



**DEPARTMENT OF INFORMATION AND COMMUNICATION
TECHNOLOGY**

**DIPLOMA IN INFORMATION TECHNOLOGY
(DIGITAL TECHNOLOGY)**

DFT50114: INTEGRATED PROJECT

**AMCAR RENTAL CAR SERVICE
(TECHNICAL REPORT)
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ABSTRACT

AMCAR is a useful app that connects people who own cars with those who want to rent them. The app was created to solve a common problem faced by car owners: figuring out who is responsible for traffic violations when their car is rented out. AMCAR solves this problem by tracking rental cars in real time, which helps with proper maintenance, reduces downtime and allows car owners to get the most out of their vehicles. In addition, the app determines exactly who is at fault for any traffic violation, protecting car owners from legal issues and financial problems.

In addition to solving liability issues, AMCAR makes the rental process easier. It digitizes all necessary documents, provides reminders to return the car on time, offers secure payment options, and facilitates effective communication between car owners and customers. AMCAR's ultimate goal is to create a reliable and transparent platform that benefits car owners and customers in the rental industry.

2.0 PROJECT PLAN

2.1 PROBLEM STATEMENT

The car rental industry has traditionally faced several challenges that AMCAR seeks to address:

1) Manual form and inefficiency

- The renting procedure is inefficient when traditional manual form is used since it requires time-consuming documentation and manual record keeping.

2) Difficulty in identifying responsible individuals for traffic violations

- Difficult to identify people who traffic offences committed since using the manual form

3) Late or non-return of rented vehicles

- Customers always return rental vehicles either late or not at all, causing the vehicle owners inconvenience and profit loss .

2.2 OBJECTIVE

The car rental industry has traditionally faced several challenges that AMCAR seeks to address:

- 1) **Improve efficiency through digitalization:** AMCAR's aim is to make the leasing process more efficient by switching from manual forms to a digital platform. This will require automating operations related to documentation and record keeping and designing an intuitive user interface.

Example: "Improve efficiency, for instance, by automating operations related to documentation and record-keeping and digitising the leasing process."

- 2) **Enable accurate identification of responsible parties for traffic violations:** AMCAR wants to make it easier to identify those guilty of traffic offenses involving rental cars. Implementing a comprehensive tracking system that links individual incidents to responsible parties is necessary to achieve this goal.

Example: "Enable accurate identification of responsible parties for traffic violations by implementing a robust tracking system that connects specific incidents to the individuals involved."

- 3) **Ensure timely returns of rented vehicles:** AMCAR works to minimize hardship and financial loss for vehicle owners by requiring the timely return of rental cars from customers. This goal entails giving customers prompts about their homework through the use of reminders, notifications and clear communication channels.

Example: "Ensure timely returns of rented vehicles by providing reminders, notifications, and clear channels of communication to prompt customers about their return obligations."

2.3 SCOPE

Scope for System:

1) Traffic Violation Identification:

- a) This system will identify exactly who is responsible for any traffic violations that occur with the rental car.
- b) This will protect the car owner from legal issues and financial obligations that arise

2) Rental Management System:

- a) The system will provide a digital process to manage tenancies, eliminating the need for paperwork.
- b) It will simplify car rental by allowing online documentation, automatic record keeping and efficient communication between car owner and customer.

3) Timely Return Reminders:

- a) The system will send reminders and notifications to customers, reminding them to return the rented car on time.
- b) This feature aims to reduce the incidence of customers returning cars late or not at all, which can cause inconvenience and financial loss for car owners.

Scope for User:

Admins (Car Owners):

- 1) **Management of Rental Listings:** Car owners have the power to designate rental rates, availability, and car specifics in their rental listings.
- 2) **Communication with users:** Through the messaging function of the app, car owners can connect with users to answer questions, give instructions and deal with any problems related to the rental.

Customers:

- 1) **Vehicle Search and Reservation:** Customers can search for available rental cars based on where they are, when they want to pick them up, and other criteria. They can then use the app to book the desired car.
- 2) **Rental Agreement and paperwork:** Customers can sign the rental agreement electronically and provide the relevant identity as part of the rental paperwork procedure.
- 3) **Timely Return Reminders:** To ensure that the rental conditions are adhered to, the customer will receive timely reminders and notifications regarding the date and time of return of the rented car.

2.4 LITERATURE REVIEW

Car rental apps have gained significant popularity in recent years, providing users with easy and on-demand access to vehicles for various purposes. This literature review aims to explore and analyze three well-known car rental applications: Turo, Getaround and Zipcar. By examining the features, user experience and impact of these apps, valuable insights can be gained to inform the development and improvement of the AMCAR rental car app.

Table 2.1 : Comparison of Apps Rental

	Application A	Application B	Application C
Name	Turo - Find your drive	GoCar	Zipcar
Description	Turo is a car rental platform that connects car owners with individuals looking to rent a vehicle. It offers a peer-to-peer rental model, allowing users to choose from a wide selection of cars listed by individual owners. Users can find and rent vehicles that suit their needs and preferences, making it a personalized car rental experience. Turo provides a safe and transparent rental process by implementing a trust and reputation system, where users can review and rate both car owners and renters. In addition, Turo offers insurance coverage to protect both parties during the rental period. Overall, Turo aims to provide a convenient and flexible car rental solution that goes beyond traditional rental services.	GoCar is an on-demand car sharing platform that allows you to rent a car by the hour or day via the GoCar app. In other words, you simply rent a car of your choice, from whatever time you want, for how long you want, pay for it, pick it up from various locations, unlock and lock the doors and report any damages, all in the app! GoCar has been in Malaysia since 2015 and they have grown from 5 cars to over 600 cars, in over 280 locations around Selangor, Kuala Lumpur, Kedah, Johor, Penang. They are even expanding to Seremban and Ipoh very soon! GoCar offers various car models in its fleet, such as sedans, crossover SUVs, MPVs, and pickup trucks.	Zipcar is a car-sharing service that provides convenient access to vehicles on a short-term basis. Users can sign up for a membership and reserve a Zipcar vehicle located in their area for hourly or daily use. The service offers a wide range of vehicles, including cars, vans and SUVs, which can be booked in advance or on the spot through their mobile app or website. Zipcar differentiates itself by providing a self-service experience, allowing users to unlock reserved cars using their membership card or smartphone. The service covers the cost of fuel, insurance and roadside assistance, making it a hassle-free option for individuals who need occasional access to a car without committing to owning one. Zipcar aims to provide a sustainable transportation alternative by reducing the number of privately owned vehicles and promoting efficient car sharing among its members.

Name	Turo - Find your drive	GoCar	Zipcar
Logo			
Features	1) Search Filters - The Turo app allows users to search for rental cars using a range of filters, including location, make and model, price range, and other specific features such as automatic transmission or four-wheel drive. This makes it easy for renters to find a car that suits their needs and preferences. 2) Flexible Rental Options - Turo offers a range of rental options, including daily rentals, weekly rentals, and long-term rentals. This allows renters to choose the rental period that works best for their needs and budget. 3) Instant Book - Turo's Instant Book feature allows renters to book a car instantly without waiting for approval from the car owner. This is particularly useful for last-minute bookings or when a renter needs a car quickly.	1) Booking and Reservation: You can easily book and reserve a car through the app by selecting the date, time, and location where you want to pick it up. 2) Unlocking and Access: Instead of using physical keys, you can unlock and access the rented car directly from your phone using the app. 3) Flexible Rental Periods: You have the flexibility to rent a car for a few hours, a whole day, or even longer, depending on your needs.	1) Booking System - Users can easily book Zipcar in advance via mobile app or website. This ensures that the selected vehicle will be available at the specified time and location. 2) Variety of Vehicles - Zipcar offers a wide selection of vehicles, including compact cars, sedans, SUVs and vans, catering to different needs and group sizes. 4) Keyless Entry - Zipcar uses a keyless entry system, allowing users to access reserved vehicles using their membership card or smartphone. This streamlines the recruitment process and eliminates the need for a physical key.

