FACULTY OF COMPUTING

SECD2613 SYSTEM ANALYSIS AND DESIGN

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GROUP PROJECT : FLIGHT TICKET BOOKING SYSTEM

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1.0 INTRODUCTION

One of the most important forms of transportation in the modern world is the airplane. In the past, passengers had to physically purchase their airline tickets at the airport counter. We can now purchase a plane ticket without physically being at the counter thanks to advancements in technology. People can buy the flight ticket online anytime and anywhere by using any website, application, and gadget. A basic system for managing flight inventory, scheduling, seat assignments, and aircraft loading was first implemented in 1950. (Enoghomwanse et al., 2022) Initially, the reservation system is only available to airport employees because it makes handling customers easier for them. When there are more people purchasing airline tickets, those in the airline industry believe that this is a good reason to grow the airline system in order to increase sales and streamline customer service. As a result, there are numerous online platforms for purchasing airline tickets. In addition to handling airline management duties, the current system is a cutting-edge flight ticket booking system that benefits both the customer and the airline company. It meets the needs of the customer from the moment of booking until the flight is completed. (Enoghomwanse et al., 2022)

Customers use the booking system to purchase airline tickets because it is more convenient. In addition, they could access the flight schedule that worked for their schedules and budgets and compare prices across different dates. Additionally, the current generation favors systems that are easy to use, accessible, and flexible. Furthermore, some travel agency businesses are working together with the booking system to lower the cost of travel rather than taking a solo trip. There is fierce competition among airlines, and many of them offer discounts and other benefits to customers who book within specific dates. In other hands, customers can pay with peace of mind knowing that their money is secure. There are a variety of payment methods available, including credit card, e-wallet, Touch n Go, and online banking FPX.

Nevertheless, every airline company has both benefits and drawbacks to its current system. All platforms, however, have shortcomings and are not as seamless as purchasing a plane ticket in person at the airport counter. We at Elvanta Tech are working hard to develop a Velaris booking system that will satisfy every customer. A brand-new flight ticket booking system called Velaris Flight Ticket Booking System will address every issue that arises with existing systems. As computer technology advances, the flight ticket system is expanding quickly. We must ensure that the new system is distinct from existing ones and has additional features. This company

wants to develop an easy-to-use system for booking flight tickets. For the Velaris Flight Ticket Booking System, we will use Airline Reservation Systems (ARS) since they facilitate the management of flight reservations, inventory, and passenger data.

2.0 BACKGROUND STUDY

Travelers have encountered many issues when it comes to booking either manually or through existing online platforms, such as slow interfaces, lengthy booking processes, limited availability, high prices, unfriendly user experiences, and complicated payment methods. These issues are further exacerbated by the threat of scams that are becoming more rampant nowadays. In fact, according to the Thales Group, the threat of cybersecurity has become alarming, as the emergence of AI and organized syndicates has made the threat more serious for both the airline industry and traveler safety. ("The rising cyber", 2024) Because as we transit toward the future world where digital will be an inseparable part of our lives, it makes this matter more important than ever. On 23 March, a cyberattack by a group of an organized syndicate on KLIA rendered the airport's online system implorable. This has triggered an alarm about the safety of the online system. (Nizam, 2025) It's critical for the development of the airline online booking system to be greater than the current existing system, as the threat is evolving. While providing a seamless experience to both the customer and the company that operates the system. Hence, our objective is to form a system application that will fulfill all the requirements, but at the same time, it will not jeopardize the security. That is when Elvanta Tech discovers that it is inconvenient for the customer to go through all of these problems. Elvanta Tech finds an idea to create the Velaris Flight Ticket Booking System to improve flight ticket booking systems by finding the solution for all the problems faced by customers. This will give customers a better experience and be able to increase the sales.

The online booking platform has various features to arrange schedules and handle the bookings part. For flight ticket booking systems through online platforms, there are airlines and OTAs such as Kayak, Expedia, and Skyscanner. These platforms all offer online flight management, booking, and search services. The service provided, including flight search and selection, will feature real-time availability, as well as options for searching, comparing, filtering, and sorting. For booking and payment, the platform will offer features such as a streamlined booking process, secure payment processing, and support for multiple currencies. In terms of booking management, it will include functionalities for viewing booking details, making modifications, handling cancellations, and processing refunds. Additional services will also be available, including baggage information, loyalty program integration, and customer support.

