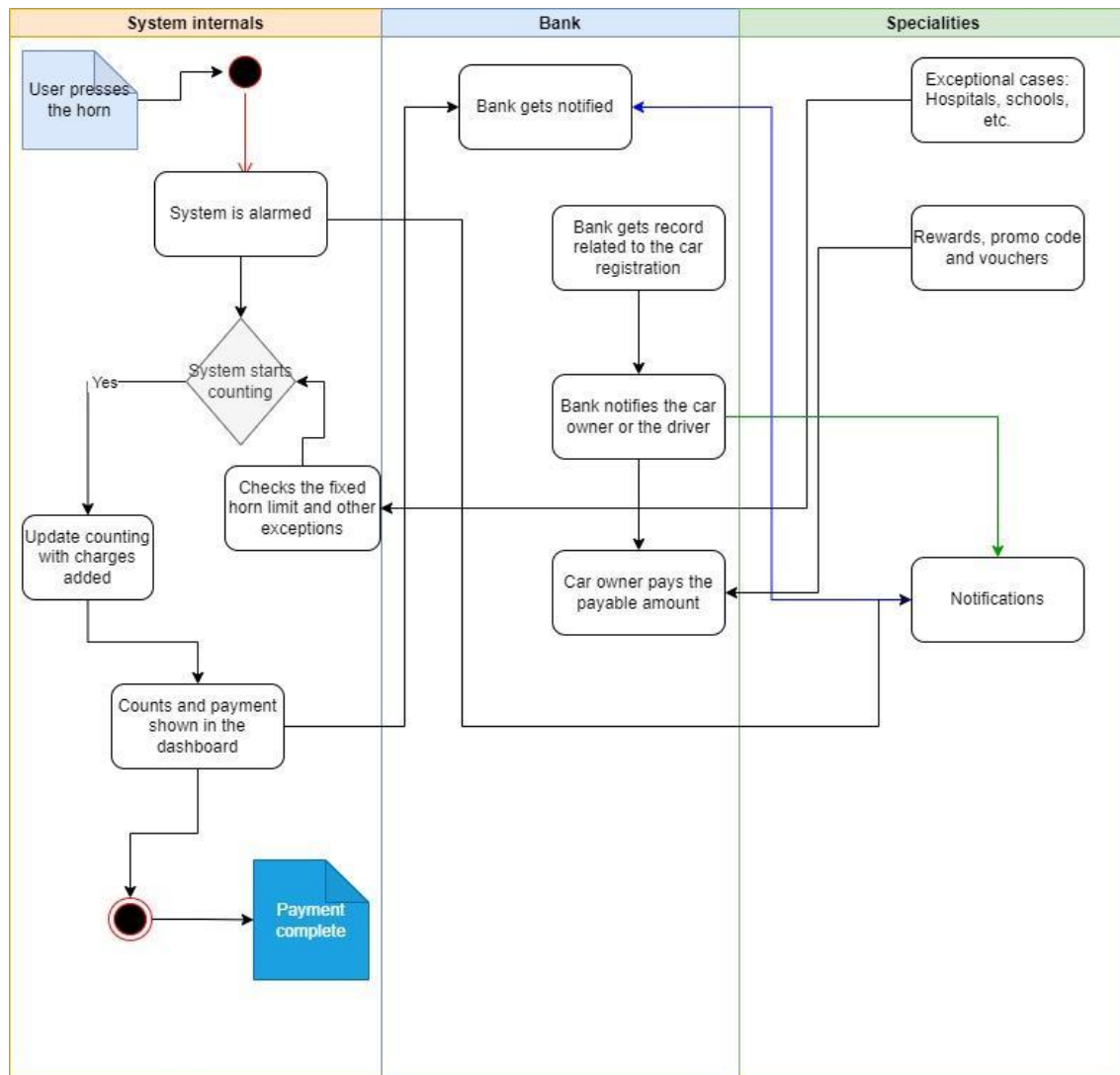
Activity: Payment Notification



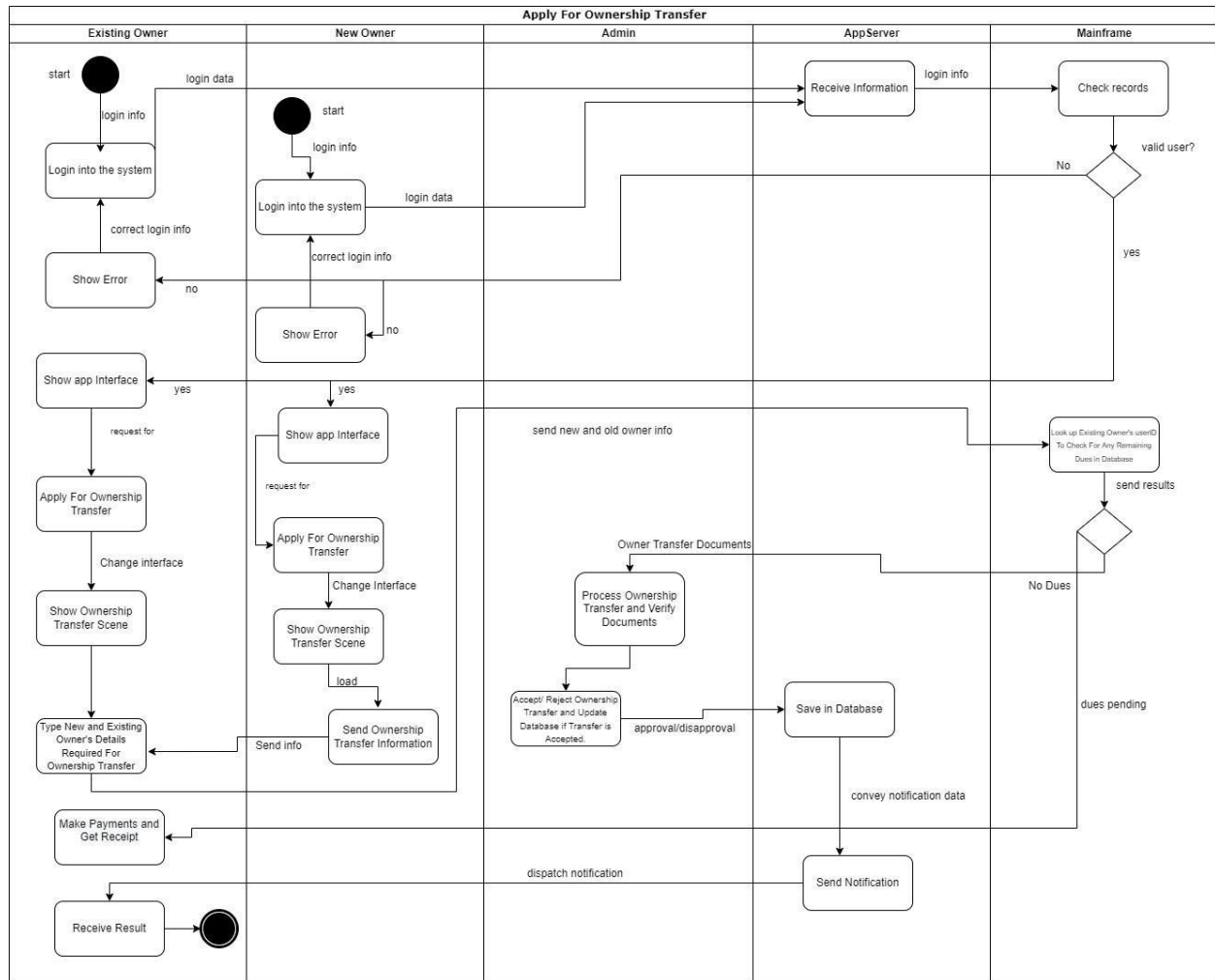
Activity: Car Owner Registration



Activity: Making payment

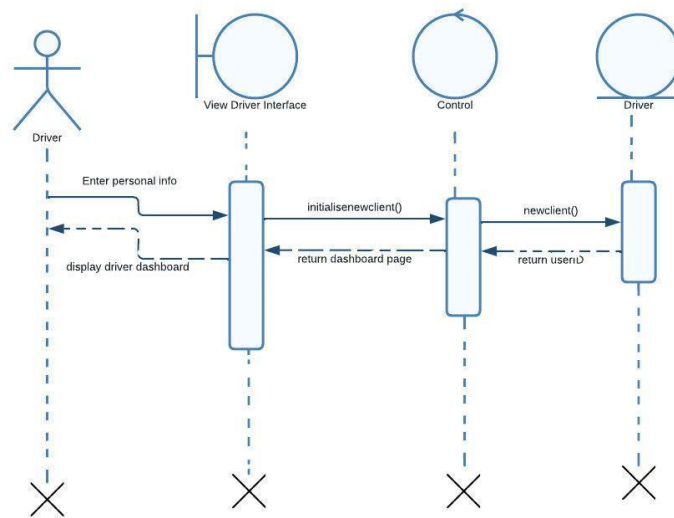


Activity: Transfer of Ownership

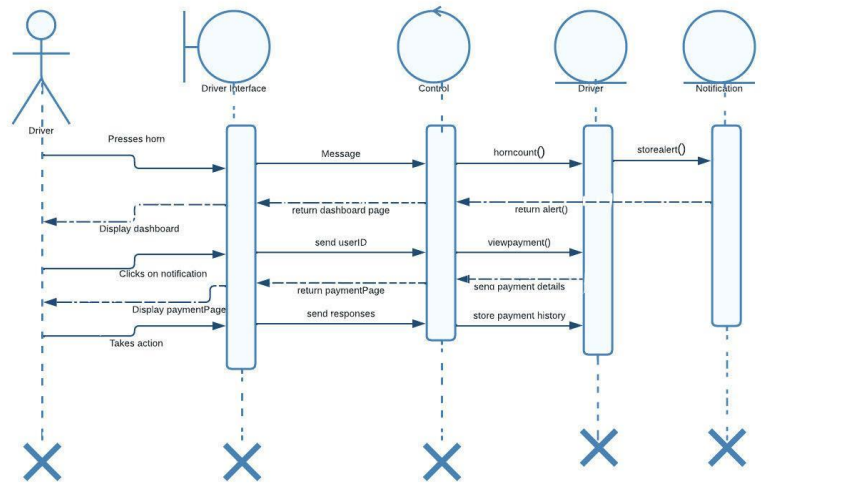


18. Sequence Diagrams

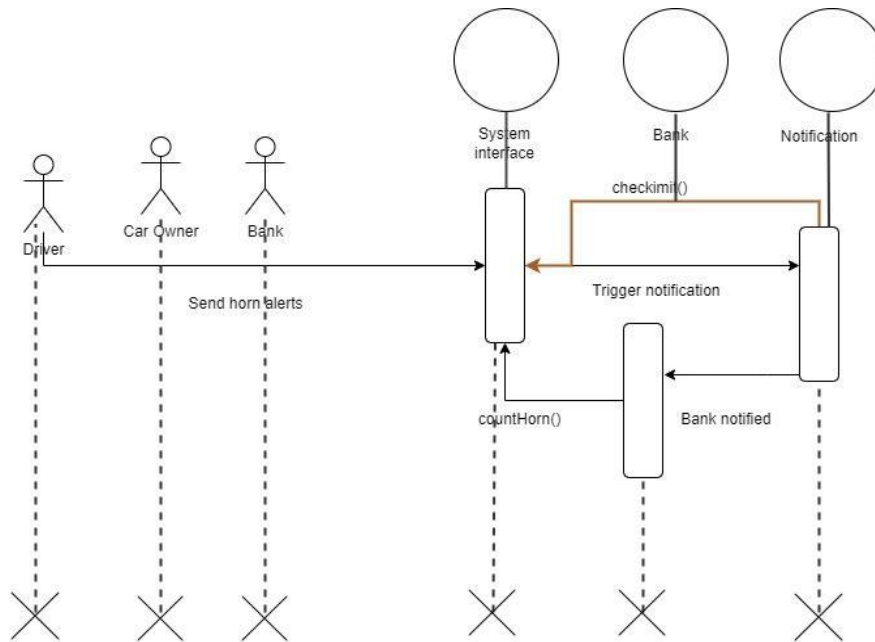
User Sign-up



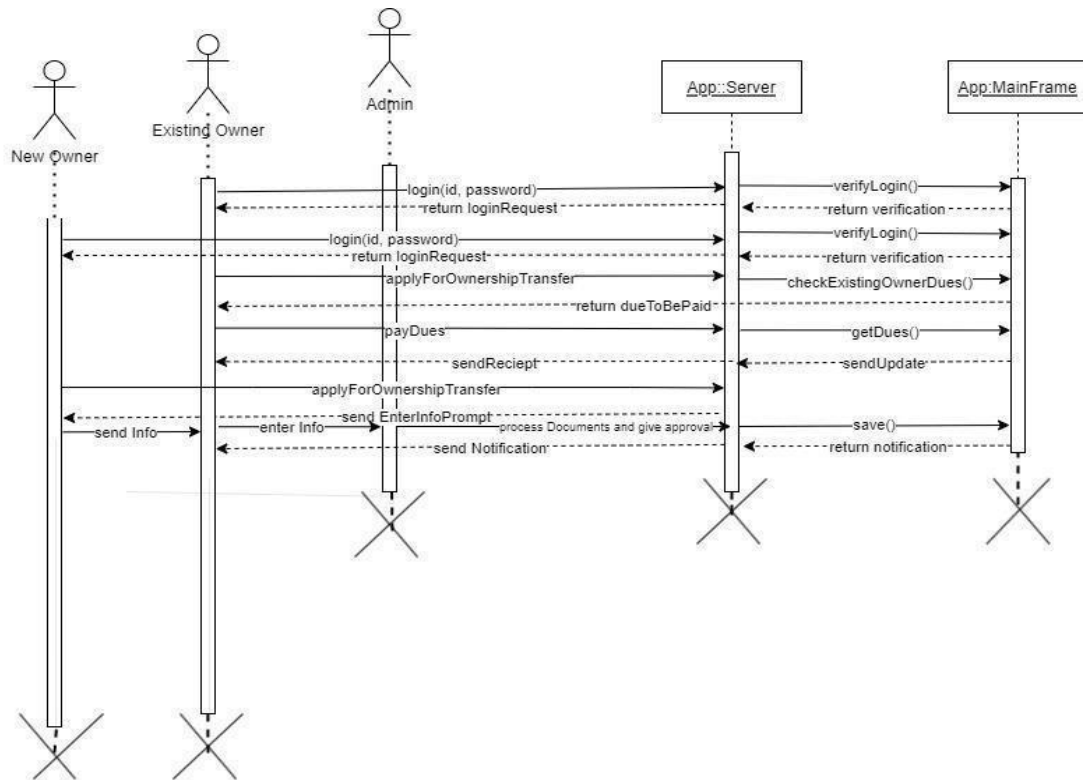
Payment



Horn Counting

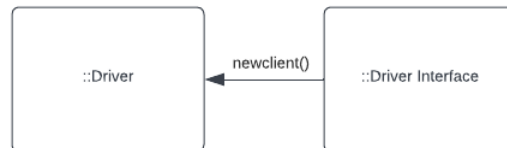


Transfer of Ownership

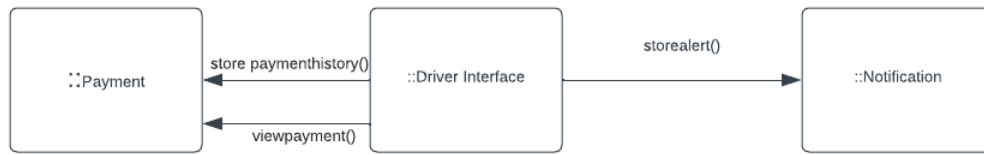


19. Communication Diagrams

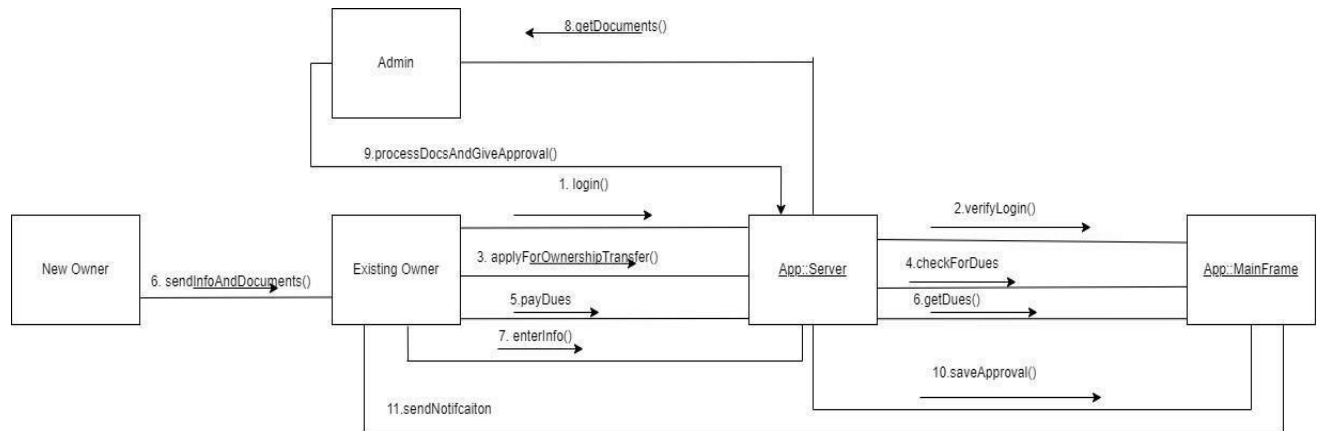
User registration



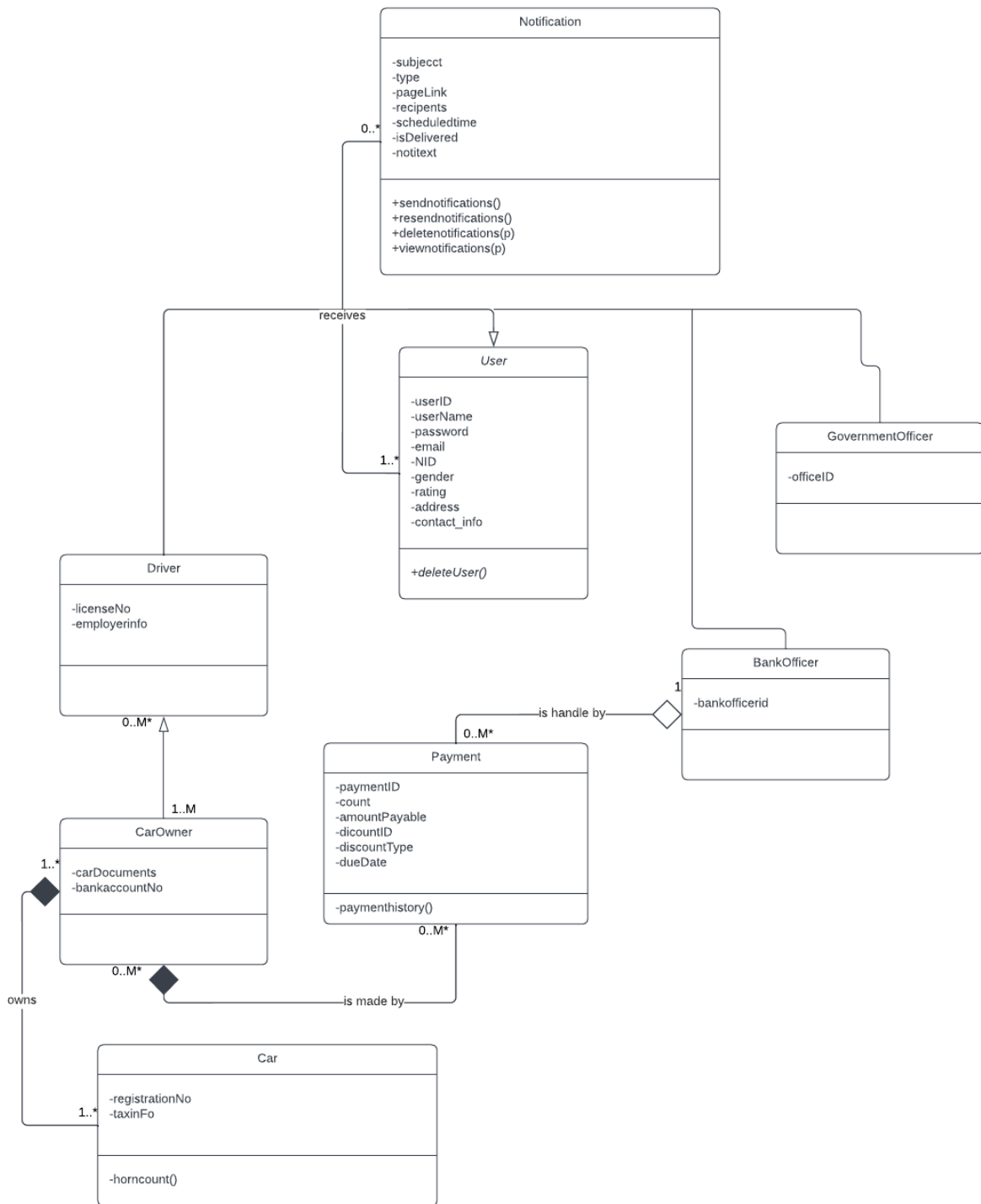
Payment



Transfer of Ownership

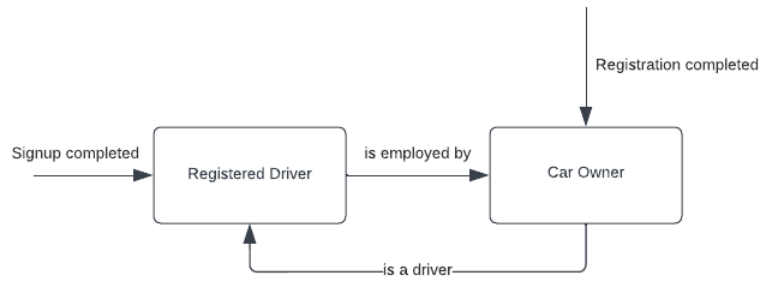


20. Class diagrams

