

Week 7: Visual Report or Dashboard Preparation

Introduction

This report presents a comprehensive analysis of airline operations and performance using Power BI dashboards.

The visualizations collectively narrate the story of how airlines perform in terms of flight volume, delays, cancellations, and route patterns across different months and airports.

The goal of this visual report is to combine multiple analytical perspectives into a coherent storyline that uncovers insights on:

- The scale of flight operations,
- The causes and patterns of delays,
- Airline performance comparisons,
- Airport and route-level analysis, and
- Trends in delays and cancellations over time.

Through this interconnected dashboard design, we can track the journey from a broad dataset overview to specific airline insights and finally conclude with key findings and recommendations.

Storyline Across Dashboards

1. Dataset Overview – Understanding the Scale of Operations



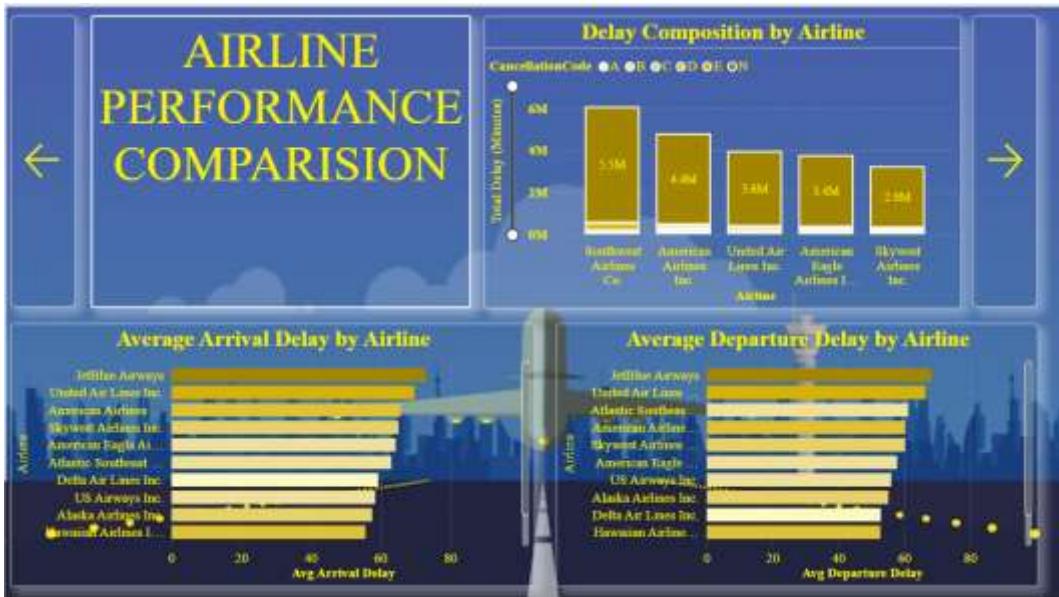
- The story begins with the Dataset Overview Dashboard, which introduces the overall flight dataset and provides key performance indicators (KPIs). Here, we see the magnitude of the data with 483.37K total flights, covering an average distance of 753.45 miles per flight.

- The total recorded delay amounts to nearly 29 million minutes, showing how significant delay management is within the aviation industry. Despite these delays, the percentage of cancelled flights remains extremely low (0.09%), reflecting strong operational reliability.
 - Additionally, the pie chart reveals that Southwest Airlines holds the largest share of total flights, followed by American Airlines and United Airlines. This dashboard sets the foundation for the entire report — providing a macro-level understanding before diving deeper into performance and delay specifics.
2. Flight Summary – Exploring Delay Components



- The Flight Summary Dashboard examines the types of delays that contribute to total delay minutes. It breaks down delays into five major categories: Carrier, NAS (Air Traffic), Late Aircraft, Weather, and Security delays.
- Among these, Late Aircraft Delay (26.68 mins) and Carrier Delay (17.40 mins) are the most significant contributors, while Weather (3.15 mins) and Security (0.08 mins) have minimal impact.
- This indicates that operational and scheduling inefficiencies within airlines — rather than external factors — are the leading causes of flight delays.
- The dashboard also presents overall statistics such as total delay (29M mins), average distance (753.45 miles), and most recent flight data (30-06-2019), tying back to the dataset scale introduced earlier.