Velaris Flight Ticket Booking System is developing an Airline Reservation System (ARS), a software commonly used by airlines to manage and store flight information, passenger data, and booking records. It serves as a centralized database for flight schedules, seat availability, fare details, and passenger profiles. This system helps to improve the process of searching, booking, and purchasing flight tickets online. Nowadays, most of the customers have high expectations towards the flight ticket booking system. This makes the other system very hard to cope with and leads to customer dissatisfaction with that system and reduces the sales. They want a convenient, simple, responsive, user-friendly, and fast response where they can access it 24 hours anywhere. This study aims to create an integrated system and a user-friendly interface that allows customers to easily access any flight information in real-time, manage their own bookings, and be able to complete their payment through online payments. Velaris will have administrators that have tools to manage all the flight schedules and are able to operate while monitoring all the bookings efficiently. Velaris' goal is to have an efficient operation, reduce all the administrative overhead, and enhance the overall travel experience for all the customers by implementing this system for Velaris.

3.0 PROBLEM STATEMENT

The problem statement for this project is to address and solve the limitations present in an existing flight ticket booking system, such as searching for flights, selecting available flights, and paying for the reservation. All of this discovery led to the creation of an improved airline reservation system through the Velaris Flight Ticket Booking System. The Velaris Flight Ticket Booking System aims to overcome issues such as:

1. **Complex user interfaces**

   Complicated user interfaces will result in a dashboard that loads with all the icons, making it impossible to jump to the next page and select a flight. Customers also faced confusion due to the complex and non-intuitive booking process, which lacked clear guidance and straightforward navigation. Additionally, the customer has a limited number of dates to select from. This caused them to become frustrated, which raised the number of booking errors. Additionally, it will result in a greater reliance on customer service, which raises operating expenses. Customers will not return to this system because of all these issues, as it is not user-friendly, particularly for elderly and busy working adults.

2. **Payment failures**

   The systems experienced payment failures, either declining the payment or loading the page until it timed out. Another problem is that even if the payment fails, the seat stays the same and prevents the customer from making another reservation for a flight ticket. Hence, the customer will lose their trust in their payment towards the system, and the system will lose all the potential sales.

3. **Payment and refund issues**

   When a customer has already made the payment and that particular payment is successful, but the system was loading or the internet was down, it will lead to an unsuccessful booking, which will cause the flight system to refund pages. There are also system timeouts that happen while the payment gateway is processing. Customers may also pay more than the original price in cases where the system incorrectly converts the currency. All of these problems, however, were not resolved quickly, and they were consistently postponed or said that refunds were either unsuccessful or not possible due

to an inefficient system.

4. **Security vulnerabilities**

Regarding system security, the system might not be up to date with the most recent version, which leads to outdated encryption protocols and a decreased level of trust. This can result in insecure Application Programming Interfaces (APIs) with weak authentication mechanisms, potentially leading to customer data breaches. The government may impose regulatory fines when a company fails to follow the law, especially in cases where customer data is leaked to unauthorized parties. As a result, customers may lose trust in the airline.

5. **Search and filtering inefficiencies**

When customers have difficulty finding flights using the search function, it indicates that the system has a poor filtering mechanism for flight ticket availability, often providing delayed or inaccurate results. Furthermore, the absence of specific times or dates for flights makes it difficult for customers to find the best ticket options, which may cause them to abandon the platform and choose not to return.

6. **Language and localization failures**

A flight ticket booking system should support multiple languages to be globally accessible, helping attract and retain customers from around the world. If the system lacks translation features, it can be difficult for customers to select flight times accurately. Additionally, if the system is not accessible 24/7 and does not support time zone handling, international customers may face challenges when trying to book flights at their convenience. As a result, we risk losing potential global customers.

4.0 PROPOSED SOLUTION

I. Feasibility Study

- Improving productivity end users (customers and airport personnel).
- Streamlined workflows tend for greater end user experience.
- A well-planned flight ticketing system from the front end and back end enables a smooth workflow.
- The flight ticketing system selection procedures naturally lead to a user-friendly interface (front end).
- Real-time monitoring shows the most accurate data directly.
- Continue to maintain a reliable and consistent connection to the flight ticketing system.

II. Element of feasibility

1. **Technical Feasibility**
   - Review the integration capabilities
   - Check the current system of the requested company is capable of handling the add-on process later.
   - Identify the resource that meets the expectations.

2. **Economic Feasibility**
   - Cost of estimate for the entire project, including system study, employees' studies and software/hardware.
   - Forecast extra revenue within the flight ticketing system
   - Cost possible financial risks with the airline due to unexpected expenses.

3. **Operational Feasibility**
   - Evaluate end-user readiness and acceptance for an upgraded flight ticketing system.
   - Make backup preparations for the data.
   - Assess the impact on daily operations so as to analyze system possibilities.

III. Cost - Benefit Analysis (CBA)

COSTS		Year 0	Year 1	Year 2	Year 3	Year 4
Development Cost (One-time)						
Integration with Airline Systems	10000	**11000**				
E-ticketing Software License	8500	**9350**				
Consultant Ticketing System	19000	**20900**				
Training of Airline Personnel	18500	**20350**				
Total (Development Cost)		**61600**				
Production Cost						
System Hosting	3500		3850	4120	4408	4716
IS Support	16500		18150	19421	20780	22235
Maintenance and Technical Setup	2500		2750	2943	3148	3369
Annual Production Costs			24750	26483	28336	30320
(PRESENT VALUE)			22500	21886	21289	20709
ACCUMULATED COSTS			84100	105986	127276	147985
BENEFITS		Year 0	Year 1	Year 2	Year 3	Year 4
Labor Cost Reduction	88000	78000	70200	73710	77396	81265
(PRESENT VALUE)			63818	60917	58148	55505
ACCUMULATED BENEFITS			63818	124736	182884	238389
GAIN OR LOSS			-20282	18749	55608	90405
PROFITABLE INDEX		1.46761				

Figure 4.1: Cost - Benefit Analysis Velaris Booking Ticketing System

5.0 OBJECTIVE

The improvement project of the booking ticket system aims to effectively manage and resolve the issues that arise in the system. Improving productivity, streamlining workflows, and enhancing the customer experience. A well-designed ticketing system also enables businesses to track and analyze data to identify trends and areas for improvement.

The system is convenient with a friendly user interface. Allowing the users to navigate and search the flights based on their preferences with real-time information. Maintain a reliable connection with the airline database system to deliver updated schedules, pricing, and seat availability.

6.0 SCOPE OF THE PROJECT

The scope of the improvement project focuses on this common area of the system.

1. UI/ UX and Interface Design

Enhance overall the user interface to ensure an easy and smoother, more intuitive experience across any platform (tablet, laptop, or smartphone). Including simplifying the booking process by improving navigation and making the system accessible to any level of expertise users.

2. System Reliability and Booking Accuracy

Improving the booking confirmation by synchronizing flight schedules, seat availability, and ticket pricing with the airline system databases. Eliminating booking problems like duplicate entries or failed transactions.

3. Payment Gateway Integration and Feedback Mechanism

Real-time customer support responsive improvements, such as automated FAQ, related to booking changes, cancellation, and reimbursement. Transaction update and automated checking on pending reimbursement status.

4.Improving Search Experience

Redesign the search results display and algorithm . Alternative on date suggestion shown when no matches are found. Connect to a third party to provide up-to-date availability and pricing. Use intelligent caching to ensure quick search results without outdated data.

Develop auto-complete for destination and dates to save time in the booking process . Apply logic to improve matching the misspelling or abbreviation.

5. Strengthen the Security

Strengthen the security protocols to prevent fraud and safeguard users' sensitive data. Ensuring compliance with international Data Protection Standards.

6. Implement Multi-language and Time Zone Awareness

Using dynamic language switchers or applying AI power tools to be globally accessible.. Users can select the language preference from the drop-down menu. The application dynamically changes the displayed texts with the translated version or fallback default language .

Automatically format to local time zone and convert the flight time accordingly. Display local and destination times clearly to avoid confusion.