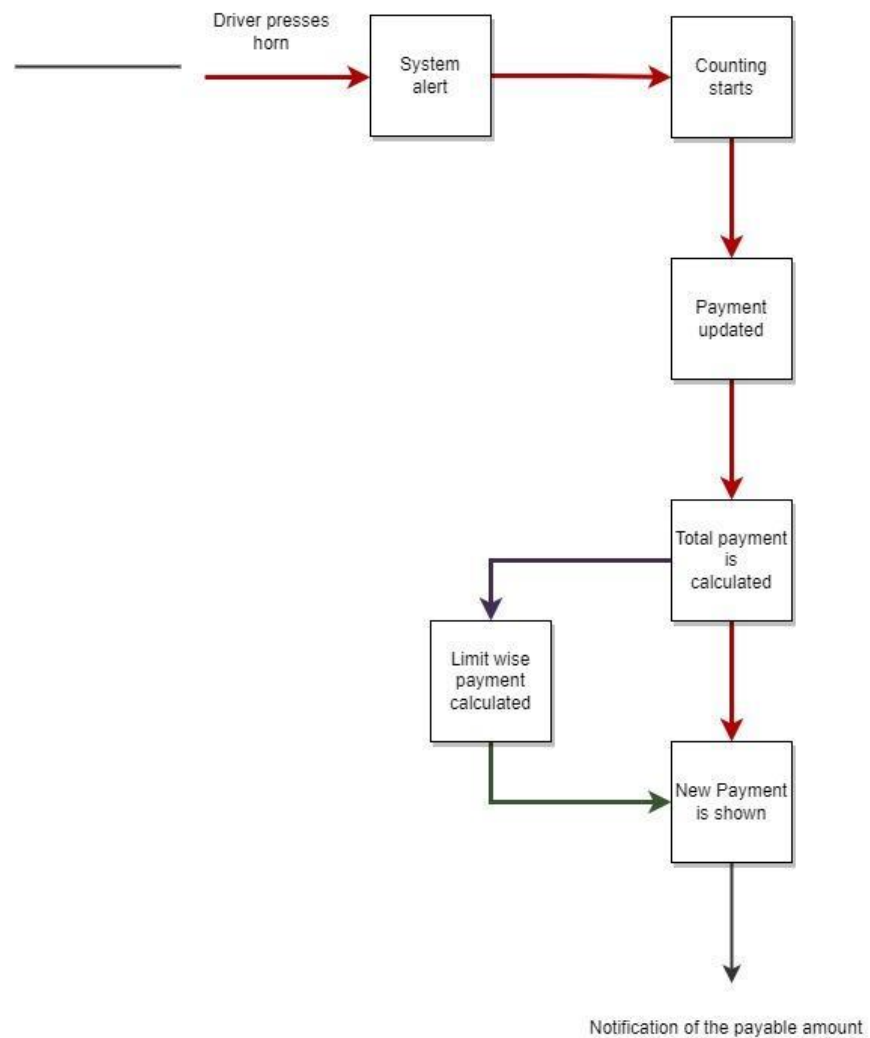


21. State-chart Diagrams

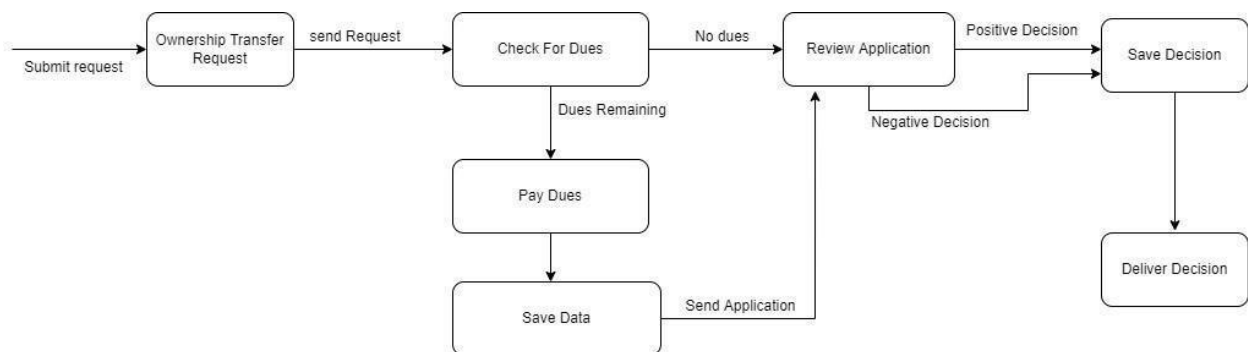
User Registration



Payment



Transfer of Ownership



22. CRUD Matrix

User Registration

ACTIVITY	DRIVER	CAR OWNER	ADMIN	BANK OFFICER	GOVERNMENT OFFICER
Enter Driver Personal Details	U				
Create Driver Account	C				
Register Car Owner	U				
User log in	R	R	R	R	R
Upload Car Documents		U			
View Payment Details	R	R		R	
View New Car Owner Registration			R		R
Accept/Reject Car Owner			U		U
Send Notification	C			CU	CU
Deliver Notification	RU			R	R
Make Payment		CU		R	R

Payment

Activity	User	Bank	Payment	Notification
User registration	C			C

User logon	R			R
Provide personal info	CU	R		RU
Provide bank details	U	RU		U
Read guidelines	R	R		
Pay charge	U	RUD	U	R
Check rewards	R	RUD	CRUD	CR
