Airplane travel procedures for passengers using BPMN

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I.   Introduction of the project

This project focuses on modeling **the procedures for passengers travelling by airplane** using Business Process Model and Notation (BPMN). ***The Airline Passenger Processing Department*** is responsible for managing and facilitating the entire process of passenger travel from booking to boarding the airplane.

1. Objectives

The department's primary objective is to ensure a smooth, safety, efficient and enhance satisfaction for passengers while complying with aviation regulations and maintaining operational efficiency. This includes tasks such as booking, check-in, baggage handling, security checks, boarding, and addressing passenger inquiries.

Safety: Ensure the safety, maintain high levels of security and compliance with aviation regulations.

Efficiency: Minimize delays and improve operational efficiency.

Customer Satisfaction: Provide excellent customer service to enhance the travel experience.

Communication: Maintain clear and effective communication with passengers and between departments.

2. Key Tasks

Ticket Booking and Reservation: Confirm reservations and issue electronic tickets.

Check-In: Verifying passenger information, issuing boarding passes, assign seats, and handling baggage.

Baggage Handling: Processing and tagging checked-in luggage.

Security Screening: Ensuring passengers and their belongings are free of prohibited items.

Immigration Control: Verification of travel documents for international travelers.

Boarding Procedures: Manage the orderly boarding of passengers onto the aircraft.

In-Flight Services: Providing customer service during the flight, including safety briefings, food and beverage service, and addressing passenger needs.

Landing and Disembarkation: Ensuring safe and efficient disembarkation.

Baggage Claim: Assisting passengers with baggage retrieval and handling any lost or damaged baggage issues.

3. Dictionaries and Definitions

BPMN (Business Process Model and Notation): A graphical representation for specifying business processes in a workflow.

Passenger: A person who travels in an aircraft.

Flight Attendant: A member of the cabin crew responsible for ensuring passenger safety and comfort during the flight.

Security Personnel: Staff responsible for conducting security screenings.

Ground Staff: Airline personnel responsible for handling baggage and assisting passengers at the airport.

Ticket: A document confirming the passenger's reservation for a flight.

Booking Reference (PNR): A unique code assigned to a passenger's booking, used for identification and management of the reservation.

Check-In: The process by which passengers confirm their presence on a flight, typically involving seat assignment and baggage drop-off.

Check-in Counter: A location where passengers confirm their presence on a flight, check luggage, and receive a boarding pass.

Boarding Pass: A document provided by an airline after check-in, giving a passenger permission to enter the restricted area of an airport and board the airplane for a particular flight.

Boarding: The process of passengers entering the aircraft and finding their assigned seats.

Security Screening: A process where passengers and their carry-on luggage are examined for prohibited items before boarding a flight.

Customs Control: Procedures conducted to inspect goods being brought into a country to ensure compliance with import regulations and duties.

Immigration Control: A checkpoint where passports and visas are verified to ensure passengers have the necessary documentation to enter or exit a country.

Gate: The area at an airport where passengers board or deplane.

Baggage: The suitcases, bags, and personal items that passengers bring with them on their journey. This includes both checked and carry-on baggage.

Baggage Handling: The process of managing passenger luggage from check-in to arrival at the destination, including loading, unloading, and transportation.

Baggage Claim: The area where passengers retrieve their checked luggage upon arrival.

Customer Feedback: Information provided by customers about their experience with the airline, used to improve services and address issues.

Ground Services: Airport-based operations that include check-in, baggage handling, and boarding assistance.

Customer Service: Support services provided to passengers before, during, and after their flight.