7.0 PROJECT PLANNING REPORT
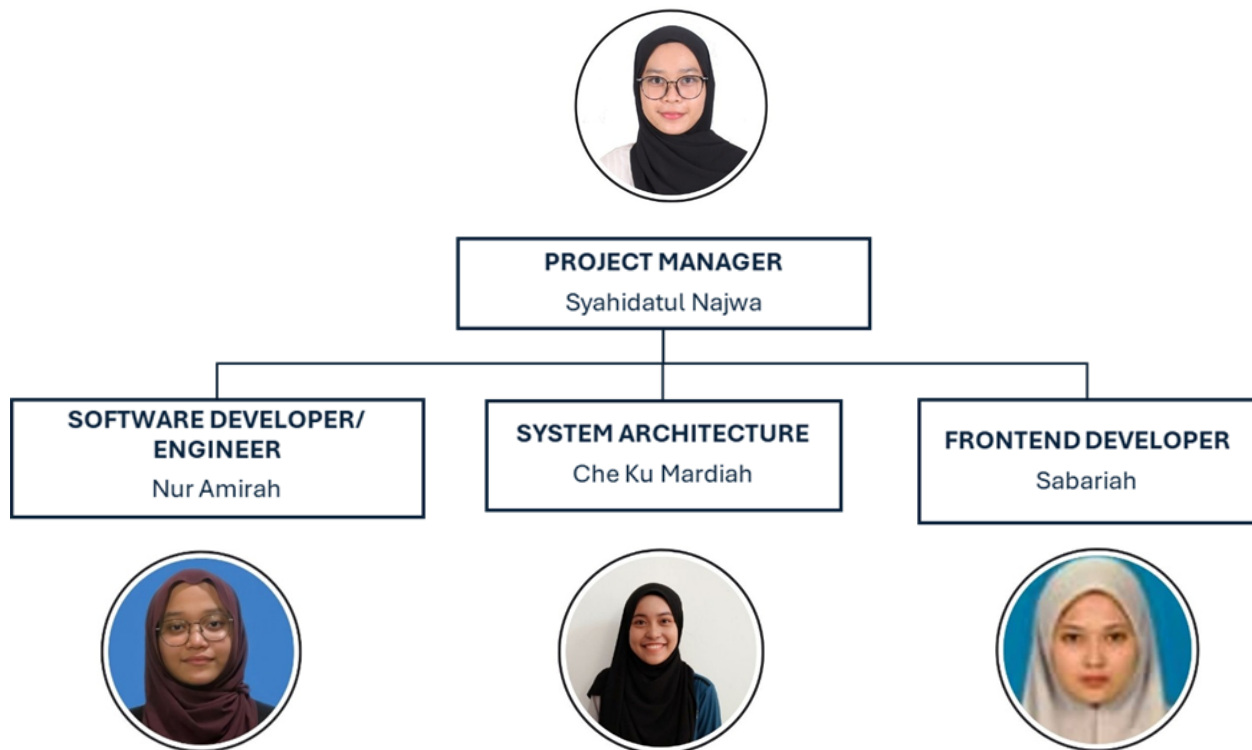
7.1 Human Resource

Organizational Structure

Figure 7.1: Organizational Structure of Project Planning

7.1.1 ROLES AND RESPONSIBILITIES

1. **Project Manager**

   ● Monitor the progress of projects and ensure that they are completed on time.
   ● She uses various tools and techniques, such as Gantt charts and project management software, to track project progress and identify potential issues.

2. **Software Developer/ Engineer**

   ● Designs, develops, tests, and maintains software applications.
   ● They work through the entire software development lifecycle, from planning and coding to testing and deployment.
   ● Specifically, they write and debug code, develop algorithms, and document requirements.

3. **System Architects**

   ● Designing, developing, and overseeing the implementation of IT systems, ensuring they meet business requirements and align with organizational goals.
   ● They analyze system requirements, assess technology options, and develop architecture designs that encompass hardware, software, networking, and data storage components.
   ● System Architects also ensure that these designs align with industry best practices, standards, and organizational goals, and that the systems are scalable, secure, and efficient.

