A complete Flight Delay Analysis

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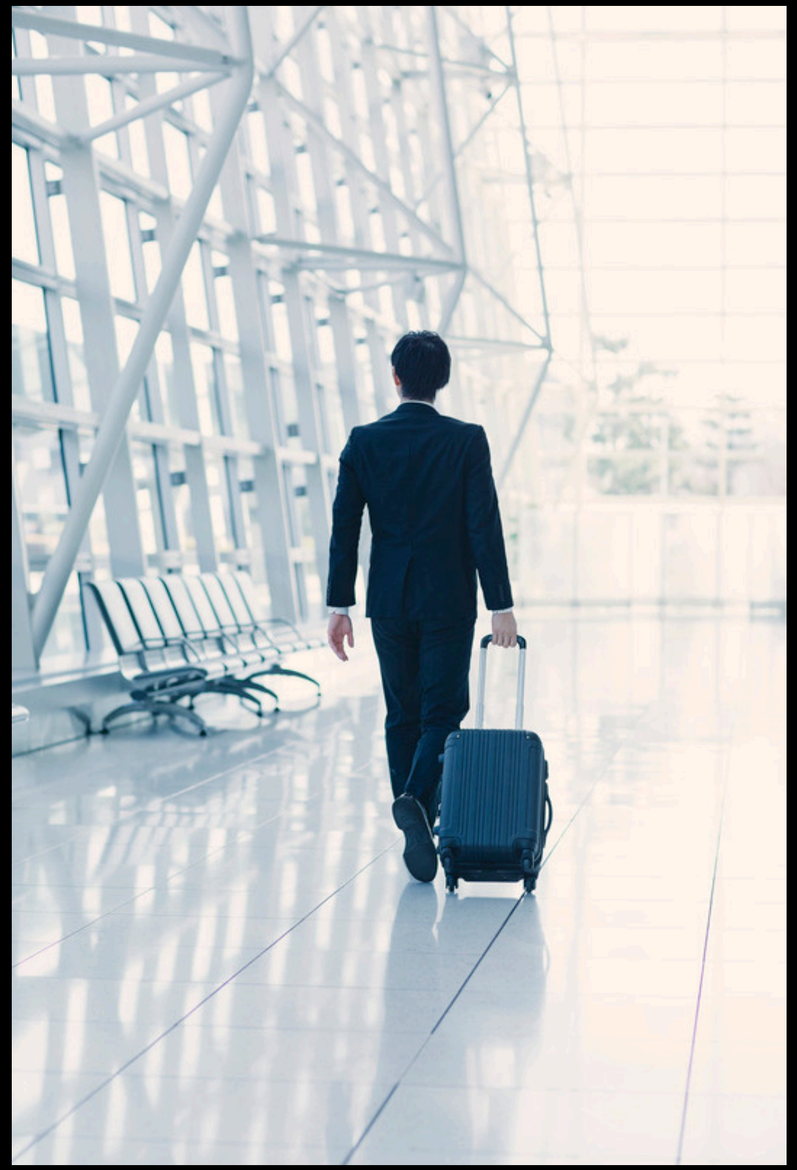
Introduction:

Flight delays are a common challenge in the aviation industry, affecting passenger satisfaction, airline efficiency, and airport operations. This project focuses on analyzing flight delays across **multiple dimensions to uncover patterns and insight**

Problem:

Flight delays are a common challenge in the aviation industry, affecting passenger satisfaction, airline efficiency, and airport operations. This project focuses on analyzing flight delays across multiple dimensions to uncover patterns and insight



Objective:

- Identify key factors contributing to flight delays
- Evaluate carrier performance based on punctuality
- Determine delay-prone airports, cities, and routes
- Provide data-driven insights using SQL for analysis and Excel for visualization

🛠️ Tools Used:

- SQL: For data extraction and analysis
- Excel: For data visualization
- Canva: For creating the presentation layout

Data Summary:

Column	Description
Carrier	Airline Code
DepDelay	Delay in Departure (mins)
ArrDelay	Delay in Arrival (mins)
Origin, Dest	Airports
DayOfWeek	Numeric Day (1–7)

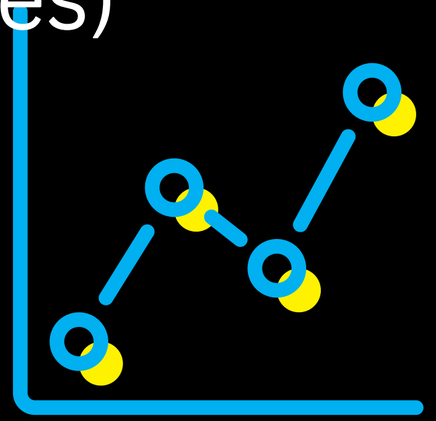
Quick Stats:

🛬 Total flights analyzed: 28,738

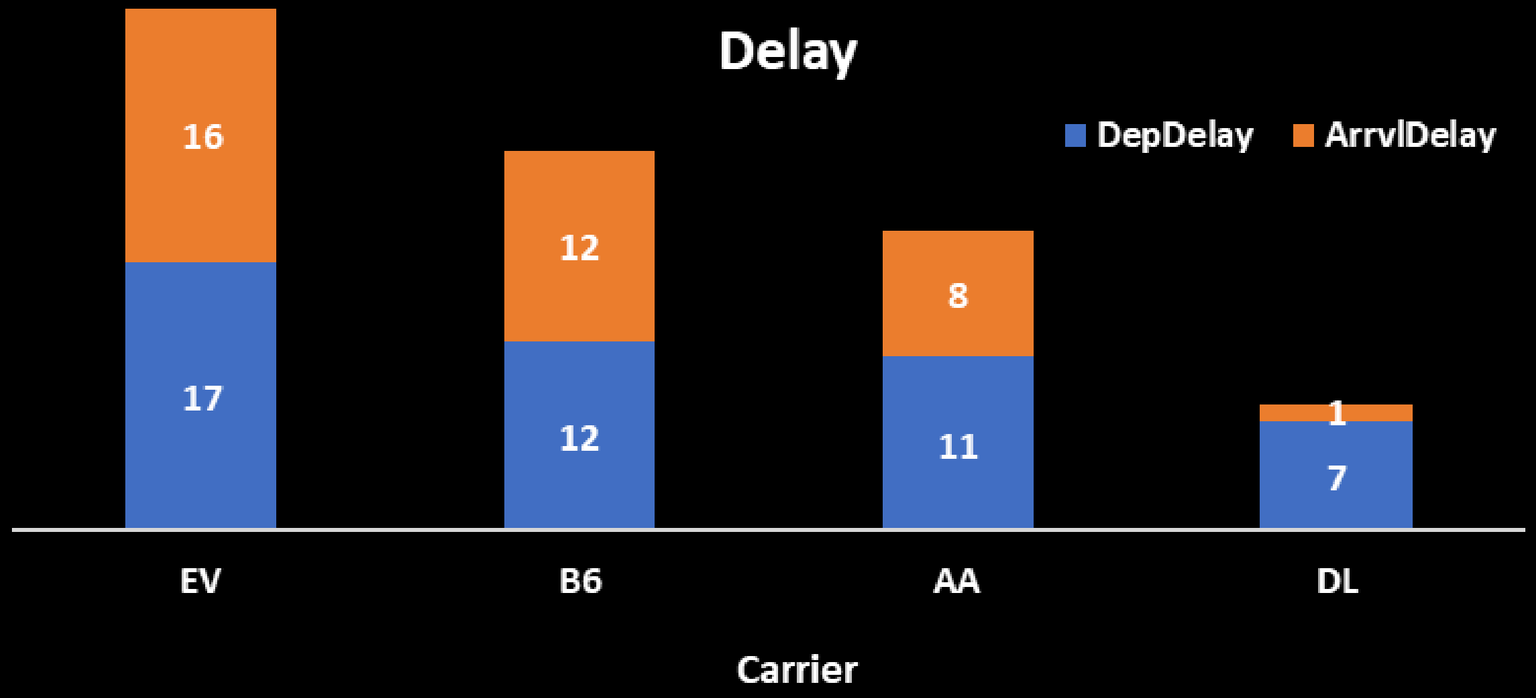
⏱️ Avg. departure delay: 8.59

⏱️ Avg. arrival delay: 4.00

📅 Worst Delay Day: Thursday(Avg delay 28.97 minutes)