II. List of Processes in Airline Passenger Processing

Management Processes

Operational Management	Quality Management	Compliance and Safety Management	Risk Management	Financial Management

Primary Processes

Booking a Ticket → Check-In → Immigration Control (international flights) → Security Check → Boarding → In-Flight Experience → Landing and Disembarkation → Baggage Claim

Support Processes

Customer Service	Baggage Handling	Flight Information Display and Announcement	Catering Services	Ground Services Coordination

Management Processes

1. Operations Management
2. Quality Management (CRM)
3. Compliance and Safety Management
4. Risk Management
5. Financial Management

Primary Processes

1. Ticket Booking and Reservation
2. Check-In Process
3. Immigration Control (for international flights)
4. Security Check
5. Boarding Process
6. In-Flight Services
7. Landing and Disembarkation
8. Baggage Claim

Supporting Processes

1. Customer Service
2. Baggage Handling
3. Flight Information Display and Announcement
4. Catering Services
5. Ground Services Coordination

I. Primary Processes

Process Name	Objective	Steps	Inputs	Outputs	Stakeholders	Tool/Systems
1. Ticket Booking and Reservation	Allow passengers to search and book flights easily.	1. Search for Flights 2. Select Flight 3. Enter Passenger Details 4. Payment Processing 5. Booking Confirmation	- Passenger details - Payment info	Booking confirmation, e-ticket	Passengers, airline booking system	Airline website/app, payment gateway
2. Check-in	Enable passengers to check-in and obtain a boarding pass, check luggage	1. Approach check-in counter or uses self-service kiosks/ online check-in. 2. Provide booking reference and ID, check in luggage and generate luggage tags. 3. Assign or confirm seat selection. 4. Issue boarding passes and check luggage.	Booking reference Passport/ID, luggage	Boarding pass, checked luggage	Passengers, airline check-in system, staff	Online check-in portal, airport kiosks
3. Immigration Control (for international flights)	Verify travel documents and clear traveler for international departure.	1. Passenger proceed to immigration counter. 2. Present passport, visa (if applicable), and boarding pass. 3. Answer any questions from immigration officers. 4. Receive exit stamp on passport.	Passport, visa (if applicable), boarding pass.	Cleared passengers for international departure.	Travelers, immigration officers.	Custom system
4. Security Check	Ensure safety and security of all passengers, and carry-on items	1. Passenger proceed to security checkpoint. 2. Present boarding pass and identification. 3. Place carry-on items and personal belongings in bins for screening. 4. Pass through metal detectors or body scanners. 5. Collect belongings after screening.	Boarding pass, ID, carry-on items	Cleared security status	Passengers, security personnel	Security screening equipment
5. Boarding	Facilitate orderly entry of passengers onto the aircraft.	1. Passenger wait in the boarding area until boarding is announced. 2. Present boarding pass at the gate. 3. Proceed to aircraft and find assigned seat.	Boarding pass	Passengers boarded	Passengers, boarding gate staff	Boarding gate system
6. In-Flight Services	Ensure a safe and comfortable flight for passengers.	1. Stow carry-on luggage in overhead bins or under the seat. 2. Provide safety instructions 3. Serve meals and beverages or entertainment 4. Follow crew instructions during turbulence or emergencies.	Boarding pass, in-flight services request	Comfortable flight experience	Passengers, flight attendants	In-flight entertainment system, meal service
7. Landing and Disembarkation	Ensure safe and orderly deplaning of passengers.	1. Announce landing and arrival details. 2. Assist passengers with disembarkation. 3. Ensure all personal belongings are collected. 4. Guide passengers to immigration/customs (if applicable).	Carry-on luggage	Passengers disembarked from the aircraft	Passengers, flight attendants	None
8. Baggage Claim	Ensure passengers retrieve their luggage.	1. Passenger proceed to baggage claim area. 2. Identify and collect checked luggage from the conveyor belt. 3. Present luggage receipt if requested. 4. Exit the baggage claim area.	Boarding pass, Checked luggage receipt	Retrieved luggage	Passengers, baggage handling staff	Baggage claim system

II. Supporting Processes

| Process Name	Objective	Steps	Inputs	Outputs	Stakeholders	Tools/Systems
1. Customer Service	Handle passenger inquiries, booking changes, and special requests.	1. Assist passengers with inquiries regarding flight schedules, delays, and airport navigation. 2. Handle special requests such as assistance for disabled passengers or unaccompanied minors. 3. Handle complaints and provide resolutions. 4. Process refunds and compensation.	Inquiry details, change request, special requests.	Resolved inquiries, updated bookings	Passengers, customer service staff	Customer support system, CRM
2. Baggage Handling	Manage passenger luggage from check-in to arrival.	1. Tag and label checked luggage at the check-in counter. 2. Transport luggage from the check-in area to the aircraft. 3. Load luggage onto the aircraft. 4. Unload luggage upon arrival and transport to the baggage claim area. 5. Assist with locating and retrieving lost or delayed luggage.	Passenger luggage, baggage tags.	Delivered luggage	Baggage handlers Passengers	Baggage handling systems Baggage scanning and tracking systems
3. Flight Information Display and Announcement	Provide timely updates and information to passengers regarding flight statuses, gate changes, and other relevant details.	1. Receive Updates: Obtain flight schedule and operational updates from airline operations. 2. Update Displays: Input updated information into the flight information display system. 3. Announcements: regarding flight statuses, gate changes, and boarding procedures. 4. Monitor Changes: Continuously monitor for any updates or changes in flight information. 5. Coordinate: Collaborate with gate agents and ground staff to ensure passengers are informed.	Flight schedules Operational updates Gate assignments	Updated flight information displayed on screens Public announcements over the PA system	Passengers Gate agents Ground staff Airline operations	Flight information display system (screens) Public announcement (PA) system
4. Catering Services	To provide meals and services during the flight.	1. Prepare Meals and Beverages 2. Serve Passengers 3. Handle Special Requests	Catering supplies	Served meals, satisfied passengers.	Flight attendants Ground handling staff Passengers	Catering management software
5. Ground Services Coordination	Coordinate ground handling activities to ensure efficient aircraft turnaround and passenger services.	1. Aircraft Refueling 2. Cleaning and Maintenance 3. Passenger Assistance	Flight schedule and details Ground handling requirements	Prepared aircraft (clean, refueled, loaded)	Ground handling staff Airline operations Airport authorities Passengers	Ground handling management systems

III. The specification of requirements
1. BPMN
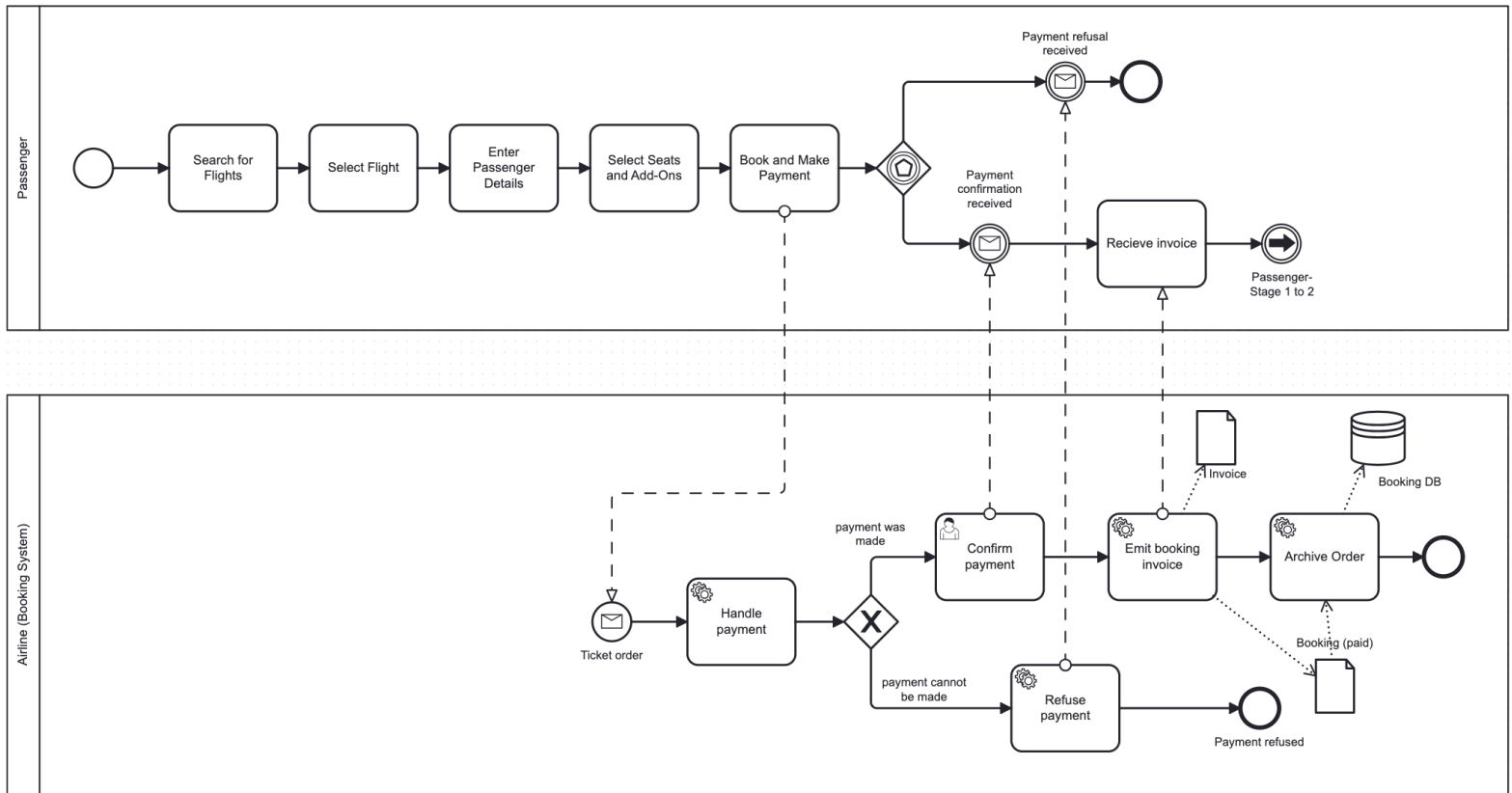
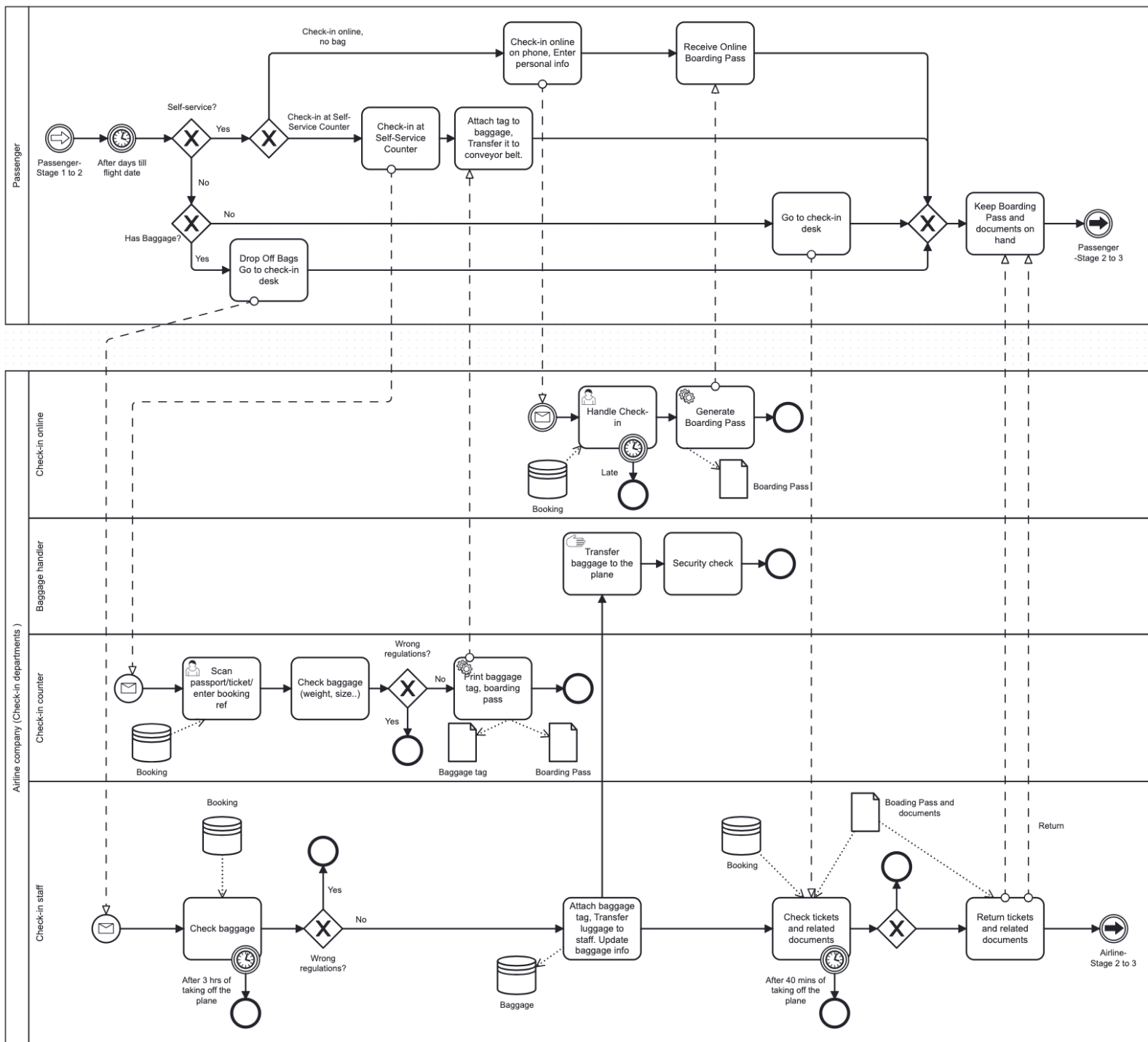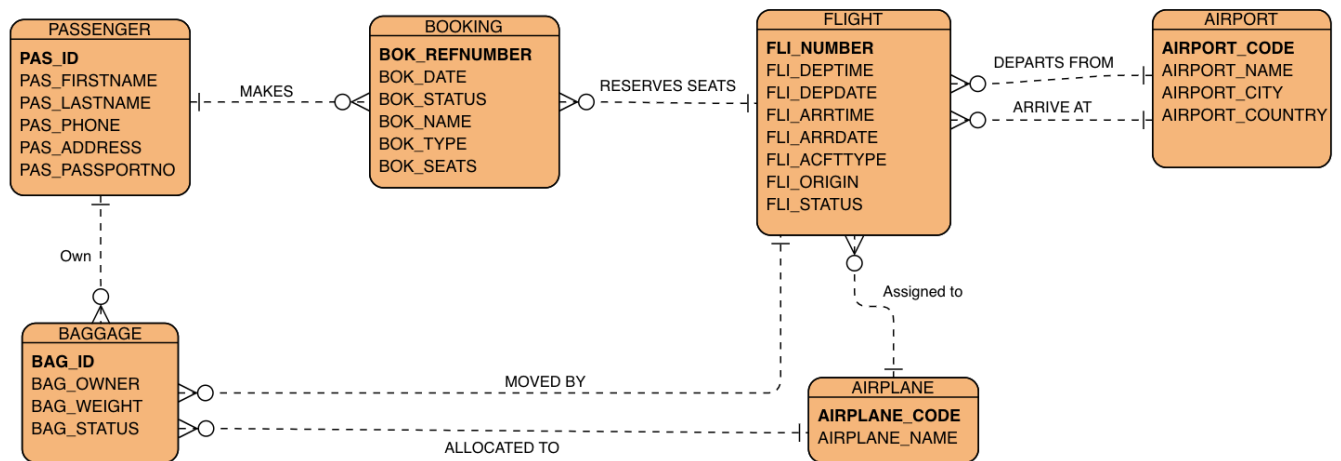*Figure 1: Booking Process (Stage 1: Ticket Booking and Reservation)*

Figure 2: Check-in Process (Stage 2: Check-in)

Passenger

Passenger -Stage 2 to 3

Domestic Flight?

Yes

No

Go to Custom Gate

Perform Passport and Visa

Take back Passport and visa

Go to Security Screening

Go to Security Screening

Perform Security Screening

Collect carry-on and Go to boarding gate

Perform Passport and Boarding pass

Go to plane

Settle down, ready to fly, Take off

Arrive to destination

Go to baggage claim

Exit

Baggage Handle

Return baggage

Lost baggage?

No lost

Yes

End of journey

Airline company

Check-in staff

Airline- Stage 2 to 3

Domestic Flights?

Yes

No

Customs officer

Booking

Check Passport and Visa

Passport & Visa

Accepted

Rejected

Stamp and return passport

Do immigration procedures

Check Passport and Visa

Confirm information

Interview

Booking

Passport & Visa

International Passenger have checked baggage

International Passenger NO checked baggage

End of journey

Security officer

3. Immigration Control (for international flights)

4. Security Check

Check carry-on baggage and security

Yes

No

Wrong regulation?

Guide customers to Departure lounge

Airport ground staff

Guide passengers to the immigration area

Guide passenger to the Baggage Claim area

Guide passengers to get off the plane

International Passenger

Domestic passengers with checked baggage

Domestic passengers NO checked baggage

Guide passenger to the arrival area

End of journey

Flight attendant

5. Boarding

Boarding Pass

Check boading pass

Guide passengers to board the plane

Guide passeger about seating, carry-on luggage

Provide safety instructions

Serve meals and beverages or entertainment

Guide passengers to get off the plane

6. In-Flight Services

Lost and Found Department

Receiving claim and processing

2. Conceptual Model of Data

Entities and Their Relationships

1. **Passenger**
   - o `PAS_ID`: Unique identifier for each passenger.
   - o `PAS_FIRSTNAME`: The first name of the passenger.
   - o `PAS_LASTNAME`: The last name of the passenger.
   - o `PAS_PHONE`: Contact phone number of the passenger.
   - o `PAS_ADDRESS`: Home address of the passenger.
   - o `PAS_PASSPORTNO`: Passport number of the passenger.
2. **Booking**
   - o `BOK_REFNUMBER`: Unique reference number for each booking.
   - o `BOK_DATE`: Date when the booking was made.
   - o `BOK_STATUS`: Status of the booking (e.g., confirmed, cancelled).
   - o `BOK_NAME`: Name under which the booking was made.
   - o `BOK_TYPE`: Type of booking (e.g., one-way, round-trip).
   - o `BOK_SEATS`: Number of seats reserved in the booking.
3. **Flight**
   - o `FLI_NUMBER`: Unique flight number.
   - o `FLI_DEPTIME`: Departure time of the flight.
   - o `FLI_DEPDATE`: Departure date of the flight.
   - o `FLI_ARRTIME`: Arrival time of the flight.
   - o `FLI_ARRDATE`: Arrival date of the flight.
   - o `FLI_ACFTTYPE`: Aircraft type used for the flight.
   - o `FLI_ORIGIN`: Originating airport code for the flight.
   - o `FLI_STATUS`: Current status of the flight (e.g., on time, delayed).
4. **Airport**
   - o `AIRPORT_CODE`: Unique code for the airport.
   - o `AIRPORT_NAME`: Name of the airport.
   - o `AIRPORT_CITY`: City where the airport is located.
   - o `AIRPORT_COUNTRY`: Country where the airport is located.

5. **Airplane**
   - o `AIRPLANE_CODE`: Unique code for the airplane.
   - o `AIRPLANE_NAME`: Name or model of the airplane.
6. **Baggage**
   - o `BAG_ID`: Unique identifier for each piece of baggage.
   - o `BAG_OWNER`: Owner of the baggage (references `PAS_ID`).
   - o `BAG_WEIGHT`: Weight of the baggage.
   - o `BAG_STATUS`: Status of the baggage (e.g., checked-in, lost).