AirFly-Insights

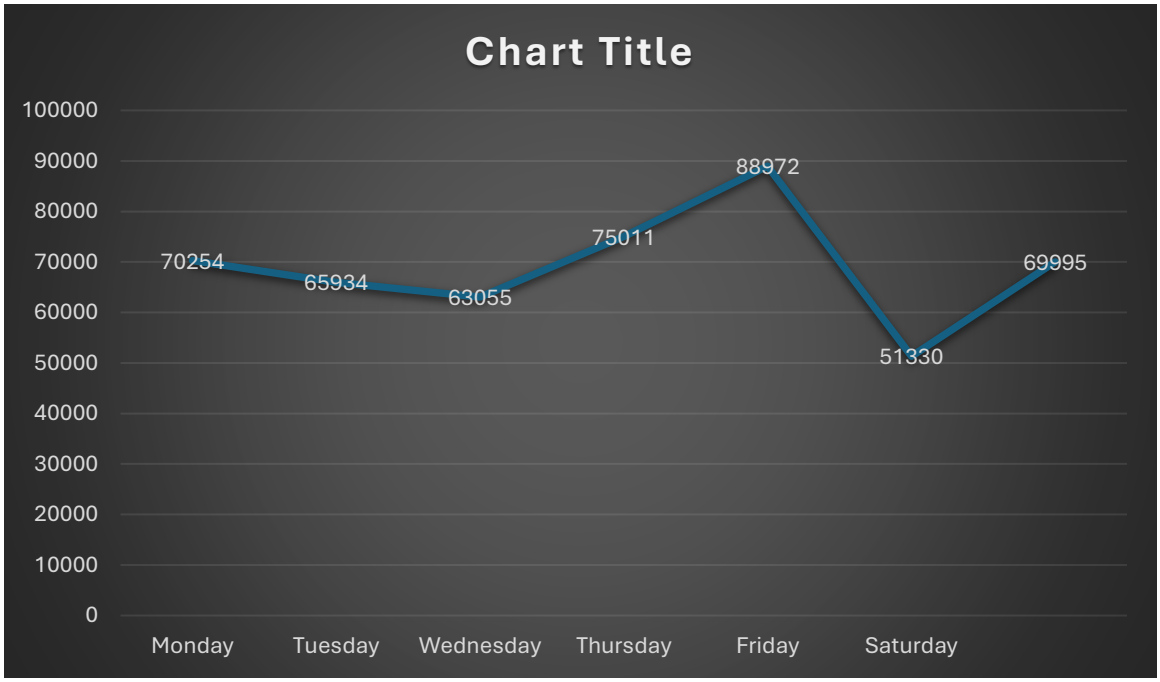
Infosys SpringBoard Internship

Dataset:

- **Kaggle:** Flight Delay and Causes
- https://www.kaggle.com/datasets/undersc0re/flight-delay-and-causes
- This dataset contains airline flight records including flight details,delays,airport and operations.
- It contains 484,559 rows and 29 columns initially.
- After preprocessing 484,310 rows and 33 columns.

Key Performance Metrics:

Flights by Day:

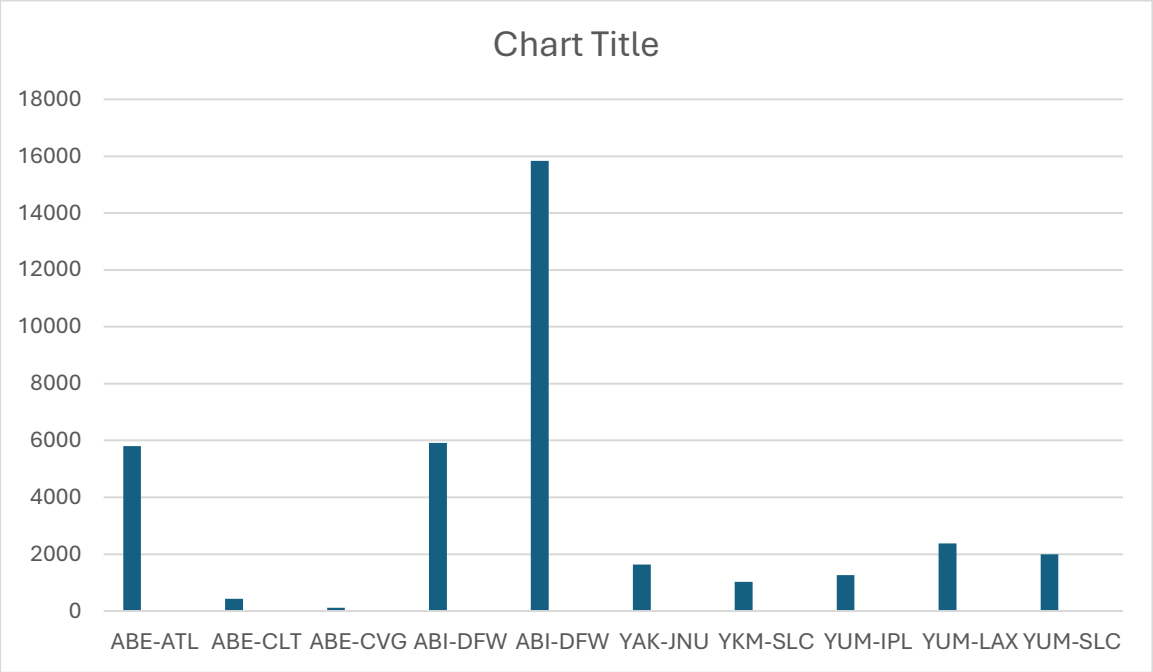


Distance:

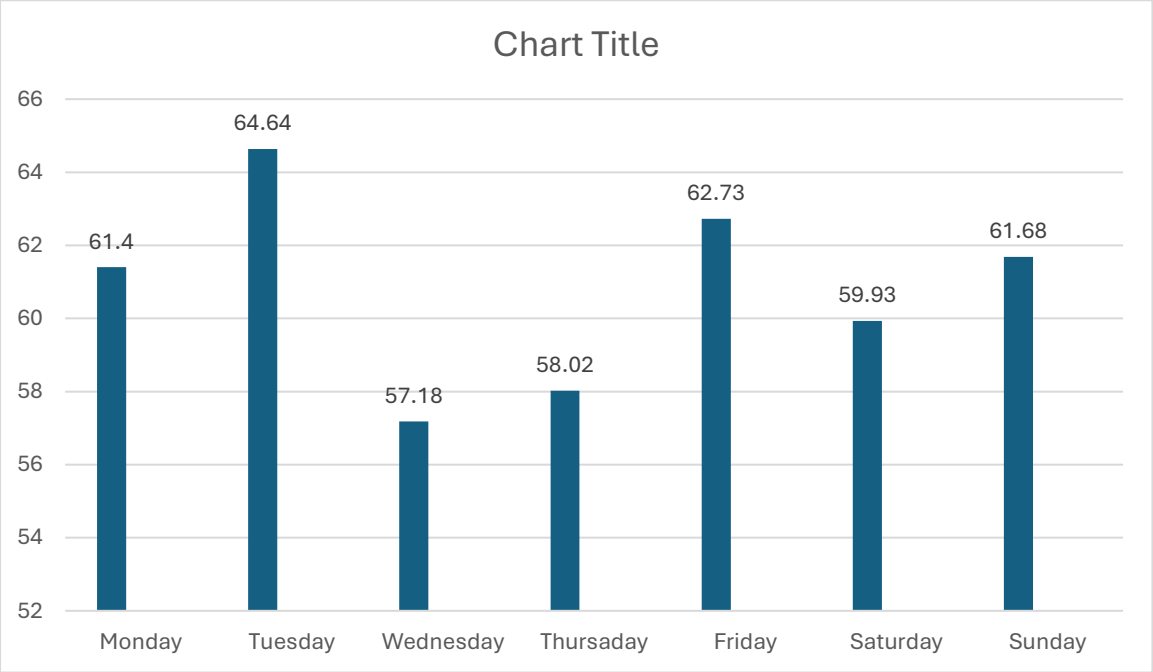
a. Minimum Flight Distance: 31 miles
b. Maximum Flight Distance: 4,502 miles
c. Average Flight Distance: 752.3844 miles

Delay:

TOTAL ROUTE DELAY



BASED ON DAY OF WEEK



Insights

Travel Patterns:

- Friday is the busiest travel day (88,972 flights), while Saturday has the lowest traffic (51,330 flights).

Route-Level :

- The **ORD → LGA** route is the most delay-prone, reflecting congestion challenges at both a major Midwest hub (Chicago O'Hare) and a ighly slot-constrained East Coast airport (LaGuardia).
- The **ALB → CVG** route records the lowest average delays, highlighting the benefits of regional connectivity between less congested airports with smoother operations.

Week based delay:

- Wednesday has less delay.
- Tuesday has more delay.

Preprocessing Technique:

Data Cleaning Steps

a. Duplicate Removal

- All duplicate rows were detected and removed using drop_duplicates().

b. Handling Missing Values

- **Numeric Columns (Delays, Distance, Time):**
  - Columns: DayOfWeek, ActualElapsedTime, CRSElapsedTime, ArrDelay, DepDelay, Distance, AirTime, CarrierDelay, WeatherDelay, NASDelay, SecurityDelay, LateAircraftDelay, Diverted, TaxiIn, TaxiOut.
  - Missing values imputed with **column-wise mean**.
- **Categorical/Time Columns (DepTime, ArrTime, Org_Airport, Dest_Airport):**
  - Missing values filled using the **mode within each flight group** (groupby(FlightNum) and filled with most frequent value).
- **Remaining Missing Values:**
  - Any leftover null entries were dropped to ensure a clean dataset.

Data Type Conversions

- **Date column:** Converted from string to datetime format.
- **Time columns (DepTime, ArrTime, CRSArrTime):**
  - Converted from integer (hhmm) to proper **HH:MM string format** using a custom parsing function.

Feature Engineering

- **Month:** Extracted from Date column.
- **Hour:** Extracted from Date (departure hour).
- **Route:** Created by concatenating Origin and Dest (e.g., *ORD → LGA*).
- **DayName:** Mapped DayOfWeek values (1–7) into actual weekday names (Monday–Sunday).
- **TotalDelay:** Computed as the sum of individual delay causes:
    - WeatherDelay + CarrierDelay + NASDelay + SecurityDelay + LateAircraftDelay.

Final cleaned dataset saved as:
Flight_delay_cleaned.csv