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Design and Development of a Fullstack Information System for an E-Flight Ticket Platform Using JavaScript

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ABSTRACT

Whatever the reason for people's craving for speed, air travel in the present day is developing quite quickly. Online transportation service providers are starting to appear in response to the growing demand for air travel, catering to consumers' desires for convenience and speed. As time went on, the public's enthusiasm in making online travel reservations led to the establishment of an increasingly well-liked e-ticket platform. This study aims to design and develop a Fullstack E-Flight Ticket Platform information system that uses primarily Javascript programming language. The information system is designed to simplify the process of order flight tickets online, starting from scheduling search, route selection, payment, to sending electronic tickets to customers. In this research, users requirement and comprehensive system design were carried out using UML and Entity Relationship Diagram (ERD). The development of this information system uses Javascript libraries, such as Node.js, React.js, and ExpressJS. The result of this research is a Fullstack E-Flight Ticket Platform information system that run well and can be easily, intuitive users experiences. With the Fullstack E-Flight Ticket Platform information system, it is hoped that it can simplify and speed up the process of ordering flight tickets for the people of Indonesia and also become a reference for researchers or information system developers in developing fullstack Javascript-based information systems.

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1. INTRODUCTION

Act No. 1 of 2009 states that aviation must be a part of a national transportation system with capital density, high technology, speed, and dependable management. To contribute to the creation of a steady and dynamic national distribution pattern, it also needs to fulfill its potential and play an effective and efficient role. Because safety is so important to the aviation sector, optimal safety requirements are required to satisfy current technology improvements. Any individual or group operating inside an international organization, such as the Federal Aviation Administration (FAA), the European Aviation Security Agency (EASA), or the International Aviation Safety Organization (ICAO), is required to abide by all norms and regulations. The European Economic Community (MEE) counts the Joint Aviation Authority (JAA) as one of its members.[1] Regardless of the people's need for speed, modern air transport is undergoing a very rapid development.[2] With the increasing need for air transportation, online transportation service providers are emerging to meet people's needs for speed and ease of travel. As time passed, the emergence of an increasingly popular e-ticket

platform was due to an increasing public interest in booking flights online. However, developers were forced to keep upgrading the system due to high demands on the quality and speed of product delivery.[3] The rapid development of information technology in the current digital era has influenced many aspects of human life, including the aviation industry.[4] Nowadays, people can easily purchase flight tickets online through websites or applications provided by airlines.[4][5] However, there are still many issues faced in the online flight ticket booking process, such as complex and time-consuming procedures, limited information provided by websites or applications, and errors in the payment and ticket delivery process.[6] Therefore, there is a need for an information system that can simplify and expedite the online flight ticket booking process by providing comprehensive, accurate, and reliable information.[7] One way to address these issues is by designing and developing a Fullstack E-Flight Ticket Platform information system using the JavaScript programming language.[8]

JavaScript has been around for over 20 years and is one of the dominant programming languages used in web development. Initially, it was used to enhance user interactions on websites. In 2009, an American software engineer named Ryan Dahl developed a server-side programming environment for JavaScript called Node.js [1],[2] which is still widely used and continually evolving. This led to the concept of fullstack JavaScript Development, indicating that software/system development activities use JavaScript from the server-side to the client-side.

2. METHOD

This project has a period of 3 sprints (6 weeks) to create a digital product, in the form of a web application based on predetermined features (MVP) and technical requirements.[1] The final project theme is titled "E-Flight Ticket Platform," benchmarked against Garuda Indonesia. Each student is free to create their own application name. In essence, this platform serves as a place to purchase and book flight tickets online, both one-way and round-trip.[9] The platform offers various types of domestic and international flights. The flow/process of the platform is open to creative interpretation by the final project team. There are two user roles: admin and buyer. Buyers can send and receive transaction receipts through this platform.[8]

The mandatory Minimum Viable Product (MVP) features are as follows:

a. User Registration
b. In-App Notification Implementation (Example: Bell icon within notifications, not push notifications)
c. User Profile
d. Transaction History (Example: Booking List, Check-in, and Travel Documents such as Visa, Passport, Residence Permit).[10]

There are two user roles in the system, namely Buyer and Admin, with the following details for each role:

A. Buyer
   a. Two departure categories: One-Way and Round Trip
   b. Departure destination (From and To)
   c. Departure time, and return time (if choosing round trip)
   d. Listing of airports (Airport name, country code, and location)
   e. User's wishlist in local data
B. Admin
   a. Admin has their own page (List of customers who booked, purchased tickets, departure schedules, payment history)
   b. Admin can CRUD (Create, Read, Update, Delete) listing items (image, description, location price)
   c. Items are categorized into two types: round trip and one-way.
C. Data Collection Methods

   There is primary and secondary data collection that conducted during the pre-initialize project. Primary data sources are obtained through question-and-answer sessions with the Facilitator, referring to secondary data sources in the form of the Final Project Brief. Secondary data sources are derived from the Final

Project brief document provided by Binar Academy in PDF file format (attached file) and refer to the benchmark system of Garuda Indonesia booking (https://www.garuda-indonesia.com/id/id/index).

D. System Development Method

The system development method used in this research is the iterative and incremental system development method.[4] This method combines both iterative and incremental approaches in system development. The iterative approach in this method allows for improvements and changes in the system development through iterations. In this method, there are several stages of system development as follows:

a. Requirements analysis stage: conducting an analysis of user needs to determine the functional and non-functional requirements of the Fullstack E-Flight Ticket Platform information system.
b. System design stage: designing the Fullstack E-Flight Ticket Platform information system using UML and Entity Relationship Diagram (ERD).
c. Implementation stage: implementing the information system using JavaScript libraries such as Node.js, React.js, and ExpressJS.
d. Testing stage: testing the information system to ensure that it functions properly and meets user needs.
e. Evaluation stage: evaluating the performance of the Fullstack E-Flight Ticket Platform information system and analyzing the strengths and weaknesses of the developed system.[11]

The proposed system is the Fullstack E-Flight Ticket Platform designed to facilitate the process of purchasing flight tickets online. This system consists of a web-based application that allows users to search for flight schedules, choose routes, make payments, and receive electronic tickets. The system is developed using the JavaScript programming language and leverages various libraries such as Node.js, React.js, and ExpressJS. The system architecture follows the Model-View-Controller (MVC) pattern and is designed for scalability, security, and user-friendliness. It also includes a database management system designed using Class Diagram to ensure efficient management of flight information and user data. Overall, the proposed system aims to provide a reliable and efficient solution for booking flight tickets online and enhancing the overall user experience.[12]

The design process begins with the creation of diagrams based on the primary and secondary data collected. It is then followed by the design of the backend system, implementing the MVC architectural pattern, and the design of the frontend, following the principles of atomic design.

3. RESULT AND DISCUSSION

We begin with modelling requirement using UML modelling based on primary and secondary collected data :

3.1. System Design

There are two actors involved in the system. If represented using a Use Case Diagram, it would look like the following:

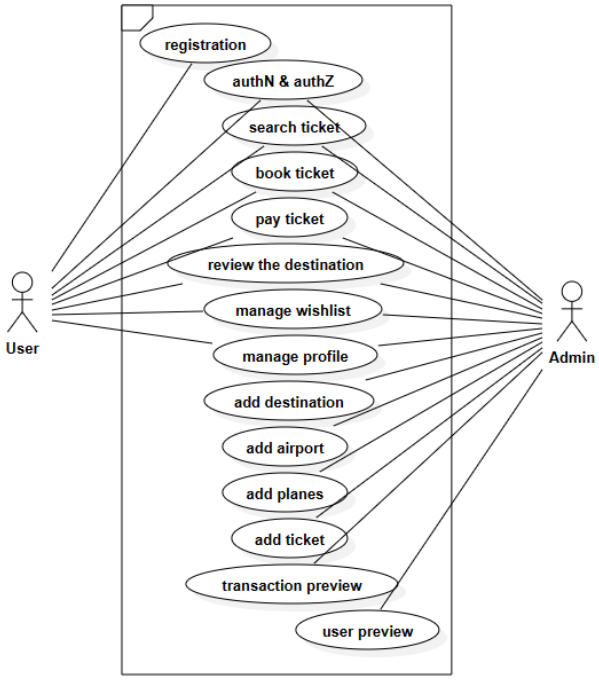

Figure 1. Use Case Diagram

In figure 1, as we can see that each actor has activities to interact with system to fulfill necessary transaction both as input and output. Every activity will be described further using Activity Diagram.

