Acorn Airline Performance Report

Table of contents

01 Dataset Overview

02 Performance Analysis

03 Reasoning

04 Suggestions for improvement

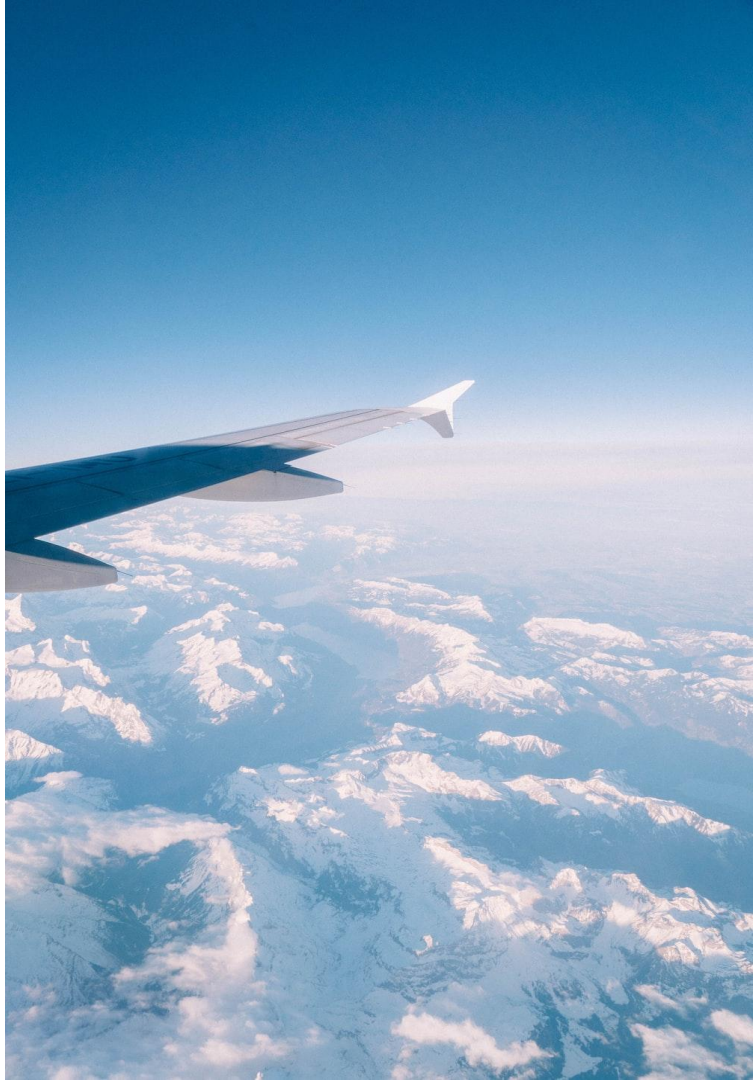
01

Dataset Overview

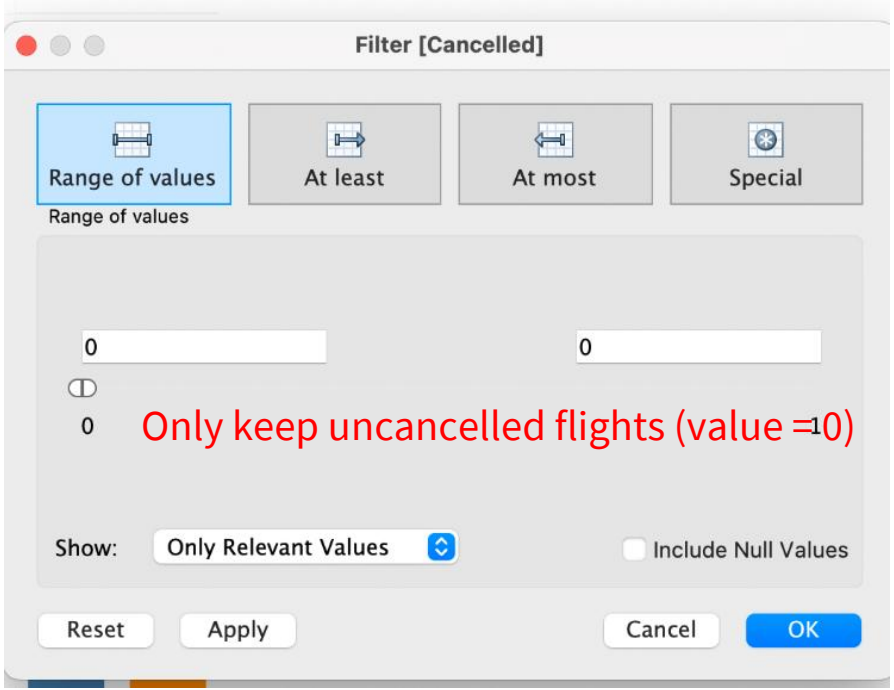
Dataset Overview

- Columns : 25
- Rows : 346,580
- Timeframe : 01 July - 31 August 2019
- Location : USA

- Total flights : 346,580 flights
- Acorn Airline : 164,490 (47.46%)
- Berry Airline : 182,090 (52.54%)



Data Cleaning



- **Null value**

  Filtered by Tableau function when necessary

  E.g. speed = distance / airtime