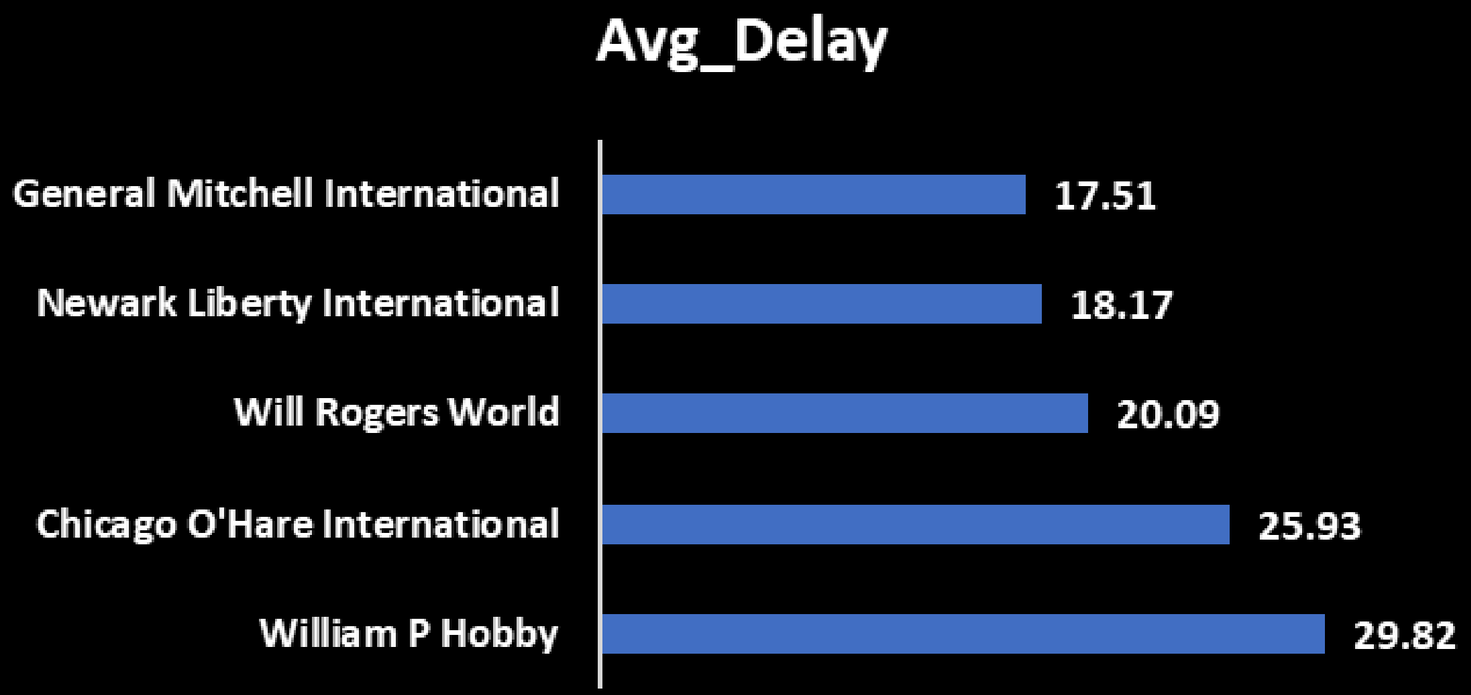


Average departure and arrival delay per airline



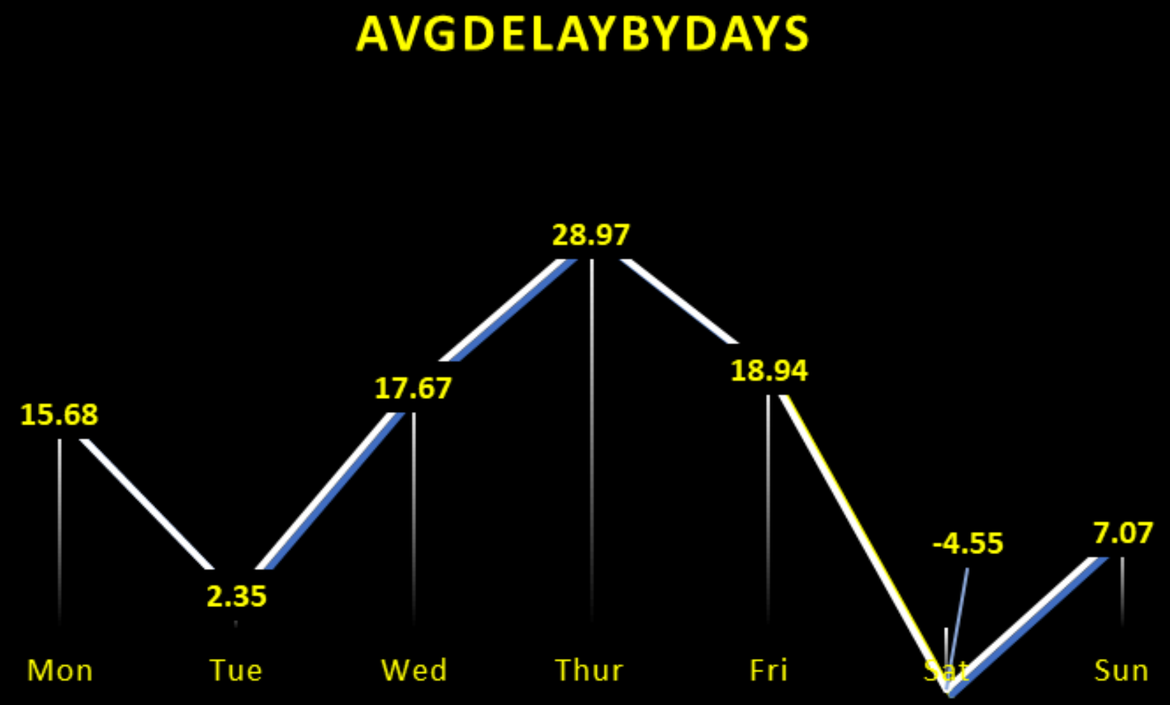
Insights: These carriers consistently show longer departure and arrival delays, which may be influenced by factors such as lower scheduling buffers, budget airline operations, or congested hubs.