Get notification	R	U	D	C

Transfer of Ownership

Activity	Existing Owner	New Owner	Admin	Driver
Register	C	C		
Login	R	R		
Edit profile		U	R	
Apply For Ownership Transfer	U	U	R	
Horn Notification	R	R	RU	R
Ownership Notification	R	R		

Section 5:

23. Structure English pseudo code for the system

User Sign-up

```
1  IF "SignUp" clicked THEN
2    GET registration form
3    DISPLAY form
4    IF "next" clicked THEN
5      GET Registration form
6      DISPLAY registration form
7      IF "Agree to all terms and conditions" clicked THEN
8        IF user clicks "REGISTER" THEN
9          IF user NOT EXIST THEN
10             GET user input
11             CREATE user account
12             DISPLAY dashboard
13             IF Show Notification clicked THEN
14               SEND all available Notification
15             ELSE IF Horn Count clicked THEN
16               DISPLAY Horn Details
17             ELSE IF Ownership Transfer clicked THEN
18               GET Ownership Transfer form
19               DISPLAY Ownership Transfer form
20             ELSE
21               SEND error message to user
22             ENDIF
23           ELSE
24             SEND error message to user
25           ENDIF
26         ELSE
27           DELETE user Details
28         ENDIF
29       ENDIF
30     ENDIF
31   ENDIF
```

Notification System

```
1 DO WHILE user logged in
2   GET pending Notification
3   IF user is Bankofficer
4     IF payment document checking pending THEN
5       RESEND notification message to Bankofficer
6       IF Bankofficer clickes on check document THEN
7         GET payment document input
8         DISPLAY payment document
9       ENDIF
10      IF Bankofficer clicks on DONE THEN
11        STORE information in ARCHIVE
12      ENDIF
13    ENDIF
14
15    IF user is Driver OR Car Owner
16      IF Dues Pending THEN
17        RESEND notification message to Driver AND Car Owner
18        IF Driver OR Car Owner clicks on due details
19          GET Due Pending Details
20          DISPLAY Due Pending Details
21        ENDIF
22
23
24      ELSE IF horn pressed THEN
25        GET horn Count
26        ADD TO horn Count
27        DISPLAY horn Count
28        SEND notification to Driver
29      ENDIF
30
31    IF user is Car Owner
32      IF Ownership Transfer pending THEN
33        GET approval Details
34        IF approval Details NOT found
35          SEND is in process NOTIFICATION to user
36        ELSE
```

```

37         IF approval is accepted
38             SEND approved Notification to user
39         IF approval is rejected
40             SEND rejected Notification to user
41         ENDIF
42     ENDIF
43 ENDIF
44
45 IF user is GovtOfficer
46     IF Driver Verification pending THEN
47         RESEND notification to GovtOfficer
48     IF "Check Driver Verification" clicked THEN
49         GET Driver documentations
50         CHECK Driver documentations
51         IF "Verify" clicked THEN
52             IF approval is accepted
53                 SEND approved Notification to user
54             IF approval is rejected
55                 SEND rejected Notification to user
56             ENDIF
57         ENDIF
58     ENDIF
59 ENDIF