  Cannot be null

- **Cancelled flights**

  Exclude cancelled flights while calculating some proportion

  E.g. proportion of delayed flights, proportion of diverted flights

Meet Mr.B

Acorn Airlines or Berry Airlines?

Criteria in choosing airline:

- Suitable flights (time and routes)
- No/Minimal disruption to his busy schedule

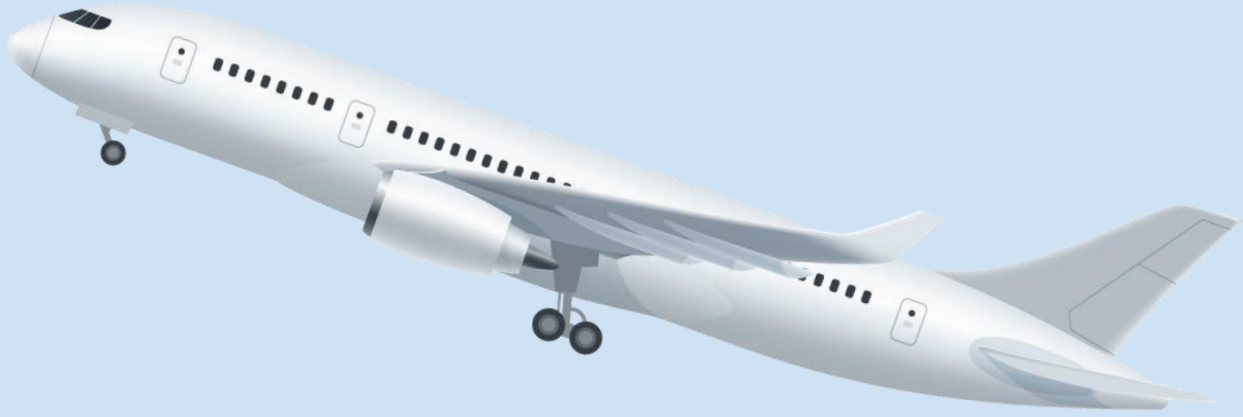
Mr.B’s concerns

Are there large number of choices?

Are there my preferred flight paths?

The shorter the arrival delay, the better!

I don’t want my flight to be cancelled or diverted!



