

# Air Cargo Analysis Project

## Project Overview

The objective of this project is to analyze the operational data of an air cargo company, focusing on ticket sales, customer demographics, and flight details. This analysis aims to improve the company's customer service and operational efficiency by leveraging SQL queries to extract meaningful insights from the database.

## Problem Statement

The air cargo company seeks to prepare reports on regular passenger ticket sales, busiest routes, and other metrics to enhance the customer experience and streamline operations. The analysis will involve creating views, stored procedures, and executing various SQL queries to fulfill these requirements.

## Dataset Description

The analysis is based on four main tables:

**Customer:** Contains customer information, including:

### Dataset description:

**Customer:** Contains the information of customers

- customer\_id – ID of the customer
- first\_name – First name of the customer
- last\_name – Last name of the customer
- date\_of\_birth – Date of birth of the customer

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- gender – Gender of the customer

**passengers\_on\_flights:** Contains information about the travel details

- aircraft\_id – ID of each aircraft in a brand
- route\_id – Route ID of from and to location
- customer\_id – ID of the customer
- depart – Departure place from the airport
- arrival – Arrival place in the airport
- seat\_num – Unique seat number for each passenger
- class\_id – ID of travel class
- travel\_date – Travel date of each passenger
- flight\_num – Specific flight number for each route

**ticket\_details:** Contains information about the ticket details

- p\_date – Ticket purchase date

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- customer\_id – ID of the customer
- aircraft\_id – ID of each aircraft in a brand
- class\_id – ID of travel class
- no\_of\_tickets – Number of tickets purchased
- a\_code – Code of each airport
- price\_per\_ticket – Price of a ticket
- brand – Aviation service provider for each aircraft

**routes:** Contains information about the route details

- Route\_id – Route ID of from and to location
- Flight\_num – Specific flight number for each route
- Origin\_airport – Departure location
- Destination\_airport – Arrival location
- Aircraft\_id – ID of each aircraft in a brand
- Distance\_miles – Distance between departure and arrival location

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## Methodology

### Database Design

An Entity-Relationship (ER) diagram was created to visualize the relationships between tables. Primary and foreign keys were established to maintain data integrity.

### SQL Queries and Procedures

- **Create Views:**

A view was created to display only business class customers and their associated airline brands.

```
96 • create view business_class_brand As
97     select
98     class_id,
99     brand
100    from
101    ticket_details
102   where
103   class_id = "business";
```

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- **Stored Procedures:**

A stored procedure was created to extract ticket details, incorporating a function to determine if complimentary services are provided based on class type.

```
189 • CREATE PROCEDURE get_ticket_details_with_services()
190 BEGIN
191     -- Query to extract ticket purchase date, customer ID, class ID and complimentary services
192     SELECT
193         p_date AS ticket_purchase_date,          -- Ticket purchase date
194         customer_id,                             -- Customer ID
195         class_id,                                -- Class ID
196         get_complimentary_services(class_id) AS complimentary_services -- Call the function to get service status
197     FROM
198         ticket_details;                          -- Source table
199 END //
200
201 DELIMITER ;
202
203 call get_ticket_details_with_services()
---
```

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- **Calculating Revenue:**

A query was written to calculate total ticket sales by customer and aircraft ID, using the **ROLLUP** function for subtotals.

```
--  
85 ●  SELECT  
86      customer_id,                                -- ca  
87      aircraft_id,  
88      SUM(price_per_ticket * no_of_tickets) AS total_price  
89  FROM  
90      ticket_details  
91  GROUP BY  
92      customer_id, aircraft_id WITH ROLLUP;  
93
```

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- **Distance Categorization:**

A stored procedure was created to categorize distances into short, intermediate, and long-distance travel.

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```
151 Delimiter //          -- create a stored procedure that groups the distance travel
152
153 create procedure get_distance_category()
154 begin
155     select flight_num, distance_miles,
156         case
157             when distance_miles >=0 AND distance_miles <= 2000 then 'SDT'
158             when distance_miles >=2000 AND distance_miles <= 6500 then 'IDT'
159             when distance_miles >=6500 then 'LDT'
160             else 'Unknown'
161         END As travel_categories
162     from routes;
163
164 End //
165
166 delimiter ;
167 call get_distance_category()
```



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- Using Cursors:

A cursor was implemented to extract the first record of the customer whose last name ends with "Scott."

```
207 DELIMITER //
208
209 • CREATE PROCEDURE get_first_customer_scott()
210 BEGIN
211     DECLARE done INT DEFAULT 0;           -- Variable to check if we have fetched the record
212     DECLARE customer_id INT;              -- Variable to hold customer ID
213     DECLARE first_name VARCHAR(50);       -- Variable to hold first name
214     DECLARE last_name VARCHAR(50);        -- Variable to hold last name
215
216     -- Declare the cursor
217     DECLARE customer_cursor CURSOR FOR
218     SELECT customer_id, first_name, last_name
219     FROM customer
220     WHERE last_name LIKE '%Scott';        -- Filter for last names ending with 'Scott'
221
222
223     DECLARE CONTINUE HANDLER FOR NOT FOUND SET done = 1;
224
225     -- Open the cursor
226     OPEN customer_cursor;
227
228     -- Fetch the first record
229     FETCH customer_cursor INTO customer_id, first_name, last_name;
230
231     -- Check if the record was fetched
232     IF NOT done THEN
233         SELECT customer_id, first_name, last_name; -- Display the fetched record
234     ELSE
235         SELECT 'No customer found whose last name ends with Scott' AS message; -- Handle no result case
236     END IF;
237
238     -- Close the cursor
239     CLOSE customer_cursor;
240 END //
241
242 DELIMITER ;
```

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## **Results and Findings**

- The implementation of views and stored procedures has streamlined data retrieval processes, making it easier to generate reports.
- The revenue calculations provided insights into the most profitable customer segments and ticket classes.
- Distance categorization allowed for better planning of flight routes based on travel distance, which can help optimize operations.

## **Conclusion**

The air cargo analysis project successfully utilized SQL to extract meaningful insights from the operational database. The methodologies implemented—including views, stored procedures, and various SQL queries—enabled effective data management and reporting. This project provides a solid foundation for further analysis and operational improvements in the air cargo industry.