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**GROUP ASSIGNMENT**

**CT026-3-1-SAAD**

**SYSTEMS ANALYSIS AND DESIGN**

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# Introduction

## Introduction of the company

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The name of our company is APSys. Our company’s motto is “Bring your ideas to life”. Our company currently consists of six staff which include two system analysts, two computer programmers, one UI designer, and one accounting staff. The system analysts are responsible for conducting research on possible solutions, providing recommendations based on findings, planning the project and developing proposals that outline feasibility and costs (Portland Community College, 2018). Furthermore, the roles of computer programmers include writing and testing code for new programs, troubleshooting system errors, managing database systems, implementing build systems, providing technical support and so on (BetterTeam, n.d.). Moreover, the UI designer is in charge of designing the overall layout and aesthetics for websites, meeting with clients to discuss their requirements and developing prototypes that clearly illustrate how sites function and look like (Resources for Employees, n.d.). The accounting staff is responsible for managing financial transactions, handling payroll, analyzing, and preparing financial reports and statements, and budgeting (BenjaminWann, 2023).

### **1.1.1 Vision & Mission**

The vision of the company is to establish itself as a leading IT enterprise that drives digital transformation and empowers businesses and individuals with innovative technology solutions. This achievement would allow us to support TSI in advancing the aviation industry by providing technological innovations that improve their system.

Our objective is to create simplified and user-friendly IT systems. Our company places a high priority on economic efficiency, utilizing technology to optimize all the expenses and offer cost-effective solutions. Our system also boasts a robust infrastructure that guarantees 24/7 availability, providing uninterrupted access to our users. We also propose the implementation of real-time notifications and secure communication channels within our solutions.

## Overview of the business process of the new proposed management system

As technology continues to evolve and shape our world, it is crucial that we find effective solutions to meet the changing needs of society. One area where this is particularly important is in the realm of travel. With the rise of global tourism and increased accessibility to travel, it is more important than ever to have a reliable and efficient system for reserving flights, tickets, and seats as well as managing company reports. Fortunately, modern technology offers us a wide range of tools and resources that we can use to build a robust and user-friendly system for travel booking. Whether it's through websites or mobile applications, we can leverage the power of technology to create a seamless and hassle-free experience for travelers as well as improve company reports management system.

It is undeniable that the main challenge that we face in developing such a system is ensuring that it is accessible and inclusive for all travelers, including those with special needs and disabilities. This requires us to carefully consider the needs and requirements of different groups, and to design our system in a way that can accommodate these diverse needs. Thankfully, with our proposed solutions, we can create a system that is able to recognize, cater and respond to a wide range of different situations, scenarios, and requirements. Whether it's providing wheelchair-accessible seating, accommodating travelers with hearing or vision impairments, offering seat selection function to ensure that families with young children are seated together, offering a variety of special meals, or providing various child-friendly services, our system can be tailored to meet the specific needs of each individual traveler.

Besides, the proposed system can assist TSI in managing their company reports easily and effectively, thus enabling the staff who oversee creating the reports to spend less time and effort on less critical duties. Additionally, it would benefit the entire business because the information produced by the system will be more accurate and less likely to contain errors than information produced by humans who work long hours and risk seeing their work's quality deteriorate over time.

Other than that, our system is intended to assist airlines in making knowledgeable decisions about capacity allocation, pricing, scheduling, and resource management. The forecasting function which depends on historical data, market trends, and other pertinent criteria can help to solve the overbooking scenario and produce precise estimates of future demand that airlines may utilize to make strategic business choices. This can monitor real-time data and modify operations in response to changes in the environment, such as unanticipated changes in demand or weather disruptions to make flight cancellations and rescheduling.

In short, by harnessing the solutions proposed by our company, TSI will be able to possess more effective, accessible, and inclusive flight reservations, flight cancellations and rescheduling, and company reports management system, thus making the travel enjoyable, convenient, and stress-free for both airline company and customers.

# 2.0 Problems and Proposed Solutions

## 2.1 Problem: Overbooking (Hong Rui Yi)

Overbooking is a potential issue that often arises in an airline flight system. If the airline sells more tickets than there are seats on the flight, cancellations may become a problem. When a flight is canceled, there may not be enough seats available on other flights to accommodate all of the affected passengers.

The cause of overbooking mostly comes from the practice of overbooking which is a common strategy used by airlines to maximize their profits, as they assume that some passengers will not show up for their scheduled flight. Besides, unforeseen events such as weather or air traffic disruptions might also cause a domino effect on flights, leading to overbooking.

Overbooking has a detrimental effect on both passengers and airlines. It can result in passengers being denied boarding, which can disrupt their travel plans and cause significant inconvenience. In addition to that, passengers may miss important meetings or events, resulting in lost revenue or additional expenses to book alternative travel arrangements.

### **2.1.1 Proposed Solution**

As a result, overbooking is a frequent issue for airlines, but it may be solved by implementing cutting-edge technologies, efficient communication, and procedures. Overbooking risk may be decreased by adopting proactive measures like using airline forecasting systems. It creates forecasts of the demand for aviation services by examining historical data, present market circumstances, and other pertinent aspects. Thus, it will raise client pleasure, lessen legal problems, and safeguard their brand's reputation.

This system will employ its advanced analytics and data modelling approaches, such as machine learning and time series analysis, to find patterns and trends in the previous year's data in order to take advantage of the airline's strategic business. The algorithm then provides forecasts of future demand, which the airline may use to optimise scheduling, pricing, and capacity allocation. For instance, due to the holiday season and increased demand for travel during the year-end school holidays, December is often the most popular month for airline operations in Malaysia. In fact, the airlines' timetables should consider the popularity of December as a popular travel month and add more flights or increase capacity on popular routes during this period. In fact, these assist airlines in optimising their resources and maximize revenue.

In addition, this system must keep track of and anticipate how to react to environmental changes. They do this by gathering and examining data from many sources, such as satellites, radar systems, weather stations, and computer models as they put the weather forecast model into practise. The airlines may decide to cancel or postpone flights in order to protect the safety of passengers and crew, based on the examination of this data. When this happens, the airline will normally notify the impacted passengers as quickly as possible and provide refunds or other flights. The airline can arrange and reschedule the flights to escape the worst of the weather thanks to these forecasts and analyses. In general, it lessens the effects of extreme weather and cuts down on airline losses.

## 2.2 Problem: Lack of capabilities to handle passenger preferences for seats (Jeniffer)

The problem with the existing system is the lack of capabilities to handle passenger preferences for seats. The case study above didn’t mention that passenger can choose their preferred seat in the information system. That means passengers’ perceptions of the seat are not valued by the existing system. They will be randomly displayed to a seat they might not want to. In most cases, passengers are required to take their time to make their choice of the seat at the check-in counter due to the lack of capability of the system to handle customer preference for seats.

The cause of the lack of capabilities to handle customer preference for seats is most airlines will prioritize other aspects of the reservation process. For example, the airlines give more attention to ticket pricing and availability. Airlines as one of the most vital industries in the world, they regard the profit they earn and sometimes neglected passenger preferences. Besides, the complexity of airline seat configurations causes the existing system didn’t provide the seat selection for the passenger. This is because the airline seat is complex with different classes, seat types and amenities. The permutations and combinations of seat preferences are hard to manage by the existing system.

The effect of the lack of capabilities to handle passenger preference for seats is wasting passengers’ time. The passengers need to come to the check-in counter to make their arrangements for seat choosing before they are allowed to board the airplane. Besides, this can lead to dissatisfaction for passengers who have specific preferences for seating arrangements, such as they want to sit beside the airplane window or aisle seats but are randomly assigned to the seat they don’t want. They are forced to come to the airport earlier to do the changes. As customer-centric approaches progress, the significance of delivering a more personalized experience for passengers would be recognized. Therefore, airlines that don't care about their passengers' feelings will only lose them in today's fiercely competitive aviation market as they switch to superior carriers.

### **2.2.1 Proposed Solution**

The lack of capabilities to handle passengers’ preferences for seats can be solved with the implementation of a user-friendly airline reservation system that offers more personalized choices for seat selection. Passengers are able to choose their preferred seat selection and enhance their overall experience on the flight.

The proposed system begins with the passenger selecting their desired flight and time. Once the basic details are confirmed, an intuitive interface is provided to passengers which is an interface for choosing seats on the interactive map produced accurately based on the airline classes and the aircraft type will be provided to passengers. This is to help passengers have a clearer view of the seat’s location and view.

To select their preferred seat, passengers just need to simply click on the available seat number of their choice during the flight ticket booking process. This ensures that passengers can express their preferences for a specific seat and have greater control over their seating arrangements right from the start and makes it easier and more enjoyable for passengers to choose their preferred seats. This intuitive interface contributes to a smoother booking experience, reducing any potential frustrations or confusion that passengers may encounter. As a user-friendly airline reservation system, it also allowed passengers to choose their preferred seat even after the booking process.

This proposed system can improve customer experience and satisfaction as they are able to choose the seat they want and enjoy the flight to their destination. Other than that, it also boosts customers’ pleasure and overall comfort during the flight. Satisfied customers are more likely to become loyal to the airline, leading to increased customer retention and profitability.

## 2.3 Problem: The priority reservation seats for people with special needs and disabilities (Abdulrahman)

The case study indicated above has a problem with the present system since it does not address the priority reservation seats for individuals with special needs and impairments, these groups that must always be taken care of. ‎

In general, a lot of stores, businesses, and public places don't offer the essentials, like wheelchairs and slide stairs, that help people with special needs and disabilities feel relieved and comfortable. These problems make it difficult for disabled persons and individuals with special needs to go about their everyday lives, thus these people are always looking for specific stores, shopping centres, and marketplaces that may satisfy their demands. When people decide to fly, they search for airlines that can provide their basic necessities. ‎

The location of the seat and whether or not it is close to the restrooms are the key concerns for persons with disabilities and special needs when booking a ticket. Since it is well known that the majority of modern aeroplane passageways are congested and challenging to manoeuvre, it is challenging for them to stroll through the passage to the restrooms. Furthermore, he runs the risk of hurting himself if he loses control and tumbles. (*Issues Related to Persons with Disability*, 2023).

People with special needs and disabilities regularly need to use the restroom, thus it is challenging for them to be sitting far from one. This can be extremely difficult and have a negative impact on their wellbeing.

Airlines who do not put in place the required procedures for people with special needs and disabilities when they travel may suffer a considerable loss of customers. These groups of people are constantly looking for airlines that put their needs first and offer inclusive and accessible services. Customers may choose different airlines that offer better accessibility and diversity if these conditions are not met. Negative word-of-mouth and reviews can also hurt the airline's reputation and result in lost business as a result. Therefore, by luring in and keeping clients that give accessibility and inclusivity a high priority when booking travel, airlines can gain a competitive edge. ‎

### **2.3.1 Proposed Solution**

Airlines should set up a system that gives disabled and special needs passengers priority in selecting seats near the restrooms in order to improve accessibility and inclusivity for these passengers when flying. All classes, including First, Business, Premium Economy, and Economy, ought to have access to this system. Airlines may better serve their customers' requirements and promote a more inclusive travel experience by putting this approach into place.

Airlines can adopt this approach by introducing a seat selection procedure that enables passengers with special needs and people with disabilities to choose seats near the restrooms during the booking process. This could be accomplished via the airline's website or a customer care agent with the necessary training. In order to give those with special needs and disabilities enough time to go to their seats and settle in, airlines can also create a priority boarding procedure for them.

Through improved accessibility and a reduction in the stress and inconvenience of having to go far to use the restroom, this system's deployment would benefit people with disabilities and special needs. Additionally, by doing this, the airline would be able to show its dedication to inclusion and accessibility, which might draw in and keep passengers who place a high value on these aspects when choosing a flight provider.

All things considered, having a system that provides priority to disabled and special needs folks to select seats close to the restrooms is a crucial step towards fostering a more inclusive and accessible travel experience for everyone.

## 2.4 Problem: The existing food menu is incomprehensive and unfriendly for customers with special dietary needs (Joan)

One of the problems in the current systems is that the existing food menu is incomprehensive and unfriendly for customers with special dietary needs. Despite a variety of foods available on most of the flights, there are still less special dietary meal options offered for passengers with dietary restrictions and allergies. For instance, gluten-intolerant meals, low lactose meals, diabetic meals, vegetarian meals, religious meals and so on. Besides, there is also a lack of food choices on the children’s menu as well as some airlines even do not serve infant and child meals. Moreover, the allergen information and ingredients of meals are also not included in the current menu to act as a reference for passengers while selecting their in-flight meals.

The cause of the incomprehensive and unfriendly food menu for passengers with special dietary needs is that most airlines do not consider the specific dietary requirements of their passengers. This is due to the fact that most airlines primarily concentrate on the profit that they earn and often overlook their customers’ specific demands. This means that they generally only emphasize on the meal prices, the portion of foods, and the taste of the foods served without looking too much at the ingredients of meals and giving attention to the serving of special meal menu.

An incomprehensive and not customer-friendly food menu may decrease customers’ food ordering experiences and lead to customer dissatisfaction. For example, customers might mis order the meals that they are restricted to eat, and this may negatively affect customers’ confidence, making them less likely to order the meal again from that airline. In addition, it can also cause inconveniences by making the process of pre-ordering in-flight meals cumbersome and time-consuming as they need to spend their time searching for the meals which are suitable for them to eat.

### **2.4.1 Proposed Solution**

The issue of the incomprehensive and unfriendly food menu for customers with special dietary needs can be solved by implementing an inclusive and customer-friendly meal ordering system that offers categorization of various meal types and provides detailed descriptions of the meals. This system is designed to offer a range of tempting meals that cater for a wide variety of dietary requirements to make sure that all customers’ needs are met.

In this proposed system, the categorization of meals into several specific options which includes allergies, intolerances, religious beliefs, medical issues, individual preferences, and infant and children will be implemented. It can aid in facilitating the meal ordering process as this system allows customers to view all the meals that are suitable for them to eat by simply applying a filter. Apart from that, the allergen information and all the ingredients utilized to prepare the meals would also be provided on the menu to assist customers in selecting their desired meals. For instance, halal meals, vegetarian meals, and the type of meats contained in the meals will be labelled with symbolic icons as well as allergens such as wheat, dairy products, eggs, peanuts, and shrimp will also be highlighted in the menu to enable customers to see what is or is not safe and allowed to eat based on their dietary requirements to ensure that they can enjoy the meals without any concerns.

The implementation of this system can elevate the positive experiences of customers by providing the special meals that they require for a safe and comfortable flight. Furthermore, it may also increase their intention of reordering in-flight meals from TSI. By implementing this system, the customer satisfaction can also be improved, and this can aid in boosting the customer loyalty and company’s revenue.

## 2.5 Problem: No unaccompanied minor services available (Ian)

The existing system has an issue because minors aged between 5 to 17 years old aren’t allowed to travel alone. This is because during the flight, children travelling alone may experience a variety of difficulties and concerns. The key priority is ensuring the security of unaccompanied children. As a result, some airlines prohibit minors from travelling alone unless they are accompanied by a guardian.

The main factors for this are responsibility and safety. Airlines place a high focus on ensuring the safety and wellbeing of passengers, particularly young children. In addition, certain airlines' safety policies might not be adequate to satisfy the needs of parents who permit their children to travel alone. Additionally, flying travel for children can be challenging. Without prior expertise, they might find it difficult to understand boarding processes and navigate airports.

One of the primary effects of the restriction is increased safety for minors. All unaccompanied youngsters will need extra adult supervision or specific support, according to the airline. With special help, this can provide parents who allow their children to travel alone with peace of mind. Parents' worries may be reduced by knowing that the airline has policies and procedures in place to ensure their child's safety.

### **2.5.1 Proposed Solution**

Identification of the passengers is the system's main objective. Implementing an age verification system is the answer. To make sure that the passenger is of legal age to travel alone, an age verification mechanism will be used during the booking process. This can be accomplished by requesting the user to input their identification information or by requiring the upload of the proof of age documents at the time of booking. Minors that are traveling alone must apply for the unaccompanied minor service. Thus, they need to pay extra cost for that service. A new flight detail will be printed in a list along with the minor's information if the child is travelling alone. As a result, the flight attendants from that flight will be aware of the location of any children travelling alone in the aircraft and will provide a special service for them. In addition, parents must explicitly consent to before allowing their child to go alone. They can do this by checking a box next to the unaccompanied service's terms and conditions to acknowledge and agree to them. In addition, with the unaccompanied minor service, it will provide special seat arrangements, priority boarding, customized meal selection for the kids, and real time flight tracking system.

## 2.6 Problem: No automatic report generating tools (Ibraheem)

One of the problems with the existing system is that they lack automatic report-generating tools or other tools that are used for analysis and data display that are implemented to produce reports at the end of every week and month, this means that all reports are created manually for hundreds of tickets per week and thousands per month. For a large-scale airline ticket provider company such as TSI, not having a report generator could be the cause of many problems for the staff and the company. Such issues are caused by a variety of factors that build up over time or appear suddenly due to changes in technological trends. Many businesses that have been in existence for a long time, including airline ticketing companies like TSI, have either suffered or are experiencing no automation at all. Another cause is a lack of awareness, as some companies may not understand the advantages of automated reporting and may not have given it any thought. This can be because people are ignorant of the technology or its potential advantages.

Firstly, the effect of manual report generation is that employees must work a lot of overtime because there are often hundreds or even thousands of client records to review and audit. This process can take a long time, and sometimes the day's allotted time is insufficient, forcing employees to work extra hours. Secondly the effect is that since report generation is being carried out manually by individuals, this may lead to issues like inconsistent or inaccurate reporting where the staff may fail to consider important user-specific information. This creates significant complications when it comes to dealing with and preserving client loyalty. Lastly, decision-making procedures may be delayed in the absence of timely and correct data provided by routine reports, which could have a negative effect on the performance of the firm, which usually leads to a less competitive company environment and depreciates the companies brand value.

**2.6.1 Proposed Solution**

The system's primary goal is to enhance business operations by addressing various aspects of the current system and their corresponding problems. The implemented system will help counter the problems faced by the staff members in charge of creating reports, as various database and information management techniques will be put into use in the system and different parts of the system will be linked together, making retrieving information about customers' flight details and costs from other departments much easier since the company already has a CRS, or central reservation system, which is responsible for the keeping of flight-related information, including e-tickets, PNRs, itineraries, costs, and rules for each booking class (Editor, 2020).

The implementation of these techniques in the new system will make it easier to deal with and generate reports that contain lots of information while also improving the accuracy and overall quality of the information the reports produce, thereby addressing problems mentioned previously like long working hours and inconsistent and inaccurate information, which will alter the entire process to increase productivity and user friendliness. Increased productivity and more accurate information will have a positive impact on the way business decisions are made, making the company more competitive in the market and increasing revenue, which will have a positive ripple effect on the company.

# 3.0 Project Planning

## 3.1 Software Development Life Cycle (SDLC) Phases

### **3.1.1 Planning**

The fundamental process of finding out why an information system should be constructed and how the project team will tackle the system’s planning phase is called project initiation. It is also the first phase of SDLC (System Development Life Cycle). Project planning starts with project initiation, which differs from company to company. However, most companies start with a technique called systems request. TSI is no different. Systems request is a formal way of asking for assistance from the information systems department in our company. It’s when someone in TSI identifies that there is a need to improve an existing system or that an entirely new system is required to improve the organization’s operations. Different ideas are then collected by our system analyst from employees working outside the IT department in TSI during the preliminary investigation phase. This is because they are the main users of the system and are the ones interacting with it daily to complete their day-to-day tasks. The systems request forms that are sent by our analyst to TSI help streamline the request process, ensure consistency, are easy to understand, include clear instructions, and finally indicate what supporting documents are needed. The issues with the existing system that were identified are overbooking, lack of capabilities to handle passenger preferences for seats, priority reservation seats for people with special needs and disabilities, the existing food menu is incomprehensive and unfriendly for customers with special dietary needs, not enough child-friendly services are available, and the lack of automatic report generating tools. The main goal of the new system will be to solve the previously mentioned issues as well as help future proof the company to a certain extent. A Gantt chart will be made to plan out our schedule to gather information and develop the system under the given period of 4 months. A preliminary investigation report will be sent to TSI to check if the project is feasible based on the estimated development time and costs while also getting to know the project benefits, scope, and constraints.

### **3.1.2 Analysis**

System analysis is the second phase of project planning following the SDLC model (System Development Life Cycle) in which a logical model of the new system is constructed. Following the creation of the logical model of the new system comes the requirement modeling in which an investigation regarding the business processes is conducted and a documentation of the new system is created. The next phase is to perform a variety of fact-finding techniques which include conducting interviews where a sample of people is selected and are asked a set of developed and accurately phrased interview questions during which the answers to the questions are recorded. Sending out questionnaires and surveys is another fact-finding method where the aim of the technique is to obtain many responses from a large variety of people. The questions in a survey are generally in a logical order and have clear instructions as to how the survey questions must be answered. Other fact-finding techniques include observation where the aim is to see what really goes on while different employees are taking care of different tasks. The issue with this technique is that productivity tends to improve whenever workers realize that they were being observed, hence it could lead to inaccurate results. The final phase of the system analysis process is the generation of an SRD (Systems Requirements Document).

### **3.1.3 Design**

In the design phase of the airline system within the Software Development Life Cycle (SDLC), the task involves creating the architectural and functional design. It includes determining the screen design, database sketches, system interface design and backend functional design including designing the data model and algorithms. The system’s design and development are built upon the requirement models from this stage. Hence, they must all work together to give a thorough comprehension of the previous phase that is represented in the solution system. After that, the design phase will emphasize translating the client’s idea into a concrete product and ensuring that the finished result matches their expectations. Before this phase ends, a System Design Specification Document (SDD) will be created and forwarded to the testing phase to guarantee that it satisfies the required functionality, scalability, and usability for the airline system. (Haiwai.S, 2021)

### **3.1.4 Implementation**

This phase begins after the system interface designs have been built and tested during the design phase. In the implementation phase, the system design is translated into actual software components, and the solution is brought to life. Configuring the hardware and software infrastructure required to support the airline forecasting system is part of this process. It entails configuring servers, databases, network connections, and any software dependencies required. Following that, depending on the system specifications, the development team constructs the software components and modules that comprise the airline system. They must write and test the code to guarantee that the software meets the needs of the clients. Following that, all the generated software components are integrated to form a full system. It helps in ensuring that the separate components perform well together, communicate effectively, and share data appropriately. Data migration takes place if necessary to transfer historical data from legacy systems to the new system. Training sessions are eventually held to familiarize the end-user. As a result, they understand how to successfully input data, configure models, analyze, and utilize the system's features. After completing all the preceding tasks, the airline system can only be deployed into the production environment. In a nutshell, this phase bridges the gap between design and operation, ensuring the airline system's effective implementation and functionality.

### **3.1.5 Security and Support**

Any programme or any application that contains essential functionality must have security as a key component. This might be as easy as protecting the database itself via malicious individuals attacking it or as difficult as performing scam detection to a qualifying lead prior to adding it onto the system. Every stage of the software development life cycle (SDLC) must involves security.

Installing safety precautions is essential in the overall picture of the TSI industry to safeguard both the database of the firm and the data of its clients. When it comes to the payment period, whereby private money-related data is exchanged, this is very important. The company uses specific procedures to protect the application's security, like authenticating the customer's identification through the use of One-Time Passwords (OTPs) before moving forward with the ticket booking process. The main goal of this phase is to increase the safety of the app as much as feasible.

## 3.2 Gantt Chart

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Tasks | Week 3 | Week 4 | Week 5 | Week 6 | Week 7 | Week 8 | Week 9 | Week 10 | Week 11 | Week 12 |
| 1.0 Project Planning |  |  |  |  |  |  |  |  |  |  |
| 1.1 Problem identification |  |  |  |  |  |  |  |  |  |  |
| 1.2 Proposed Solutions |  |  |  |  |  |  |  |  |  |  |
| 1.3 Defining Scope & Objective |  |  |  |  |  |  |  |  |  |  |
| 1.5 Prepare Preliminary Investigation Report |  |  |  |  |  |  |  |  |  |  |
| 2.0 Analysis |  |  |  |  |  |  |  |  |  |  |
| 2.1 Feasibility Study |  |  |  |  |  |  |  |  |  |  |
| 2.2 Requirement Gathering |  |  |  |  |  |  |  |  |  |  |
| 2.3 Create data model |  |  |  |  |  |  |  |  |  |  |
| 2.4 Logical System design |  |  |  |  |  |  |  |  |  |  |
| 3.0 Design |  |  |  |  |  |  |  |  |  |  |
| 3.1 Create prototype |  |  |  |  |  |  |  |  |  |  |
| 3.2 Design Interface |  |  |  |  |  |  |  |  |  |  |
| 3.3 Create Design Specification |  |  |  |  |  |  |  |  |  |  |
| 4.0 Development |  |  |  |  |  |  |  |  |  |  |
| 4.1 Develop system module |  |  |  |  |  |  |  |  |  |  |
| 4.2 Integrate system module |  |  |  |  |  |  |  |  |  |  |
| 4.3 Problem Initial Testing |  |  |  |  |  |  |  |  |  |  |
| 5.0 Testing |  |  |  |  |  |  |  |  |  |  |
| 5.1 Problem System Testing |  |  |  |  |  |  |  |  |  |  |
| 5.2 Document issues found |  |  |  |  |  |  |  |  |  |  |
| 5.3 Correct Issue found |  |  |  |  |  |  |  |  |  |  |
| 6..0 Implementation |  |  |  |  |  |  |  |  |  |  |
| 6.1 On-site installation |  |  |  |  |  |  |  |  |  |  |
| 6.2 Support Plan |  |  |  |  |  |  |  |  |  |  |
| 7.0 Security & Support |  |  |  |  |  |  |  |  |  |  |
| 7.1 System maintenance |  |  |  |  |  |  |  |  |  |  |

## 3.3 Workload Matrix

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Component:** | **JOAN YEE JIE NI** | **JENIFFER SU KAI LI** | **IBRAHEEM MOHAMMED IMADELDIN AWAD** | **ABDULRAHMAN GAMIL MOHAMMED AHMED** | **HONG RUI YI** | **IAN CHONG ZHE YIH** | **Total** |
| **Introduction** | **16.6%** | **16.6%** | **16.6%** | **16.6%** | **16.6%** | **16.6%** | **100%** |
| **Problem and**  **Proposed Solution** | **16.6%** | **16.6%** | **16.6%** | **16.6%** | **16.6%** | **16.6%** | **100%** |
| **Project Planning** | **16.6%** | **16.6%** | **16.6%** | **16.6%** | **16.6%** | **16.6%** | **100%** |
| **Feasibility Study** | **16.6%** | **16.6%** | **16.6%** | **16.6%** | **16.6%** | **16.6%** | **100%** |
| **System Analysis** | **16.6%** | **16.6%** | **16.6%** | **16.6%** | **16.6%** | **16.6%** | **100%** |
| **Design Diagram** | **16.6%** | **16.6%** | **16.6%** | **16.6%** | **16.6%** | **16.6%** | **100%** |
| **Interface Design** | **16.6%** | **16.6%** | **16.6%** | **16.6%** | **16.6%** | **16.6%** | **100%** |

# 4.0 Feasibility Study

Conducting a feasibility study is an essential preliminary step in the project’s initial phases. In order to determine the viability of a proposed solution before committing to its development, it is necessary to conduct a comprehensive analysis of all critical aspects of a proposed project. In the realm of business, success is commonly measured by the return on investment, which refers to the profitability of a project and its ability to justify the initial investment.

## 4.1 Technical Feasibility

Technical feasibility is the first step in the feasibility stage. This considers whether the resources, infrastructure, and technology are available and can be used to support the project. The process entails assessing whether the organization possesses the necessary technological resources to facilitate the development, procurement, installation, and operation of the system. The technical feasibility stage is utilized by organizations to demonstrate that a system can be effectively implemented, given the limited nature of their technology resources. This stage is crucial in ensuring that the organization does not undertake a project that exceeds their capabilities.

1. **Is the proposed technology of solution practical?**

* Yes, similar systems are widely used by other airline organizations, such as AirAsia.

1. **Do we currently possess the necessary technology?**

* Yes, we have hardware such as computers to develop and code the system, printers for reports, and company phones to communicate with departments in our organization and to communicate with clients. Besides that, we also have servers that support the system’s operation.

1. **Do we possess the necessary technical expertise, and is the schedule reasonable?**

* Yes, we have an IT department which includes a few application programmers that has developed many similar systems. In that case, we already have some experience of handling projects similar to this and are familiar with IT-related operations. (eg. working with database). Therefore, the schedule would be reasonable as our team possesses the technical expertise to tackle on similar projects.

1. **If the technology is not available, can it be acquired?**

* Yes, the applications be purchased from reputable software vendors, such as Microsoft.

## 4.2 Schedule Feasibility

Schedule feasibility is defined as the likelihood of a project to be completed within its scheduled time frame, by a planned due date. In order to estimate the time needed to complete the system, a Gantt chart is used to illustrate the project schedule to ensure that the system can be done within the given time limit.

|  |  |
| --- | --- |
| Tasks | Week |
| Planning | Week 3- Week 4 |
| Analysis | Week 4- Week 7 |
| Design | Week 7- Week 8 |
| Development | Week 8- Week 10 |
| Testing | Week 10- Week 11 |
| Implementation | Week 12 |
| Security and Support | Week 12 |
| Total | 9 Weeks |

1. **How much time is given for the project by the customer?**

* The estimated timeline is four months (around 17 weeks).

1. **How much time do you need to deliver the system?**

* The estimated time needed is 9 weeks.

1. **If time is insufficient, can we negotiate more with the customer?**

* No, the deadline is strict.

## 4.3 Operational Feasibility

Operational Feasibility is the process of determining how well a proposed system addresses business issues or capitalizes on opportunities for business. It also refers to a system that users will accept and use effectively to meet company objectives. The PIECES framework can be used to determine the urgency of operational problems that need to be fixed.

### **4.3.1 PIECES Framework**

**Performance**

1. **Does the current mode of operation provide adequate throughput and response time?**

* No, the current mode of operation does not provide enough response time. Therefore, a new system is being implemented to improve the operational mode, providing sufficient throughput and response time.

1. **Is the new system going to be efficient and have a high output?**

* Yes, by measuring the number of resources, it will indeed be more efficient and higher output than the old system.

**Information**

1. **Does the current mode provide end users and managers with timely, pertinent, accurate and usefully formatted information?**

* No. Our new system will provide better performance in every aspect. For example, it will automatically generate weather forecasts report based on the airline data. Besides, it will keep track of the booking details made along with the customer’s information each time a booking is made. Moreover, because it uses technology to generate reports, it will deliver information that is more accurate and has no errors than the original method.

#### **Economy**

1. **Does the current mode of operation provide cost-effective information services to the business?**

* No, the current mode of operation is not cost-effective because it does not provide comprehensive reporting capabilities. So that is hard to prepare weekly and monthly sales reports.

1. **Could there be a reduction in costs and / or an increase in benefits?**

* Yes. The new system with flight reservations, cancellations, rescheduling and report generating can improve overall productivity and increase benefits.

1. **Does the proposed system save more cost than older system?**

* Yes. The new system will have less problems to fix and reduce the infrastructure and maintenance costs compared to the older system.

#### **Control**

1. **Does current mode of operation offer effective controls to protect against fraud?**

* No. The new system will have authorization and approval processes to make sure the payment conducted in the new system is properly authorized personnel. This can protect it against fraud.

1. **Does current mode of operation guarantee accuracy and security of data and information?**

* No. The new system implements appropriate measures such as data backup and recovery and conducts regular security audits and assessments to guarantee the accuracy and security of data and information.

#### **Efficiency**

1. **Does the current mode of operation make maximum use of available resources, including people, time, flow of forms?**

* No.

1. **Do you need to hire / let-go people for the new system?**

* No. The new system does not need to hire /let-go people because they need to continue their roles to make sure the execution of the new system.

1. **Do we have enough time to print daily report like before?**

* Daily reports will be more efficient in terms of producing information for top management since they can get the data from across the system.

#### **Services**

1. **Does the current mode of operation provide reliable service?**

* No. The new system will be more customer friendly in providing high-quality service to satisfy customers’ requirements.

1. **Is it flexible and expandable?**

* Yes. We can convert the new system to mobile-friendly, so both the website and mobile app give flexibility for passengers to book or check-in their flight. Besides, the new system allows it to be easily upgraded and add more functions in the future.

## 4.4 Economic Feasibility

Economic Feasibility refers to the ability of the project to be done within the allocated budget. It involves analyzing the costs and benefits of the project and determining the profit of developing a new system. In order to evaluate the costs and benefits of developing the new system, the cost-benefit analysis has been conducted to calculate the tangible, direct, indirect, fixed, variable developmental and operational costs as well as identify the positive and cost avoidance benefits. The development costs include the fees that are incurred only once at the time the system is developed such as consultation, employee salaries, software purchases, software development, hardware purchases and initial user training fee. While the operational costs include the costs that are incurred after the system is implemented and continue while the system is in use. For instance, annual software license fees, electricity bills, internet fees, telephone fees, printer paper fees, printer cartridges fees, file conversion fees, and system maintenance, back up and update fees.

### **Cost-Benefit Analysis**

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Description automatically generated

1. **How much is the project’s budget?**

* RM60000.

1. **How much is our cost?**

* RM45050.

1. **How much is our profit?**

* (60000 – 45050) = Profit = RM 14950

1. **Does the organization have adequate cash flow to fund the project during the development period?**

* Yes, the company has around RM 10,000 in their reserve, thus it is economically feasible.

# 5.0 System Analysis

## 5.1 Functional Requirements

1. The system must be capable of registering new users.
2. The system must be capable of storing users’ and admins’ information.
3. The system must be capable of allowing users to log in and log out of the website.
4. The system must be capable of allowing users to book the flight ticket.
5. The system must be capable of providing users with one-way, round-trip, and multi-city options for flight booking.
6. The system must be capable of allowing users to choose the baggage weight.
7. The system must be capable of offering the seat selection function.
8. The system must be capable of serving various meal selections for users.
9. The system must be capable of offering special services and priorities for disabilities and kids.
10. The system must be capable of calculating the total prices that the user must pay.
11. The system must be capable of allowing users to make payments.
12. The system must be capable of sending flight update notifications to users.
13. The system must be capable of allowing users to cancel or reschedule their flights.
14. The system must be capable of generating weather reports.
15. The system must be capable of generating the company sales reports automatically.

## 5.2 Non-Functional Requirements

1. The system should allow users to use different payment methods.
2. The system should make sure that users can login into their account within 2 seconds.
3. The system should require users to create a strong password that contains at least 10 characters as well as at least one capital letter, number, and symbol.
4. The system must ensure that one registered phone number can only be used to verify one user account.
5. The system must be accessible all the time and provide 24/7 services.
6. The system should have high compatibility to allow users to make reservations on any platform.
7. The system should have a user-friendly and appealing user interface.
8. The system should have high security and safety.
9. The system should be able to be updated from time to time.
10. The system should only allow admins to gain access to the customers’ data, sales report, and booking details.
11. The system should be able to update the data instantly.
12. The system should be easily maintainable and serviceable.
13. The system should be able to have resources added and removed from it depending on the number of customers it’s getting without causing issues for the customers using it.
14. The system should be very responsive.

# 6.0 Design Diagram

## 6.1 Context Diagram

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## 6.2 Level-0 DFD

A picture containing text, diagram, plan, technical drawing

Description automatically generated

## 6.3 Entity Relationship Diagram (ERD)

A diagram of a customer support

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# 7.0 Interface Design

## 7.1 Prototype

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|  |  |
| --- | --- |
| Screen Name | Log In Page |
| Output Received By | Customer, Customer service, Airline service Admin |
| Description | Allow User, Customer Service, and Airline Admin to Log In to the system. |

A screenshot of a login

Description automatically generated with low confidence

|  |  |
| --- | --- |
| Screen Name | Register Page 1 |
| Output Received By | Customer |
| Description | Allow User to register with their email. Users have to key in their credentials such as first name, last name, nationality, country code, and phone number. After that, they must tick the T&C tick box in order to continue to the next phase. |

A screenshot of a computer

Description automatically generated with medium confidence

|  |  |
| --- | --- |
| Screen Name | Register Page 2 |
| Output Received By | Customer |
| Description | This page allows users to create their own password. The uniqueness of password is extremely important to your security. Therefore, user must follow the password policy to create their password. Policies such as password must contain at least 8 to 16 characters, at least contain 1 uppercase character, at least contain 1 lowercase character, at least contain 1 number, and at least contain 1 unique symbol characters. User can only submit the password if they followed the requirements of the password policy. |

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Description automatically generated

|  |  |
| --- | --- |
| Screen Name | Flight Booking Page |
| Output Received By | Customer |
| Description | Customers are provided with one-way, round-trip, and multicity options. Customers are able to select the number of guests as well as the classes which are First, Business, Premium Economy and Economy. Customers can also choose the depart date and return date, the departure location and the arrival location, and view the price of the ticket. Besides, they can also view the airlines, flight details and the flight time. When customer clicks on the select button, they will be directed to the service selection page. |

A screenshot of a phone

Description automatically generated with low confidence

|  |  |
| --- | --- |
| Screen Name | Service Selection Page |
| Output Received By | Customer |
| Description | Customer can go to the baggage options page, seat selection page, meal selection page, as well as special services page by clicking on the button. |

A picture containing text, screenshot, font, software

Description automatically generated

|  |  |
| --- | --- |
| Screen Name | Seat Selection Page (Depart flight) |
| Output Received By | Customer |
| Description | Customer can select their preferred seat for depart flight based on the option provided as shown in the interface. There are 4 types of seat selections given to customers which are extra legroom seat, hot seat, exit row seat and standard seat. Each type of seat has different price and color represented in the seat selection interface. Customer can directly select their preferred seat by clicking the round seat icon. It will turn green when selected. After selecting the seat for the departure flight, use the drop-down box can select return flight. The seat interface will change according to the different flights. A special seat selection button is provided for disabled people. After clicking this button, customer will be directing to the special seat selection for disabled person interface in order to get friendly seat selection. |

A screenshot of a flight registration

Description automatically generated with low confidence

|  |  |
| --- | --- |
| Screen Name | Special seat selection for disabled passenger |
| Output Received By | Customer |
| Description | This page's goal is to make it easier for travelers with disabilities to make reservations by providing them with reserved seats at no extra cost. There are 24 seats allotted solely for people with disabilities. These seats are thoughtfully placed next to the restroom to ensure easy access.  Customers must input their Disability ID into a text field that has been embedded into the screen. Their status for the kept tickets is confirmed through the verification process.  Disability Description, Customers are prompted to enter their handicap type in the second textbox. According to their unique demands, this knowledge enables us to customize the layout of the seats and offer specialized help. |

A screenshot of a computer

Description automatically generated with low confidence

|  |  |
| --- | --- |
| Screen Name | Baggage Option Page |
| Output Received By | Customer |
| Description | This page uses the simplest way to choose your baggage option. Users only need to look at the screen and select which option they want, and it already shows the pricing in the option. After selecting, the user will have to press the “next” button to go to the next phase. There is also a “back” button if user wants to return to previous page. |

A picture containing text, screenshot, web page, software

Description automatically generated

|  |  |
| --- | --- |
| Screen Name | Meal Selection Page (View All) |
| Output Received By | Customer |
| Description | Customers can pre-book their in-flight meals on this page. Each customer is allowed to book up to 2 meals per flight. By applying the provided filter, customers can easily view and select gluten-free meals, low lactose meals, vegetarian meals, diabetic meals, halal meals, fitness meals, and kid meals. Additionally, customers can see pictures and prices of the meals, and select the desired quantity. Icons are available to provide customers with more information about each meal. Furthermore, customers can click on the "View Detailed Info" button to access the food description page. Once customers have finished selecting their in-flight meals, they can click on the "Done" button to return to the service selection page. |

A picture containing text, screenshot, food

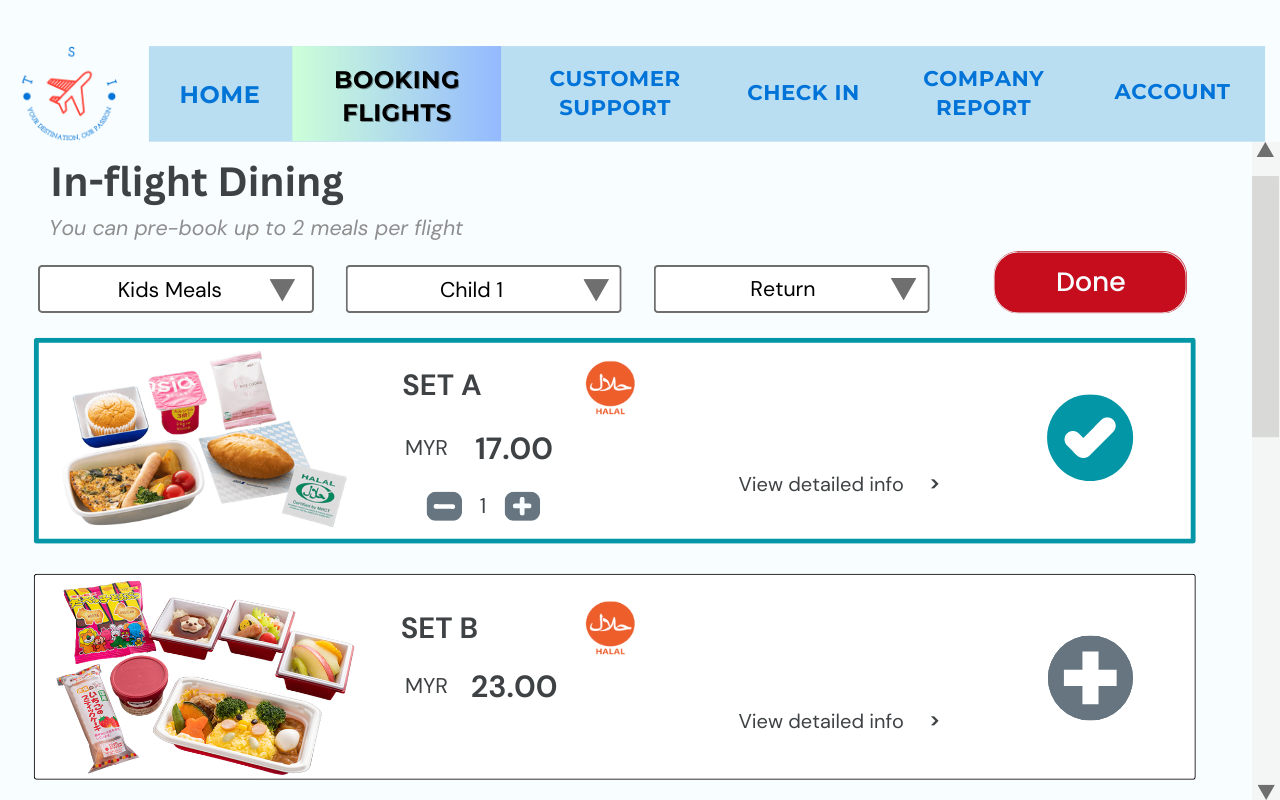
Description automatically generated

|  |  |
| --- | --- |
| Screen Name | Food Description Page (Nasi Lemak with Prawn Sambal |
| Output Received By | Customer |
| Description | On this page, customers are provided with a detailed description of the meal. The description includes information about the ingredients used to prepare the meals, as well as the allergen information. This serves as a helpful reference for customers, allowing them to make informed choices based on their dietary needs and preferences. |

A picture containing text, screenshot, web page, operating system

Description automatically generated

|  |  |
| --- | --- |
| Screen Name | Meal Selection Page (Vegetarian Meals) |
| Output Received By | Customer |
| Description | In this page, customers are able to view all the vegetarian meals served. |



|  |  |
| --- | --- |
| Screen Name | Meal Selection Page (Kids Meals) |
| Output Received By | Customer |
| Description | In this page, customers are able to view all the kids’ meals served. |

A picture containing text, screenshot, diagram, font

Description automatically generated

|  |  |
| --- | --- |
| Screen Name | Flight Reservation Page |
| Output Received By | Customer |
| Description | In this page, user only need to key in their first name and last name, and date of birth. Once the user is done, they can click the “next” button to continue. “back” button is created in case user want to go back to the previous page. |

A picture containing text, screenshot, font, diagram

Description automatically generated

|  |  |
| --- | --- |
| Screen Name | Reservation Contact Details Page |
| Output Received By | Customer |
| Description | In this page, customers need to insert their email, phone number, password or IC number, and address information. This is performed so that customer details can be stored in our customer data storage. With their information, the airline will be able to contact them with ease. Additionally, feedback forms can also be sent to every customer who puts in the email when booking. Using this data, airlines can better understand the customer needs and experience throughout the booking process. With the information gathered, the airline industry will know what to improve for the system in order to satisfy customer needs. Once the customer is done, they can click the “next” button to continue. “back” button is created in case user want to go back to the previous page. |

A picture containing text, screenshot, font, design

Description automatically generated

|  |  |
| --- | --- |
| Screen Name | Age Verification Page |
| Output Received By | Customer |
| Description | This page is to verify if a customer who is traveling alone is not between the age between 5 to 17 years old. The airline policy is that customers that are traveling alone aged between 5 to 17 years old need to apply for accompanied minor service. Customers have to click the “apply for minor service” button if the passenger who is traveling alone is a minor. |

A screenshot of a document

Description automatically generated with low confidence

|  |  |
| --- | --- |
| Screen Name | Submit Document Page |
| Output Received By | Customer |
| Description | In this page, customer must take a picture of their passport or identity card. It is needed to minimize the risk of fraudulent activity such as fake identities. After that, customer will have to take a photo ID. With this process, it can utilize the photos of the customer and their IDs to verify their identity. Customers have to make sure both the photo taken is clear and legible. Failure to submit a clear image will result the customer to retake the picture again. |

A picture containing text, screenshot, font, number

Description automatically generated

|  |  |
| --- | --- |
| Screen Name | Payment Page |
| Output Received By | Customer |
| Description | After selecting all the details for the booking process, the payment page will be on display. Options that the customer selected will be displayed on the left side of the page so that the customer will notice if some selection is made by mistakes. Pricing will also be displayed to let the customer know how much they need to pay. The right side of the page is where customers need to key in their online payment details. After that, customers can click “make payment” if done. Receipts will be sent through personal email. There will be a “return” button if the customer found any mistakes and needed to be changed. |

A picture containing text, screenshot, software, operating system

Description automatically generated

|  |  |
| --- | --- |
| Screen Name | Customer Support Menu |
| Output Received By | Customer |
| Description | Customers are allowed to select any one of the functions to request support from customer support. |

A screenshot of a chat

Description automatically generated with medium confidence

|  |  |
| --- | --- |
| Screen Name | Live chat page |
| Output Received By | Customer, customer support |
| Description | Customers are allowed to ask any question relevant to their flight schedule in this chat box. There are some frequently asked question at the left panel. |

A screenshot of a login form

Description automatically generated with low confidence

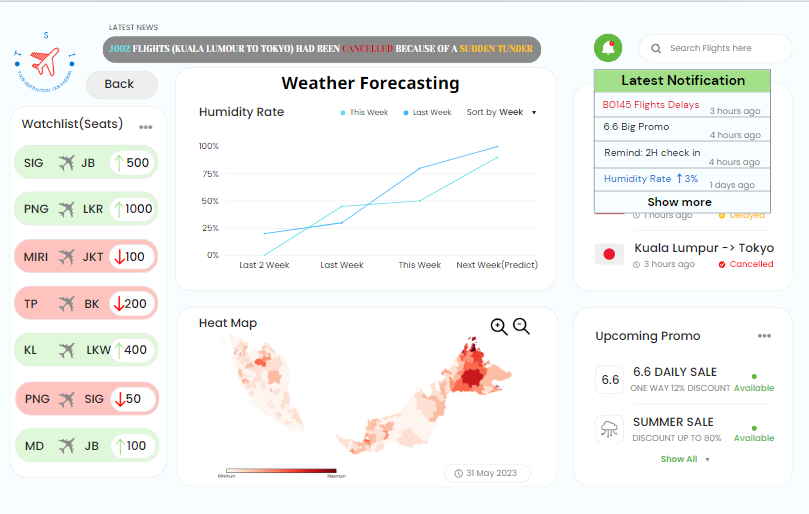
|  |  |
| --- | --- |
| Screen Name | Account recovery page |
| Output Received By | Customer support |
| Description | When a customer forgets their password, they need to key in their registered email and verification code in the text box. Then they will receive a reset password link to reset their password. |

A screenshot of a boarding pass

Description automatically generated with medium confidenceA screen shot of a boarding pass

Description automatically generated with medium confidence

|  |  |
| --- | --- |
| Screen Name | Check in Page |
| Output Received By | Customer, Customer service, Airline service |
| Description | Once the flight is ready, it will show the available bar code for the customer to check in. The countdown timer will display on the left panel. Users are allowed to download and share the flight detail by clicking the button at the right bottom corner. |



|  |  |
| --- | --- |
| Screen Name | Weather Forecasting Page |
| Output Received By | Customers |
| Description | The implementation phase incorporates a user-friendly interface featuring a line chart displaying historical, current, and forecasted humidity rates. Users have the flexibility to select their desired timeframe for a week's adjustment. Additionally, a Malaysia heat map presents a comprehensive visualization of local temperature data. The left panel showcases predicted flight ticket prices based on weather forecasts, while the right and top panels provide up-to-date news and events related to current flights. By clicking the bell button in the top right corner, users receive notifications about any modifications to flight schedules. For specific flight schedules, users can conveniently enter the flight ID in the designated textbox. |

A screenshot of a flight cancellation

Description automatically generated with low confidence

|  |  |
| --- | --- |
| Screen Name | Cancellation Page |
| Output Received By | Airline service |
| Description | This page is where the cancelling process takes place. The most recent flight and its details will be displayed on the middle page. This page's top panel will disclose any terms and conditions. |

A screenshot of a computer

Description automatically generated with medium confidence

|  |  |
| --- | --- |
| Screen Name | Rescheduling Page |
| Output Received By | Airline service |
| Description | This page is where the rescheduling process takes place. The most recent flight and its details will be displayed on the middle page. This page's top panel will disclose any terms and conditions. |

A picture containing text, screenshot, software, web page

Description automatically generated

|  |  |
| --- | --- |
| Screen Name | Flight detail page |
| Output Received By | Customer |
| Description | When a customer enters their flight number into the top right textbox, the flight schedule and payment information are displayed. |

A screenshot of a company report

Description automatically generated with medium confidence

|  |  |
| --- | --- |
| Screen Name | Available report options |
| Output Received By | Admin |
| Description | When the Staff responsible (Admin) for report generation select what type of Report, they want to generate they will be directed to the page that allows them to select the time frame of the report. |

A picture containing text, screenshot, calculator, design

Description automatically generated

|  |  |
| --- | --- |
| Screen Name | Time Period Selection |
| Output Received By | Admin |
| Description | The staff responsible (Admin) for report generation are asked to choose the time frame of the report where after choosing the month they can even choose specific dates in the month and see they reports for those day. |

A screenshot of a graph

Description automatically generated with low confidence

|  |  |
| --- | --- |
| Screen Name | Customer Satisfaction Report |
| Output Received By | Admin |
| Description | The staff responsible (Admin) for report generation are then redirected to a page where as soon as they click the generate button the report will appear as a pie chart that shows the satisfaction and unsatisfaction of the customers in percentage forms. |

A picture containing text, screenshot, number, font

Description automatically generated

|  |  |
| --- | --- |
| Screen Name | Ticket Sales Report Generator |
| Output Received By | Admin |
| Description | The staff responsible (Admin) for report generation are then redirected to a page where as soon as they click the generate button the report will appear as a bar graph that shows the ticket sales per month of if specified the per day. |

A picture containing text, screenshot, plot, line

Description automatically generated

|  |  |
| --- | --- |
| Screen Name | Profit Report Generator |
| Output Received By | Admin |
| Description | The staff responsible (Admin) for report generation are then redirected to a page where as soon as they click the generate button the report will appear as a line graph that shows the profit that the company made per day when zoomed in from the selected start date till the end date. |

A screenshot of a computer

Description automatically generated with medium confidence

|  |  |
| --- | --- |
| Screen Name | Profit Report Generator |
| Output Received By | Admin |
| Description | The staff responsible (Admin) for report generation are then redirected to a page where the generate button is clicked, the report will appear as a set of dates from the date selected that show all the available seats as well as flights that have yet to complete their journey and accordingly the available seats would be allocated to the customers when booking. |

## 7.2 GUI Design Principles

When designing th**e GUI for the flight booking system, it is significant to adhere to the following principles to create an attractive and user-friendly interface:**

1. Design the **interface layout logically and neatly.**
2. Create a **user-friendly design that is easy to remember.**
3. Clea**rly label all icons, labels, and controls.**
4. Pr**ovide hints and simple instructions to minimize data entry errors.**
5. Offer feedback responses to let users know ho**w the task is progressing and whether it was successful.**
6. Make it simple to navigate between pages b**y using hyperlinks and buttons.**
7. Maintain an a**ttractive and consistent UI design.**
8. Add **familiar control features like menu bars, text boxes, scroll bars, and checkboxes.**
9. Utilize appropriate colors to distinguish different sections within a page.

These princ**iples will aid in creating an interface that is visually appealing, intuitive, and efficient for users of the flight booking system.**

## 7.3 Input Design Principles

The proposed system involves filling out forms to enter data, and the forms will employ standard input devices, such as a keyboard, mouse, and/or touch screens. Because consumers don't need to acquire brand-new or specialized equipment merely to utilize the system, these conventional devices are extensively used, making the process of using the system both user-friendly and cost-effective.

When designing the inputs for the system the following principles were followed to ensure that the system is user friendly, flexible, and simple among other features and principles that are mentioned:

1. Simplicity, since the user should not be confused by the design, which should be simple and straightforward.
2. The design's consistency, which makes it easier for users to learn how to use the system and become acclimated to it more quickly than it would be if the design were inconsistent.
3. It was decided that error handling should make it simple for users to fix errors.
4. Minimizing the quantity of user input required to complete tasks since doing so improves the system's usability.
5. Users receiving immediate feedback is also necessary as informs the users about their actions instantaneously.
6. Related elements were grouped together to make it simpler for consumers to perceive and understand the system.
7. A variety of languages are supported, enabling the system to be used by people everywhere.
8. When a user encounters an issue which they don't understand, context-sensitive support is offered.
9. To lower the likelihood of mistakes, constraints were also added, limiting the activities that may be taken.
10. Accessibility of inputs was ensured so that all types of users can access the system including individuals with disabilities.
11. The system facilitates easy navigation through intuitive design principles.
12. The functionality of design elements is conveyed through their visual presentation.

## 7.4 Output Design

The primary goals of the design of outputs are to deliver useful and pertinent information that meets the needs of the consumers, and this information should be delivered on schedule and in sufficient quantity. Thus, it is essential to first determine the type of output required and who will require the output. ‎In this instance, the output of the registration procedure will be the customer's new username and password, allowing the user to log in to the system. ‎

If the user has already accessed the system, it is crucial to understand the inputs that the user will make. For example, if the user wants to book a flight, he must select the Booking Flights button to continue with the requirements. He must also input the date on which he wants to depart from his current location, the number of passengers who will be traveling with him, the point of departure and arrival, the time, and the class in which he wants to stay. The website will display the available flights with the selected particular time and other inputs when all of these inputs have been made.‎‎

After choosing the appropriate flight, a new page will appear with the three main buttons (Select your seat, baggage option, and Select your male). The first button, "Select your seat," produces a page that shows the user which seats they prefer to sit in for the duration of the flight as well as the various seats available and their prices. Also on this page are buttons to confirm the seat reservation and a button for people with special needs. The output of the second main button, "The baggage options," is the cost per kilogram, and the output of the third main button, "Select your meal," allows the user to customize the meal as well as select which meal he wants to eat during the flight.

After completing all of these steps and choosing "continue," a screen titled "Flight Reservation" will appear, where the user can enter all of their personal data and flight information. After this screen, the application will prompt the user to pay the flight's fees, and an invoice will be generated for them. and the result of these actions is to upgrade the ticket and enable check-in for the user. ‎‎

The system will display the available flights based on the users inputs, such as their departure date, number of passengers, departure and arrival points, time, and preferred class. The information will be presented in a clear and organized manner for easy comparison and selection.

Users will be able to select their preferred seats during the flight from a list of available options that includes respective prices for each seat. They should also be able to confirm their seat reservations and access options catering to individuals with special needs.

The system will present various baggage options available to users along with the cost per kilogram. Users should be able to easily understand the pricing associated with each option and select their preferred baggage option.

Users can customize their meal preferences for the flight using easy to navigate menus on screen that show meal descriptions alongside specifications for any modifications they want to make.

To book a flight. Users need to enter their personal data and relevant flight information on the payment screen securely. A clear invoice is generated for reference purposes once payment has been completed.

Finally upon booking completion the system will automatically upgrade your ticket type if necessary giving you details about your check in process so that you have all necessary information before travelling.

**Individual Component**

# 8.0 Requirement Gathering

## Interview (Abdulrahman Gamil Mohammed Ahmed TP071012)

The purpose of interviews is to examine thoughts, convictions, beliefs, and other perspectives on view through individual talks. During an interview session. One person conducts an inquiry while the other responds accordingly. The composition of these interviews can vary; there may be several inquirers alongside numerous observers or just two individuals engaged in direct conversation.

Undoubtedly, Interviews play a critical role in recruitment efforts as they allow the organization to evaluate potential hires' qualifications in depth. Additionally. Interviews provide invaluable insights that help us decide whether someone would excel at the organization or not (Bhat, 2018).

Certain interviews may be quite organized, employ specific queries, and gather responses using unambiguous language (such as yes/no). Some conversations are more candid and let you explore problems as they come up. Regardless of the approach, it is essential to take in-depth notes that completely reflect the interview.‎

**Interviews are very helpful for:**

• Carefully analyzing issues.

• Consider notions, stances, and attitudes.

• Investigate sensitive topics that some people might be hesitant to discuss in public.‎

When investigating problems that affect bigger groups, interviews alone are not always useful. If samples correctly reflect the general public, they can be utilized instead. Examining 5 staff members, for instance, who accurately represent the traits of a wider group of twenty staff members, might be sufficient to discover significant difficulties.

**Benefits of interviews:**

* Enables direct eye contact and behavioral observation.
* Enables handling of unforeseen situations, viewpoint clarification, and exploration
* Aids in involving participants in the TNA procedure.
* helps investigate and verify additional facts and figures (such as those found in records,) (*Data Gathering Methods and Instruments*, n.d.).
* The accuracy and organization of collected data are prioritized above all else. This method allows individuals' varying answers to be collectively analyzed while holding a constant question structure (Bhat, 2018).

**Setbacks of interviews:**

* Relies on people's availability and can take a long time.
* Sometimes people find it difficult to identify or express their true needs.
* Some people might use this opportunity to vent their anger or discuss other subjects.
* Interviewers must be prepared and competent.
* Conducting many interviews can take a lot of time and money.
* Careful sampling is required when dealing with a large population.
* Interviewers 'take over' on occasion and muck up the interview.
* Knowledge variety pales in comparison to data precision.
* Users are compelled to choose from the available response possibilities (*Data Gathering Methods and Instruments*, n.d.).

**Conduct of the Investigation Method**

One of the most worthwhile investigative approaches for gathering useful insights and information about identified problems is through interviews with relevant stakeholders. It's vital to meticulously identify suitable interviewees and engage in an effective interview process. Interviewing knowledgeable individuals with experience linked to identified issues can provide significant insights. The following stakeholders are recommended:

Airline staff: Individuals involved in reservation management, customer service, catering and operations can provide detailed feedback on operational processes. Disabled travelers: Individuals with disabilities that have used the airline's services or representatives from disability support groups could enlighten us on accessibility challenges. Passengers: Particularly customers that dealt with overbooking situations, contentious seat preferences, easily altered food menu options, and unaccompanied minor arrangements.

When coordinating interviews, it’s necessary to take care when choosing a fitting location with comfortability and respectfulness in mind concerning each participant being interviewed. Whenever possible offering various options based on individual preferences could benefit everyone taking part; this could include offices like call Centre reservations hubs airports etc., locations generally accessible by disabled people, public spaces, quiet private rooms designated solely for carrying out interviews ultimately wherever each individual participant feels most content.

Implementing an approach in line with effective interview practices means adhering to specific procedures. The fundamental method involves adequately planning ahead carefully scheduling all intended interactions particularly taking into account participants availability, establishing thought provoking questions in consideration of the problems. There is a need to confidently introduce oneself and clearly explain the reason behind doing the interview. This helps foster participant confidence ensuring consent is given when recording is deemed necessary. Then listening attentively asking key follow-up questions urging participants to provide detailed accounts of their experiences. This could include specifying examples or instances tailored to the identified problems. A comprehensive record must be maintained by either taking detailed notes or capturing conversations. Always having utmost respect for privacy concerns with regard to participants sharing confidential details learnt as part of the interview. Finally, it is important to express gratitude thanking all involved parties for generously offering their time and shown interest by participating in the interviews.

**Questions:**

1. May I inquire as to how well-versed you are in the airlines' approach and protocol concerning overbooking incidents?
2. May I kindly request examples or instances where overbooking has impacted passengers negatively?
3. How do you envision improvements or changes that could be made to address this issue better?
4. What measures could be implemented to improve the efficiency of catering to customer seat choices?
5. Are there any actions implemented to guarantee that handicapped individuals receive priority seating arrangements?
6. what suggestions for enhancing the priority reservation system that caters to individuals with disabilities?
7. May you humbly suggest some modifications or enhancements to the culinary offerings in order to better cater to the tastes and preferences of our esteemed passengers?
8. May I kindly request your insight on how adopting an automatic report-generating tool can potentially yield benefits and improvements for our organization?
9. In your view, how crucial is it to extend unaccompanied minor assistance? Which actions could be taken to ensure their availability?
10. Have you received any inquiries or feedback from our valued customers regarding the absence of unaccompanied minor services?

## Observation (Jeniffer Su Kai Li TP065517)

Observation is a method in requirement gathering that aims to see what really happens, not what people say happens. Observation should occur early in the project requirement-gathering process. It can help to get insight that is not available through conversation by observing stakeholders and end users in action. (Project Requirement Gathering: Observations, 2020)

The observation approach involves seeing, hearing, touching, and writing down the behavior, attitude, and qualities of objects, phenomena, or living beings. The researchers use this strategy to study and appreciate the subject's behavior and psychological characteristics.

Requirement gathering through observation can be done at any time or on a set timetable. This adaptability enables observations to be adapted to the specific demands of the project as well as participant availability. Observation involves directly watching how people perform processes connected to the system or activity under investigation. For example, observing jobs, workflows, decision-making processes, and interactions with current systems or tools. Requirements analysts can acquire insights into the real stages, problems, and variations involved in accomplishing specific jobs or processes by monitoring users in action.

**Benefit of Observation**

The first benefit of observation is it is the easiest method of gathering data because only very minimal technical knowledge is required for observation. Observing one's surroundings is a common practice, and with a little practice, anyone can become excellent at precisely observing and documenting their environment.

Besides, the second benefit is the observation method has high accuracy. The indirect methods such as interviews or questionnaires rely on respondents' information which may be subject to biases or inaccuracies. On the other hand, observation enables people to directly verify the obtained data. Researchers can use numerous testing methods to cross-check and evaluate the correctness of observations to ensure the data acquired is credible and trustworthy.

Other than that, observation has a benefit which is it requires less cooperation compared with another method. This is because observation does not substantially rely on respondents’ willingness to share information. This can avoid the scenario that some of the respondents lack the necessary communication skills or time to provide researchers with information about themselves. Since observation conduct frequently requires less active participation from people being observed, it is a more convenient and successful method to distribute.

(Prasanna, 2023)

**Setbacks of Observation**

Firstly, the setback of observation is the inability to observe personal behaviors and secret. People want to keep private some of the aspect of their life. The researcher may encounter respondents who are reluctant to allow their actions to be monitored. This setback limit the researcher’s capacity to obtain information about a person’s personal ideas, preferences, and sensitive facts of their life.

Secondly, the observation method is time-consuming. The researchers must dedicate a large amount of time in observation and make sure they do not rush the process. Long-term observation requires that both the observer and the observed maintain their interest and commitment. This commitment may decrease with time as observation is a long process. This time commitment might present practical obstacles, especially when researchers have limited time to undertake investigations.

Thirdly, the setback of observation is its high cost. Observation involves traveling to several locations and staying in the location where the occurrence occurred. This requires a high cost to execute to conduct the observation. Besides, to make sure the processing of observation, purchasing sophisticated and high-quality study equipment also cost a lot of money. These financial requirements make observation one of the most expensive data collection methods, often posing a challenge for researchers with limited resources.

(Prasanna, 2023)

**Conduct of the Investigation Method**

Our conduct of investigation method will be conducted by observing the users who are using the airline booking system. For example, passengers from different age groups, travel agents, or airline staff who are responsible for booking on behalf of customers. We can gain insight into their behavior and preferences by observing their interactions. The observation will take place on the airline websites which help us to easily observe users as they navigate through the booking process online. We can observe the user who is using the kiosk machine in the airport where they interact with the booking system in person. Besides, we also can conduct observation of the customer who is communicating with the staff at reservation desks to know more about their preference in the booking process.

This observation method closely monitors user behavior by using screen-capturing software or video-recording devices. Researchers can later analyze the recordings in depth by capturing users' behaviors and navigation through the booking system. Researchers obtain insights into the user experience, system efficiency, and areas for development using this strategy.

**10 Questions**

1. What difficulties do users face during the data entry process (e.g., personal information, travel details)?

2. Are there any steps in the booking procedure that are confusing or unclear?

3. Are users provided with sufficient information about additional services, such as seat selection or baggage allowance?

4. Do users encounter any technical glitches or system errors during the booking process?

5. How long does it take for users to complete the entire booking process?

6. Are there any accessibility concerns for users with disabilities?

7. How satisfied are users with the overall booking experience?

8. Were users able to easily compare different flight options based on price, duration, or other factors?

9. Are there any issues or delays in loading the search results or flight options?

10. How long did it take you to locate the airline booking system's website or app?

## Questionnaire (Ian Chong Zhe Yih Tp066848)

**A questionnaire** is a list of questions or items used to gather data from respondents about their attitudes, experiences, or opinions. Questionnaires can be used to collect quantitative and qualitative information.

Questionnaires are commonly used in market research as well as in the social and health sciences. For example, a company may ask for feedback about a recent customer service experience, or psychology researchers may investigate health risk perceptions using questionnaires.

This method is selected for our research method as it is an effective way to gather responses from a large amount of people with ease. Besides, the responses are really measured although large in number since surveys and questionnaires mainly consists of close-ended question. Apart from that, open-ended questions can also be used for respondents to express their thoughts in detail. Lastly respondents are put at ease while providing answers since their identity remains anonymous (Cleave, 2021).

**Benefits of Questionnaires and Surveys**

The first benefit of surveys and questionnaires is that it is economically efficient. It is inexpensive and cost efficient as compared to other methods of information gathering. This is because questionnaires are distributed to respondents through posts, email, text messages, and any other social media platform. It can be performed online and there is no need to visit or interact with each respondent in person. In general, this method saves costs on transport, resources such as printing and postage costs, and so on. Therefore, the budget required for this method is minimal.

The next advantage of questionnaires and surveys is their ability to be distributed extensively to a substantial pool of participants. Especially when it is a web-based questionnaire, the survey can be distributed to a large number of individuals at a time. This allows the researchers to collect data from a diverse range of individuals. Undoubtedly, this method yields significant benefits as it enables the collection of a greater number of responses, thus obtaining additional information and providing deeper insight into the perspectives of respondents regarding the system we have developed.

In addition, the use of questionnaires and surveys enables participants to uphold their anonymity and privacy. Ensuring confidentiality is a crucial aspect of conducting surveys as it can foster a climate of confidence and honesty among respondents, especially when dealing with sensitive subject matters. This has the potential to enhance the precision of data gathering and minimize the influence of social desirability bias. The feedback provided by customers is expected to be authentic and truthful. Hence, the system can be enhanced by reviewing the feedback obtained from the respondents.

**Drawbacks of Questionnaires and Surveys**

Although questionnaires and surveys provide a lot of benefits, there are several drawbacks to this method as well. One of the drawbacks of Questionnaires and surveys is that respondents might provide dishonest answers. This may result in inaccurate feedback and distort the data collected and lead to misleading results. It can also compromise the validity of the survey findings, making it difficult to draw accurate conclusions.

Furthermore, the lack of reliability is a notable limitation associated with questionnaires and surveys. The reliability and validity of the data collected through questionnaires cannot be assumed to be reliable or substantial. It is possible for survey participants to misinterpret the inquiry and inadvertently provide inaccurate data. As if they are unsure about the interpretation of the question, they might just simply give an answer to that particular question. This could have an impact on the quality of the data and information collected through this method (Reddy, n.d.).

Lastly, non-response bias is the most common limitation associated with questionnaires. Non-response is a situation in which an individual decides not to finish a questionnaire or survey. Thus, the sample may lack representation of the target population. The potential bias in question must be taken into consideration and appropriately addressed by researchers during the interpretation of their findings. In addition, it is possible that the survey findings may exhibit bias towards the characteristics of the participant who decides to provide feedback.

**Conduct of the Investigation Method**

Our conduct of the investigation’s method will be conducted through email questionnaire. This is due to its efficiency in terms of time management, as it surpasses the speed of alternative research methodologies. The email address of the respondent can be obtained through the booking system, which contains the user's information when a booking is made. The demographic of interest for our intended audience consists of senior individuals who frequently travel for relaxation, as well as professionals who travel for work purposes. Older travelers are often targeted due to the likelihood that a significant proportion of this age group is retired and may have an interest in enjoying frequent holiday travel. Elderly individuals often have a greater amount of expendable financial resources in contrast to their younger travelers who may be prioritizing other financial obligations. Business travelers are a significant customer segment who frequently fly and hold a crucial position for businesses. Frequent air travel is commonly observed among business professionals who are required to engage in client meetings and attend conferences across various locations. This implies an increased possibility of generating revenue for airlines through repeated reservations. Subsequently, the research will be conducted via email on the internet. This feature enables the participants to engage in the survey at their preferred time and pace. Respondents have the flexibility to access and complete the questionnaire at their convenience and from any location of their choice. The attribute of flexibility enhances the ease of response for participants, thereby augmenting the probability of attaining higher response rates.

**10 questions:**

1. What is your age?
2. What is your gender?
3. How often do you fly?
4. Is this your first time using an online ticketing system?
5. Rate your satisfaction with our new ticket booking system.
6. Rate the price of the ticket for the trip you are taking.
7. Do you think our ticket booking system has improved compared to the old ticket booking system.
8. Do you find the new system easier to use?
9. How long did it take for you to book a ticket with the new system?
10. Are you familiar with making online payments?

## Sampling (Ibraheem Mohammed Imadeldin Awad TP070765)

Sampling is the process by which researchers select a particular amount of data from a broader population for statistical analysis. Depending on the type of study being conducted, the appropriate sampling technique is chosen (Tuovila, 2020).

The collecting of data may be done using a variety of sampling techniques. One such method is systematic sampling, which involves randomly choosing people from a community to respond to questions on a certain subject at predetermined intervals. An alternative approach is stratified sampling, which includes choosing individuals from multiple user groups to provide a more comprehensive view of distinct user segments (McCombes, 2023). As they are two different sample techniques, stratified sampling and cluster sampling shouldn't be confounded. The population is segmented into strata in stratified sampling, and people are randomly selected from each stratum. Contrarily, cluster sampling entails grouping the population into clusters, picking one or more of the clusters, and interviewing every person in the selected clusters. Finally, random sampling is a method that selects people at random from the population, making sure that everyone has an equal chance of being picked. It's crucial to remember that various methodologies have different approaches and effects on data collecting.

**Benefits**

There are many benefits to using sampling as a requirement gathering method and the first one is that sampling helps save time and costs (What Are the Advantages and Disadvantages of Sampling in Research Methodology - Education Summary, 2022). It may be expensive to gather data from a large population, especially when considering the time, effort, and resources needed to conduct interviews, surveys, or observations. Sampling makes it possible to choose a portion of the population to get data from, thereby lowering the cost of data collecting. When using a lower sample size, the costs associated with survey administration, participant recruiting, and travel can be reduced.

Another benefit of using sampling is that it provides reliable and accurate data since with a carefully determined sample size, researchers can strike a balance between collecting enough data to make meaningful inferences and reducing the resources required for data collection (What Are the Advantages and Disadvantages of Sampling in Research Methodology - Education Summary, 2022). This precision helps ensure that the obtained data is accurate and reliable for making statistical inferences and generalizations.

Additionally, by choosing samples from various populations, a variety of information and viewpoints can be gathered (Prasanna, 2022). This aids the business in deciding what services to offer in response to demand or what needs to be improved to boost customer satisfaction and loyalty.

**Drawbacks**

The first problem with sampling is that, despite good selection methods, it might be difficult to guarantee that the chosen sample correctly reflects the total population (Prasanna, 2022). The lack of representation of various groups within the population might lead to the collection of inaccurate or incomplete data regarding the population.

If the group being examined is relatively homogeneous and devoid of variety or variation, sampling as a technique for obtaining requirements may not be of substantial use (Prasanna, 2022). Sampling is intended to capture the traits of a larger community, however in a homogeneous group, the sample might not provide any new information or viewpoints beyond what has already been identified previously.

An additional drawback of using sampling is that it may not have the ability to accurately record the changes in requirements which can evolve and change over time (Prasanna, 2022). This could lead to the use of inaccurate or out-of-date data and specifications that are inconsistent with what system users may have asked for.

**Conduct of the Investigation Method**

The initial phase of the investigation is defining the target population and the sample size where the users of the existing system who will provide valuable insight are selected to answer the questions set up by the system analyst and the number of users to be included in the sample is determined. Different factors such as user roles, experience level, and expertise are used to help ensure that the sample represents the target population accurately. The second phase is to select a sampling method based on the characteristics of the target population. To guarantee a representative sample, stratified sampling and random sampling are both seen to be viable strategies. The third phase is to develop a series of questions to learn more about the current system, making sure the questions cover topics including system flaws, advantages, user experiences, and recommendations for change. To get insights that can be put into practice, the questions should be precise, clear, and pertinent. The fourth phase is to either conduct interviews with the selected sample or send out questionnaires through email and to collect responses. The fifth phase is to analyze and interpret the data. The data is analyzed to find reoccurring themes and problems with the current system that has been mentioned. This helps with understanding the system's overall performance and user impression is made easier thanks to this examination. The sixth and final phase is to summarize and document the findings while highlighting both the faults that were found as well as the benefits of the current system's design.

**10 Questions**

1. How do you now handle reservations and passenger data?
2. What type of information are you gathering and keeping on each passenger?
3. What kinds of data or reports, such as weekly and monthly sales reports, do you now produce for management purposes?
4. How are these data gathered and analyzed?
5. Does management need any particular metrics or information?
6. What is the present system performance, reliability, and scalability constraints or difficulties?
7. Has the effectiveness of the operations been influenced by any occurrences or problems?
8. How do you now coordinate and communicate with various airlines regarding flight availability, timetables, and modifications on behalf of TSI?
9. What functions or features would you want to see in a new system to enhance the entire reservation and administration process, based on your experience?
10. What constraints or difficulties now exist in handling luggage weight and size restrictions?

## Research (Joan Yee Jie Ni TP065959)

Research is one of the methods of information gathering that would be used by our company for this airline system. Research is a useful fact-finding technique that widely utilized for information gathering by accessing the gleaned information (tutorialspoint, n.d.). This method can assist us to gain solutions to the problems that our company currently encountering by examining other companies which had previously solved similar issues (thirdsem, 2020). There are various sources that can be used to find the information required, such as journals, books, Internet sites, professional meetings, seminars, discussions, and site visit to observe a system in use.

**Benefits**

One of the benefits of using the research method is that it can aid in saving time if a solution has already existed to solve a particular problem (thirdsem, 2020). This means that our company does not have to spend a lot of time figuring out how to address the complicated issues faced as we can find out different solutions from a variety of sources.

Furthermore, research can provide our company with the latest information about the flight booking system (Soken-Huberty, n.d.). With the most recent info, our company will be able to gain a deeper insight into the existing system and build on ideas. This allows us to be better equipped to solve the problems found in the current system and create a modern system which is in line with current technology to ensure that the system that we develop is up to date with the current flight booking system.

Apart from that, research can introduce our company to new ideas in developing the system (Soken-Huberty, n.d.). It is undeniable that the more research we do, the more viewpoints we will come across as all new ideas are made of old ideas. By referring to numerous sources, our company will be able to meet existing users’ needs with new and innovative ideas or even creates new needs from old ideas (McKeown, 2019). This enables us to design a more comprehensive flight booking system to fulfil all the requirements of users.

**Setbacks**

On the other hand, there are several drawbacks to the research method. One of the drawbacks of it is that our company might not be able to get access to the right source if the information source requires the authority to access it (thirdsem, 2020). In this situation, the process of obtaining the relevant information sources will become time-consuming and cumbersome as we might need to spend time to request for approval, and occasionally this process will cost our company.

Moreover, sometimes our company might have difficulty in getting our desired information sources (KPU, n.d.). This is because the relevant information may be hard to discover or be outdated. Some information sources may even be expensive to purchase or are currently non-existent. Additionally, it will also be difficult to solve the problem if the documentation of the issue is not recorded (thirdsem, 2020). Thus, we will not be able to find out the solution from the sources and we need to spend money and time to deal with it.

**Conduct of the Investigation Method**

Our company will be gathering valuable information from different sources for our research projects, including journals, reference books, and Internet sites to act as a reference as well as to discover the solutions to the current problems of the system. The research for this project will take approximately one to two weeks to accomplish. During this process, we will examine and evaluate each information source to determine the reliability and quality of the information provided within it (Brock University Library, n.d.). We will analyze these documents based on the questions listed and then collect only the useful and significant information data that is relevant to the system development project. Our research target audience will be well-known and popular airline companies. Thus, our company’s system analyst will be visiting the website of these airline companies to observe the efficiency and constraints of their system in use. This allows us to study those successful airlines to emulate the advantages of their system while avoiding the limitations to develop a nearly ideal system. All these activities will be carried out based on the following questions.

**Questions**

1. How satisfied users are with the current airline booking system?

2. What do you see as the latest problems in the existing systems after reviewing those data and sources?

3. What are the potential solutions to the current problems found in the existing system?

4. What are the benefits and drawbacks of other airlines’ system?

5. What are the features and services that customers hoped to be implemented or improved in the new system?

6. What technologies are utilized in the backend of the booking system to manage inventory, availability, and pricing?

7. How does the current airline booking system handle flight reservations?

8. What security measures are required to protect customer data and payment information?

9. How does the current system handle special requests, such as dietary restrictions or services for passengers with disabilities?

10. How does the current airline booking system handle flight cancellation and rescheduling?

## Document Review (Hong Rui Yi TP069847)

I would use document review as one of the methods of information gathering for this airline system. Documents review is a type of requirements gathering technique. It gathers people together to walk-through the requirements documentation, page-by-page, and even line-by-line to ensure everyone’s complete understanding on the project.

**Benefits**

One of the advantages of document review is that it ensures accuracy and completeness of the research. It helps in identifying the any gaps or inconsistencies in the requirements document. For instance, reviewers can verify all necessary information from primary documents which are written by people who experienced in that event and make alignment with the project. Thus, it will enhance the clarity of any ambiguous statements and make the requirements well-defined.

Moreover, it facilitates collaboration and communication among the stakeholders. Document review allows for open discussion, and this offers a good opportunity for each person to participate. Reviewers can provide feedback, suggestions and ask questions to further refine the requirement from stakeholders and clients. Hence, it promotes effective communication and helps to address any misunderstanding early on.

**Setbacks**

On the other hand, document reviews also have some potential setbacks which should be aware of. Some of the reviewers may bring their own subjective, opinions or biases to the review process. In fact, this will influence the feedback and impact the objectivity in the requirement. Eventually, this can result in lack of consensus or disagreements among reviewers. At the end, these subjectivity and bias will lead to delays or conflicts in the requirement gathering process.

Furthermore, limited perspective causes time constraints thorough document reviews. The effectiveness of document review is highly dependent on the expertise and knowledge of the reviewer. If the reviewers have limited domain knowledge or lack a comprehensive understanding of the project objectives, they may not be able to provide valuable insights. Especially if there are complex or lengthy requirements documents, reviewers may face challenges in dedicating sufficient time. This can result in overlooking important aspects or requirements in the information gathering.

In summary, document review in requirement gathering offers benefits such as ensuring accuracy, facilitating collaborations but it is important for organization to be aware of these setbacks which are subjectivity and bias reviewers and limited perspective reviewers. However, if we can take steps to mitigate them through clear communication or diverse reviewer representation. Document review will be an essential step in the requirement gathering process that contributes to the success of the project.

**Conduct of the Investigation Method**

Document review involves several steps and considerations. Firstly, we need to define the review process and determine the specific objectives. Identify the purpose of the review, such as ensuring accuracy, completeness or alignment with stakeholder needs. For example, stakeholders should be involved in the review process of the analysis of the requirements document for the flight booking system. They will assess if all necessary functionalities are included such as seat selection, booking cancelation and reservation.

After defining the review criteria, choosing appropriate reviewers who have the necessary expertise and knowledge is very important. Reviewers can include business analysts, project managers, developers or other stakeholders with relevant insights. For instance, conducting a meeting to review the system user interface may face different ideas and designs. However, having a review team which has professional knowledge of the layout, navigation and visual design may ensure a seamless and user-friendly experience for passengers.

After considering a diverse set of reviewers, establishing a review timeline helps to set clear priorities and directions to the project. Reviewers need to set a timeline for the document review process, including deadlines for reviewers to provide feedback. In the airline system case, 2 weeks is sufficient time for thorough review and analysis of the requirement documentations. Under a proper timeline and plan, reviewers can avoid working mindlessly on tasks and focus each week on what needs to get done.

At the end, the review process can take place either in person or remotely, depending on the preferences and availability of the reviewers. In person reviews may involve physical meetings or workshops, while remote reviews can be conducted through virtual collaboration tools and email exchanges. In brief, conducting thorough document reviews in these areas will ensure that the system meets the needs of passengers and enhances a better operational efficiency.

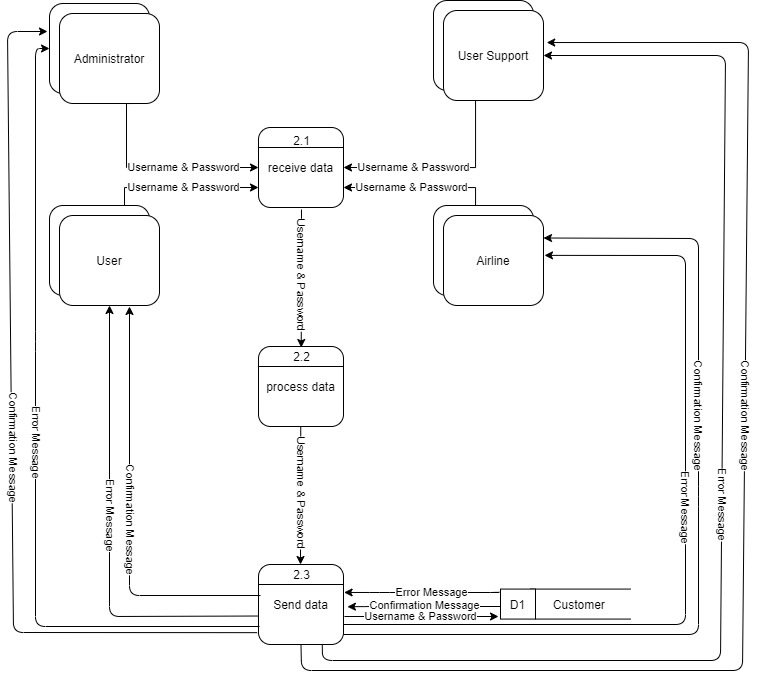
**Set of Questions**

1. Are the precise user roles and permissions in the system requirement properly defined and documented?
2. Do the system requirements specify how to handle flight cancellations and rescheduling?
3. Is it possible to provide a detailed description of how the system handles luggage tracking and reconciliation?
4. Does the paper describe the processes for handling passenger check-in, such as online check-in, seat selection, and boarding pass issuance?
5. Have security procedures and mechanisms, such as encryption standards, user authentication, and data privacy compliance, been defined to assure the protection of sensitive passenger information?
6. Is there documentation on the system's scalability and performance capabilities, such as load balancing, caching methods, and peak booking time requirements?
7. Is it possible to explicitly specify the business principles and algorithms utilised for fare calculation, pricing, and discounts?
8. Does the document describe the system's reporting and analytics capabilities, including the frequency of data updates?
9. Is there documentation on the system's multilingual support, including language preferences for passengers and multilingual customer care interactions?
10. Are particular requirements stated for accessibility elements inside the system to ensure compliance with accessibility standards for disabled passengers?