02

Performance Analysis

Comparisons between Acorn Airline and Berry Airline

Analytical Process

Flights Provided

- Quantity
- Route

Delay

Cancelation

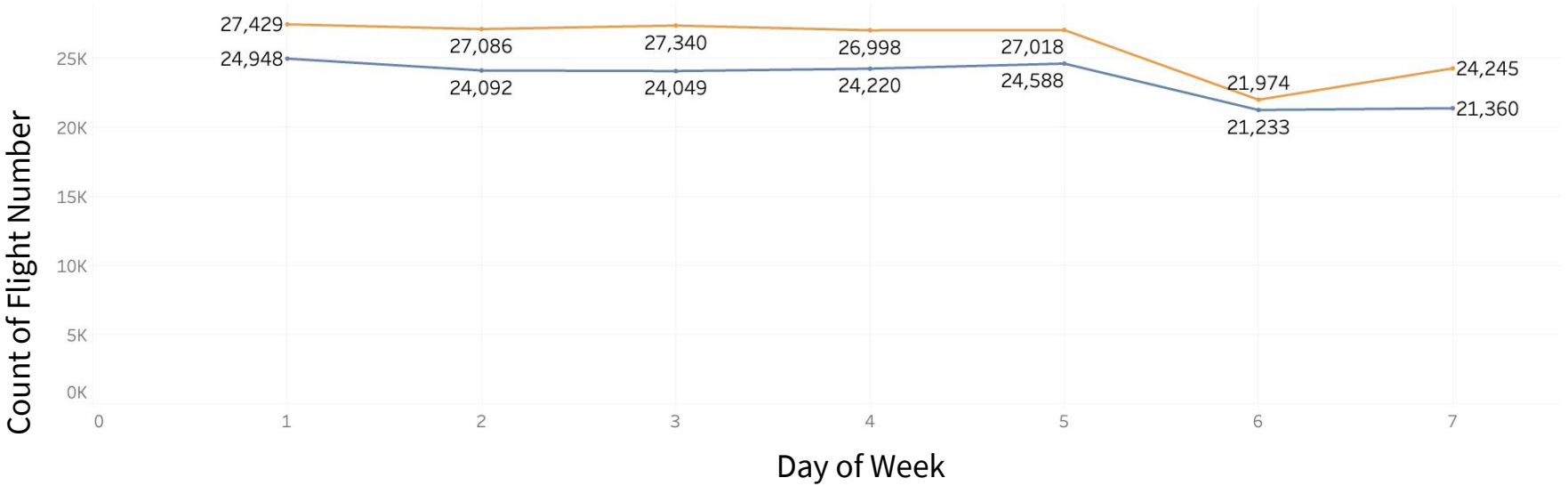
Diversion

Detail

- Taxi-in & Taxi-out
- Aircraft efficiency

Quantity

Number of Flights Scheduled vs. Day of the Week



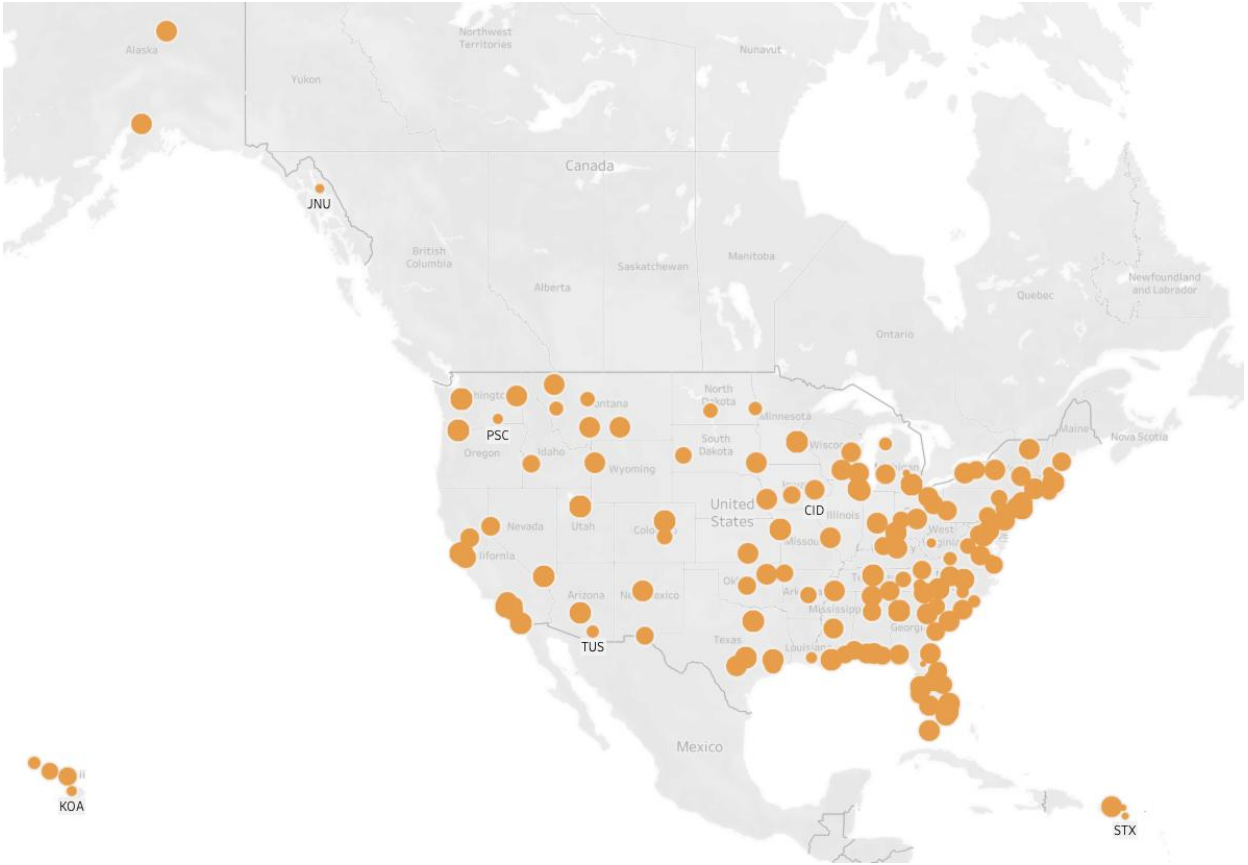
- General trend: Acorn Airline offers fewer flights everyday (including cancelled flights)
- Difference: about 3000 flights/day