Name	Turo - Find your drive	GoCar	Zipcar
Advantages	1) Wide Vehicle Selection - Turo provides a wider variety of vehicle options, as renters can choose from a range of makes and models that may not be available through traditional car rental companies. 2) Flexible Booking - Users can choose from a variety of rental periods, including hourly, daily or weekly, providing flexibility for different travel periods. 3) Delivery Options - Turo offers convenient delivery options, making it easy for users to access the rental vehicle at the location of their choice.	Convenience: The GoCar app provides a convenient way to rent a car. You can easily book a car from your mobile device, choose the desired pickup location, and access the vehicle without the need for lengthy paperwork or visiting a physical rental office. Flexibility: With GoCar, you have the flexibility to choose the type of car that suits your needs and the duration of the rental. Whether you need a car for a few hours or several days, the app allows you to select the rental period that works best for you.	1) Variety of Vehicles - Zipcar offers a wide selection of vehicles, catering to different needs and group sizes. 2) Reservation System - Users can reserve Zipcars in advance, ensuring availability at the desired time and location. 3) Keyless Entry - Zipcar's keyless entry system allows users to easily access their rental car using their membership card or smartphone. 4) Fuel and Maintenance - Zipcar covers fuel costs and provides regular maintenance for their vehicles, reducing additional expenses for users.
Disadvantages	1) Availability - Vehicle availability at Turo can vary depending on location and time, which may limit options in certain areas or during peak seasons. 2) Pricing - While Turo can provide a more affordable option than traditional car rental companies, the prices set by individual hosts can vary and may not always be competitive. 3) Reliability - Since Turo depends on the individual car owner, reliability and vehicle condition can vary. Users should carefully check ratings and reviews before choosing a rental to ensure a satisfactory experience.	1) Limited Availability: The GoCar app's availability might be limited to certain cities or regions. This means that you may not be able to access the service in all locations, which can be a drawback if you require a rental car in an area where GoCar is not available. 2) Potential Vehicle Availability Issues: Depending on the demand and popularity of the GoCar service in a particular location, there is a chance that the desired car model may not be available at your preferred pickup time. This can be inconvenient if you have specific requirements or preferences for the vehicle.	1) Availability in Restricted Areas - Zipcar availability may be limited to certain cities or regions, which may restrict access in certain locations. 2) Late Fees - Late Zipcar returns may result in additional fees, so users should be careful to return the vehicle on time to avoid additional costs. 3) Time Limits - Users usually have a set time limit for each reservation, and extending the rental may incur additional charges or require the booking of a new reservation.

Name	Turo - Find your drive	GoCar	Zipcar
Platform	Android / IOS	Android / IOS	Android / IOS
Requirement	7.0 and up	4.9.13	6.0 and up
Owned By	Shelby Clark	GoCar Mobility Sdn Bhd	Avis Budget Group
Content rating	Everyone	Everyone	Everyone
Download	5,000,000+ downloads	500,000+ downloads	1,000,000+ downloads
Ratings	4.9 / 5.0	4.4/5.0	4.1/5.0

The Conclusion is a literature review of Turo, Getaround and Zipcar application highlights several key features and factors that have contributed to their success in the car rental market. The peer-to-peer model, technology integration, user experience design, trust system and sustainability initiatives are critical aspects to consider when developing the AMCARcar rental application. By incorporating best practices and addressing the limitations identified in these existing applications, AMCAR can strive to provide users with a convenient, user-friendly and innovative car rental experience.

2.5 METHODOLOGY

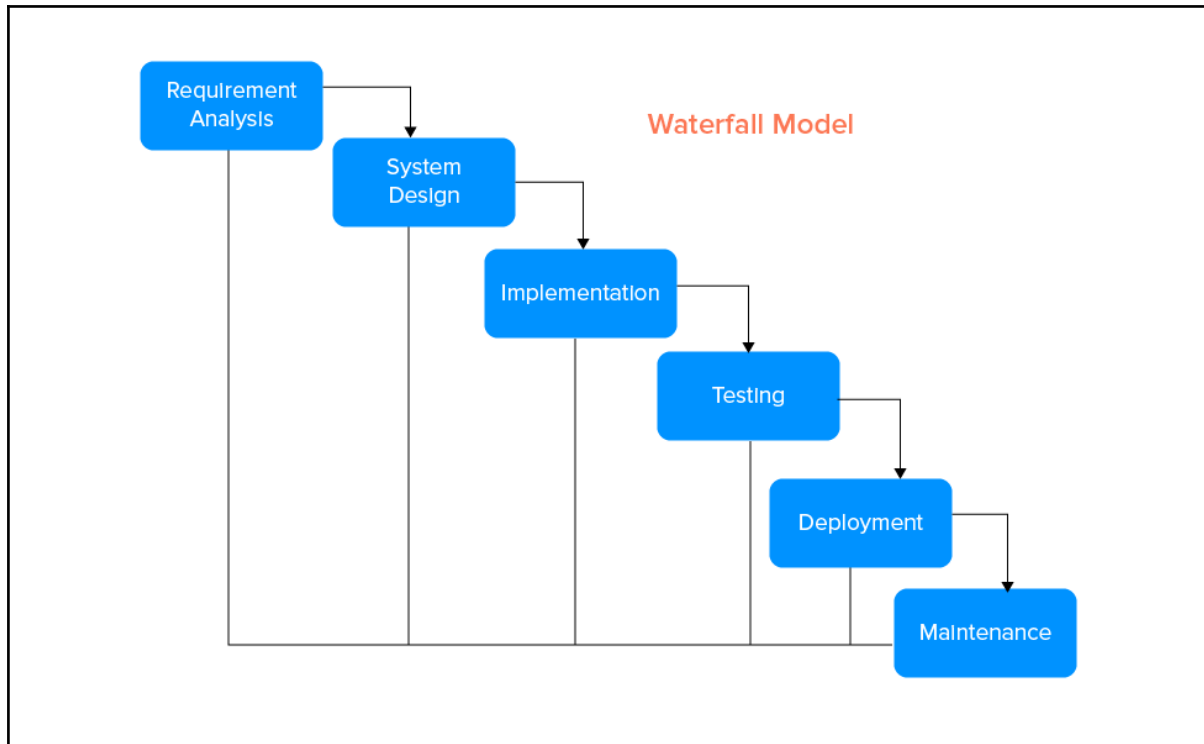


Figure 2.1 : WATERFALL METHOD

Planning the app: Gather the requirements, understand the required features and document them carefully while designing the app.

Designing the app: Creating an app: Layout, navigation, and user-friendliness should all come first when you're designing the look and feel of an app.

Developing the app: Writing code, combining functions, and creating the framework and structure of the application are all steps in the development process.

Testing the app: Thoroughly test the app, see its responsiveness and performance, and find and fix any issues or errors.

Launching the app: Launching the app: Make it accessible for download, take care of the technical aspects and make sure everything runs smoothly.