# 9.0 Design

## 9.1 DFD level 1

## 9.1.1 Login (Abdulrahman Gamil Mohammed Ahmed TP071012)

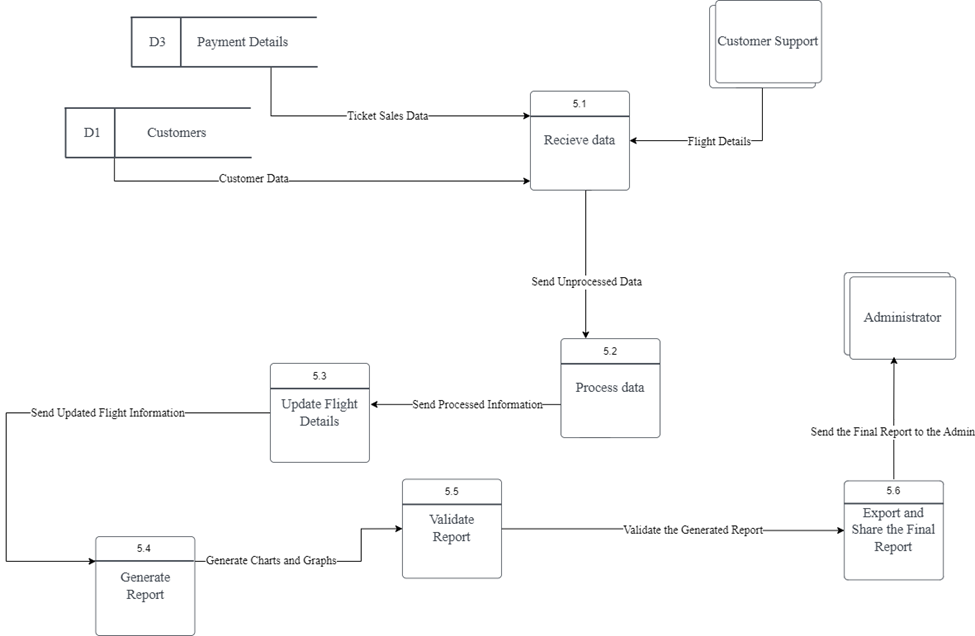


## 9.1.2 Customer Service (Hong Rui Yi TP069847)

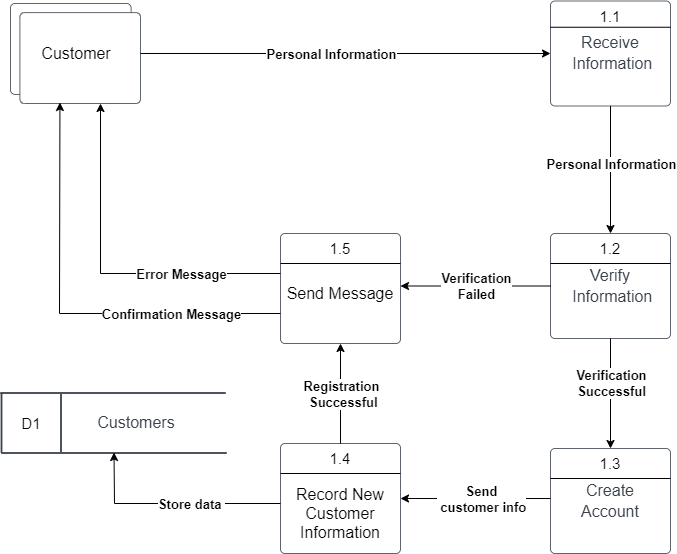
A diagram of a customer support

Description automatically generated with medium confidence

## 9.1.3 Generate Report (Ibraheem Mohammed Imadeldin Awad (TP070765)



## 9.1.4 Register (Joan Yee Jie Ni TP065959)



## 9.1.5 Payment (Ian Chong Zhe Yih TP066848)

A diagram of a payment method

Description automatically generated with low confidence

## Booking Flight (Jeniffer Su Kai Li TP065517)

A picture containing text, diagram, plan, technical drawing

Description automatically generated

**9.2 Data dictionary**

**9.2.1 Login (Abdulrahman Gamil Mohammed Ahmed TP071012).**

1. **Data flow**

|  |  |
| --- | --- |
| Name: | Login information. |
| Description: | Give the ability to access into the system. |
| Origin / Source: | Login for (user, administrator, user support, and airline) process |
| Destination / Slink: | User, administrator, user support, and airline external entities. |
| Data structure: | Username and password. |

1. **data store**

|  |  |
| --- | --- |
| Name: | Customer. |
| Description | To check whether the username and password already exist or if one of them is wrong or maybe both are wrong. |
| input data flows: | The username and password. |
| output data flows: | Error message or confirmation message. |

**9.2.2 Customer Service (Hong Rui Yi TP069847).**

1. EXTERNAL ENTITY:

|  |  |
| --- | --- |
| Name | Customer Support |
| Description | Customer support processes customer cancellation, account recoveries and other feedback responses. Aside from that, they will show weather forecasting data. |
| Input Data Flow | Request Rejected, Refund details, Weather Impacts |
| Output Data Flow | Support request, Weather impact request |

1. PROCESS:

|  |  |
| --- | --- |
| Name | Provide Customer Service |
| Description | Customer support offers various specific service to customer |
| Input Data Flow | Support request |
| Output Data Flow | Cancel or Modify Response, Feedback, Forgot Password Response |
| Process Description | start  receiving support request  handle requests  if request verified  print("request success")  else  print ("request fail")  return response  end |

|  |  |
| --- | --- |
| Name | Provide Weather Forecasting Service |
| Description | Customer support shows weather forecasting impacts to customer |
| Input Data Flow | Weather impact request |
| Output Data Flow | Show weather impact |
| Process Description | start  receiving weather historical data  forecasting impact of the data  return impact  end |

1. Data Flow

|  |  |
| --- | --- |
| Name | Support request |
| Description | Record feedback and request through live chat |
| Origin source | Customer |
| Destination | Customer service external entity |
| Data Structure | Customer account, Customer flight detail, Customer requests, Weather historical data |

**9.2.3 Generate Report (Ibraheem Mohammed Imadeldin Awad TP070765)**

1. External Entity

|  |  |
| --- | --- |
| Name | Customer Support |
| Description | Customer support will enter the update information into the system as well as receive support requests and reply to them accordingly |
| Input data flows | Support Request |
| Output data flows | Flight Details |

2. Process

|  |  |
| --- | --- |
| Name | 5.4 Generate Report |
| Description | Generates different reports such as Sales report and Customer satisfaction report while taking in information from various data stores and external entities |
| Input Data Flow | Flight Details |
| Output Data Flow | Final report with all the data required by the company to make important decisions |
| Process Description | Start  Receiving Flight Details  Process the flight details.  Process other important details.  Generate reports based on requirements.  End |

3. Data Flow

|  |  |
| --- | --- |
| Name | Generate Charts and Graphs |
| Description | Passes the generated Graphs and Charts to the validation process |
| Origin | Generate Report |
| Destination | Validate Report |
| Data Structure | Reports in Graph forms or tables |

**9.2.4 Register (Joan Yee Jie Ni TP065959)**

**External Entity**

|  |  |
| --- | --- |
| Name | Customer |
| Description | Customers can enter their personal information to register an account. |
| Input Data Flow | Error Message, Confirmation Message |
| Output Data Flow | Personal information |

**Process**

|  |  |
| --- | --- |
| Name | 7.2 Verify Information |
| Description | Verifying the personal information provided by the customer to complete the account registration. |
| Input Data | Personal Information |
| Output Data Flow | Verification Failed, Verification Successful |
| Process | Start  Read personal information  If personal information is verified  Return Verification Successful  Else  Return Verification Fails  End |

**Data Store**

|  |  |
| --- | --- |
| Name | Customer |
| Description | Stores all registered customer details |
| Input Data | Personal Information |
| Output Data Flow | - |
| Data Structure | Customer ID, Name, Email Address, Nationality, Country Code, Phone Number, Password |

### **9.2.5 Payment (Ian Chong Zhe Yih TP066848)**

1. External Entity:

|  |  |
| --- | --- |
| Name | Customer |
| Description | Customer confirms payment details and receives an invalid payment notice if payment unsuccessful or receives an online receipt if payment successful. |
| Input Data Flow | Invalid Payment Notice, Online Receipt, Verification |
| Output Data Flow | Payment Details |

|  |  |
| --- | --- |
| Name | Bank |
| Description | Bank will verify if the transaction is made and receives all the transaction information if payment is successful. |
| Input Data Flow | Transaction Information |
| Output Data Flow | Transaction Verification |

2. Process:

|  |  |
| --- | --- |
| Name | 4.1 Authorize Payment |
| Description | Collect payment details from customer and verify customer to confirm transaction. |
| Input Data Flow | Customer External Entity |
| Output Data Flow | Successful Payments, Unsuccessful Payments |
| Process Description | Start  Receive Customer Details  If customer details verified  Display Payment Successful  Else  Display Payment Unsuccessful  End |

|  |  |
| --- | --- |
| Name | 4.2 Invalid Payment |
| Description | Generate a response notice to customer to inform them their payment is invalid. |
| Input Data Flow | Unsuccessful Payment |
| Output Data Flow | Invalid Payment Notice |
| Process Description | Start  Receive Unsuccessful Payment Detail  Process Unsuccessful Payment Detail  Generate Invalid Payment Notice  End |

|  |  |
| --- | --- |
| Name | 4.3 Payment Record |
| Description | Once the transaction is verified, transaction information will be processed and passed to Bank External Entity. Data of transaction will then be stored to D3 Payment Details. |
| Input Data Flow | Successful Payments, Transaction Verification |
| Output Data Flow | Transaction Information, Transaction Data |
| Process Description | Start  Receive Successful Payment Detail  Store Transaction Data in D3 Payment Details  Passes Transaction Information to Bank  End |

|  |  |
| --- | --- |
| Name | 4.4 Payment Receipt |
| Description | If payment is successful, will receive data from D3 Payment Details and generate an online receipt for the customer. |
| Input Data Flow | Payment Record |
| Output Data Flow | Online Receipt |
| Process Description | Start  Receive Payment Record  Generate Online Receipt  Display Online Receipt  End |

3. Data Flow:

|  |  |
| --- | --- |
| Name | Payment Detail |
| Description | Enable customer to make online transactions for payment. |
| Origin | Customer |
| Destination | Bank |
| Data Structure | Customer ID, Payment ID, Payment Method, Payment Date |

4. Data Store:

|  |  |
| --- | --- |
| Name | D3 Payment Details |
| Description | Store all payment data |
| Input Data Flows | Transaction Data |
| Output Data Flows | Payment Records |
| Data Structure | Customer ID, Payment ID, Payment Method, Payment Date |

### **9.2.5 Booking Flight(Jeniffer Su Kai Li TP065517)**

**External Entity**

|  |  |
| --- | --- |
| Name | Customer |
| Description | Customer can enter the flight details to search and select suitable flights and reserved seat, meal, and checked luggage and input passenger details to book the flight, customer will receive an itinerary after the booking is confirmed. |
| Input Data Flow | Flight Search Results, Flight Itinerary |
| Output Data Flow | Flight Details, Passenger Information, Reserved Seat, Reserved Meal, Checked Luggage |

|  |  |
| --- | --- |
| Name | Airline |
| Description | Airline will check the booking request and give a booking reply |
| Input Data Flow | Booking Request |
| Output Data Flow | Booking Reply |

**Process**

|  |  |
| --- | --- |
| Name | 3.1 Search flight |
| Description | To help customer search suitable flights |
| Input Data | Flight details |
| Output Data Flow | Flight Search Results |
| Process | Start  Read flight details  Find suitable flights  Print flight search results  End |

|  |  |
| --- | --- |
| Name | 3.2 Select flight |
| Description | To select customer preferred flight for travel |
| Input Data | Flight Search Results |
| Output Data Flow | Selection Results |
| Process | Start  Read Flight Search Results  Select Flight  Print Selection Results  End |
|  |  |
| Name | 3.3 Input Details |
| Description | To input passenger information and store in Reservation Database |
| Input Data | Passenger Information |
| Output Data Flow | Passenger Information Record |
| Process | Start  Receive Passenger Information  Store Passenger Information  Store Passenger Information Record to Reservation Database  End |

|  |  |
| --- | --- |
| Name | 3.4 Extra Requirement |
| Description | To get customer requirement and store in Reservation Database |
| Input Data | Reserved Seat, Reserved Meal, Checked Luggage |
| Output Data Flow | Passenger Requirement |
| Process | Start  Read Extra Requirement (Reserved Seat, Reserved Meal, Checked Luggage)  Store Passenger Requirement in Reservation Database  End |

**Data Flow**

|  |  |
| --- | --- |
| Name | Flight Search Results |
| Description | To allow the customer to see the available flight for them to select |
| Origin | Search flight process |
| Destination | Customer external entity |
| Data Structure | Depart Date, Return Date, Departure Place, Arrival Place |

|  |  |
| --- | --- |
| Name | Flight Itinerary |
| Description | To let the customer know the booking is confirmed |
| Origin | Confirm Booking Process |
| Destination | Customer external entity |
| Data Structure | Depart Date, Return Date, Departure Place, Arrival Place, Meal Selected, Seat Selected, Checked Luggage Booking Number, Booking Date, Passenger Information |

**Data Store**

|  |  |
| --- | --- |
| Name | D2 Reservation Database |
| Description | Store all booking data |
| Input Data Flows | Selection Results, Passenger Information Record, Passenger Requirement |
| Output Data Flows | Customer Booking Details |
| Data Structure | Depart Date, Return Date, Departure Place, Arrival Place, Meal Selected, Seat Selected, Checked Luggage Booking Number, Booking Date, Passenger Information |

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