BA

AA

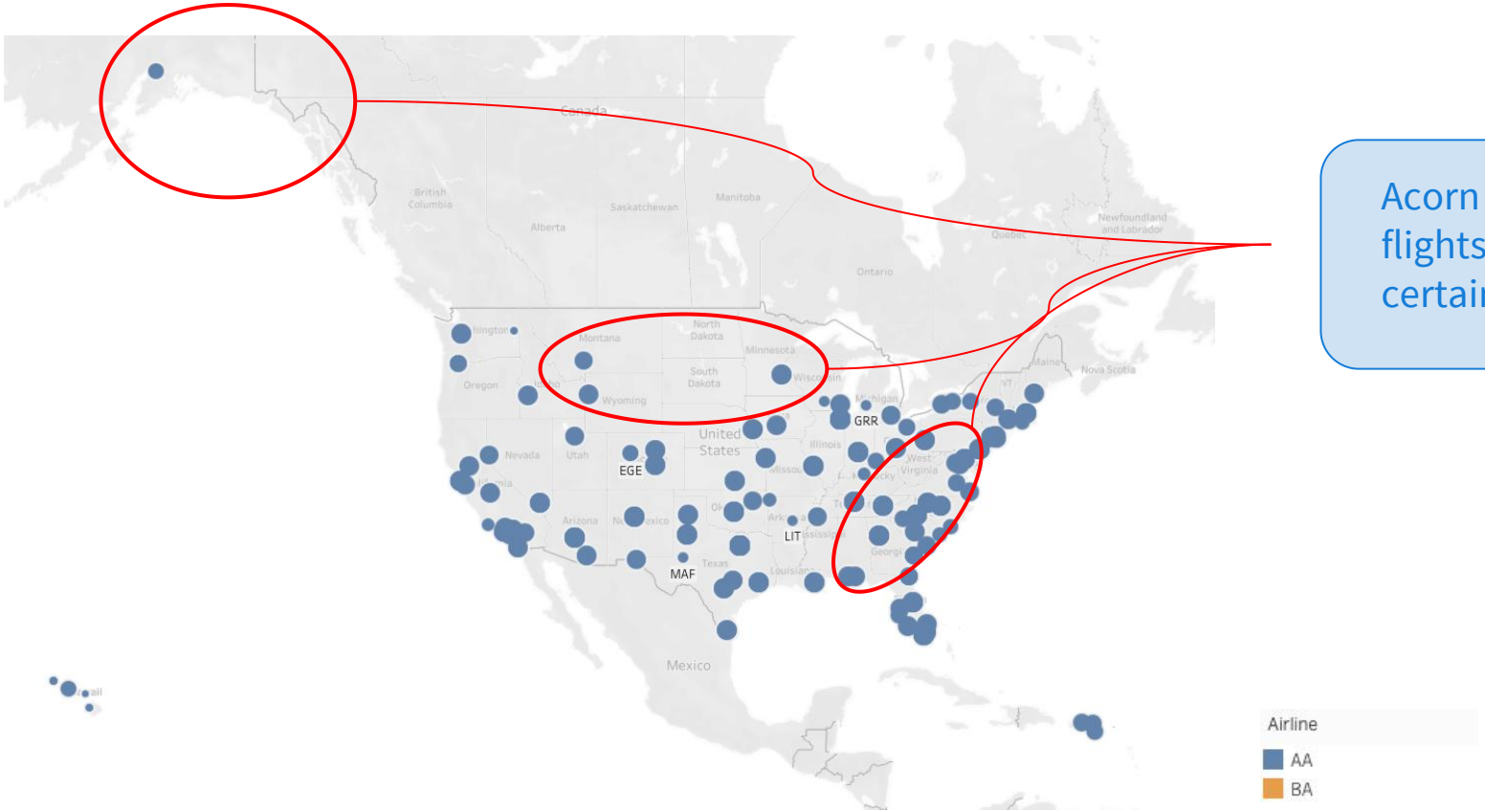
Route

Airports where Berry Airline flights reach



Route

Airports where Acorn Airline flights reach

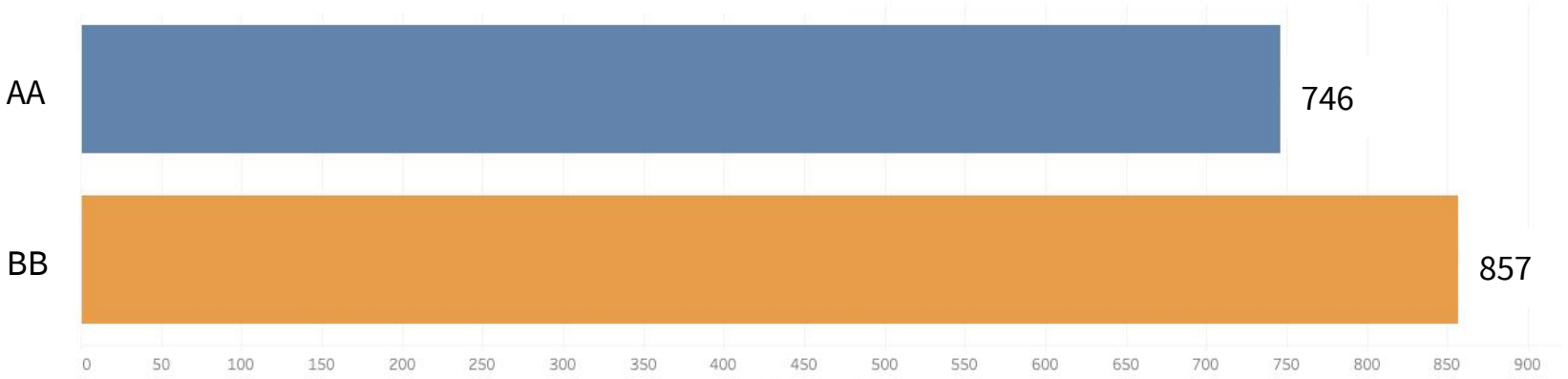


Acorn Airlines' flights do not reach certain areas

Route