2.6 GANTT CHART

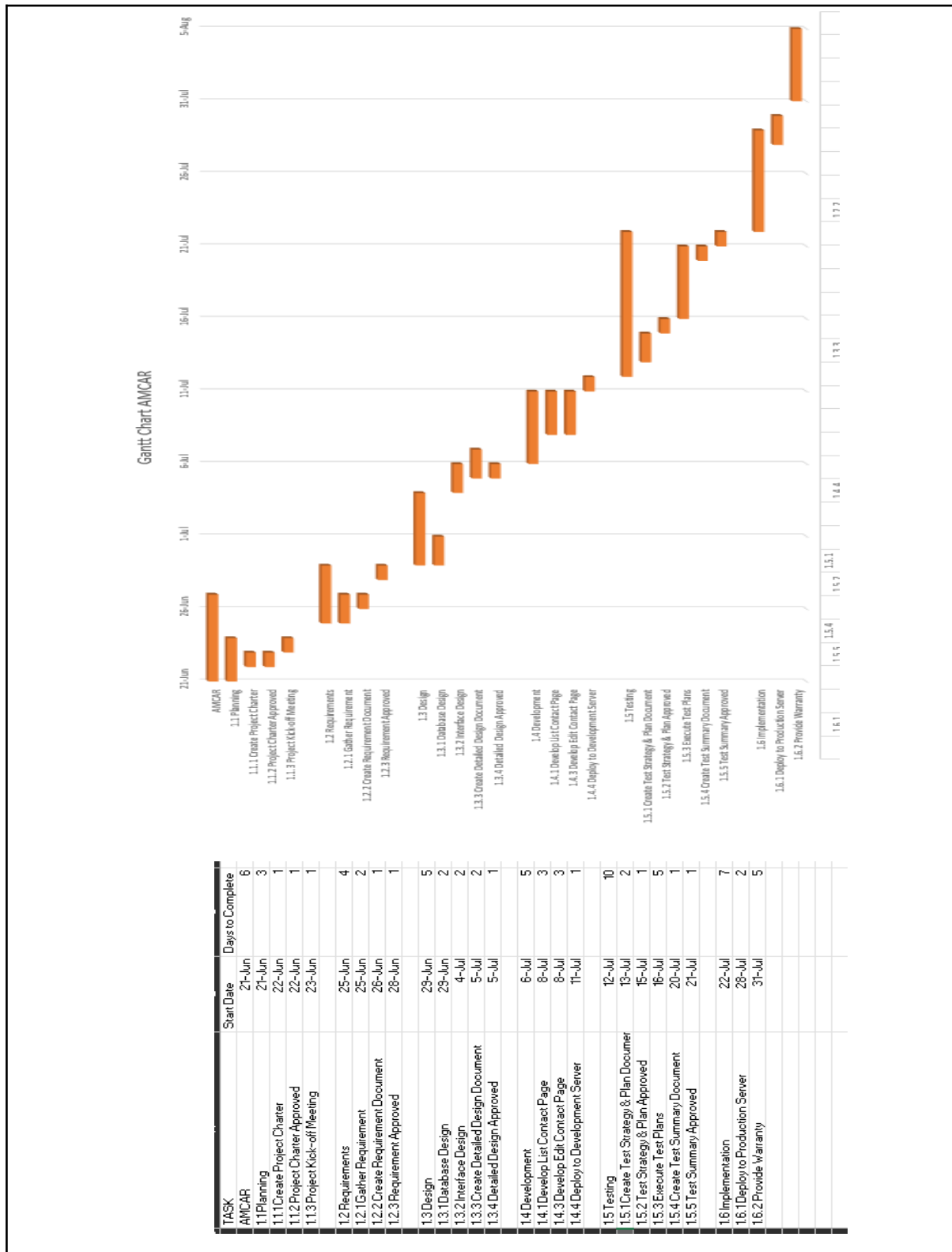


Figure 2.2 : Gantt Chart Progress

3.0 REQUIREMENT SPECIFICATION

3.1 FUNCTIONAL REQUIREMENT

a) User Registration and Login:

Users should be able to sign up and create accounts with the app.
They should be able to log in securely to access their accounts.

b) Car Listing and Booking:

Car owners should be able to list their cars for rent on the app.
Customers should be able to search and book rental cars they like.

c) Traffic Violation Management:

The app should figure out who's responsible for any traffic violations involving rental cars.
Car owners should get notified about any traffic issues with their cars.

d) Digital Documents and Reminders:

The app should store important documents like rental agreements and insurance info.
Customers should get reminders to return the rental car on time.

3.2 NON FUNCTIONAL REQUIREMENT

a) Performance:

The app should be fast and responsive, without any annoying delays.
It should handle lots of users without slowing down.

b) Security:

The app should keep user data and payments safe using strong protection methods.
It should prevent unauthorized access and keep information private.

c) Reliability:

The app should work well all the time, without crashing or breaking.
It should have backups in case something goes wrong.

d) Scalability:

The app should grow easily and handle more users and cars as it becomes popular.
It should be able to handle more demand without problems.

e) Compatibility:

The app should work on different devices like phones and tablets.
It should be compatible with various operating systems.

3.3 HARDWARE & SOFTWARE SPECIFICATION

Table 3.1 :

No	Hardware	Specification
1	Laptop HP Pavilion 15	• Processcor : 12th Gen Intel(R) Core(TM) i5-1240P 1.70 GHz • RAM : 8.00 GB (7.68 GB usable) • Graphic Card: Intel ® Iris ® Xe Graphics • Hard Disk : 500 GB HDD
2	Laptop AcerAspire 5 (A515-51G-55 A5)	• Processcor : Intel(R) Core(TM) i5-7200U CPU @ 2.50GHz 2.71 GHz • RAM : 4.00 GB DDR Memory • Graphic Card: Intel HD Graphics 620 • Hard Disk : 1 TB HDD
No	Software	Specification
1	Android Studio	Developing app using java language
2S	Microsoft Word	Writing proposal and report
3	Adobe Illustrator	Creating and designing image
4	Firebase	Database

3.4 SYSTEM CONFIGURATION

XAMPP: This is the main software we will be using, which includes Apache (web server) and MySQL (database).

- Apache: Responsible for hosting and serving the website.
- MySQL: Used for managing the database and storing data.

Hardware Specification:

- 1) Laptop HP Pavilion 15
 - Processor: 12th Gen Intel(R) Core(TM) i5-1240P 1.70 GHz
 - RAM: 8.00 GB (7.68 GB usable)
 - Graphic Card: Intel® Iris® Xe Graphics
 - Hard Disk: 500 GB HDD
- 2) Laptop Acer Aspire 5 (A515-51G-55A5)
 - Processor: Intel(R) Core(TM) i5-7200U CPU @ 2.50GHz 2.71 GHz
 - RAM: 4.00 GB DDR Memory
 - Graphic Card: Intel HD Graphics 620
 - Hard Disk: 1 TB HDD

Software Specification:

- 1) Android Studio
 - Developing app using Java language
- 2) Microsoft Word
 - Writing proposal and report
- 3) Adobe Illustrator
 - Creating and designing images
- 4) Firebase
 - Database

3.5 SECURITY REQUIREMENT

- 1) **User Authentication:** Ensure that only authorized users can access the app. Use strong passwords and additional security measures such as verification codes.
- 2) **Secure Database Management:** Protect app databases from unauthorized access or tampering. Back up your data regularly and keep it safe.
- 3) **Error Handling:** Handle errors and exceptions gracefully without exposing sensitive information to the user. Error messages should be generic and not reveal specific details about the system or database.

