Airline Reliability Intelligence

On-Time Performance + Weather Attribution | Portfolio Demo

TL;DR

Built an **ops analytics pipeline** that combines **100.0K flight records** (synthetic, BTS format) with **real NOAA weather data** to measure airline reliability and quantify weather impact. Key finding: **severe weather correlates with +0.3 minute** additional delay. Pipeline achieves **97% data quality score** with full weather attribution.

DEMONSTRATION: Flight data is synthetic (BTS format) for portfolio demonstration. Weather data is real (NOAA CDO API).

100.0K	67.8%	2.01%	97%
FLIGHTS	ON-TIME RATE	CANCEL RATE	QUALITY SCORE

What This Demonstrates

Data Engineering

- Multi-source data integration
- NOAA API integration
- 100K+ row processing
- Weather-flight joins

Analytics Engineering

- Reliability scoring
- Weather attribution
- Carrier rankings
- Anomaly detection

Key Insight: Weather Attribution

⛈️ Weather Impact Quantified

Flights on **severe weather days** (high precip/wind/fog) experience **+0 minute** additional delay compared to normal conditions. Cancel rates increase from **2.1%** to **1.9%**.

Note: Correlation observed; causation requires further analysis.

Carrier Leaderboard

🥇 **Best:** F9 — 68.4% on-time

⚠️ **Needs Improvement:** NK — 67.1% on-time

Technical Highlights

- **Flight Data:** BTS-format on-time performance records
- **Weather Data:** NOAA CDO API (GHCND daily summaries)
- **Airports:** 10 major US hubs with weather stations
- **Pipeline:** Python → Star Schema → Weather Join → Quality Gates → KPIs
- **Duration:** 37 seconds

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Data Sources: Synthetic flight data (BTS format) + NOAA CDO API (real weather)

PORTFOLIO DEMONSTRATION - Flight data is synthetic for demo purposes

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