4. **Frontend Developer**

- Designing and implementing the user interface and user experience of web applications.
- They work with HTML, CSS, and JavaScript to create visually appealing and intuitive web pages and applications.
- Their responsibilities also include optimizing website performance, improving load times, and troubleshooting front-end issues.
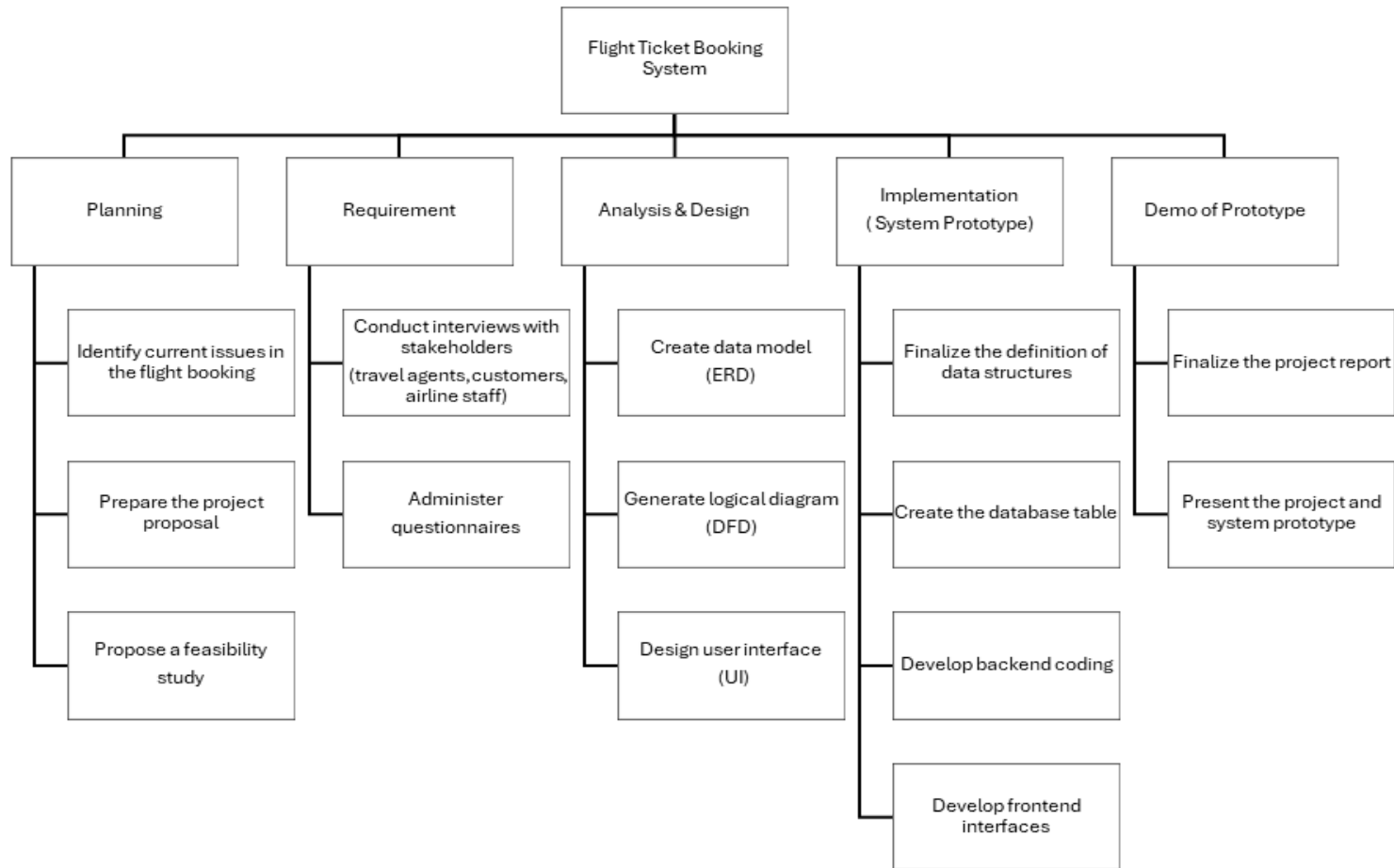
7.2 WORK BREAKDOWN STRUCTURE (WBS)

Figure 7.2.1 : Work Breakdown Structure (WBS)

7.3 PERT CHART (BASED ON WBS)

ID	ACTIVITY	PREDECESSOR	DURATION (DAYS)
A1	Identify current issues in the booking flight	NONE	7
A2	Prepare the project proposal	A1	7
A3	Propose a feasibility study	A2	7
B1	Conduct interviews with stakeholders	A3	7
B2	Administer questionnaires	A3	7
C1	Create data model (ERD)	B1, B2	7
C2	Generate logical diagram (DFD)	C1	7
C3	Design user interface (UI)	C1	7
D1	Finalize the definition of data structures	C2, C3	7
D2	Create the database table	D1	7
D3	Develop backed coding (flight logic, seat select)	D1	14
D4	Develop frontend interfaces (forms, UI)	D1	14
E1	Finalize the project report	D2, D3, D4	7
E2	Present the project and system prototype	E1	7