4.0 FINAL DESIGN

4.1 LOGICAL DESIGN

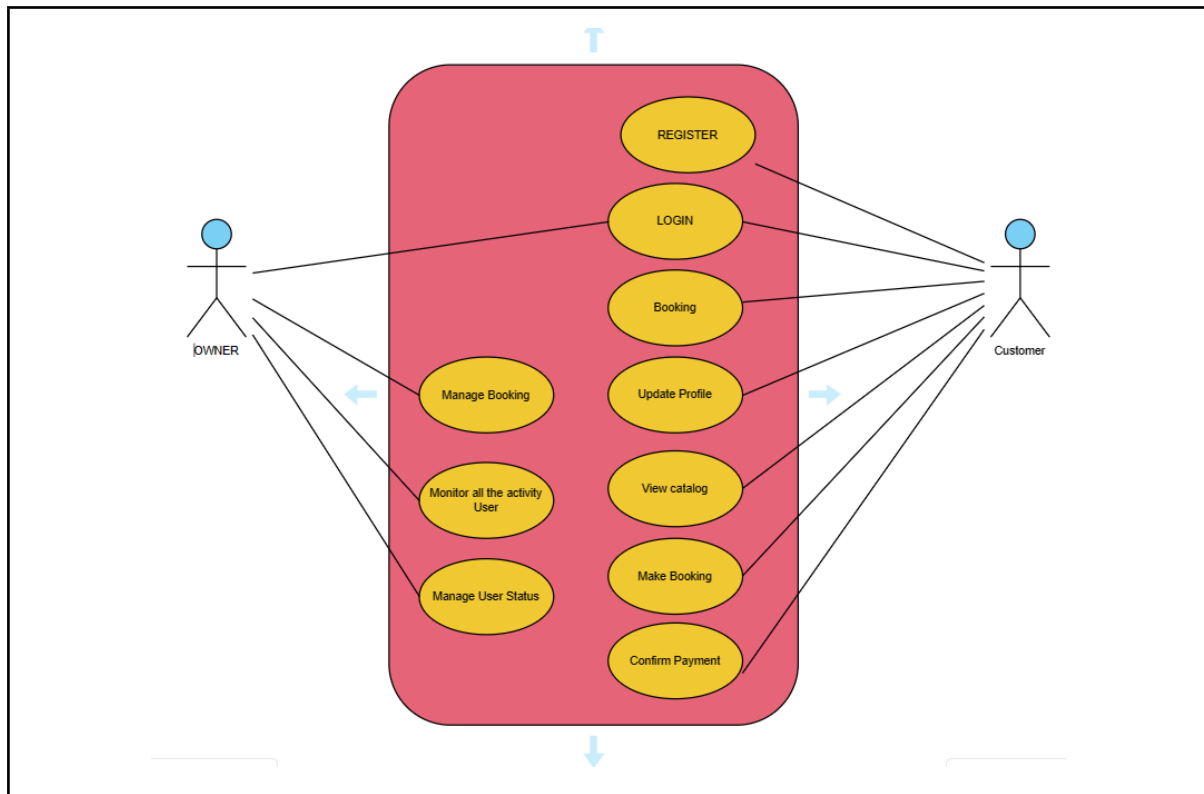


Figure 4.1 : Case Study Amcar

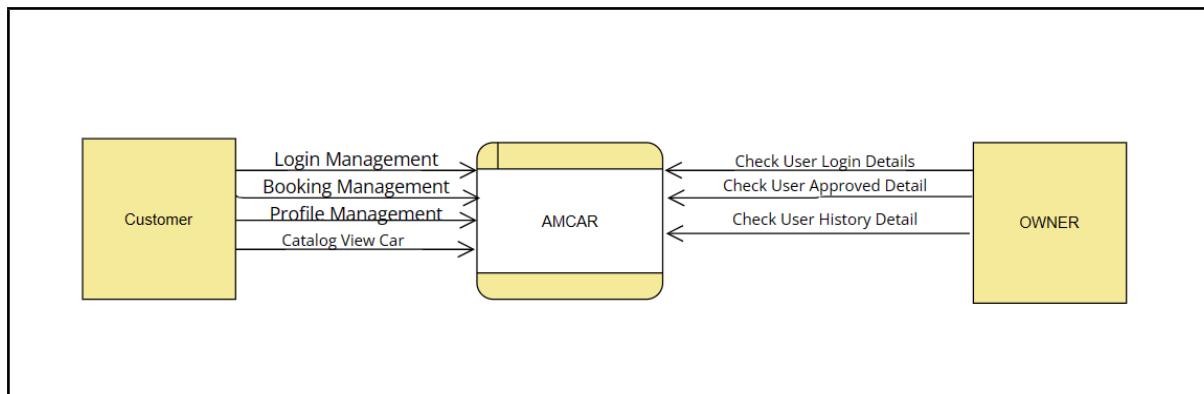


Figure 4.2 : DFD Amcar

4.2 PHYSICAL DESIGN

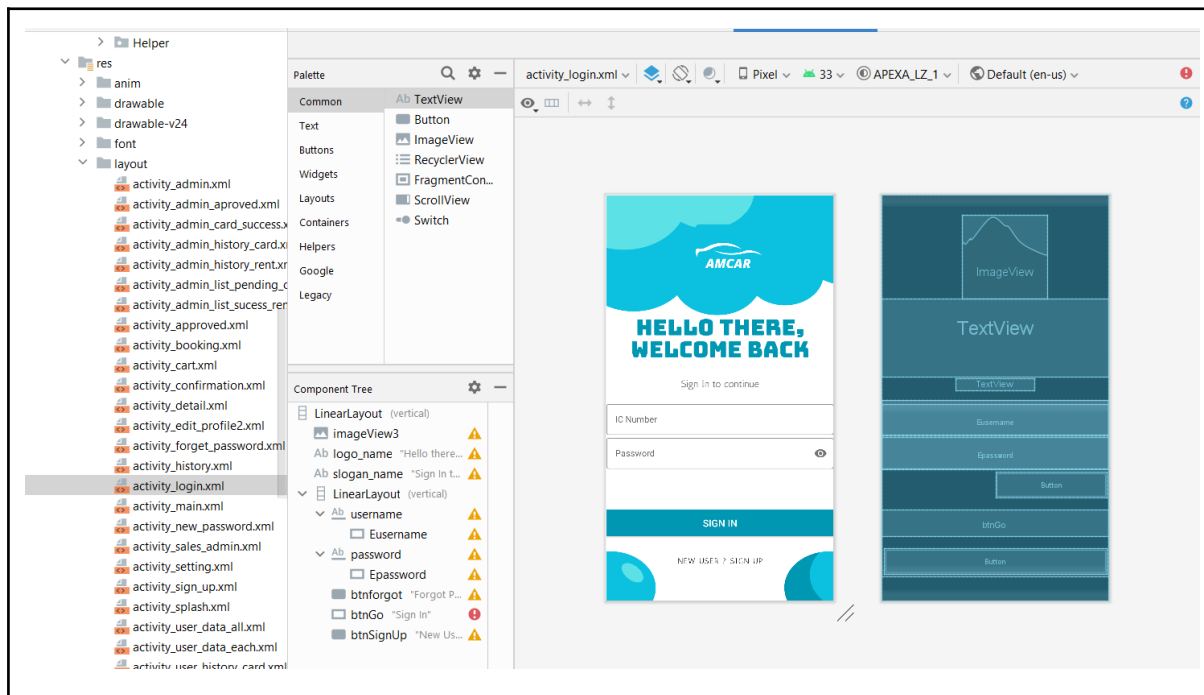


Figure 4.3 : Login Amcar

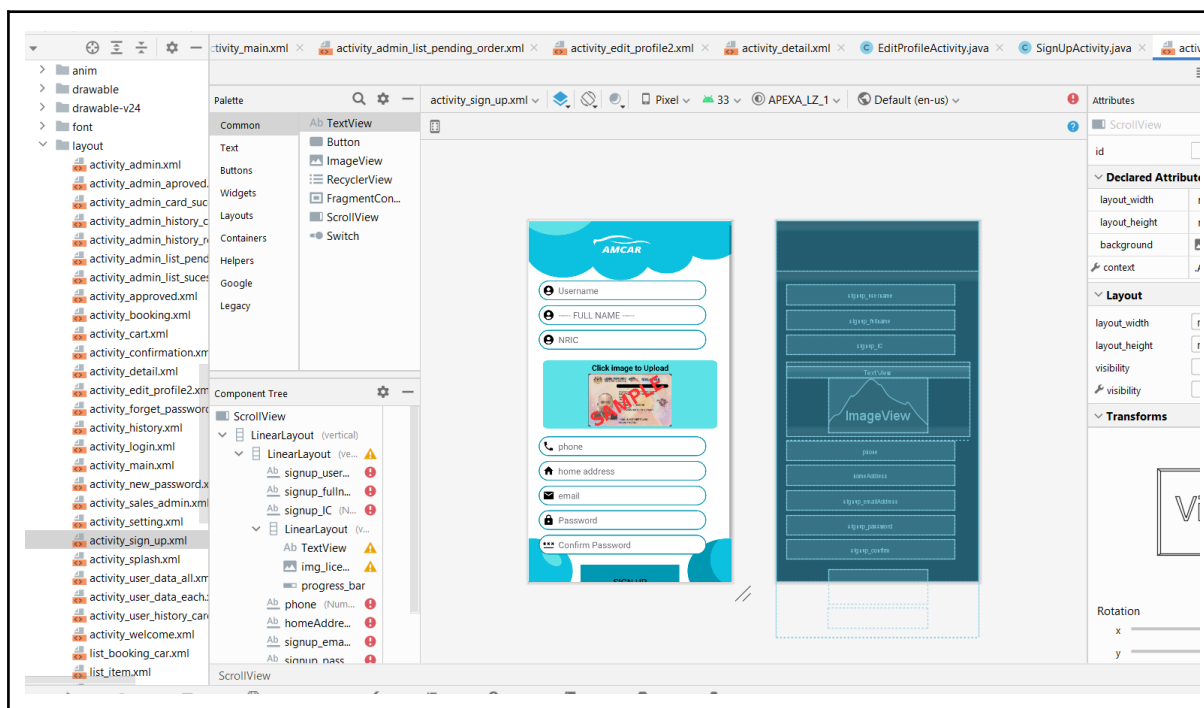


Figure 4.4 : Sign Up Amcar

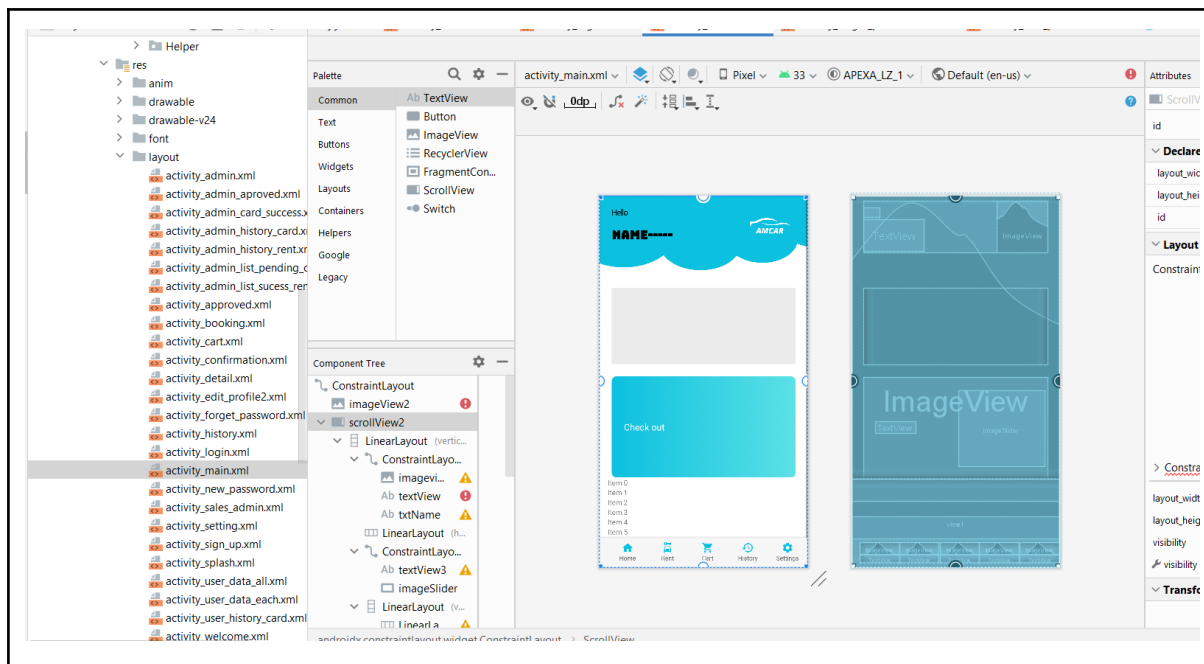


Figure 4.5 Main Page Amcar

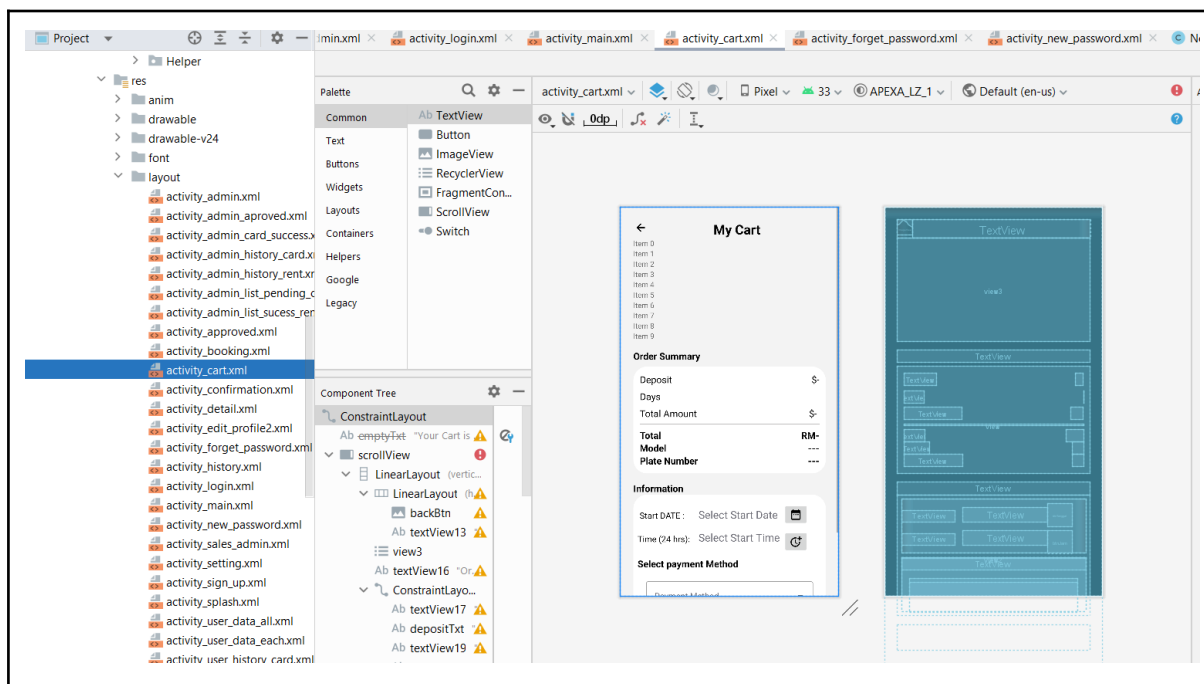


Figure 4.6 Cart Amcar

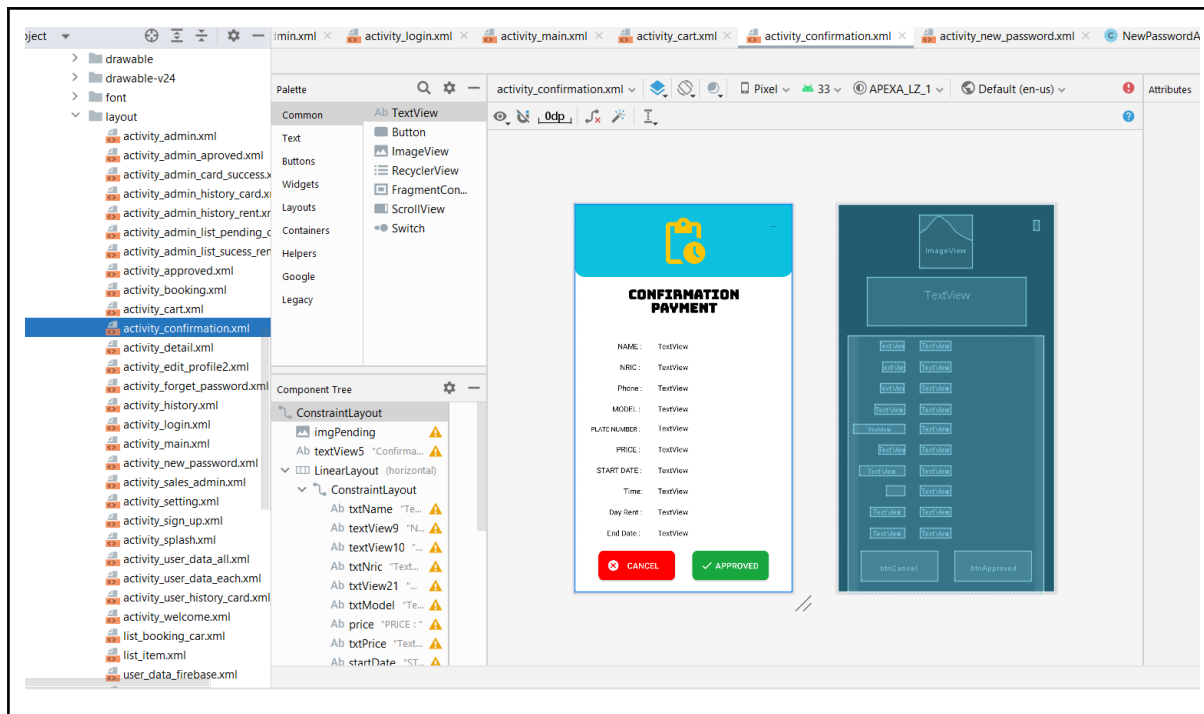


Figure 4.7 : Confirmation Amcar

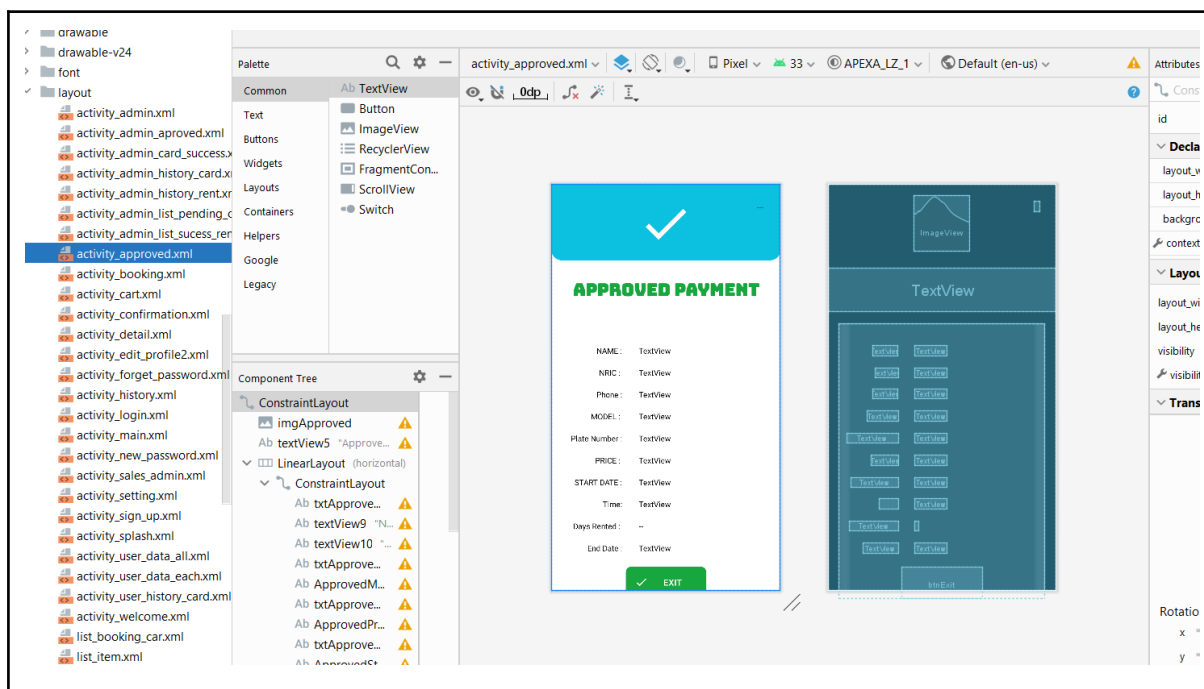


Figure 4.8 : Approved Amcar

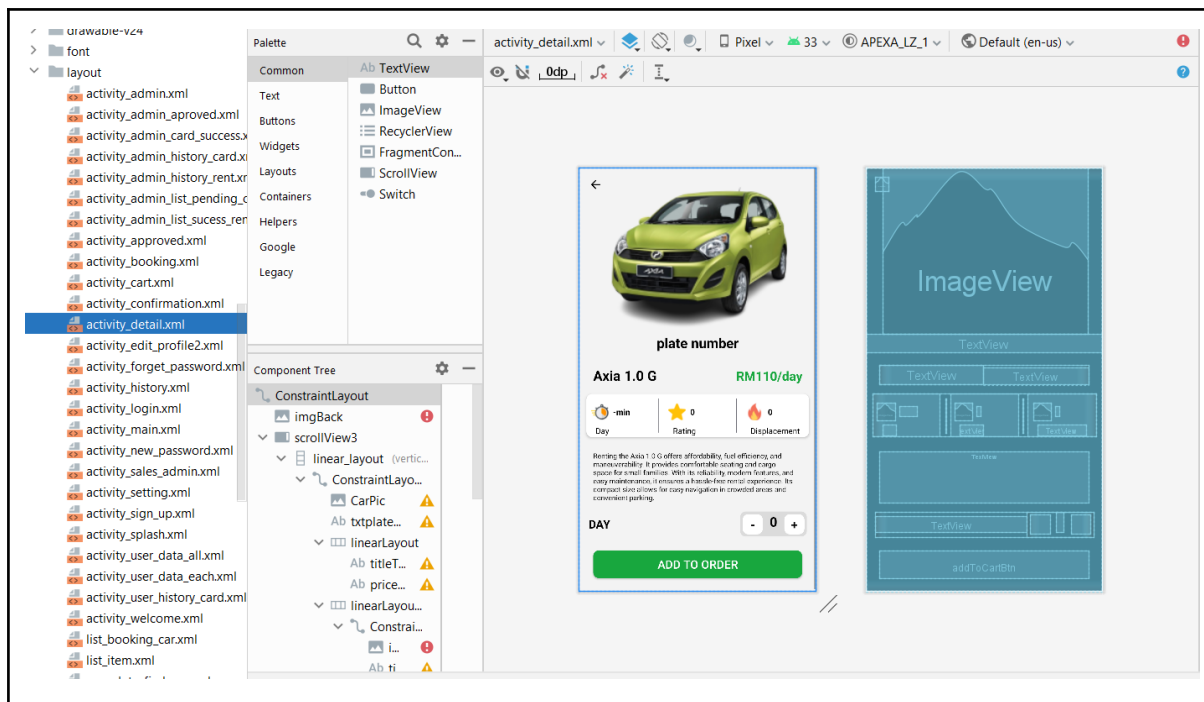


Figure 4.9 : Detail Amcar

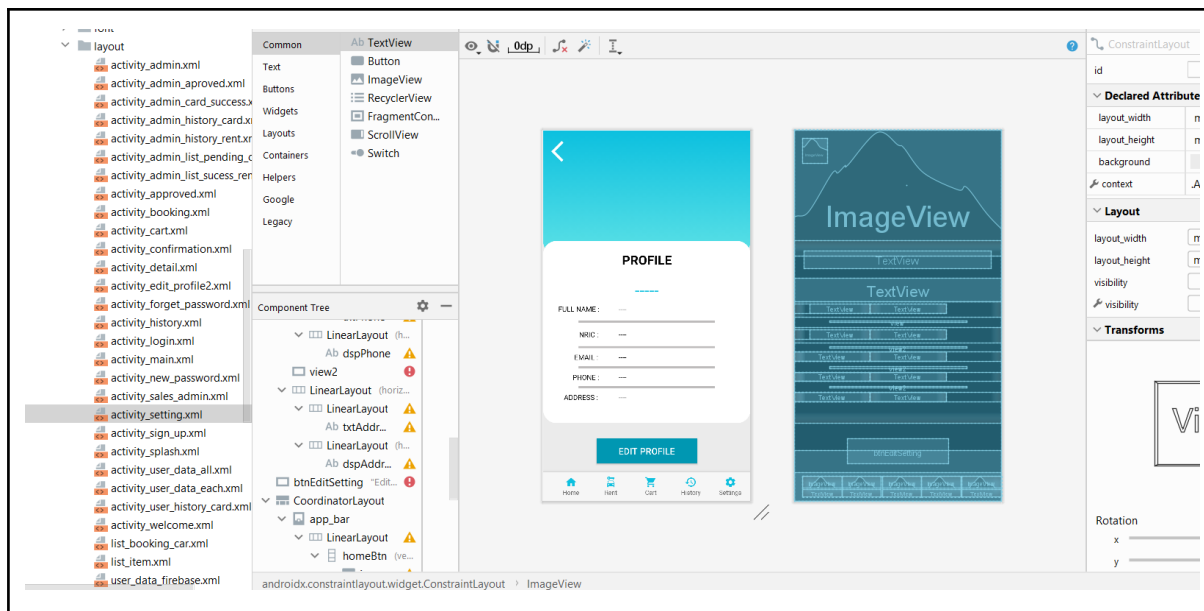


Figure 4.10 : Profile Amcar

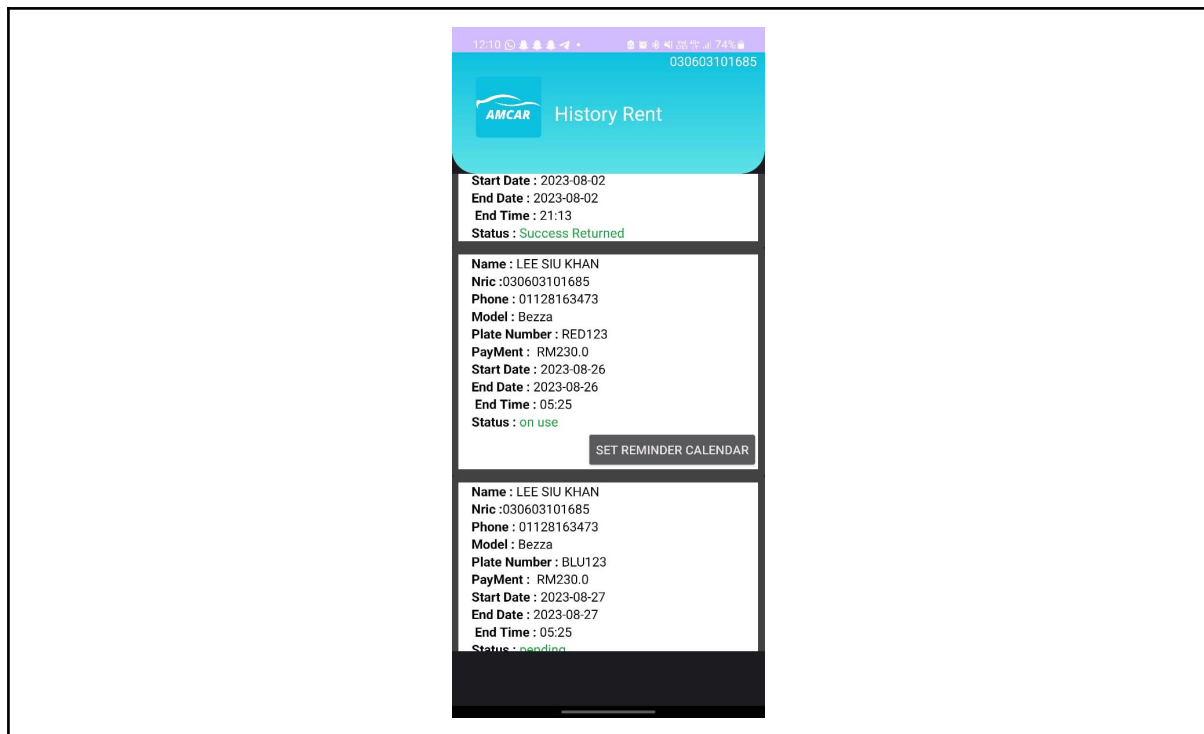


Figure 4.11 : History Amcar

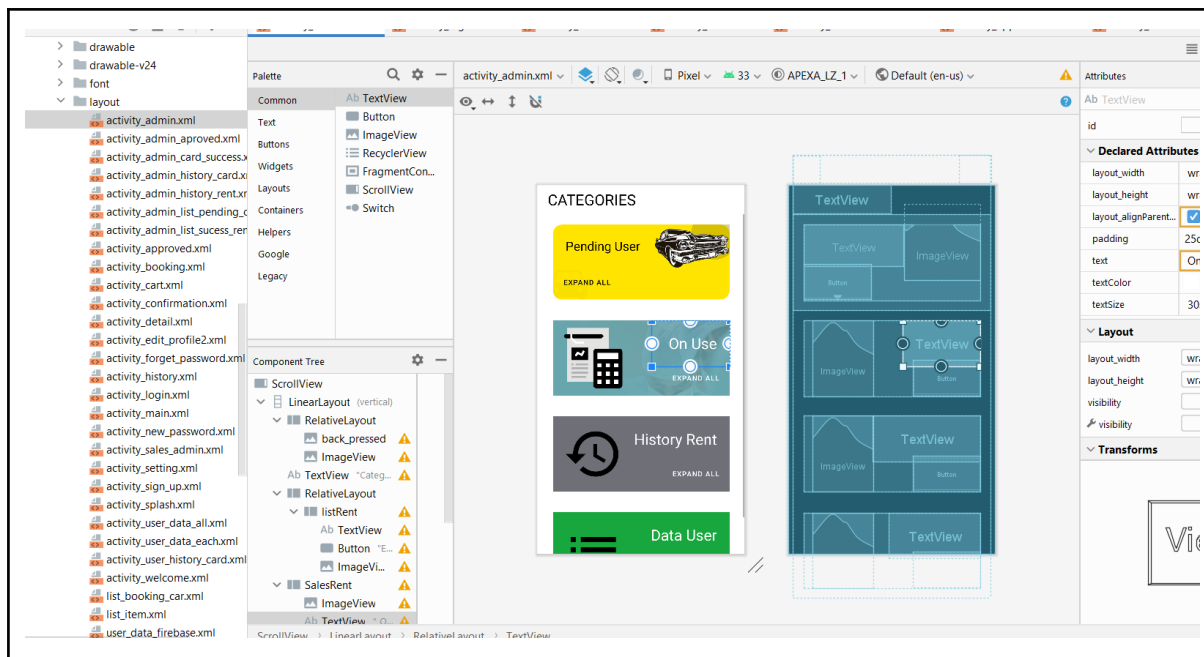


Figure 4.12 : Admin Page

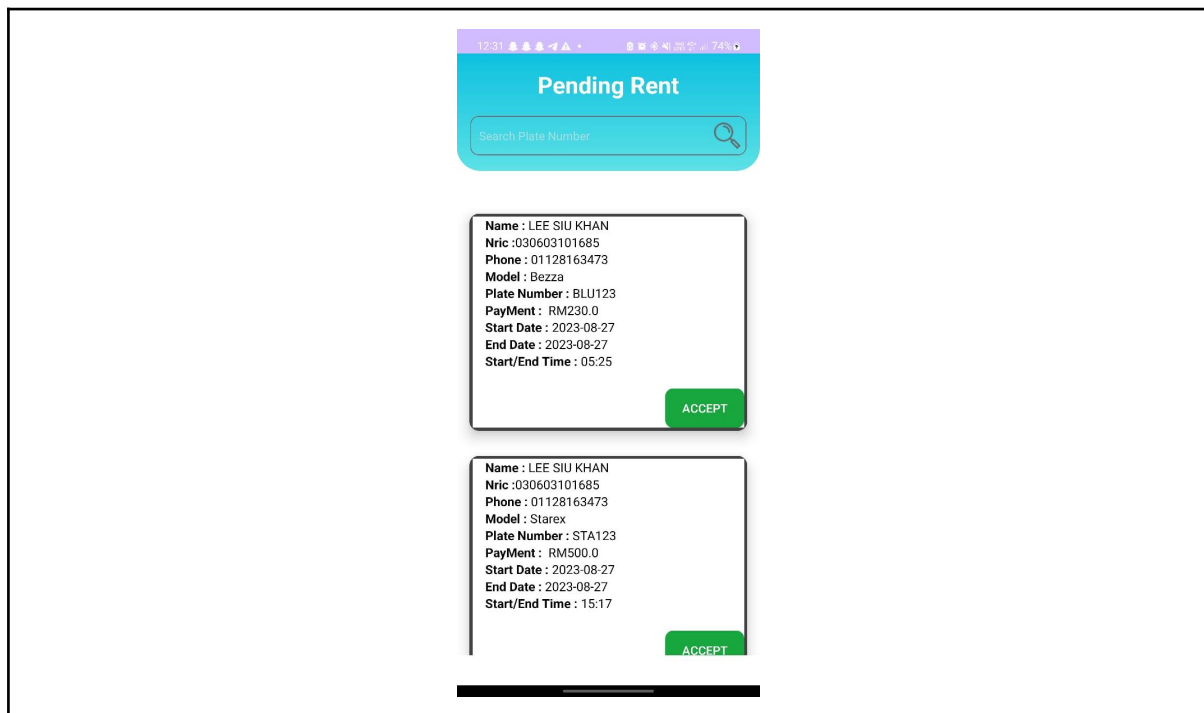


Figure 4.13 : Pending Rent Page

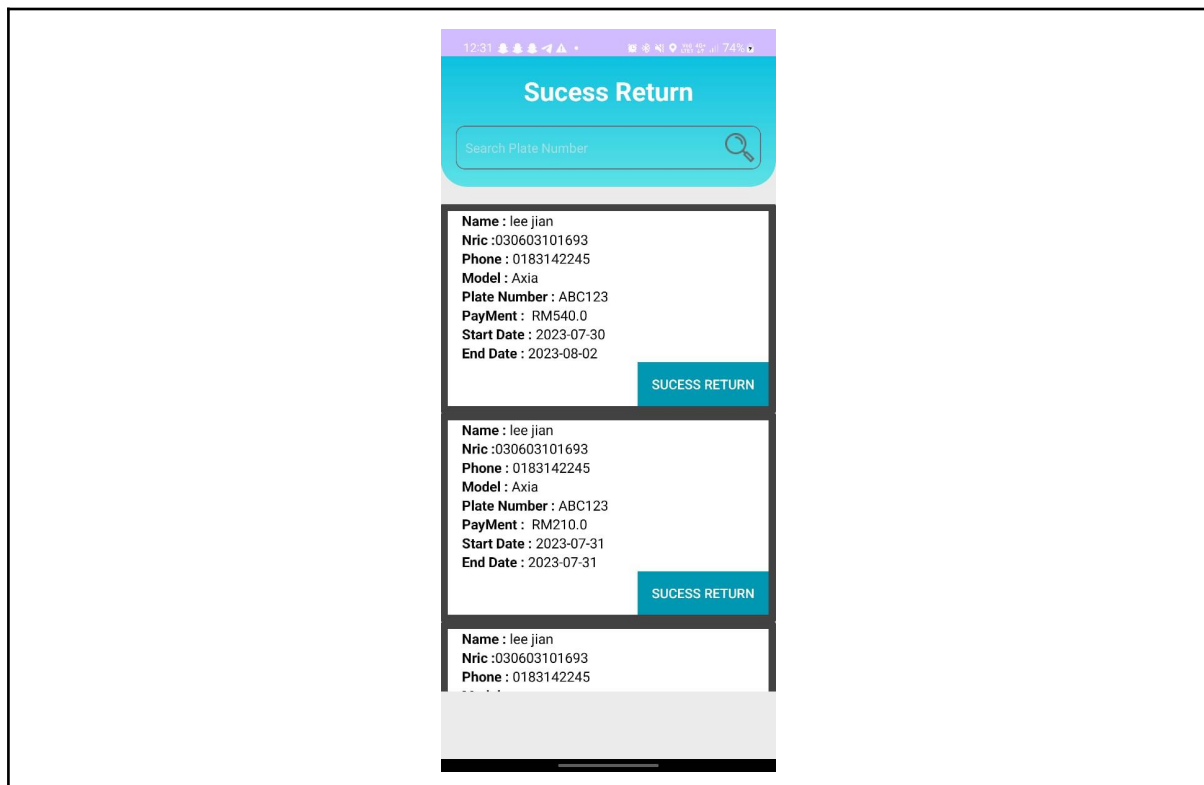


Figure 4.14 : Success Return Page



Figure 4.15 : Data User Page

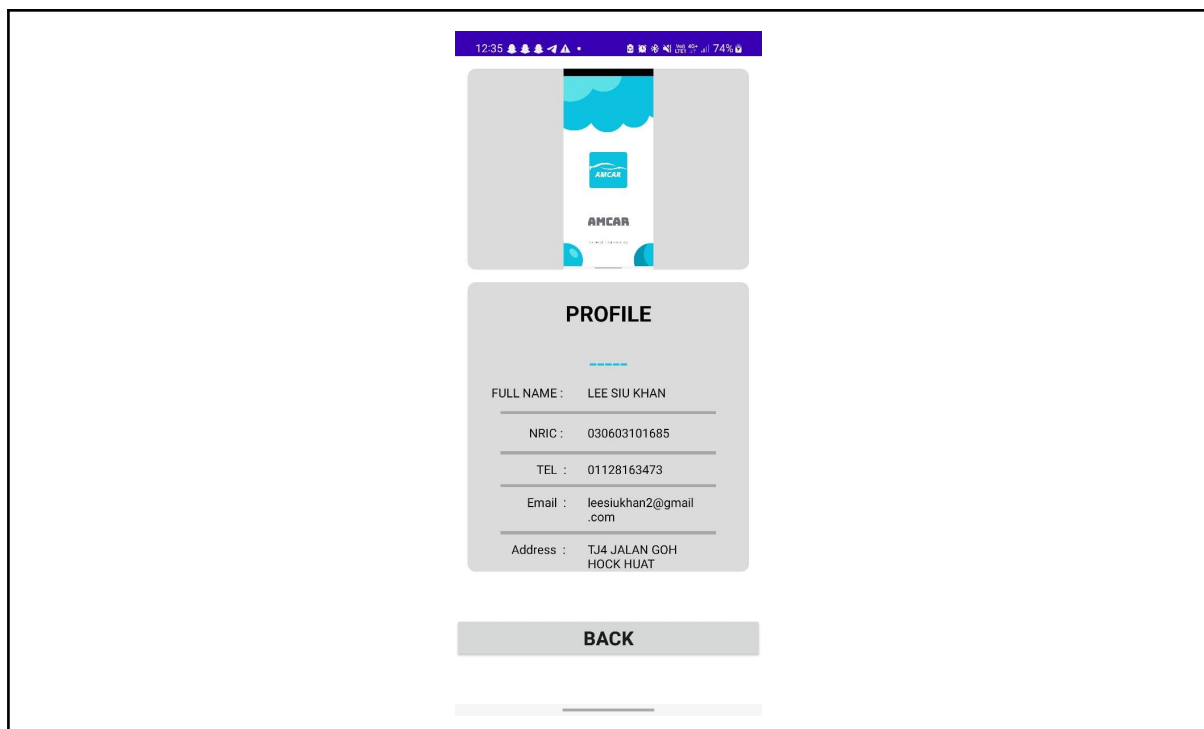


Figure 4.16 : Data Each User Page

5.0 TEST DESCRIPTION RESULT

Table 5.1: Unit Testing Plan

Unit Testing						
No	Test Case Name	Test Procedure	Pre-conditional	Expected Result	Tester	Result (Pass / Failure)
1	Login	User is required to fill the username and password field before access the system	Users need to register or sign up before login	Prompt notification successful login	Ts. Nurul Zakiah	Pass
2	Sign Up	User is required to fill all the data field before login the system	Users need to register or sign up before login	The new user account is successfully created, and the user's data, including name, ID, and contact information, is stored securely in the database.	Ts. Nurul Zakiah	Pass
3	Upload Digital License	User is required to upload license photo field	The app has uploaded documents important license for a rental booking.	The app should display the relevant documents for the specific rental booking.	Ts. Nurul Zakiah	Pass
User Page						
4	Car Listing and Booking	User fills in all the necessary details of the car, including make, model, price and other relevant information.	The app is accessible to car owners for listing their cars.	The car details should be accurately displayed on the app after listing.	Ts. Nurul Zakiah	Pass
5	Calendar Reminder	User add the calendar in	The app is accessible to	After booking a rental car, the app	Ts. Nurul Zakiah	Pass

		calendar app default	customers for booking rental cars.	should allow the customer to set a calendar reminder for the return date, and this reminder should be added to the user's calendar on the specified date and time.		
Admin Page						
6	Traffic Violation Management	Owner search the the customer by searching plate number, name or nric to find the person	Display all the data by searching	Display with the information user history rental	Ts. Nurul Zakiah	Pass
7	Car Return	Owner should click the button success return if customer return car rental	Displat at new page called history rental page	The car status is updated to "Returned" in the database, and the rental history is recorded for the respective user and car, including the start and end dates of the rental period.	Ts. Nurul Zakiah	Pass

Table 5.2: Integration Testing Plan

Integration Testing						
No	Test Case Name	Test Procedure	Pre-Conditional	Expected Result	Tester	Result (Pass / Failure)
1	User Registration and Car Listing	Check if new users can register easily and car owners can list their cars for rent.	The app should be accessible for user registration and the car owner should be able to access the car listing feature.	New users should be able to register without any problems, and car owners should successfully list their cars.	Ts. Nurul Zakiah	Pass
2	Car Booking and Rental Documents	Make sure the customer can book the car and access the necessary rental documents.	The app should be running and the car listing with the relevant rental documents should be available.	Customers should be able to book a car without any problems and they should have access to the necessary rental documents.	Ts. Nurul Zakiahi	Pass
3	Available status of Car	User book a rent car, which means the car is on use and not available for this moment	The System should display not available in the Booking area page	User won't confuse and worry the car is either available or unavailable	Ts. Nurul Zakiah	Pass
4)	Reminder add in calendar	User should click the button set reminder on history page user to make more efficient reminder	The calendar app should display the notes and time	The reminder will push notification on phone when time closed to timeout	Ts. Nurul Zakiah	Pass
5	Upload New License	User should upload new license image that expired license	The user must have already registered and logged into the AMCAR app. The "License Upload" section should be accessible to the user.	The license image will finally display new license	Ts. Nurul Zakiah	Pass

6.0 MAJOR INTEGRATION

6.1 ADVANTAGE OF AMCAR

Efficient Rental Management: AMCAR streamlines the car rental process by digitizing documentation, reducing paperwork and automating record keeping. This efficiency benefits car owners and customers alike, saving time and effort.

Accurate Traffic Violation Tracking: The app's real-time car tracking system helps identify the party responsible for any traffic violation involving a rental car. This protects car owners from legal trouble and ensures fair accountability.

Timely Return Reminder: AMCAR sends reminders and notifications to customers, reminding them to return the rented car on time. This helps reduce the incidence of late returns and avoid inconvenience for car owners.

Wide Vehicle Selection: For customers, AMCAR provides access to a variety of rental cars listed by individual car owners, offering a more diverse selection than traditional car rental companies.

6.2 DISADVANTAGE OF AMCAR

Limited Availability: Depending on location and user base, rental car availability may vary. In some areas, there may be fewer options or limited access to app services.

Car Owner Reliability: Since AMCAR relies on individual car owners listing their vehicles, vehicle reliability and condition may vary. Users should check reviews and ratings to ensure a satisfactory rental experience.

Potential Price Variability: When car owners set their rental rates, prices may vary, and some may not be as competitive as traditional car rental companies, which affects overall cost effectiveness.

App Performance: To provide a smooth user experience, AMCAR needs to handle a large number of users without slowing down or crashing. Ensuring consistent performance during peak hours is important.

Reliance on Technology: As a digital platform, AMCAR's success depends on reliable technology infrastructure and internet connectivity. Any technical issue can impact the overall user experience.

7.0 RECOMMENDATION & CONCLUSION

Recommendation

- 1) **Link Banking on the App Amcar:** This Method make user easier than pay in cash or using Qr code method at the counter
- 2) **User Authentication and Verification:** Outline the methods used to authenticate users and verify their identities, both for car owners and renters. This ensures that only legitimate individuals have access to the app and its features.
- 3) **Communication System:** This App need some communication chat that easier on the app than using any social media such as whatsapp need to get the number from owner.
- 4) **Accessibility Considerations:** If relevant, outline any efforts made to ensure AMCAR is accessible to users with disabilities, following accessibility guidelines and best practices.

Conclusion

AMCAR is a useful app that connects people who want to rent car. It solves a common problem for car owners: figuring out who is responsible for traffic violations when their car is rented. With AMCAR, car owners can track their rental cars in real time, which helps with proper maintenance, reduces downtime and allows them to get the most out of their vehicles. The application also determines exactly who is at fault for any traffic violation, protecting car owners from legal issues and financial problems.

AMCAR also facilitates the rental process. It digitizes all necessary documents, provides reminders to return the car on time and helps car owners and customers communicate effectively. AMCAR's ultimate goal is to create a reliable and transparent platform that benefits car owners and customers in the rental industry.

Overall, AMCAR is a user-friendly app that simplifies car rental, helps avoid traffic violation disputes and aims to provide an easy and reliable experience for everyone involved.

8.0 REFERENCE

https://digitalcommons.harrisburgu.edu/cgi/viewcontent.cgi?article=1037&context=pmgt_dandt

<https://www.moontechnolabs.com/blog/turo-app/#:~:text=Turo%20offers%20a%20range%20of%20delivery%20options%2C%20including%20airport%20delivery.car%20in%20a%20convenient%20location.>

<https://play.google.com/store/apps/details?id=com.zc.android&hl=en&gl=US>

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[\(PDF\) Car Rental System \(researchgate.net\)](#)

[\(PDF\) Online Car Rental System using Web-Based and SMS Technology \(researchgate.net\)](#)