Comparison of Flight Paths

Number of Distinct Flights of the two Airlines
Airline

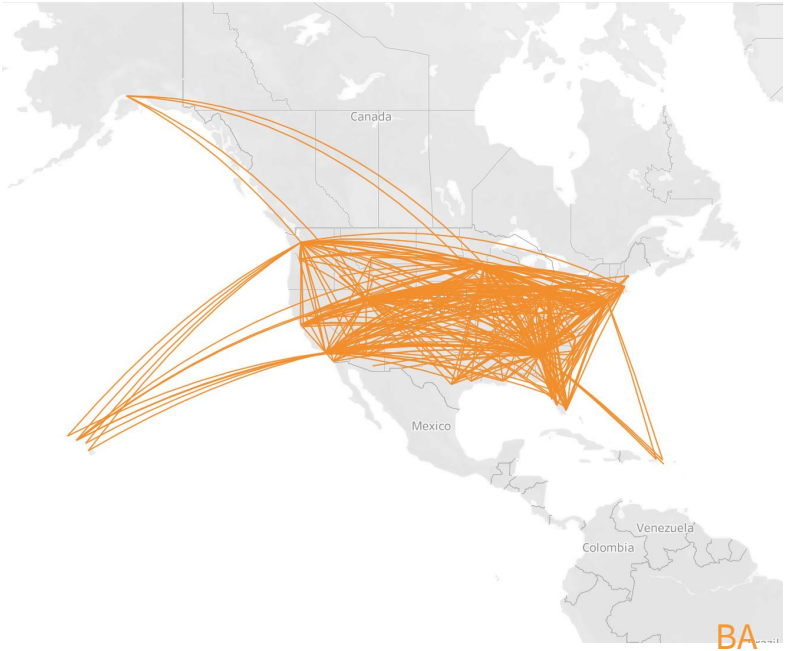


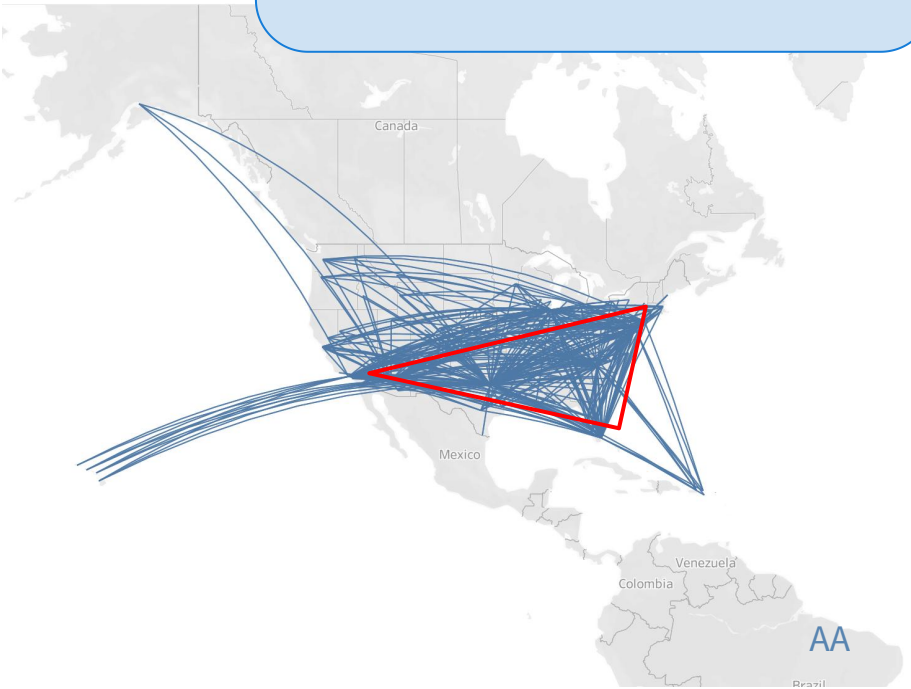
- **857** different flight paths provided by Berry Airlines
- **746** different flight paths by Acorn Airlines

Route

Visualized distinct flight paths in map

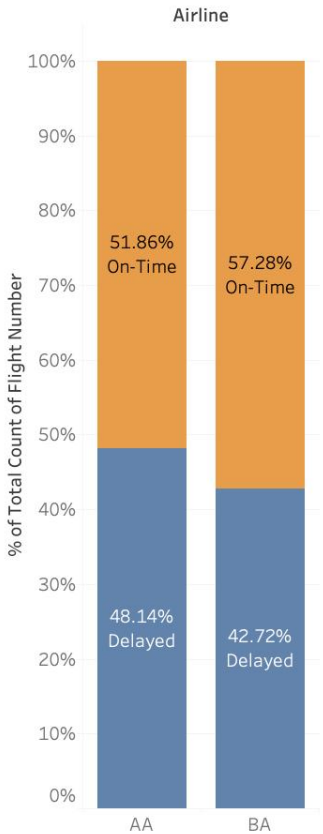
Air routes of Acorn Airlines are mainly focused in South-east regions while Berry Airlines' routes are more evenly distributed across the country.



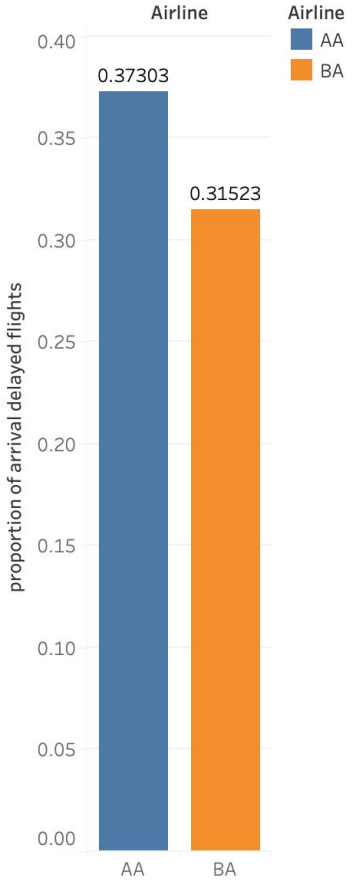


Delays

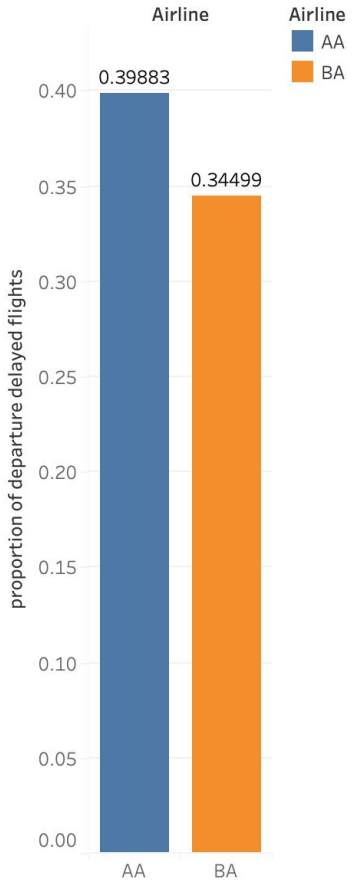
Proportion of delayed flights



Proportion of arrival delayed flights



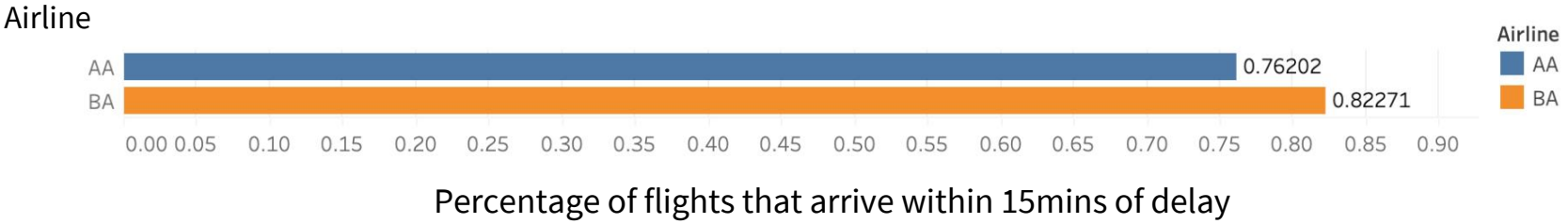
Proportion of departure delayed flights



- Acorn Airlines has more delayed flights.
- In general, the proportion of delayed flights are around 40-50%.

Delays

Percentage of flights arrive within 15 mins after scheduled time



- **Majority** of flights (>75%) arrive with a moderate delay
- The percentage of moderately-delayed flights from Acorn Airlines is about 7% less compared to Berry Airlines.

