

# **Why Do Flights Keep Getting Delayed?**

**A Data Story About Timing, Weather, and Airline Reliability**

**By Pavan Kalyan Muniyappa**

**DATA6100 – Data Visualization**

**Professor : John Donovan**

**MP3 Part A – Major Project Narrative**

**Date: October 15, 2025**

Everyone has lived that moment: you're sitting in an airplane, the engines start, the cabin lights dim, but the plane isn't moving. Minutes turn to hours, and the captain's voice breaks the silence "We're delayed."

At that moment, every traveler asks the same question: why?

I wanted to move beyond frustration and find data driven answers. Using publicly available flight level data from the Bureau of Transportation Statistics (BTS) and Kaggle, I studied thousands of U.S. flights between 2019 and 2023. Each record contained when a flight departed, when it arrived, whether it was delayed or canceled, and what caused it.

My goal was simple, understand what patterns hide behind the chaos of U.S. air travel. Is it weather? Airline performance? Bad scheduling? Or something else entirely? This project explores the story that the numbers tell and what those stories mean for the millions of travelers who take to the skies each year.

After cleaning and restructuring the dataset into one master table of flight level details, several clear patterns emerged.

Morning flights were consistently the most reliable. As the day progressed, delays grew sharply. Evening and night flights were nearly twice as likely to depart late. The pattern makes sense: small early delays snowball through the day, creating a ripple effect by sunset.

The data also showed that Fridays and Sundays were the worst for on time performance. Business travelers and weekend vacationers fill the schedule, creating heavy traffic and fewer recovery gaps between flights.

**Weather is a constant enemy of air travel, but its impact changes with the calendar. Winter brings snow, ice, and wind to northern airports like Chicago and Boston. Summer brings thunderstorms to the Midwest and South, affecting hubs like Atlanta and Dallas. Overall, weather related delays rose sharply in summer compared with spring months.**

**While every airline faces the same weather, not all manage it the same way. Legacy carriers such as Delta and United showed stronger recovery after storms, while some low cost carriers saw cascading delays that lasted all day. The difference often came down to fleet size and backup availability larger airlines had more aircraft ready to replace delayed ones.**

**Across all flights, late arriving aircraft accounted for nearly one third of all delays, followed by carrier related issues like maintenance or crew. Weather delays came next significant but not the single biggest driver. This finding was surprising, while we often blame storms, internal airline operations contribute just as much.**

**Not all busy airports perform poorly. Denver and Seattle maintained relatively strong on time records despite harsh weather, showing how planning and infrastructure can offset environmental challenges.**

**Together, these findings paint a simple but powerful picture, flight delays are not random they follow patterns.**

**Understanding those patterns can help different audiences. Travelers can choose morning flights to reduce risk and plan around storm seasons. Airlines can strengthen maintenance turnaround and standby resources to prevent cascading disruptions. Policymakers can prioritize investments in weather resilient airport systems.**

**It's important to acknowledge the limits of this analysis. My current dataset includes 5,000 flights a manageable sample that mirrors the structure of the 80 million flights recorded in U.S. airspace between 2019 and 2023. For a more statistically robust study, the next phase will involve drawing a random, representative subset of millions of real records or combining several years of BTS data for deeper validation.**

**Even with this limitation, the narrative is clear, delays grow through the day, weather shapes them by season, and airlines differ in how they manage disruption.**

**Next time your flight is delayed, you'll know the reason is written in the data.**

**Thank you**