Figure 7.3.1 : PERT Chart (based on WBS)
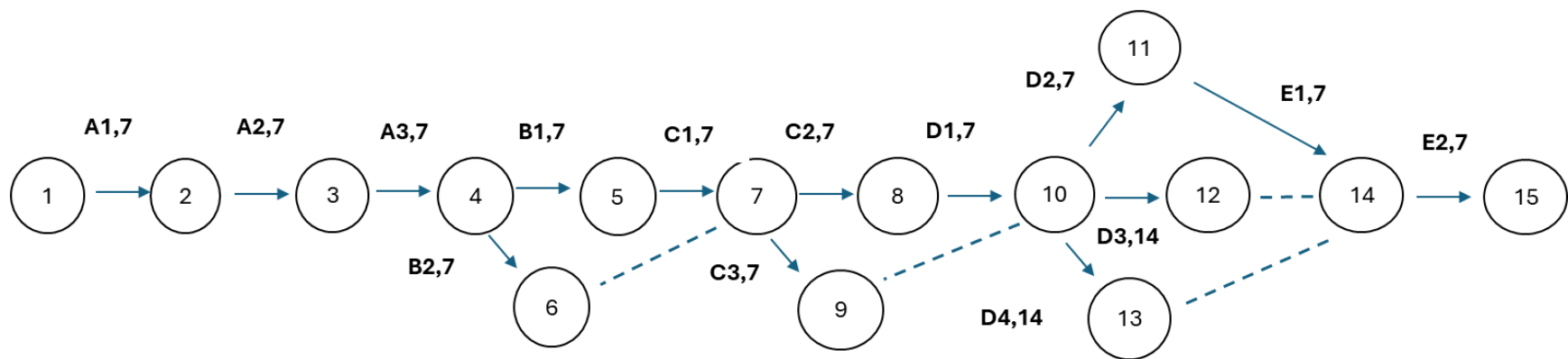
All durations are in day.
1. A1-A2-A3-B1-C1-C2-D1-D2-E1-E2
2. A1-A2-A3-B1-C1-C2-D1-D3-E2
3. A1-A2-A3-B2-C1-C3-D1-D4-E2

Length :
1. 7+7+7+7+7+7+7+7+7+7 = 70
2. 7+7+7+7+7+7+7+14+7= 70
3. 7+7+7+7+7+7+7+14+7 = 70

Figure 7.3.2 : PERT Chart (based on WBS

7.4 GANTT CHART

| TASK	PLAN START	PLAN DURATION	START	END
Identify current issues in the booking flight	7	7	01/04/25	07/04/25
Prepare the project proposal	7	7	01/04/25	07/04/25
Propose a feasibility study	8	7	07/04/25	14/04/25
Conduct interviews with stakeholders	15	7	14/04/25	21/04/25
Administer questionnaires	22	7	21/04/25	28/04/25
Create data model (ERD)	29	7	28/04/25	05/05/25
Generate logical diagram (DFD)	36	7	05/05/25	12/05/25
Design user interface (UI)	43	7	12/05/25	19/05/25
Finalize the definition of data structures	50	7	19/05/25	26/05/25
Create the database table	57	7	26/05/25	02/06/25
Develop backed coding (flight logic, seat select)	71	14	02/06/25	16/06/25
Develop frontend interfaces (forms, UI)	85	14	16/06/25	30/06/25
Finalize the project report	92	7	30/06/25	06/07/25
Present the project and system prototype	99	7	06/07/25	14/07/25

Figure 7.4.1 : Gantt Chart
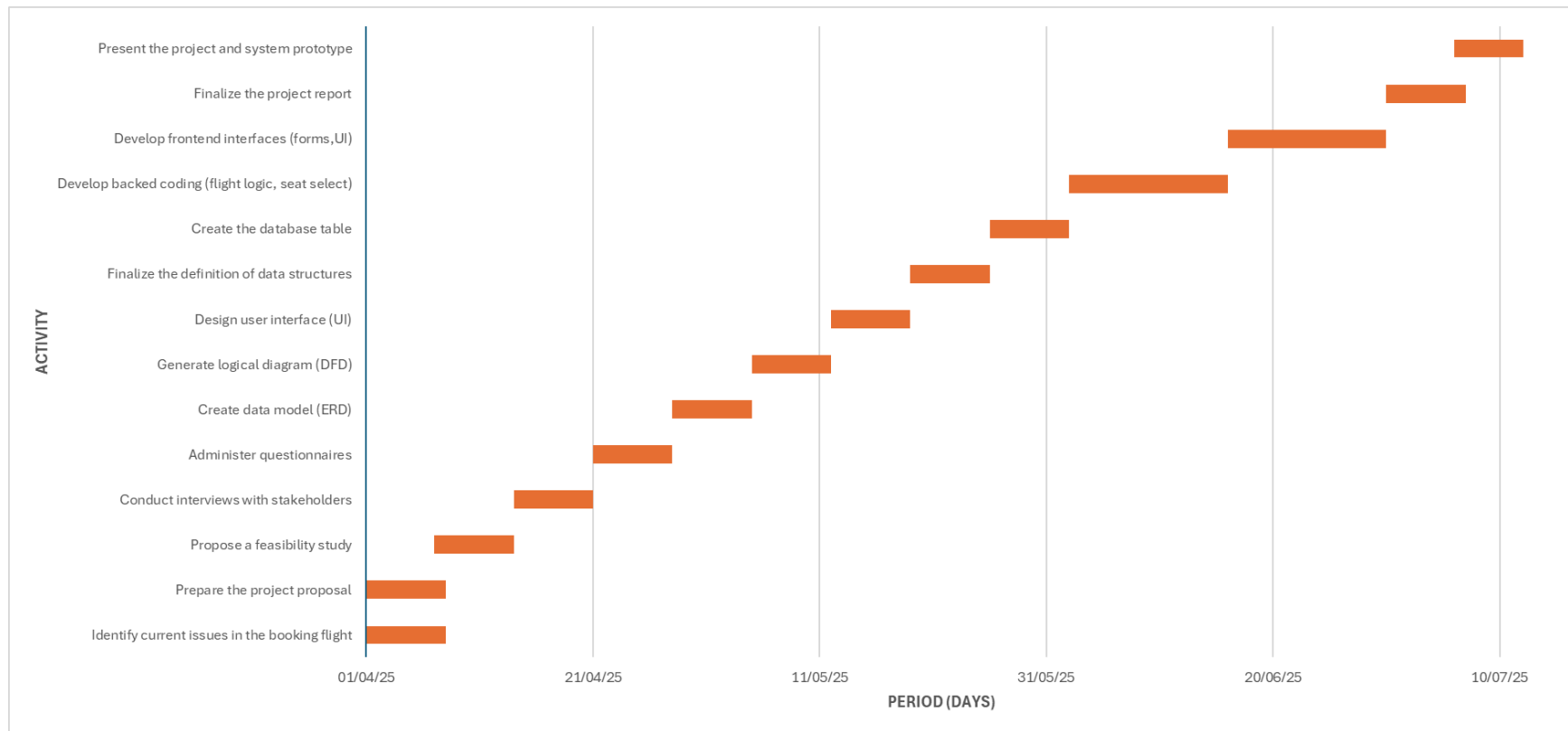
Figure 7.4.2 : Gantt Chart

8.0 BENEFITS AND OVERALL SUMMARY OF PURPOSED SYSTEM

With the improvement project of the flight ticket booking system, there are many benefits that can be accumulated and provide mutual satisfaction to customers and airlines. Including enhancing the user experience, increasing efficiency, and expanding business potential.

The requirement for manual customer service can be eliminated , thus reducing customer service expenses, including labor, site rental fees, and administration costs. A user-friendly interface and smart search feature help users to find the best flight option based on their budget and preference. Enhancement in security in transaction

This online booking system definitely offers an intuitive interface, allowing users to make fast reservations effortlessly without needing any technical assistance. By enhancing user experience, the advanced system would increase customer loyalty and trust. Data gathered from user behaviors, preferences, and booking patterns helps us to analyze customer preferences and the interaction platforms, therefore enabling more efficient marketing strategies.

9.0 REFERENCE

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