Airline Performance Analysis Project

1. Objective

This project aims to analyze the performance of commercial airlines by using SQL for data extraction and cleaning, and Power BI/Tableau for visualization. Learners will explore flight performance metrics such as delays, cancellations, and flight schedules to gain insights into operational efficiency and identify areas for improvement.

By the end of this project, learners will:

- ✅ Master SQL queries for data cleaning and analysis.
- ✅ Develop interactive dashboards using Power BI/Tableau to track flight performance.
- ✅ Understand the impact of delays on airline operations.
- ✅ Provide actionable insights and recommendations for optimizing flight schedules and reducing delays.

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2. Project Overview

The dataset consists of historical flight data, including flight schedules, departure and arrival times, flight durations, delay causes, and performance metrics such as cancellations. This data will be used to analyze airline performance, identify trends, and derive recommendations to improve airline efficiency.

Learners will:

- Use SQL to clean, filter, and analyze flight data.
- Apply Power BI/Tableau to create dynamic dashboards.
- Conduct exploratory data analysis (EDA) to understand key patterns in flight performance.
- Generate insights for improving scheduling and reducing delays.

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3. Dataset Details

Dataset Name: Financial Reporting and Analysis
Dataset Link: Click Here for CSV File **or** XLSX File
Total Records: Varies by dataset (Example: 10,000 flight records)

Columns Overview:

a). Flight Information: Flight ID, Airline Name, Flight Date, Departure/Arrival Airports

b). Scheduling Data: Scheduled Departure/Arrival Time, Actual Departure/Arrival Time

c). Performance Data: Delay Reasons, Delay Time, Cancellation Status, Flight Duration, Passenger Count

Data Source & Format:

a) Provided as a CSV/XLSX file

b) Can be imported into SQL databases for structured queries.

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4. Task to be Performed

Task 01: Data Preprocessing & SQL Setup

- Load the dataset into SQL (MySQL/SQL Server).
- Create a structured table and define primary keys.
- Check for missing or inconsistent data and clean using SQL queries.
- Format date and time fields, and remove duplicates.

Task 02: Exploratory Data Analysis (EDA) Using SQL

- Calculate key performance metrics such as total number of flights, average delay time, and delay causes.
- Identify the busiest airports and analyze delay trends.

Task 03: Data Visualization with Power BI/Tableau

- Import SQL query outputs into Power BI/Tableau.
- Create interactive dashboards to visualize key performance metrics such as delays, flight trends, and cancellations.

Recommended Visualizations:

- 📊 **Total Flights per Airline** (Bar Chart)
  - X-axis: Airline Name
  - Y-axis: Total Flights
- 📈 **Delay Trends Over Time** (Line Chart)
  - X-axis: Flight Date
  - Y-axis: Average Delay Time
- 🌍 **Busiest Airports** (Map Visualization)
  - Dimension: Airport Locations
  - Measure: Flight Count
- 🍰 **Delay Causes Breakdown** (Pie Chart/Bar Chart)
  - Dimension: Delay Reason
  - Measure: Count of Delays
- 📉 **Airline Performance Comparison** (Table/Heatmap)
  - Columns: Airline Name
  - Metrics: Total Flights, Avg Delay, Passenger Count

Power BI Steps:
1️⃣ Connect SQL Database to Power BI.
2️⃣ Load the cleaned flight dataset.
3️⃣ Use DAX functions for additional calculations (e.g., average delays).
4️⃣ Design dynamic dashboards with slicers and filters.

Task 04: Generating Insights & Recommendations

- Analyze the data to generate insights:
  - Which airlines experience the highest delays?
  - Which airports have the most congestion?
  - What are the primary causes of delays?
  - How do peak flight hours impact delays?

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5. Final Report & Submission Guidelines

Deliverables:

- 📜 SQL Database & Queries
- 📊 Power BI/Tableau Dashboard File
- 📑 Project Report (PDF) with insights & recommendations

Submission Checklist:

- ✅ SQL Scripts: Queries for data processing & analysis
- ✅ Power BI/Tableau Dashboard: Fully functional with visualizations
- ✅ Report Structure:
  - Introduction & Objective
  - EDA & SQL Queries
  - Key Findings & Trends
  - Visual Analysis Screenshots
  - Conclusion & Business Insights

Evaluation Criteria:

- Data Cleaning & SQL Queries (25%)
- EDA & SQL Insights (25%)
- Power BI/Tableau Dashboards (25%)
- Report Quality & Interpretation (25%)

Submission Details:

- Report: Submit in PDF format.
- Dashboard: Share .pbix (Power BI) or .twix (Tableau) file.
- SQL Code: Submit a clean and documented SQL file.
- GitHub: Provide a link to your GitHub repository with organized project files.
- All files and links must be sent via email to projects@emergingindiagroup.com