3. Airline Performance Comparison (Part 1) – Delay Distribution Across Airlines

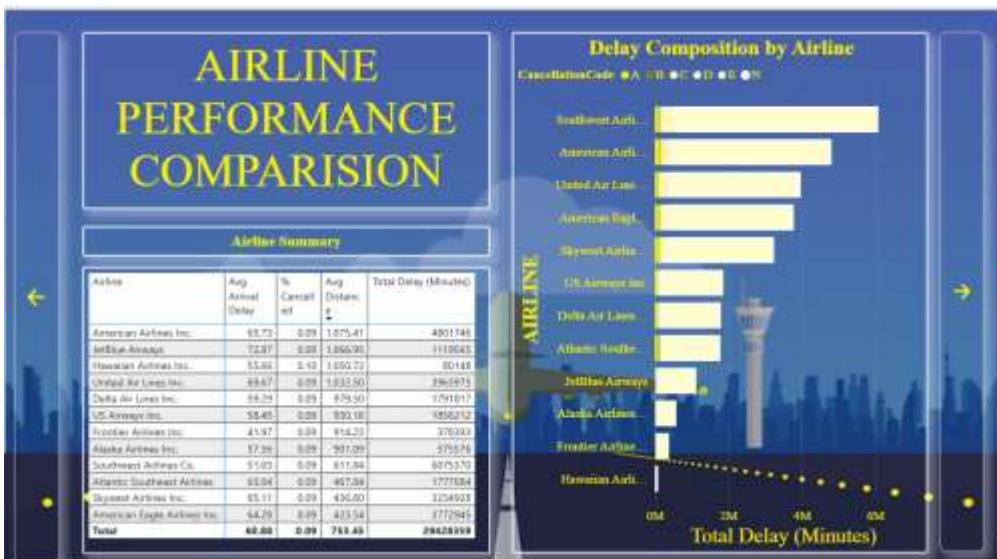


- In this dashboard, we shift focus from overall causes to airline-level performance.

Here, total delay minutes are compared among major airlines, along with their average arrival and departure delays.

- Southwest Airlines records the highest total delay (5.5M minutes), followed by American Airlines (4.4M) and United Airlines (3.6M). However, this is partially due to their higher flight volumes.
- The bar charts also reveal that JetBlue Airways experiences the highest average arrival and departure delays, while Hawaiian Airlines maintains consistently low delay averages — making it one of the most punctual carriers.

4. Airline Performance Comparison (Part 2) – Summary Metrics



This dashboard provides a comprehensive numerical summary of airline performance.

Each airline's average arrival delay, cancellation rate, average distance, and total delay minutes are displayed side by side for direct comparison.

From this summary:

- JetBlue Airways emerges as the airline with the highest average delay (72.87 mins).
- Frontier Airlines records the lowest delay (41.97 mins), highlighting its operational efficiency.
- Delta Air Lines performs strongly, with balanced delay and cancellation metrics.
- Hawaiian Airlines stands out for maintaining low delays and cancellations despite longer average distances.

5. Flight Volume, Airline & Airport Analysis – Identifying Key Hubs



The Flight Volume & Airport Analysis Dashboard zooms out to examine flight patterns geographically.

The U.S. map visualization displays flight concentration by origin airport, clearly identifying major hubs like:

- ORD (Chicago O'Hare)
- DFW (Dallas–Fort Worth)
- ATL (Atlanta Hartsfield–Jackson)

These airports handle the highest flight volumes, suggesting they are critical to national air traffic flow.

A pie chart complements this by showing that American Airlines covers the greatest total distance (79M miles), followed closely by Southwest and United Airlines.

This dashboard connects airline operations to geography — highlighting how high-volume airports contribute to systemic congestion and delays.

6. Trends Over Time – Monthly Delay Patterns



The Trends Over Time Dashboard visualizes changes in average delays from January to June.

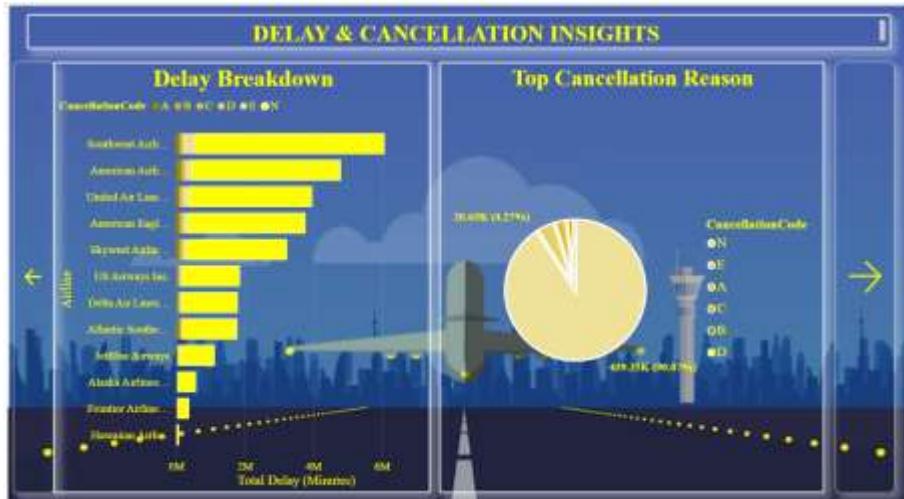
The trend line shows:

- A peak in February,
- A decline through April and May, and
- A rise again in June.

