



# UTM

UNIVERSITI TEKNOLOGI MALAYSIA

FACULTY OF COMPUTING

SECD2613-03

SYSTEM ANALYSIS AND DESIGN

PROJECT PHASE 2 – INFORMATION SYSTEM  
GATHERING AND REQUIREMENT

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## **1.0 Overview of the Project**

In this project, we aim to enhance the current e-Hailing system to address its existing issues and improve user experience. E-hailing services allow users to book transportation via electronic applications, facilitating easy travel for students, workers, and the general public. Despite the convenience, the current systems have problems related to complexity, data security, and efficiency. Our goal is to enhance the current e-Hailing system to a user-friendly, secure, and efficient e-Hailing system that caters to a broad range of users, including older generations and to those who are less familiar with the current modernized technology.

While identifying the problem statement and feasibility studies along with the project objectives and scopes, we need to identify the users' feedbacks on the current issues of e-Hailing system in order for us to develop a more smoother and more user-friendly of the e-Hailing system, to ensure the system is applicable to everyone involved in booking public transportation online. Then, we need to arrive at a conclusion on the users' feedback and proceed with the project objectives.

## 2.0 Problem Statement

Based on our analysis of the current e-hailing systems, we have identified three main problems:

- **Price and affordability:**

During peak hours or high-demand situations, e-hailing services often give high and unpredictable prices, making it not affordable at all to most users. This condition will also affect the accessibility and reliability of the e-hailing services

- **Safety concerns:**

Whether driver or customer, e-hailing services face significant challenges regarding the safety aspect. Incidents of harassment, assault, and theft have been reported, causing an untrusted environment among people in the e-hailing community

- **Inefficiency in Handling High User Traffic:**

The systems struggle with delays and inefficiencies, particularly during peak times. This leads to frustration among users who need timely transportation.

## 3.0 Proposed Solutions

To tackle these identified problems, we proposed the following solutions based on three aspects:

Price and affordability:

### 1. Implement a Cap on Surge Pricing

Introduce a maximum limit on how high surge prices can go during peak times. This cap can prevent exorbitant fare increases while still allowing for some flexibility to incentivize drivers.

### 2-Driver Incentives During Peak Times

Offer additional incentives to drivers during peak hours without passing the extra cost directly to passengers. Ex: give bonus for completing a certain number of rides during high-demand periods

Safety concerns:

### 1- Anonymous Reporting System

Create an anonymous reporting system within the app that allows users to report safety concerns without revealing their identity, encouraging more users to report issues without fear of repercussions.

### 2- In-App Emergency Button

Integrate an emergency button within the app that allows passengers and drivers to immediately notify local authorities or e-hailing service security teams in case of an emergency.

## Inefficiency in Handling High User Traffic:

### 1- Real-Time Data Processing

Use real-time data processing technologies to ensure that user requests and driver availability are updated instantly, reducing delays.

### 2- Cloud-Based Infrastructure

Implement a cloud-based system to handle high volumes of data and user requests efficiently.

### 3- AI and Machine Learning

Utilize AI for demand forecasting and optimal driver allocation to improve response times and service reliability.

By addressing these key issues, the e-Hailing system will offer a more accessible, secure, and efficient service, enhancing overall user satisfaction.

## **4.0 Information Gathering Process**

### **4.1 Method used**

For this project, we decided to use the interactive method to collect the data. We collected the information needed by making a questionnaire related to the problems that we identified in the e-hailing systems, and in this case, we specifically mean Grab. Then, we distributed the survey across several groups online.

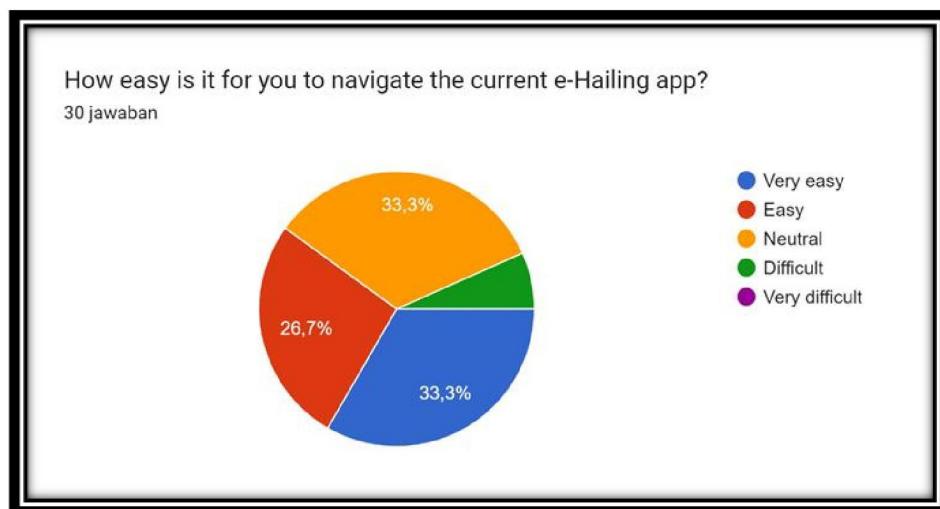
We chose an interactive method, specifically an online questionnaire, for gathering information because in this project, we unfortunately do not have the resources to proceed with other methods like preparing an interview with the users involved in the e-hailing system, we certainly cannot do the Joint Application Design (JAD) method and it is not possible for us to do the unobtrusive method as well. Because, again, the lack of resources and time, we cannot use the sampling, investigation, or the observation method. Thus, we decided to proceed with the online questionnaire distribution to deal with our case study.