Airports with the highest average departure delays



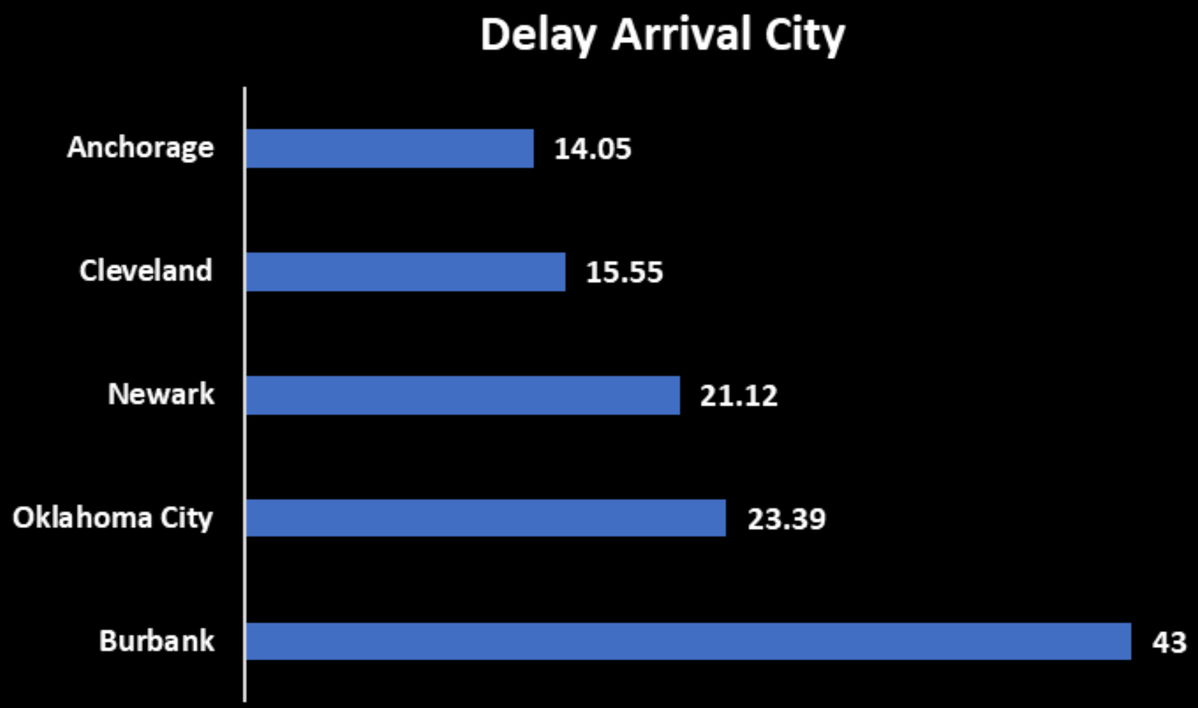
Insights: These delays may be due to regional weather conditions, limited runway capacity, or scheduling issues. This may reflect congestion or operational inefficiencies.