This suggests that mid-year months experience increased operational and weather-related challenges.

The lower section shows delay types over time, where Late Aircraft and Carrier Delays remain consistently higher, while Weather and Security Delays fluctuate seasonally.

7. Delay & Cancellation Insights (Part 1) – Breakdown by Airline



- This dashboard compares total delay minutes by airline alongside the distribution of cancellation reasons.

- Southwest Airlines again leads in total delay minutes, followed by American Airlines and United Airlines. However, the pie chart on the right shows that the majority of flights (over 90%) are not cancelled (Code N). Among actual cancellations, Reason E appears most frequently, which is typically related to external factors such as weather or airspace restrictions.

8. Delay & Cancellation Insights (Part 2) – Cancellation Summary

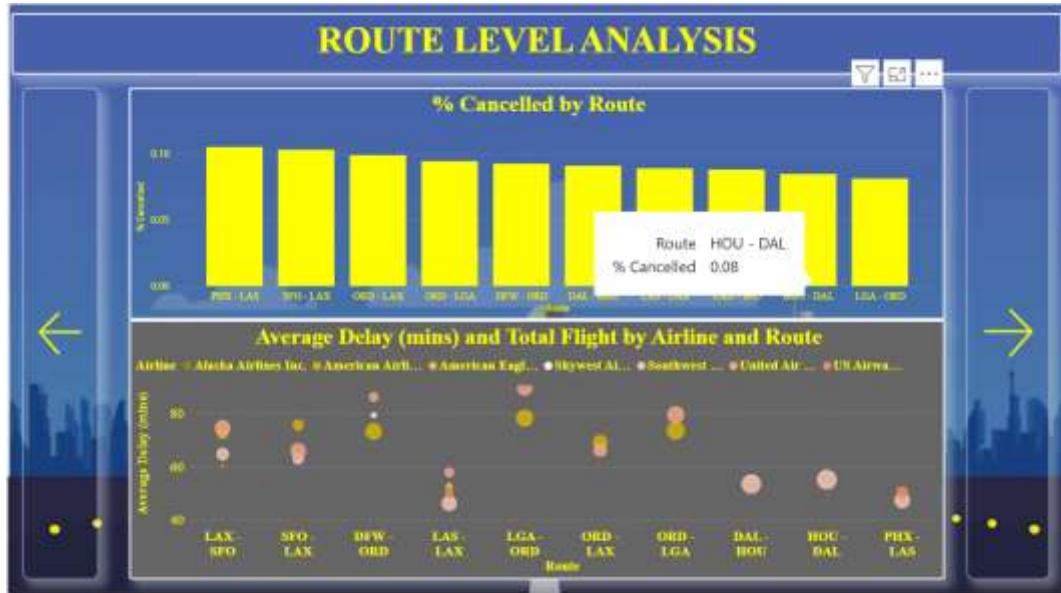


The second cancellation dashboard quantifies the total number of cancelled flights and identifies key patterns:

- Total Cancelled Flights: 44.12K
- Highest Cancellation Count: 21K
- Top Cancellation Reason: Code E
- Highest Cancellation Rate: Hawaiian Airlines (0.10%)

Despite these figures, the overall cancellation rate remains exceptionally low (0.09%), indicating strong service reliability across the industry.

9. Route Level Analysis – Understanding Performance by Flight Route



- The final dashboard ties together all insights into a concise summary of performance outcomes.

Key Results:

- Best Airline: Frontier Airlines Inc. (lowest delay average of 41.97 mins)
- Worst Airline: JetBlue Airways (highest average delay of 72.87 mins)
- SkyWest Airlines operates the most flights but experiences moderate delays.
- Delta Air Lines stands out for strong on-time performance and balanced metrics.
- Weather delays peak during mid-year months.
- Overall cancellation rate: 0.09%, with a maximum of 0.10% for Hawaiian Airlines.

These insights collectively tell a clear story — while delays are inevitable, most airlines maintain high service continuity with minimal cancellations. Operational efficiency, rather than weather, remains the main differentiator in airline performance.

10. Summary & Key Findings – Drawing Conclusions



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Conclusion

This connected series of Power BI dashboards narrates the complete performance journey of U.S. airlines — from the dataset's scale to granular insights on delay patterns, airport dynamics, and cancellations.

The storyline demonstrates how data visualization can transform raw numbers into actionable insights:

- Identifying top-performing airlines,
- Understanding delay causes and trends, and
- Recognizing patterns in airport congestion and weather effects.

Through this visual storytelling approach, the dashboards provide a comprehensive, data-driven understanding of airline performance — empowering decision-makers to improve efficiency, minimize delays, and enhance customer satisfaction.