```

Horn Count

```

1 DO WHILE user is logged in
2     IF Horn is pressed:
3         GET horn Count details
4         ADD TO horn Count
5         IF Horn Count >= 5:
6             GET userID
7             UPDATE Due Pending
8             SAVE IN database
9         ENDIF
10        GET Due Pending Details
11        DISPLAY Due Pending Details
12    ELSE
13        DISPLAY horn Count
14        SEND numberOfHornPressed notification to Driver
15    ENDIF
16 ENDIF

```

25. Prototype the user interface

User Sign-up

Sign up

First Name

Last Name

NID

Your Email

Please select your Gender:

Male

Female

Enter your Number


Your Address

Password

Repeat your password


I agree all statements in [Terms of service](#)

Register




[I am already member](#)


User Login



[Create an account](#)

Login


 Your username

 Password

☐ Remember me

[Log In](#)


User Dashboard




Horn Police

A system that ensures a peaceful environment

Homepage

Payment About Transfer of Ownership Notification  Logout

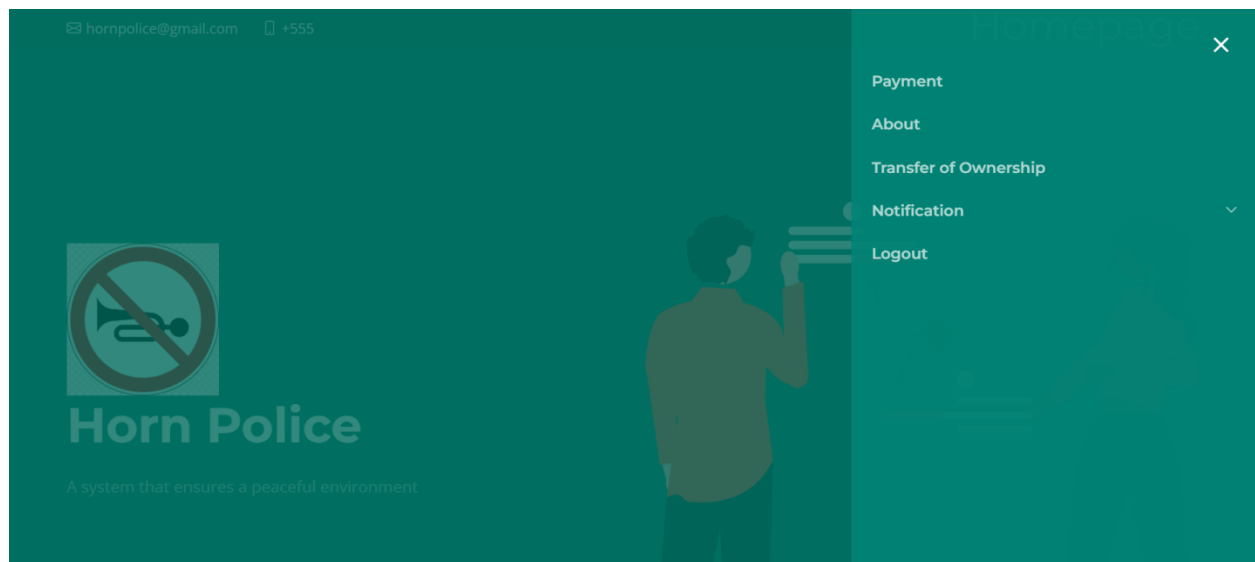


About Us

Noise pollution is not the answer!



User Navigation Bar



User Payment Information Page



Horn Police

[Go back](#)



Amount: Tk 120

Payment due on 01/09/2022

Note: If payment is not paid within the due date, after 4 days the car would be taken away.

Transfer of Ownership Page

Ownership Transfer

For Existing Owner

Existing Owner Name

Contact Info

Address

Your Mobile Number

Email

NID

Car Details



☐ NID

Car Details

☐ Car Registration Number

☐ Existing Owner license number

For New Owner

☐ New Owner Name

Contact Info

☐ Address

☐ Email

☐ NID

Car Details

☐ Repeat Car Registration Number

☐ New Owner license number

Upload Documents

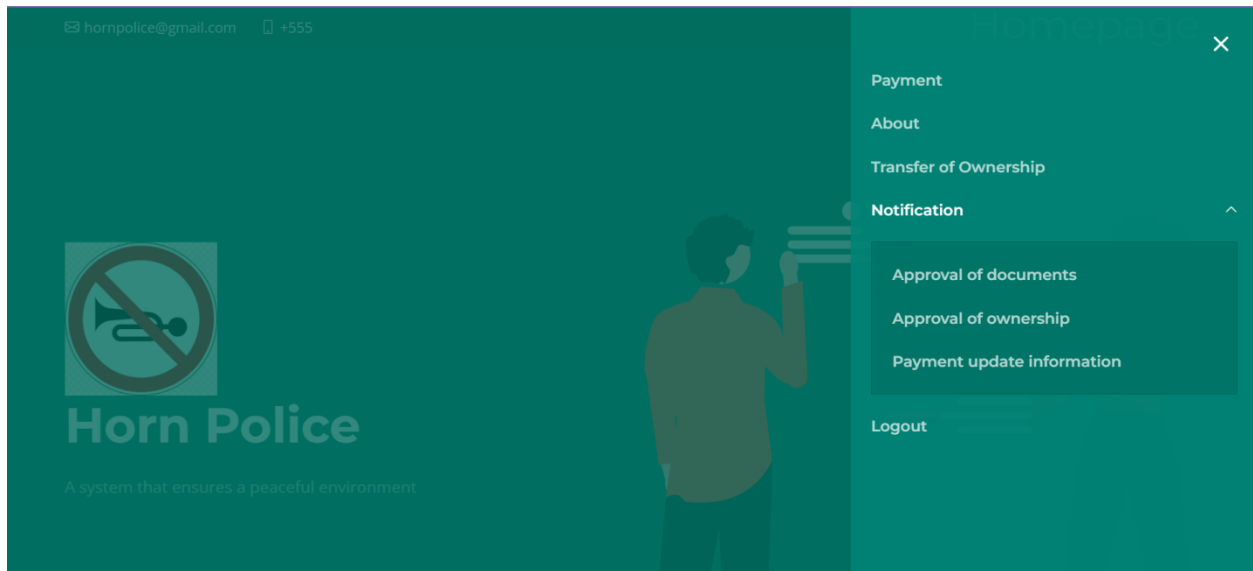
upload all the necessary documents

Upload here

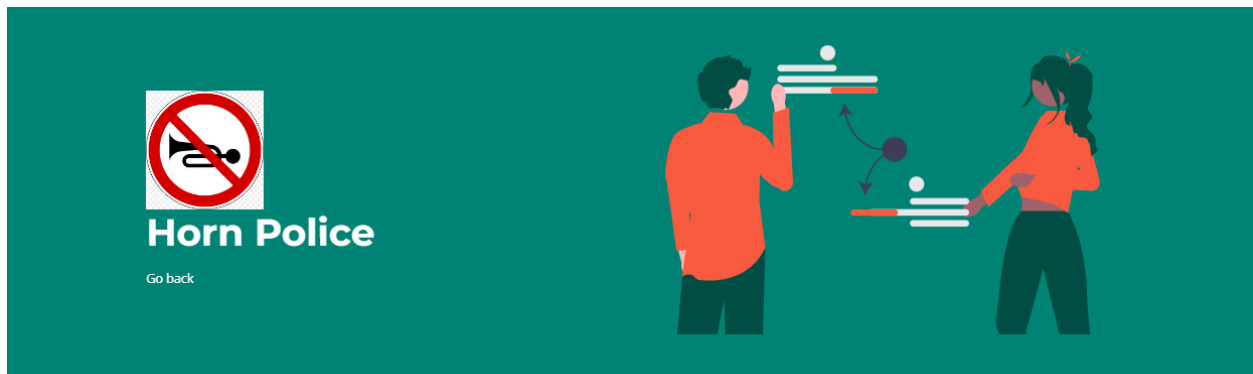
☐ I agree all statements in [Terms of service](#)

Apply

User Notification




User Payment Update Information Notification



Payment Information

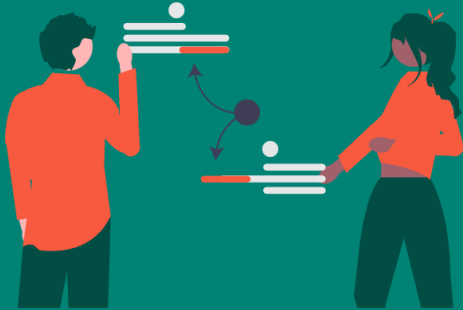
No payment due.

Approval of Documents Information



Horn Police


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Approval Status

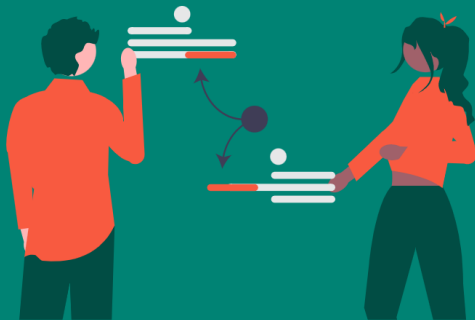
Congratulations! Your documents were approved.

Approval of ownership transfer notification



Horn Police

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Approval Status

Congratulations! Your request to change ownership has been approved.