Day of the week sees the most delays



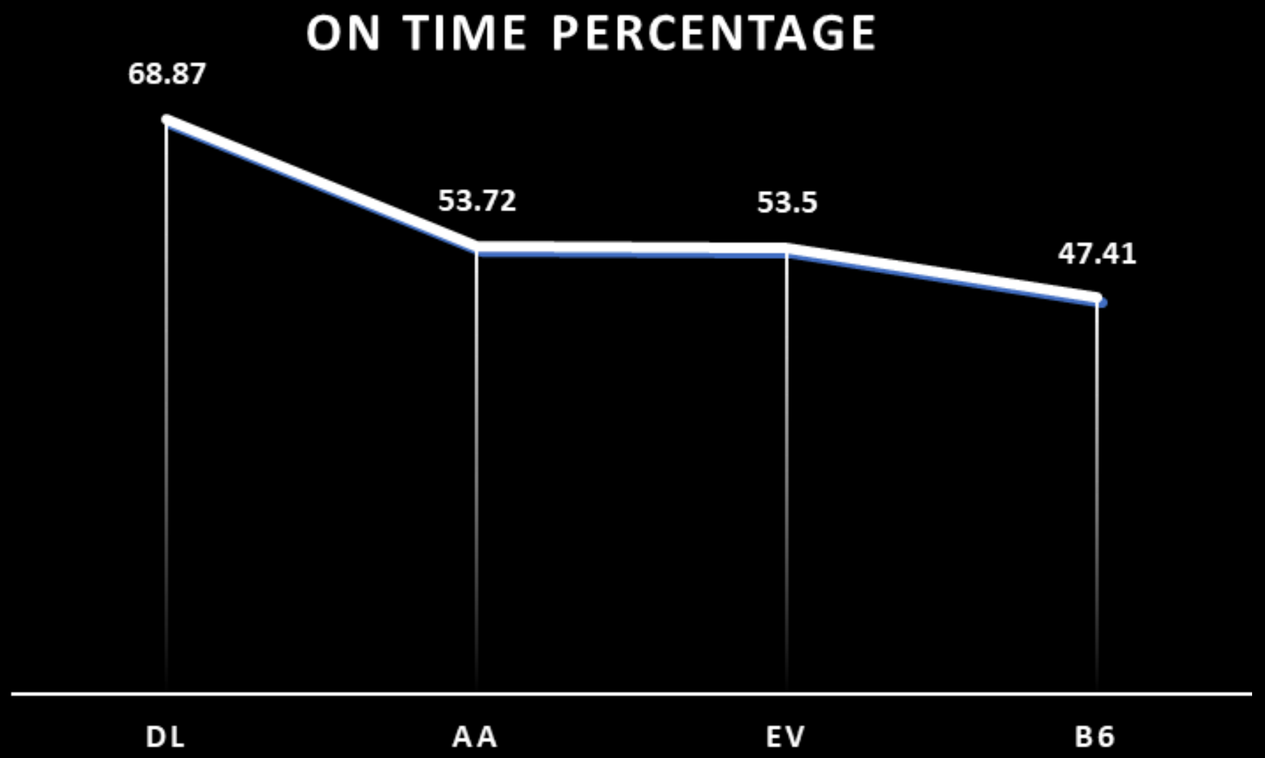
Insights: Thursday experiences the highest total average delay at 28.97 minutes, followed by Friday and Wednesday. This suggests that delays tend to peak mid-to-late week, possibly due to higher traffic volume or cumulative schedule drift.

City has the most delayed arrivals



Insights: These cities are likely affected by regional constraints or weather-related issues. Strategic improvements in arrival management could help reduce delays.

Carrier has the best on-time performance



Insights: Delta Airlines (DL) leads with an impressive on-time performance of 68.87%, showcasing consistent punctuality. This is significantly higher than several regional carriers and reflects operational efficiency.

Top 5 busiest airport flight routes or Most Frequent Routes

Origin	Destination	Flight_Count
Orlando International	Hartsfield-Jackson Atlanta International	207
Hartsfield-Jackson Atlanta International	Orlando International	206
LaGuardia	Hartsfield-Jackson Atlanta International	204
Hartsfield-Jackson Atlanta International	LaGuardia	201
Hartsfield-Jackson Atlanta International	Ronald Reagan Washington National	184

Insights: The busiest route is between Orlando International and Hartsfield-Jackson Atlanta International, with over 207 recorded flights. These high-traffic routes are critical for network efficiency.

Recommendation:

- Improving airport infrastructure at top delay locations.
- Enhancing airline scheduling mid-week (Thursday delays).
- Studying weather impact on delay-prone cities.
- Expanding capacity for busiest routes to **reduce load.**

Conclusion:

This project reveals critical patterns in flight delays across carriers, airports, cities, and days of the week. Key takeaways include:

- Delta Airlines leads in punctuality, indicating strong operational efficiency.
- Thursday shows the highest average delays, likely due to mid-week congestion buildup.

- Top delay-prone airports and cities may face scheduling or weather constraints, highlighting the need for better traffic and weather management.
- Busiest flight routes are mostly centered around Hartsfield-Jackson Atlanta International, indicating its strategic role as a hub.

By combining SQL-based analysis with Excel visualizations, this project provides actionable insights that can aid airlines and airport authorities in improving time performance and operational planning.

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GitHub: