

# Innovative Design Mobile Application for Effortless Car Rental Reservations using Design Thinking Method

Pandu Teja Sutrisno  
University of Technology Yogyakarta  
Yogyakarta, Indonesia

Tri Widodo  
University of Technology Yogyakarta  
Yogyakarta, Indonesia

## ABSTRACT

Technological developments are currently very rapid, as if all activities can be carried out with Android-based applications, including transportation in the car rental sector. The process of getting car information from Gahara Rent Car was previously done by asking to come directly to the rental place. Current technological developments can make it easier for those who want to get car information along with a booking system that can be accessed based on Android. With the application design to determine the level of effectiveness of the application to be built. This system design was created using the Design Thinking method which consists of the empathize, define, ideate, prototype and test stages. The main focus of this application is to make it easier for customers to make car rental orders without needing to come to the location and can be done from anywhere.

## General Terms

Android, Flutter, NodeJs

## Keywords

Design Thinking, Rental, Car, User Interface

## 1. INTRODUCTION

In this modern era, technological developments reach a very wide range of life, especially in helping human life. Mobile application development is gaining increasing attention due to the rapid growth of the mobile technologies and mobile application market[1]. Inefficient Booking Process: The existing booking process is cumbersome and time-consuming. Customers often have to wait in long queues or make multiple phone calls to reserve a car. This results in delays and inconvenience for both the customers and the rental company[2]. The role of technology today can make it easier for everyone to access the latest information anywhere and anytime. This technology is used to make it easier to manage a company's finances to present information effectively and efficiently. For operational efficiency, the information system can be accessed via smartphone so that the operating system is easy to understand.

A rental service is one where customers come to seek the rental of a rental unit[3]. The lack of transparency leads to confusion and frustration among customers, impacting their overall experience and trust in the rental service[2]. A person who needs transportation must call a rental car company and sign a contract[3]. Traditional ways of doing business have changed dramatically since the advancement of technology[4]. The developed system will enable the users to effectively manage the transaction, scheduling, and inventory of cars of the car rental business[5]. It can also help user to give their idle car in rent which will give them an extra bit of income[6]. In the last five years, design thinking has emerged as the quickest organizational path to innovation and high-performance, changing the way creativity and commerce interact[7].

## 2. RESEARCH METHOD

The process in the design thinking method is an iterative process with several stages to identify and understand users, user problems and solutions that allow the author to define the problem from a certain point of view. So that later the design thinking method allows writers to generate as many ideas as possible and develop innovative solutions by democratizing the design through hypothetical testing and prototypes[8]. Another definition of design thinking is an approach to solve design problems by understanding users' needs and developing insights to solve those needs[9].

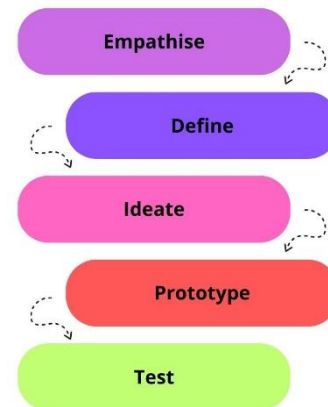


Fig 1 Design Thinking Method

This research will apply the design thinking method to ensure that the product or application meets user expectations and provides an optimal experience. Based on Figure 1, these are the stages or processes carried out by the researcher. This stage is in accordance with the design thinking process, starting from empathise, define, ideated, prototype and test.

### 2.1 Empathise

The empathize stage is an activity about data collection that prioritizes empathy for those around, especially users[10]. The goal of this stage is to understand user needs, and what do users need in a car rental application design that will be built.

### 2.2 Define

At this stage, identify the problem and look for ways to overcome the problem by defining the problem based on the results of user research. This stage will determine the problems that will occur for users in the future.

### 2.3 Ideate

In the design thinking process, the 'Ideate' phase is the process that consolidates ideas that contribute to the ultimate goal of creating a solution for each of the observed problems[11].

## 2.4 Prototype

Prototype is a simple experimental model of a proposed solution used to test or validate ideas, design assumptions and other aspects of its conceptualization[9]. To find out the system flow of the application, we will use a prototype of the system flow that will be designed.

## 2.5 Test

Short evaluation process and only contains important steps that will be useful for the continuation design improvements[11]. At this stage, testing will be carried out on each feature in the application.

## 3. RESULT AND DISCUSSION

### 3.1 Empathise

Based on the empathy stage, it can be warned that in the current technological era, car rental applications can easily be created, so that it can make things easier from the customer's side and in checking the unit, up to the transaction stage. The results of the persona can be seen in the fig 2.

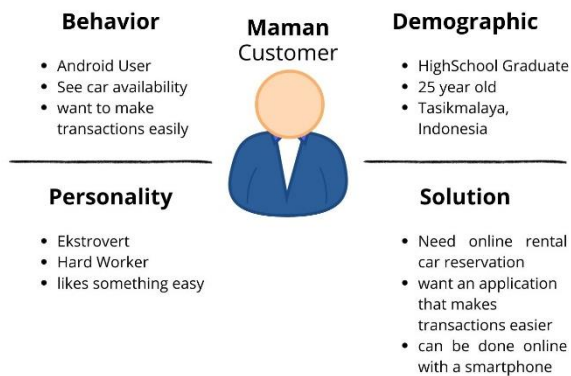


Fig 2 User Persona

### 3.2 Define

At this stage the author collects all ideas from interviews conducted with target users as support in creating a platform that can meet user expectations and turn it into a user persona[8]. Define phase were used as a basis for determining the functionalities of the mobile application[12]. Based on the results of the interview Customers need an application plan that can make it easier to check units and transactions, so the solution is to create a design prototype before designing the application in order to get results that are in line with what consumers need.

Table 1 Require List

No	Required List
1.	Register and Log in Rent Car Application
2.	View Information and Rent a Car
3.	View Car Details and Rental Prices
4.	Transaction
5.	Rent Car Location
6.	Log Out Application

### 3.3 Ideate

At this stage, the idea produced as a solution must be in accordance with the user's problems, so that a system flow and features will be created in the application from the perspective

of the user and service provider. here is the design of the rent car application.

#### 3.3.1 Login Page View

This page is the start page when the user opens the application.

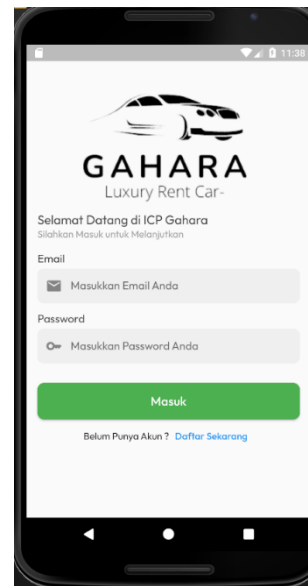


Fig 3 Login

#### 3.3.2 Home Page View

The main menu is the first page when the user enters the application, it contains a car and car rental information menu.



Fig 4 Home Page

#### 3.3.3 Car rental menu

The car rental menu will present a selection of cars available at Gahara rent car.

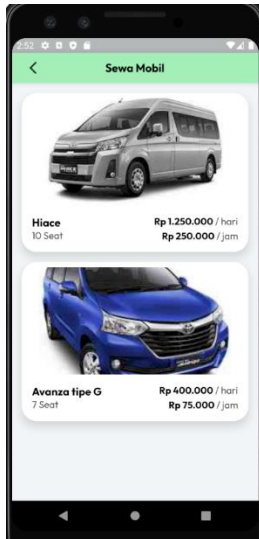


Fig 5 Car Rental Menu

### 3.3.4 Car Information Page

This page contains the cars available at Gahara rent car.



Fig 6 Car Information Page

### 3.3.5 Car Detail Page

The car details page is a page that contains the specifications of the selected car.

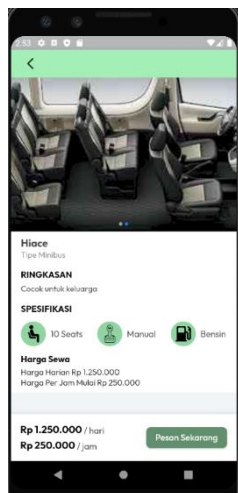


Fig 7 Car Detail Page

### 3.3.6 Settings Page

This page is the page where users can change their profile and also log out of their account.

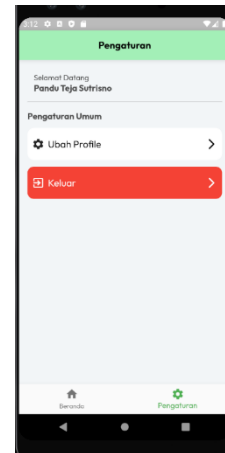


Fig 8 Setting Page

### 3.3.7 Location Page

The location page is a page that contains the Gahara Rent Car location.

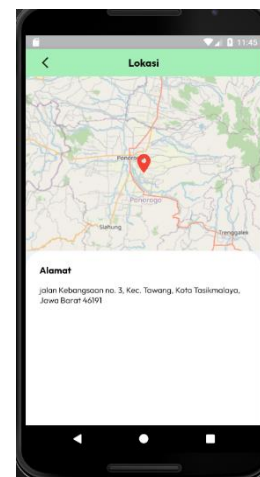


Fig 9 Location Page

### 3.3.8 Order List Page

In the active orders section there will be a list of active orders and it contains rental data up to the rental price.

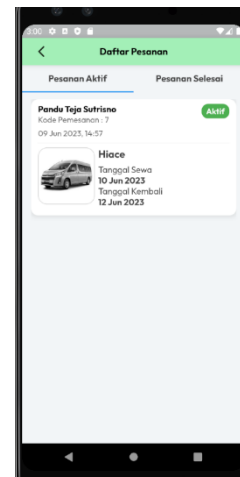
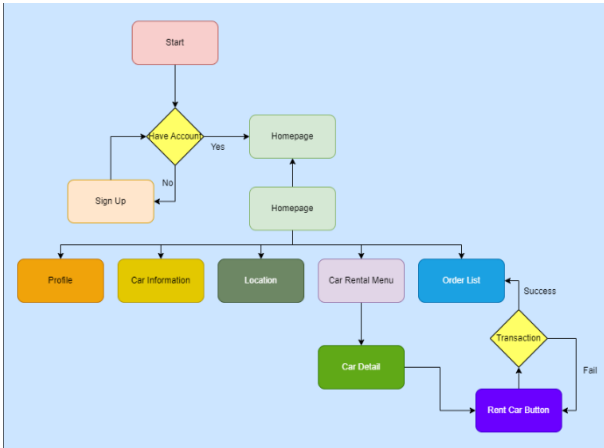


Fig 10 Order List Page

### 3.4 Prototype

At this stage produces a series of reduced product versions or determines specific features in a product, so that users can explore solutions to problems created in the previous stage[13]. The results of the prototype system flow for each feature in the application design can be seen in Fig 11.



**Fig 11 Prototype Sistem**

A car rental app design prototype can include a variety of elements, from the home page to the booking process and user account management. The following is an example of a car rental application design prototype description:

Homepage:

- Clean and simple design with an organized navigation menu.
- Attractive display with appetizing food images.
- Prominent “Car Information, Location, Car Rental Menu, Order List and Profile” button to enhance user action.

Car Information:

- to customize vehicle selection based on criteria such as model, price, or fuel type.
- A list of vehicles that match your search criteria, including images, model names, and prices.

Location:

- feature to tell customers the location of the car rental owner.

Car Rental Menu:

- A page that provides complete details about the vehicle, including specifications, amenities and rental policies.
- A prominent “Order Now” button.

Order List:

- Notification feature to inform users about booking status and rental History which includes all previous transactions.

Profile:

- Users can view order history, manage shipping addresses, and set account preferences.
- Option to provide a review or rating after receiving the order.

### 3.5 Test

At the testing stage, researchers use the black box testing method To find out the performance of this car rental application, the author carried out test using the Black Box Testing method. Black Box Testing refers to the technique of testing a system with no knowledge of the internals of the

system. Black Box testers do not have access to the source code and are oblivious of the system architecture[14].

**Table 2 BlackBox Testing**

Feature	Input	output	Result
Register	Register on the login menu then fill in the registration form	Successful registration	Success
Login	Fill in your username and password then select login	Enter the main application page	Success
Profile	Press the profile feature on the main page	User profile view	Success
Car Rental Menu	Press the Car Rental Menu feature on the main page	Car Rental Menu	Success
Car Information	Press the Car Information Page feature on the main page	Car Information Page	Success
Order List	Press the profile feature on the main page	User profile view	Success
Location	Press the Location Button on the main page	Enter the Location page	Success
Transaction	Press the car rental button.	Payment Success then Order List Page	Success

## 4. CONCLUSION

With the completion of all research activities, system analysis, program design through to implementation and discussion, the author can draw the following conclusions:

1. This research is able to develop an Android-based online car rental application design that includes car rental information that can be accessed online, making it easier for renters to get information when renting a car, knowing which cars are available and booking times, renting a car according to their wishes easily.
2. This research is able to create an Android-based application design that can help the owner or manager of Gahara Rent Car in managing and

publishing information related to cars at Gahara Rent Car so that it can be accessed online.

3. Innovative application design to make it easier for developers to get application design plans that suit their users and what is needed to develop applications.
4. Successfully created an application design prototype to make it easier for customers to check and make unit transactions.

## 5. ACKNOWLEDGMENTS

With great gratitude, we hope that this car rental application can provide the best benefits and experience for users. We thank the development team who have provided their dedication and expertise in designing, developing and testing this application design prototype. Your contribution not only improves the application's functionality, but also brings significant innovation.

## 6. REFERENCES

- [1] E. Li and M. Yang, "Enhancing Teaching Effectiveness in Mobile Application Development with Structured Practice," *TALE 2019 - 2019 IEEE Int. Conf. Eng. Technol. Educ.*, 2019, doi: 10.1109/TALE48000.2019.9226000.
- [2] R. Donde, A. Chaudhari, S. Kapse, and V. Ghuge, "RESEARCH IN ENGINEERING MANAGEMENT THE CAR RENTAL SYSTEM," pp. 1345–1347, 2023.
- [3] A. Thakur, "Car Rental System," *Int. J. Res. Appl. Sci. Eng. Technol.*, vol. 9, no. VII, pp. 402–412, 2021, doi: 10.22214/ijraset.2021.36339.
- [4] B. Tidd, Pavitt, "Integrating Technological Market," no. May, pp. 75–87, 2018.
- [5] M. Albino, "Development of Car Rental Management System with Scheduling Algorithm," *Int. J. Sci. Eng. Technol.*, vol. 9, no. 2, pp. 1–7, 2021.
- [6] S. H. Mahi, U. H. Maliha, and S. Sakib, "Development of Web and Mobile Application Based Online Buy, Sell and Rent Car System," *Proc. - 2020 Adv. Comput. Commun. Technol. High Perform. Appl. ACCTHPA 2020*, pp. 143–147, 2020, doi: 10.1109/ACCTHPA49271.2020.9213208.
- [7] O. Serrat, "Knowledge Solutions: Tools, Methods, and Approaches to Drive Organizational Performance," *Knowl. Solut. Tools, Methods, Approaches to Drive Organ. Perform.*, pp. 1–1140, 2017, doi: 10.1007/978-981-10-0983-9.
- [8] W. S. L. Nasution and P. Nusa, "UI/UX Design Web-Based Learning Application Using Design Thinking Method," *ARRUS J. Eng. Technol.*, vol. 1, no. 1, pp. 18–27, 2021, doi: 10.35877/jetech532.
- [9] A. Suzianti, A. D. Wulandari, A. H. Yusuf, A. Belahakki, and F. Monika, "Design Thinking Approach for Mobile Application Design of Disaster Mitigation Management," *ACM Int. Conf. Proceeding Ser.*, pp. 29–33, 2020, doi: 10.1145/3379310.3379324.
- [10] I. Darmawan, M. S. Anwar, A. Rahmatulloh, and H. Sulastri, "Design Thinking Approach for User Interface Design and User Experience on Campus Academic Information Systems," *Int. J. Informatics Vis.*, vol. 6, no. 2, pp. 327–334, 2022, doi: 10.30630/joiv.6.2.997.
- [11] N. Vittayaphorn *et al.*, "Design and Development of a User-Centered Mobile Application for Intermodal Public Transit in Bangkok: A Design Thinking Approach," *Infocommunications J.*, vol. 2023, pp. 41–52, 2023, doi: 10.36244/ICJ.2023.SI-IODCR.7.
- [12] G. L. Diaz Intal, D. Senoro, and T. Palaoag, "User Experience Design for Disaster Management Mobile Application using Design Thinking Approach," *ACM Int. Conf. Proceeding Ser.*, pp. 7–13, 2020, doi: 10.1145/3446569.3446587.
- [13] E. Z. Dewi, M. Fransisca, R. I. Handayani, and F. L. D. Cahyanti, "Analysis and Design of UI/UX Mobile Applications for Marketing of UMKM Products Using Design Thinking Method," *Sinkron*, vol. 7, no. 4, pp. 2329–2339, 2022, doi: 10.33395/sinkron.v7i4.11505.
- [14] M. Syarifudin and T. Widodo, "Implementation of User Centered Design for Psychologist Consultation Application Design," *Int. J. Comput. Appl.*, vol. 185, no. 39, pp. 17–22, 2023, doi: 10.5120/ijca2023923196.