Here is the link of the questionnaire:

[https://docs.google.com/forms/d/e/1FAIpQLScOkxA711i6Gr4fXFDJcq-eTi8r5yqZEEewW9FEIX1jdHppJA/viewform?usp=sf\\_link](https://docs.google.com/forms/d/e/1FAIpQLScOkxA711i6Gr4fXFDJcq-eTi8r5yqZEEewW9FEIX1jdHppJA/viewform?usp=sf_link)

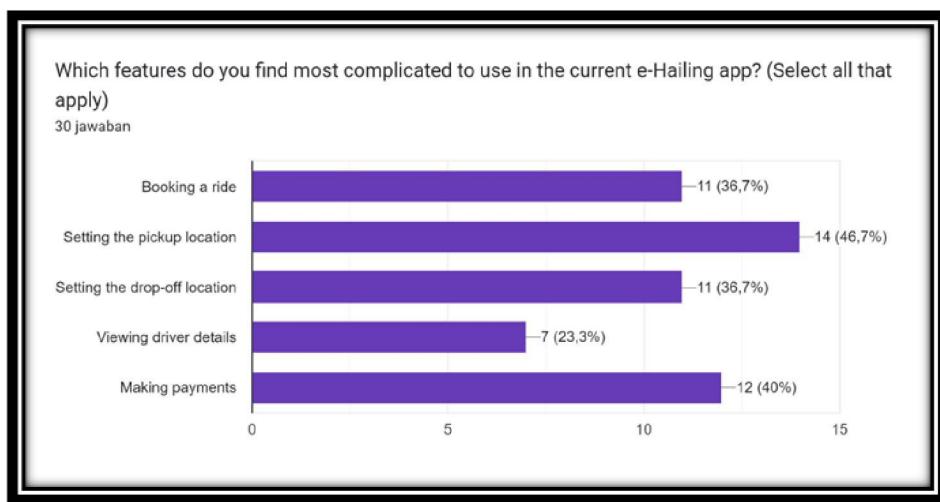
After distributing the questionnaire across several UTM students' groups online, we successfully gathered 30 responses. Here is the information obtained from each of the questions.

## **Question 1: How easy is it for you to navigate the current e-Hailing app?**



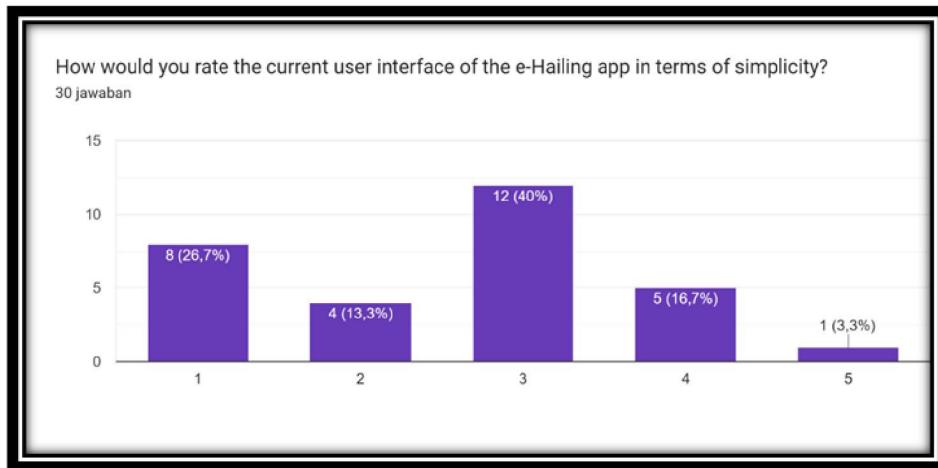
There are about 10 people who think the current e-hailing apps are very easy to use. While the e-Hailing system is easy to use, there are several individuals who experienced issues with the current system.

## **Question 2: Which features do you find most complicated to use in the current e-Hailing app? (Select all that apply)**



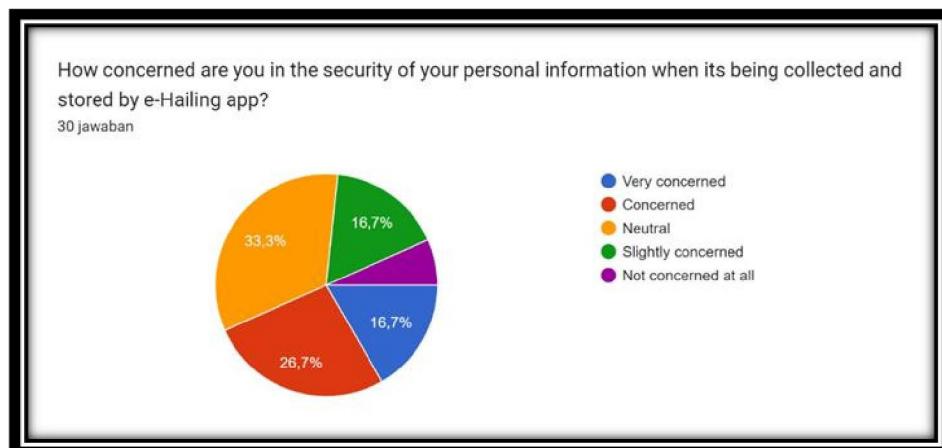
Almost half of the respondents agree that the most complex use in the e-Hailing app is setting the pickup location, followed by making payments.

**Question 3: How would you rate the current user interface of the e-Hailing app in terms of simplicity?**



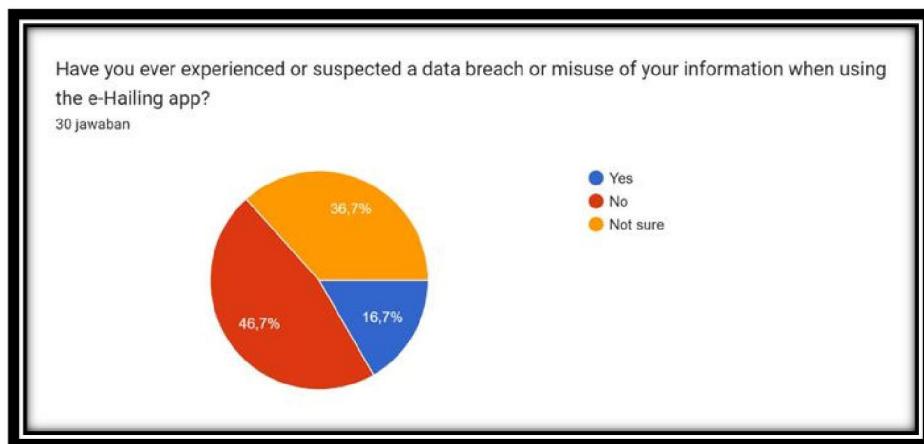
Most respondents rate the current UI of the e-hailing app as average. However, some of the respondents responded that they faced difficulties with the e-Hailing system design interface.

**Question 4: How concerned are you in the security of your personal information when its being collected and stored by e-Hailing app?**



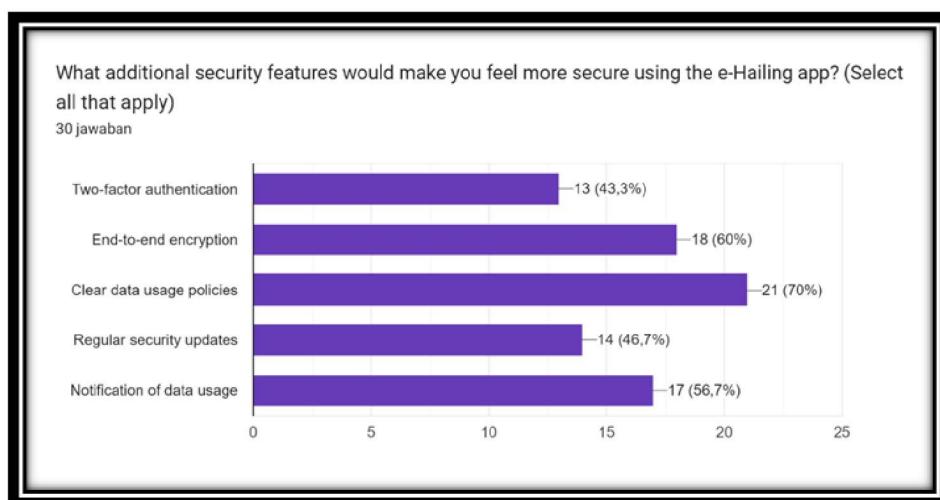
About 10 out of 30 people feel normal regarding the security of personal data in the e-hailing app, yet there are also some respondents who feel concerned about their data privacy online.

**Question 5: Have you ever experienced or suspected a data breach or misuse of your information when using the e-Hailing app?**



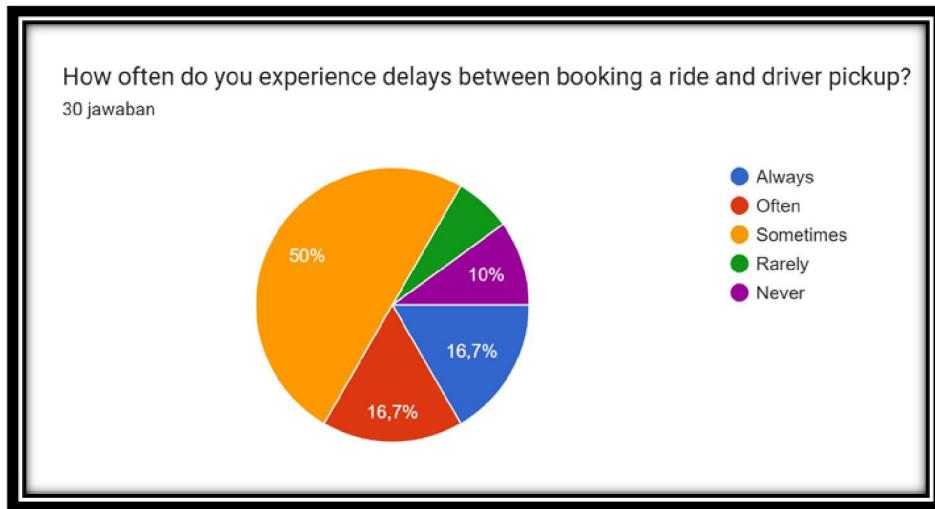
14 respondents never experienced data misused in e-hailing apps, but 5 of them had. This indicates that there have been cases of users' data being misused.

**Question 6: What additional security features would make you feel more secure using the e-Hailing app? (Select all that apply)**



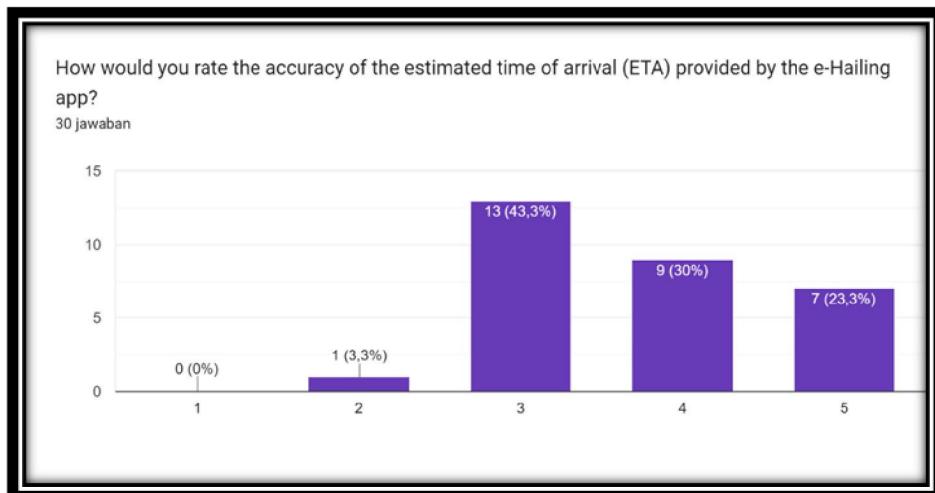
Data usage policies is the most demanded feature by more than half of the respondents, followed by end-to-end encryption and data usage notification feature.

**Question 7: How often do you experience delays between booking a ride and driver pickup?**



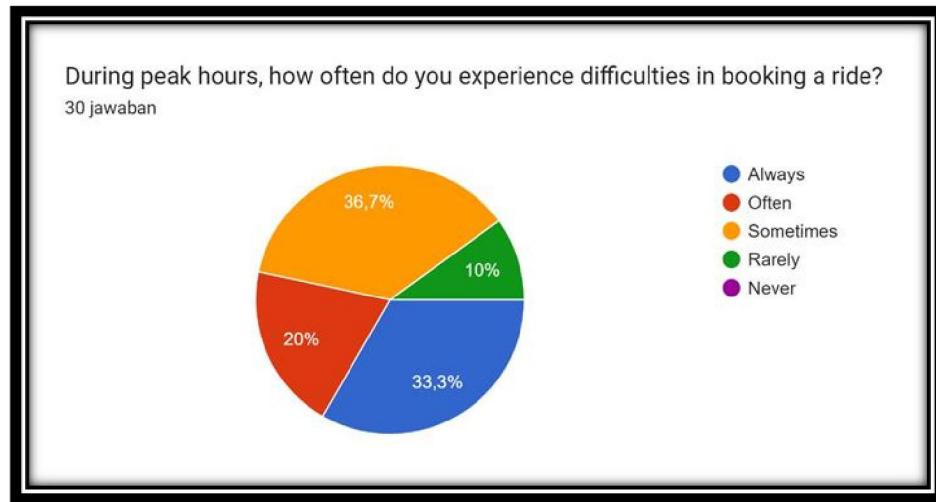
Occasionally, 15 out of 30 users got some time delays between ride booking and driver pickup. This is confirming us that there are users who experience delays in public transportation booking and pickup.

**Question 8: How would you rate the accuracy of the estimated time of arrival (ETA) provided by the e-Hailing app?**



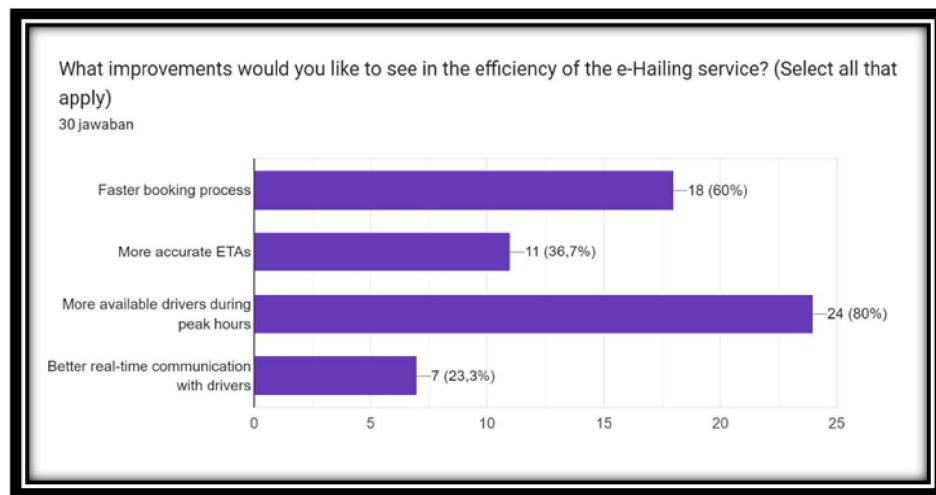
Almost every respondent feels that the ETA provided by the e-hailing app is accurate enough. Nevertheless, there is a respondent who responded less accurately.

**Question 9: During peak hours, how often do you experience difficulties in booking a ride?**



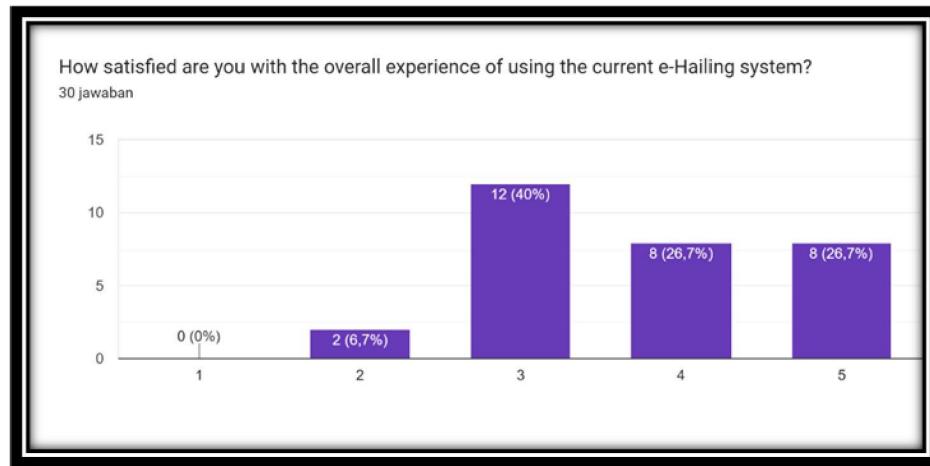
All respondents had experienced difficulties in booking a ride during peak hours of e-hailing. This tells us that during urgency periods, delays are more likely to occur.

**Question 10: What improvements would you like to see in the efficiency of the e-Hailing service? (Select all that apply)**



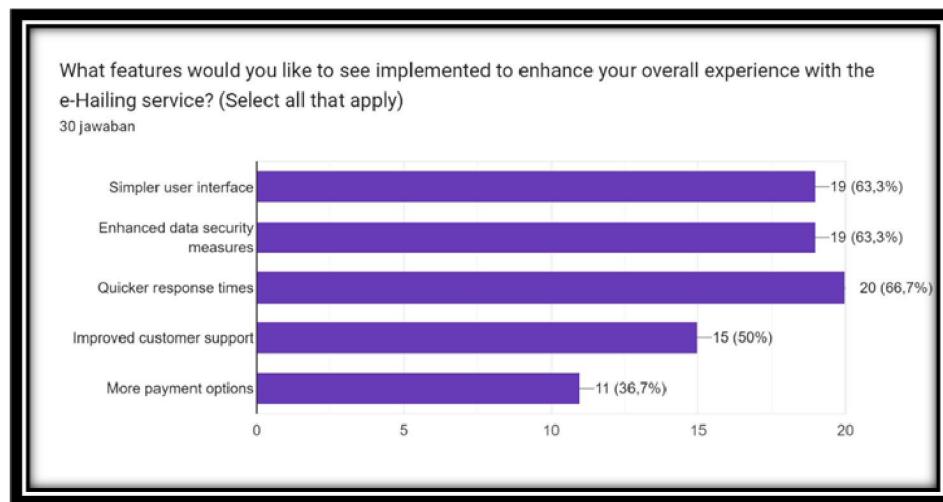
The most wanted improvement in the e-hailing system asked by users are related to drivers' availability in peak-hours period and the booking process time.

**Question 11: How satisfied are you with the overall experience of using the current e-Hailing system?**



More than 90% users are satisfied with the overall current e-hailing system, which is a high confidence level. Although it is quite high, we try to increase the confidence level even more to ensure a broader number of users will face minimal issues with the e-Hailing system.

**Question 12: What features would you like to see implemented to enhance your overall experience with the e-Hailing service? (Select all that apply)**



Faster response times, data security enhancements, and a simpler UI are the features that users want to improve their overall experience with the e-hailing systems.

### **Question 13: Do you have any specific suggestions for improving the e-Hailing system?**

Here are some other specific suggestions from the respondents.

Do you have any specific suggestions for improving the e-Hailing system?
12 jawaban
I think it's already good
no
Add in-app emergency buttons and ride-sharing options for added safety.
Implement a real-time tracking system that's easily accessible at all times
Making the fare calculation more transparent
Increase the availability of vehicles that can accommodate for passengers with disabilities, such as wheelchair-accessible cars
Promote discounts to passengers who often use e-Hailing as their main mode of transport
Not at all
Simplicity of UI of the system

Simplicity of UI of the system
Allow better price negotiation
No
Hire more drivers

*(This question is not compulsory to fill, so not all respondents answered it.)*

## **4.2 Summary from Method Used**

By collecting the data through the survey, we can see some of the issues that currently still exist within the Grab application's system. Based on the users' input, we can focus on determining which aspects need to be improved first, like the peak-hours issue. This, hopefully, is what can help us to be able to create a better system than before, which can help solve the problems that are still bothering application users today and improve their experience when using it.

## 5.0 Requirement Analysis

### 5.1 Current Business Process

Here are the scenarios and workflow of the current system process for the **users**.

1) [Login to the System](#)

2) [Main Menu Options](#)

The main menu displays options "Book a Ride", "Ride History", "Profile", "Settings", and "Help."

3) [Book a Ride](#)

a) [Enter Pickup and Drop-off Locations](#)

Users will decide their locations for pickup and drop-off.

b) [Select Ride Type](#)

Users choose the preferred ride type based on fare and vehicle availability that are able to tackle their urgent needs.

c) [Confirm Booking](#)

Users confirm the booking, and the system searches for available drivers.

Estimated time of arrival (ETA) for the driver is displayed.

d) [Track Ride](#)

Users can track the driver's location in real-time on a map.

4) [Ride History](#)

a) [View Past Rides](#)

Users can view details of their past rides like date, time, fare, driver information, and route taken.

5) [Settings](#)

a) [Notification Preferences](#)

Manage notification settings for ride updates, promotions, and account alerts.

b) [Security Settings](#)

Update password and enable two-factor authentication.

c) [Privacy Settings](#)

Review and manage data sharing preferences and permissions.

6) [Help](#)

a) [FAQs and Support](#)

Access FAQs, contact support via chat or email, and report issues or provide feedback.

Here are the scenarios and workflow of the current system process for the **driver**.

1) [Login to the System](#)

Drivers open the e-Hailing app.

2) [Main Menu Options](#)

The main menu displays options such as "Availability", "Ride History", "Profile", "Earnings", "Settings", and "Help."

3) [Availability](#)

a) [View Ride Requests](#)

Drivers will see available ride requests such as pickup and drop-off locations.

b) [Accept Ride](#)

Drivers accept a ride request, and the system provides navigation to the pickup location.

c) [Start Ride](#)

Upon reaching the pickup location, drivers start the ride after confirming the passenger's identity.

d) [Complete Ride](#)

Drivers navigate to the drop-off location and complete the ride.

4) [Ride History](#)

a) [View Past Rides](#)

Drivers can view details of past rides, including date, time, fare, and passenger feedback.

5) [Profile](#)

a) [View and Edit Profile](#)

Drivers can view and edit personal information, vehicle details, and documents.

b) [Availability Hours](#)

Drivers can set up their preferred availability hours to the users or their journey of pickup and drop-off.

6) [Earnings](#)

a) [Earnings Breakdown](#)

Detailed breakdown of earnings, including daily, weekly, and monthly summaries.

b) [Payment Settings](#)

Manage payment methods and review payout schedules.

7) [Settings](#)

a) [Notification Preferences](#)

Manage notification settings for ride requests, system updates, and account alerts.

b) [Security Settings](#)

Update password and enable two-factor authentication.

8) [Help](#)

a) [FAQs and Support](#)

Access FAQs, contact support via chat or email, and report issues or provide feedback.

## 5.2 Functional Requirement (Input, Process, and Output)

### 5.2.1 Context Diagram

PROCESS	INPUT	OUTPUT
Current E-Hailing System	<ul style="list-style-type: none"><li>• Customer Order</li><li>• Customer Data</li><li>• Payment</li><li>• Driver Info</li></ul>	<ul style="list-style-type: none"><li>• Booking Report</li><li>• Customer Information</li><li>• Payment Receipt</li><li>• Driver Assignment</li></ul>

### 5.2.2 Diagram 0

PROCESS	INPUT	OUTPUT
Booking Online	<ul style="list-style-type: none"><li>• Customer Order</li><li>• Customer Data</li></ul>	<ul style="list-style-type: none"><li>• Booking Information</li><li>• Customer Data</li></ul>
Making Payment	<ul style="list-style-type: none"><li>• Payment</li><li>• Customer Data</li><li>• Booking Information</li></ul>	<ul style="list-style-type: none"><li>• Payment Receipt</li><li>• Customer Details</li></ul>
Allocating Driver	<ul style="list-style-type: none"><li>• Customer Information</li><li>• Driver Info</li></ul>	<ul style="list-style-type: none"><li>• Driver Info</li><li>• Customer Information</li></ul>
Driving	<ul style="list-style-type: none"><li>• Driver Info</li></ul>	<ul style="list-style-type: none"><li>• Driver Assignment</li></ul>
Making Report	<ul style="list-style-type: none"><li>• Booking Information</li><li>• Customer Information</li><li>• Driver Info</li></ul>	<ul style="list-style-type: none"><li>• Booking Report</li></ul>

### 5.2.3 Child Diagrams

#### 5.2.3.1 Child Diagram for Process 1: Booking Online

PROCESS	INPUT	OUTPUT
Entering Drop-off Location	<ul style="list-style-type: none"> <li>• Customer Order</li> <li>• Canceled Order</li> </ul>	<ul style="list-style-type: none"> <li>• Customer Order</li> </ul>
Entering Pick-up Location	<ul style="list-style-type: none"> <li>• Customer Order</li> </ul>	<ul style="list-style-type: none"> <li>• Customer Order</li> </ul>
Confirming Booking Order	<ul style="list-style-type: none"> <li>• Customer Order</li> <li>• Customer Data</li> </ul>	<ul style="list-style-type: none"> <li>• Unconfirmed Order</li> <li>• Confirmed Order</li> <li>• Customer Data</li> </ul>
Canceling Order	<ul style="list-style-type: none"> <li>• Unconfirmed Order</li> </ul>	<ul style="list-style-type: none"> <li>• Canceled Order</li> </ul>

#### 5.2.3.2 Child Diagram for Process 3: Allocating Driver

PROCESS	INPUT	OUTPUT
Finding Driver Vacancies	<ul style="list-style-type: none"> <li>• Customer Information</li> <li>• No Assigned Drivers</li> </ul>	<ul style="list-style-type: none"> <li>• Customer Information</li> <li>• Available Driver Vacancies</li> <li>• No Driver Vacancies</li> </ul>
Finding Assigned Drivers	<ul style="list-style-type: none"> <li>• No Driver Vacancies</li> </ul>	<ul style="list-style-type: none"> <li>• Available Assigned Drivers</li> <li>• No Assigned Drivers</li> </ul>
Waiting Driver Sequentially	<ul style="list-style-type: none"> <li>• Available Assigned Drivers</li> </ul>	<ul style="list-style-type: none"> <li>• Driver finished</li> </ul>
Assigning Driver	<ul style="list-style-type: none"> <li>• Customer Information</li> <li>• Available Driver Vacancies</li> <li>• Driver finished</li> <li>• Driver Info</li> </ul>	<ul style="list-style-type: none"> <li>• Driver Info</li> <li>• Customer Information</li> </ul>

## **5.3 Non-functional requirement**

### **5.3.1 Security**

- The E-hailing system should employ multi-factor authentication (MFA) for user accounts, especially for administrators and drivers.
- Regular security audits and vulnerability assessments must be conducted every month to ensure data integrity online.

### **5.3.2 Performance**

- The E-hailing system should be able to handle thousands of ride requests per second to ensure smooth operation during peak hours.
- Average response time for user requests should be less than 2 seconds. This will minimize the delays during peak hours whenever users are in urgency.

### **5.3.3 Scalability**

- The E-hailing system must be able to scale horizontally to accommodate increased load without significant degradation in performance.
- The system should support scaling up to 100 000 simultaneous users to ensure everyone can apply for public transportation online easier.

### **5.3.4 Accessibility**

- The E-hailing system must comply with accessibility standards such as WCAG 2.1 to ensure it is usable by people with disabilities.
- Features such as voice commands, screen readers, and adjustable text sizes should be supported as well.

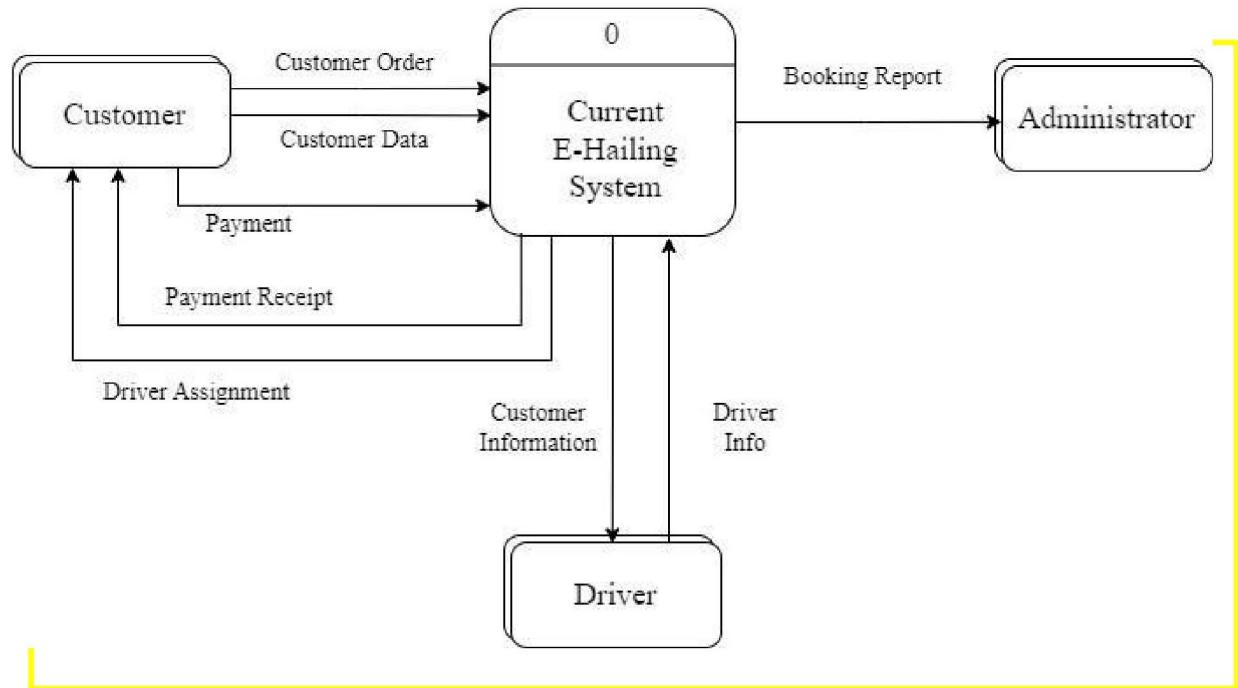
### **5.3.5 Resilience**

- The E-hailing system must be able to recover from failures periodically.
- Disaster recovery plans should be in place, with data recovery tests conducted periodically.

## 5.4 Logical DFD AS-IS System

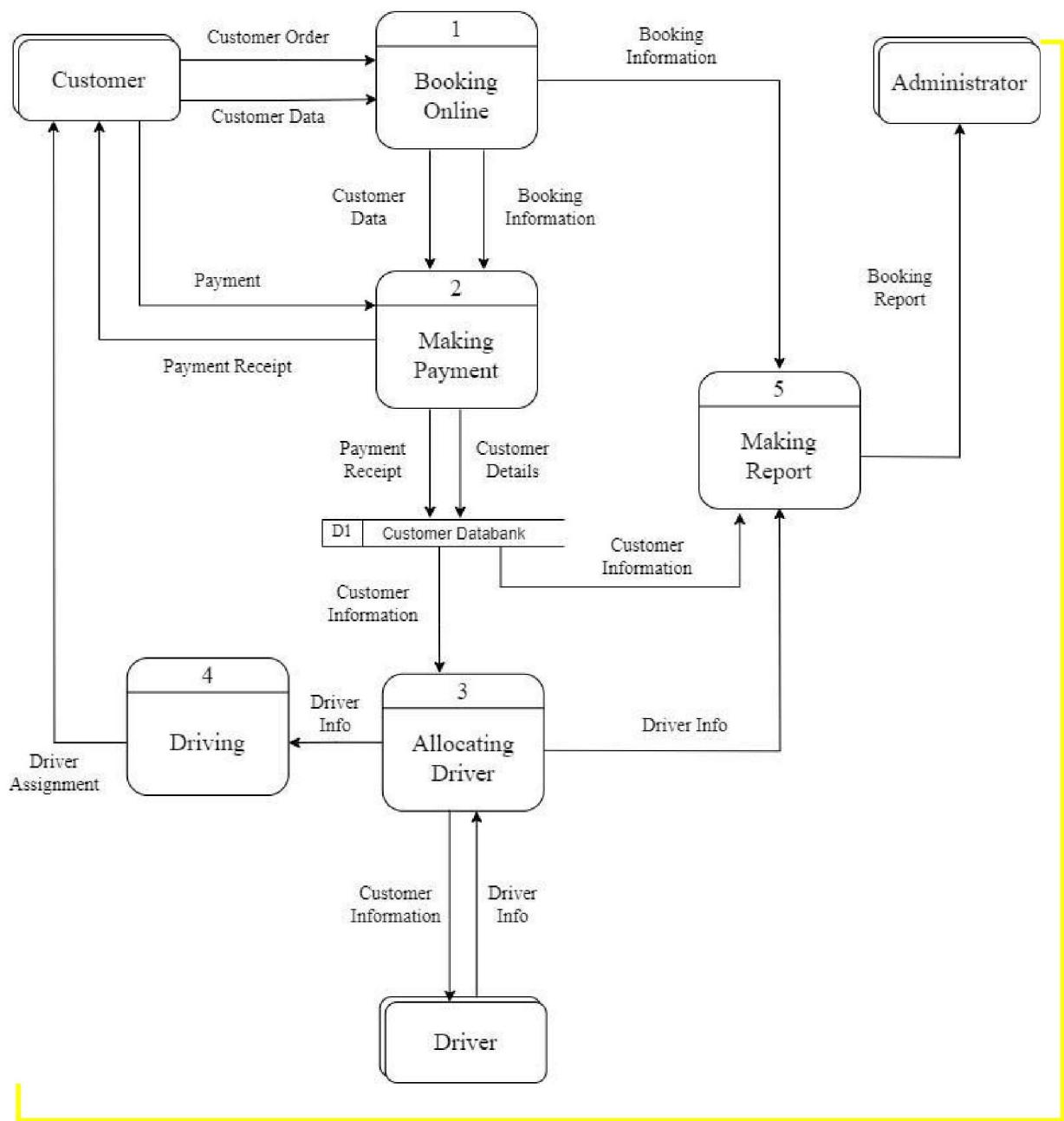
Logical Data Flow Diagram (DFD) for the current e-Hailing system.

### 5.3.6 Context Diagram



*Context Diagram for the current E-Hailing system*

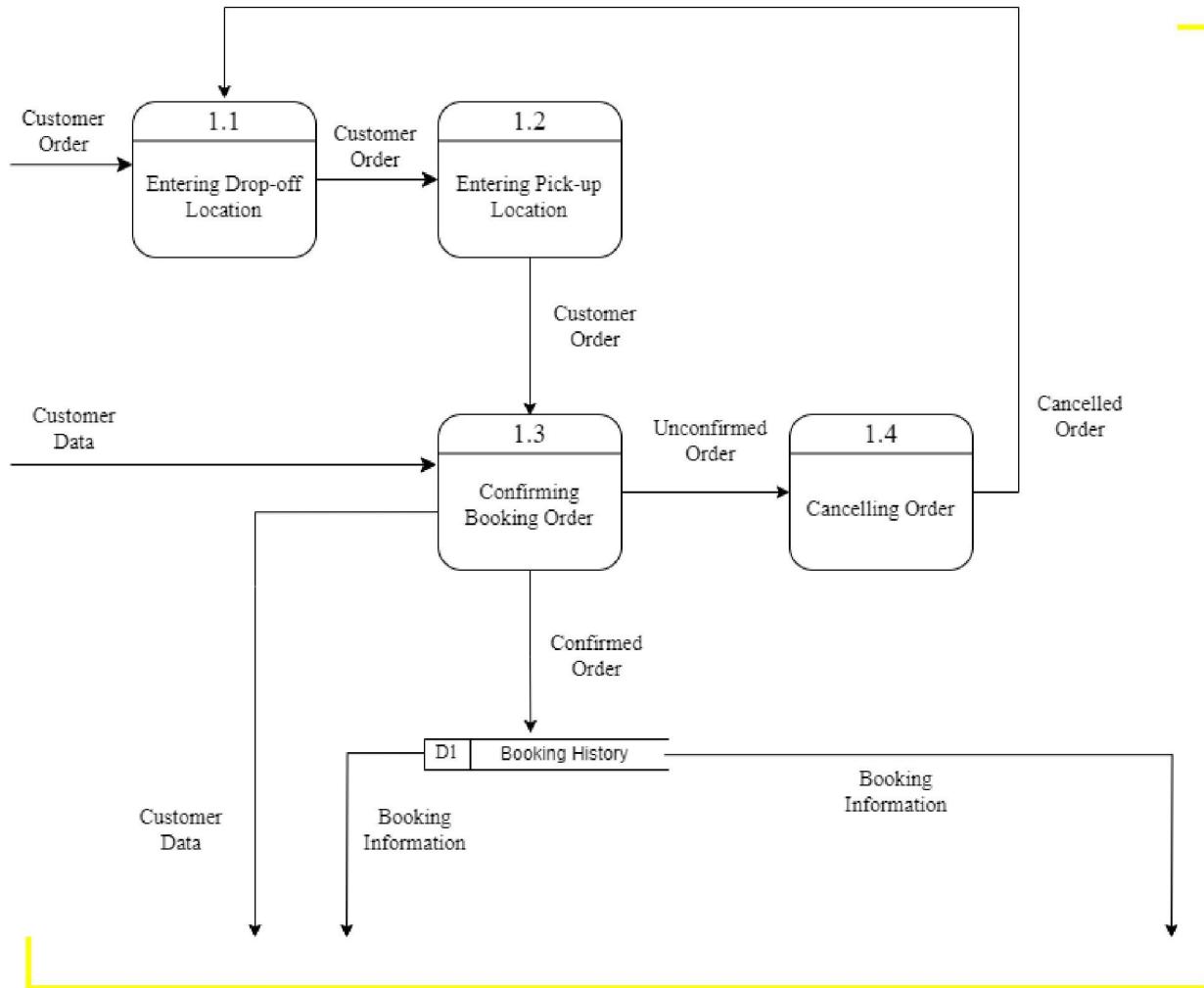
### 5.3.7 Diagram 0



### *Diagram 0 for the current e-Hailing system*

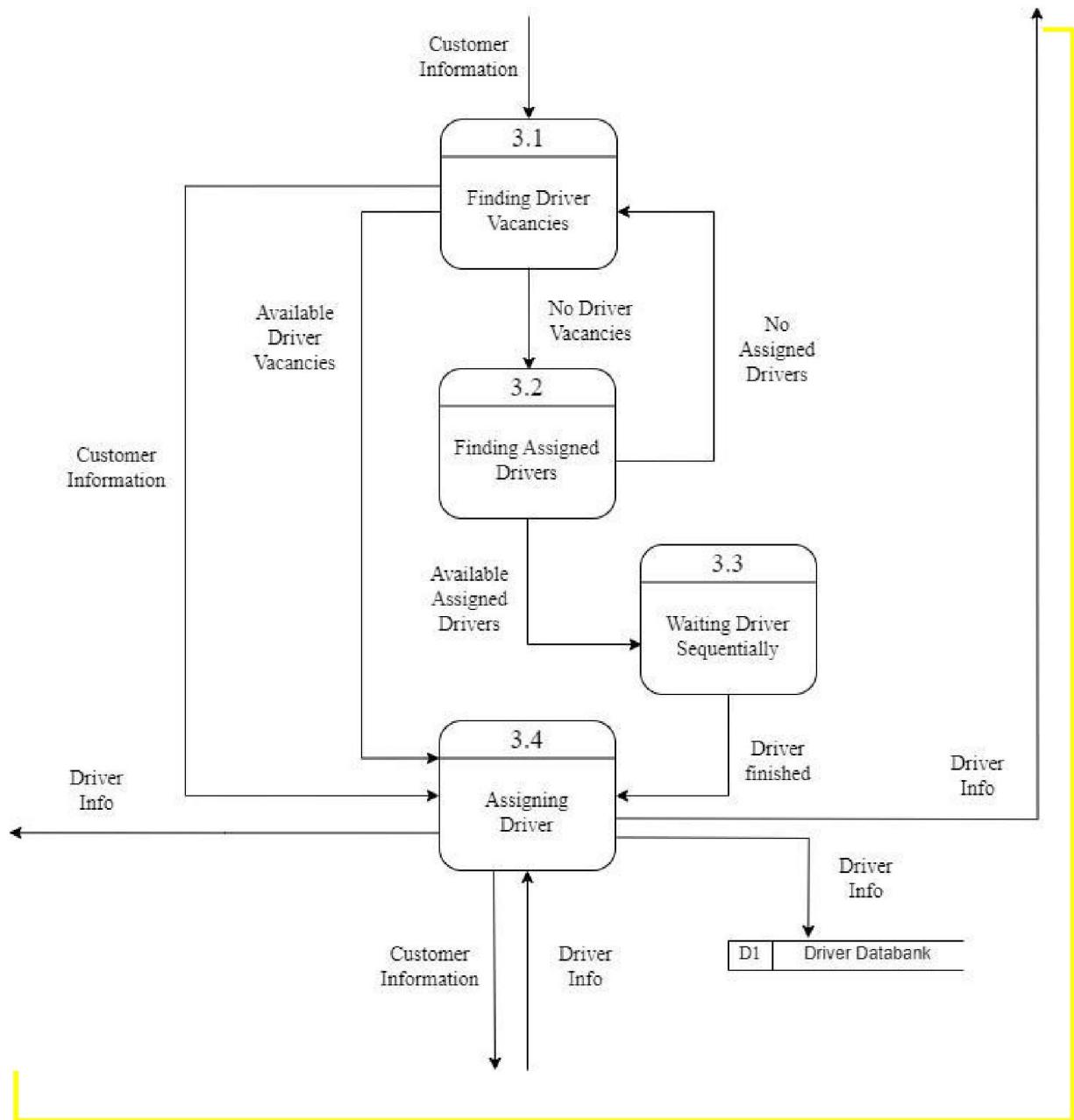
### 5.3.8 Child Diagram(s)

Process 1: Booking Online



*Child Diagram for Process 1 (Booking Online) for the current e-Hailing system*

### Process 3: Allocating Driver



*Child Diagram for Process 3 (Allocating Driver) for the current e-Hailing system*

## **6.0 Summary of Requirement Analysis Process**

In the requirement analysis process for our e-Hailing system project, we conducted a thorough examination to understand the needs and challenges faced by users and drivers. Here's a summary of what we did and what we found:

### **1. Information Gathering**

We collected data using an online questionnaire. This method was chosen because it was efficient and feasible given our time and resource constraints. The questionnaire was distributed to various groups online, and we received 30 responses. The questions covered ease of use, complexity of features, data security concerns, booking delays, and overall user satisfaction.

### **2. Analysis of Responses**

The data collected from the questionnaire revealed several key insights:

**Ease of Use:** Most users found the current e-hailing apps easy to use, but some had issues with setting pickup locations and making payments.

**User Interface (UI):** The majority rated the current UI as average, with a few facing difficulties. **Data Security:** There were mixed feelings about data security, with some users expressing concerns over their data privacy.

**Booking Delays:** Many users experienced delays between booking a ride and the driver's arrival, especially during peak hours.

**Peak Hour Difficulties:** All respondents had trouble booking rides during peak hours, indicating inefficiency in handling high traffic.

**Desired Improvements:** Users wanted better driver availability during peak hours, faster booking processes, enhanced data security, and a simpler UI.

### **3. Identified Requirements**

Based on the responses, we identified several functional and non-functional requirements:

Functional Requirements:

- Simplified user interface for easier navigation.
- Real-time data processing to reduce booking delays.
- Cloud-based infrastructure to handle high data volumes.
- AI and machine learning for better demand forecasting and driver allocation.
- Anonymous reporting system and in-app emergency button for safety.

Non-Functional Requirements:

- Enhanced data security measures, including end-to-end encryption.
- Reliable and scalable system performance to handle peak-hour traffic efficiently.
- Affordable pricing model with a cap on surge pricing.

### **4. Conclusion**

The requirement analysis process provided us with a clear understanding of the current system's weaknesses and the users' needs. By addressing these issues with our proposed solutions, we aim to enhance the current e-Hailing system to a more user-friendly, secure, and efficient e-Hailing system that improves overall satisfaction for both users and drivers.

## **7.0 GitHub Link for Project Phase 2**

<https://github.com/Mathan0702/SYSTEM-ANALYSIS-AND-DESIGN>