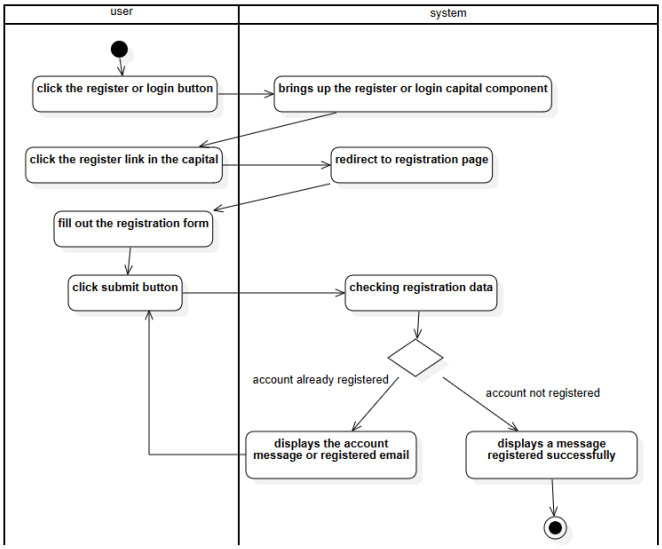

Figure 2. registration activity diagram

The registration activity in Figure 2 is the first step in using the e-flight ticket platform by entering data as a user/buyer identity such as email address, full name, username and password.

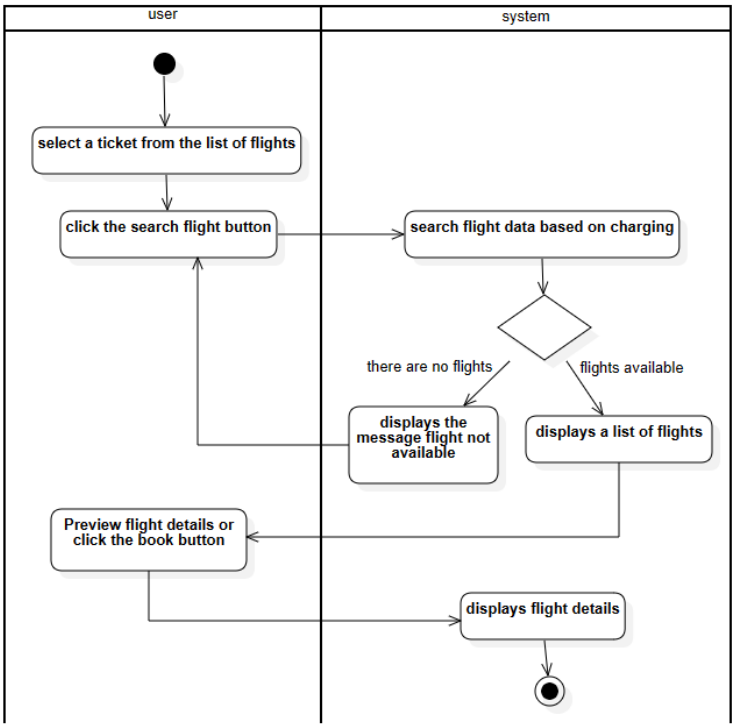

Figure 3. book ticket activity diagram

In Figure 3, this is the ticket booking process with the selection of available flight tickets based on the input results of the departure location and flight destination along with the departure time and return time.

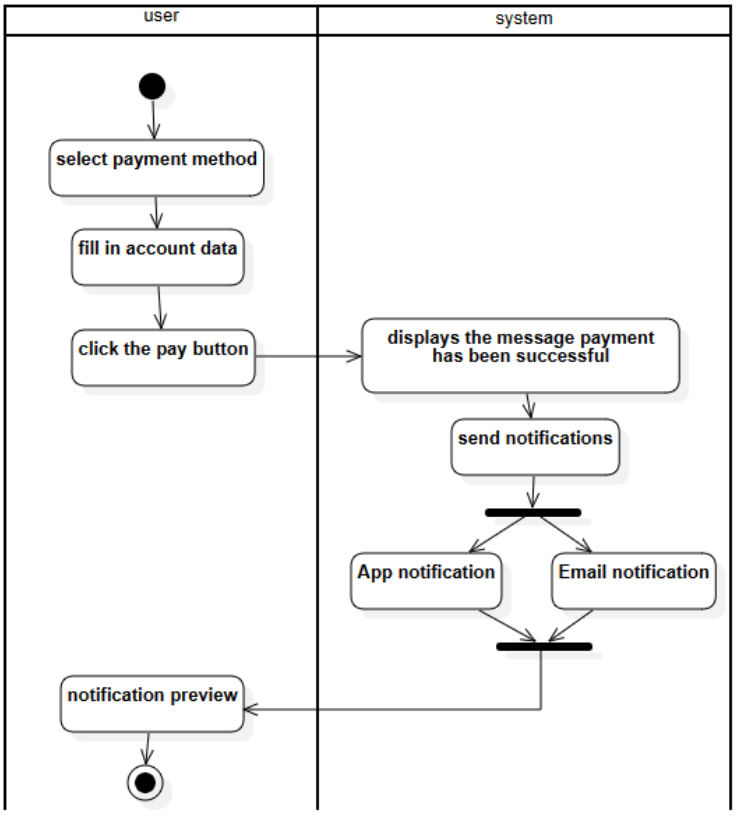

Figure 4. pay ticket activity diagram

In Figure 4, the ticket payment activity after the ticket booking process by selecting the payment method and filling in the account data.

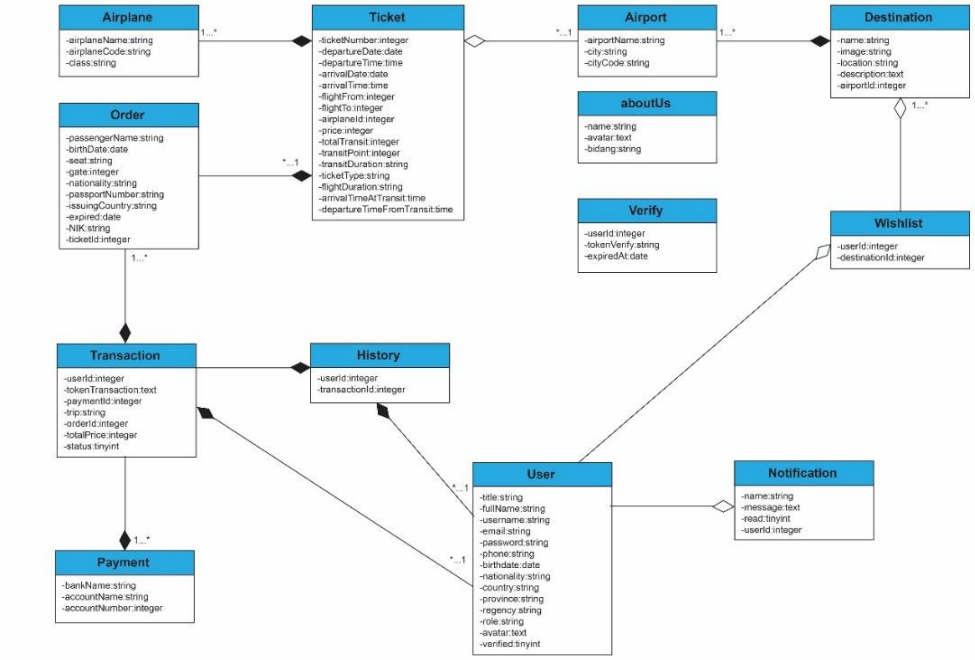

Figure 5. class diagram

in Figure 5, in designing an information system, the Class Diagram maker plays a role in mapping data relationships and determining the cardinality of data between entities. the data is based on primary and secondary data that can facilitate users in using the application.

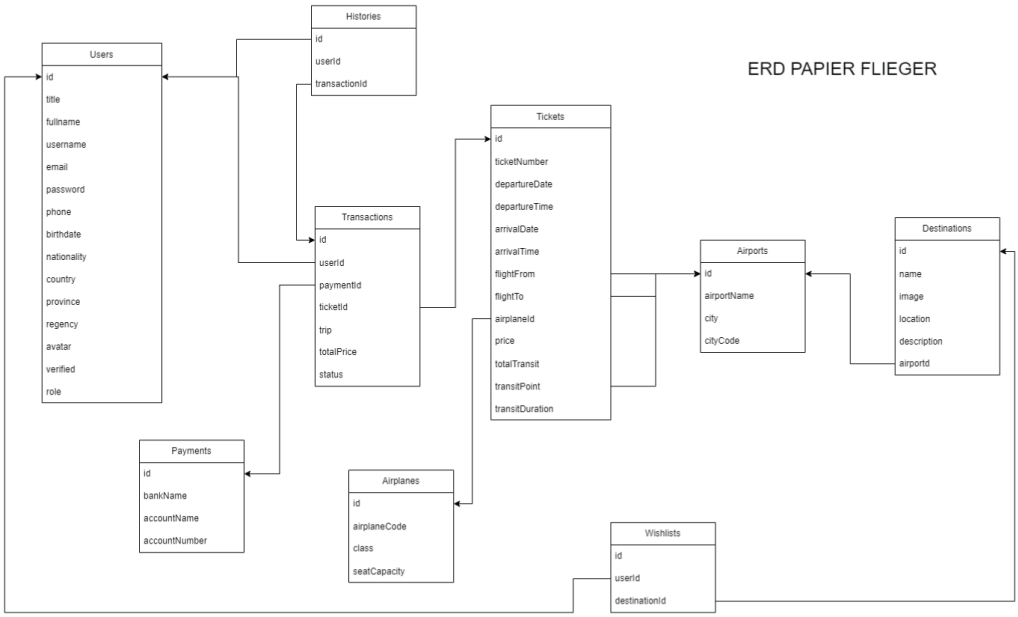

Figure 6. Entity Relationship Diagram

In Figure 6, this is a diagram used to document the shape of the data or schema in a database, as well as its relationship with each other [2].

3.2. Implementation

Implementation is the stage of applying the previously designed system design. The following is the implementation of each system design built:

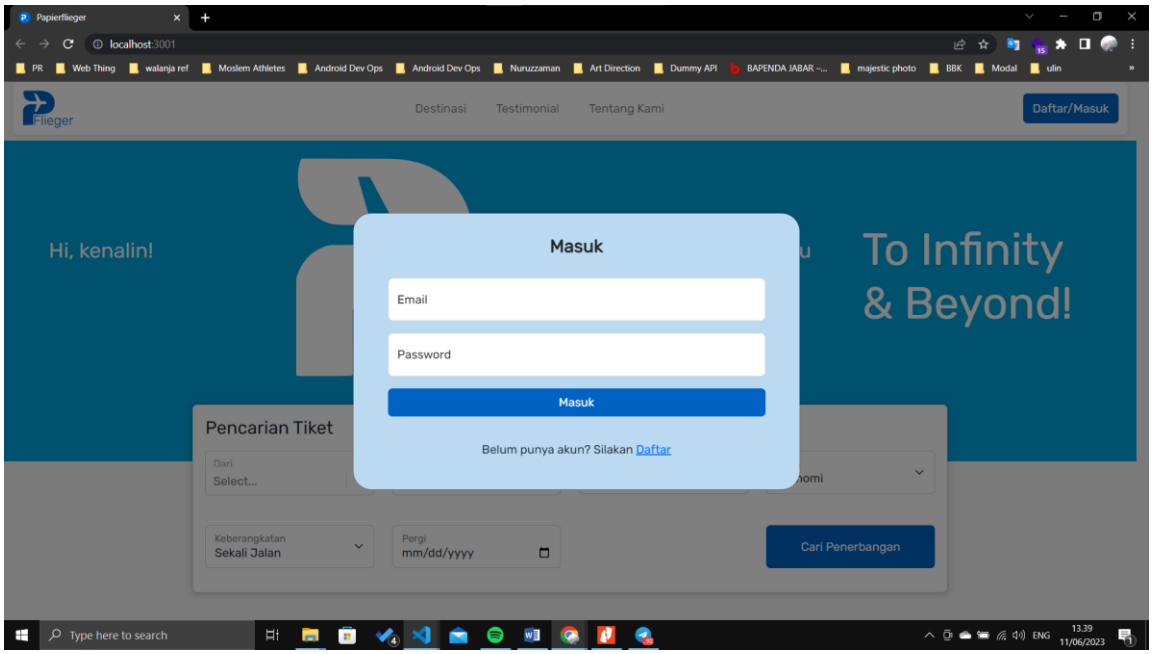

Figure 7. login page

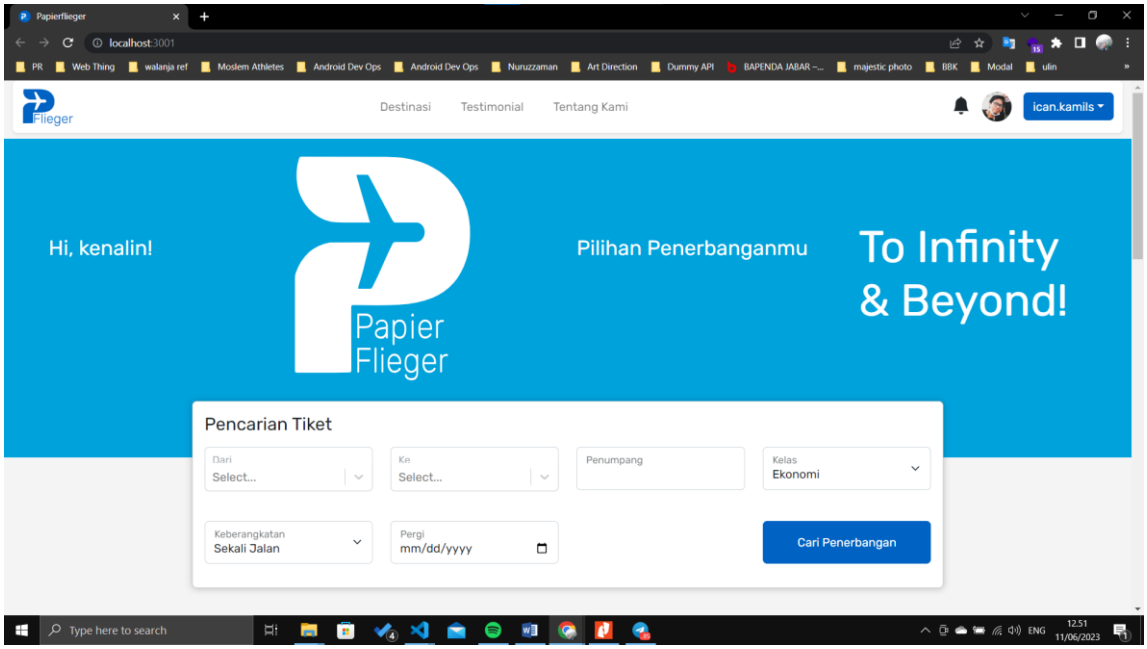

Figure 8 home page

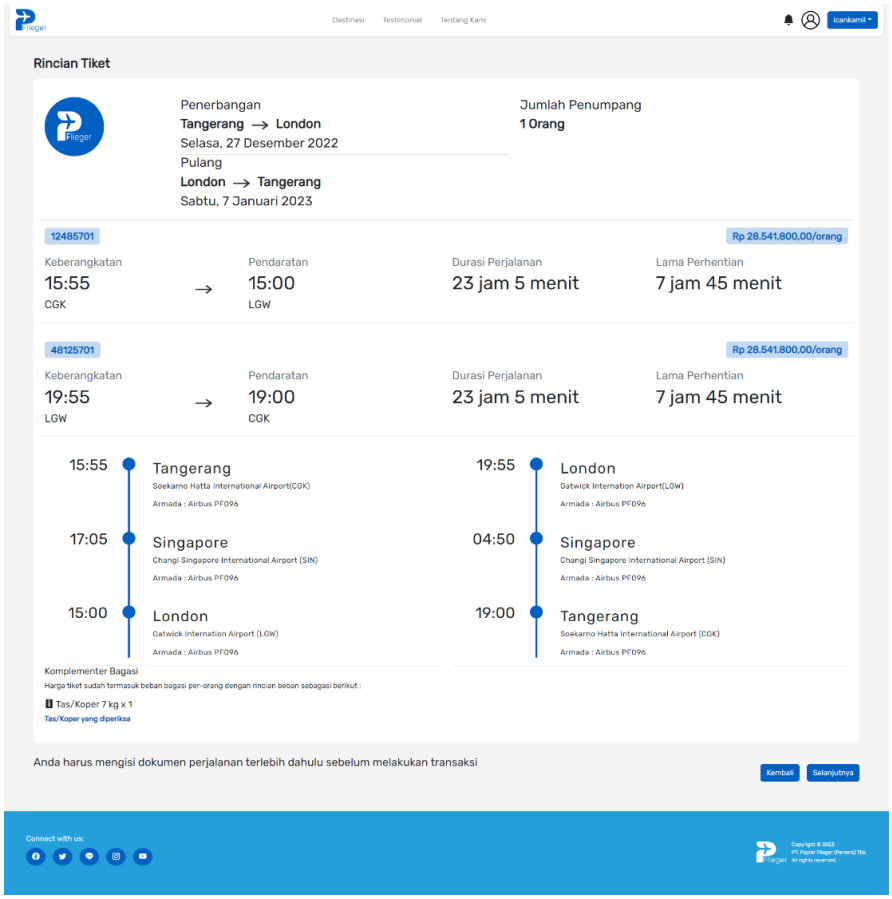

Figure 9. book ticket page

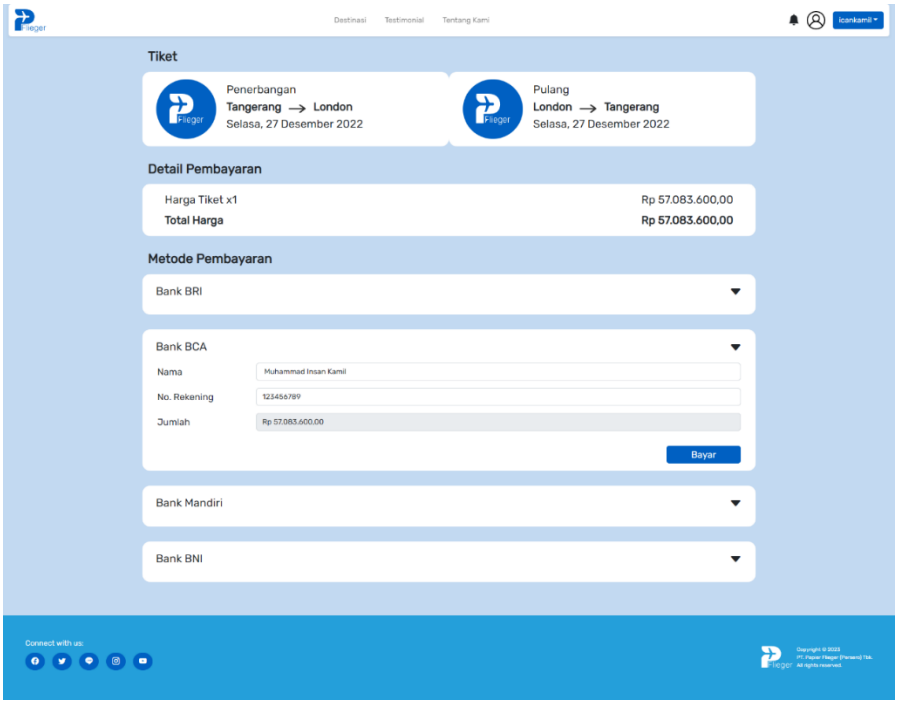

Figure 10. pay ticket page

4. CONCLUSION

Based on the above discussion a result, the idea of "fullstack JavaScript Development" was born, referring to the usage of JavaScript in software and system development processes from the server to the client., it can be concluded:

a. This research successfully achieved the goal of designing and developing a Fullstack E-Flight Ticket Platform information system.
b. The interface is designed using the ReactJS user library designed with a focus on intuitiveness and responsiveness, ensuring users can easily book airline tickets online.
c. Asynchronous process features have been successfully implemented in the E-Flight Ticket Platform system.
d. By using this system, users can book airplane tickets more efficiently and effectively, reducing the time and effort required in the process.
e. Fullstack E-Flight Ticket Platform information system has been designed and implemented with a focus on data security.

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