Cancellation

Cancellation rate of two airlines

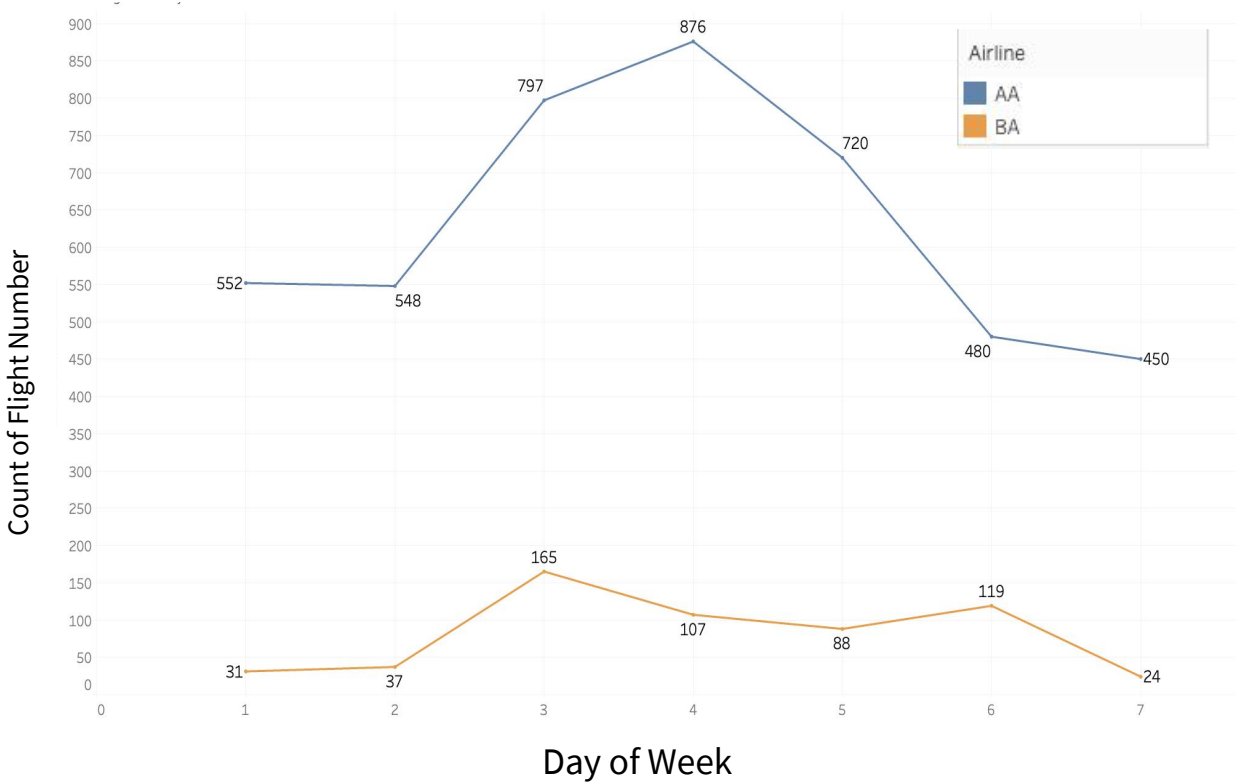
Cancellation rate:

- AA -2.67%
- BA - 0.31%

Acorn Airline has a high cancellation rate.

Cancellation

Number of Cancelled Flights vs. Day of Week



Trends:

- No. of flights cancelled per day:

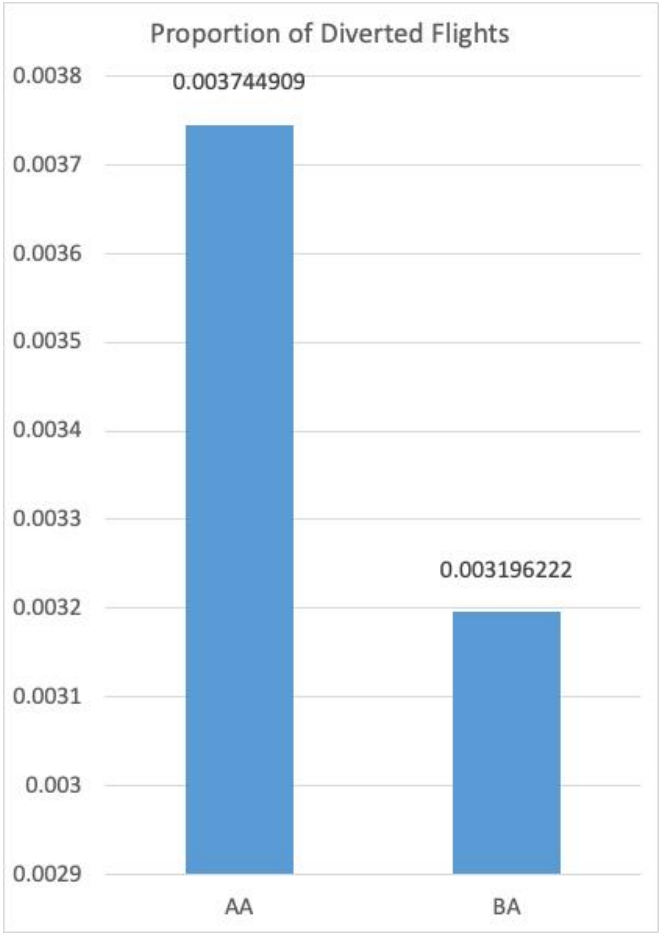
  Acorn airlines: > 400
  Berry airlines: +- 100

- During the midweek, the cancellation rate for Acorn airline flights increase.

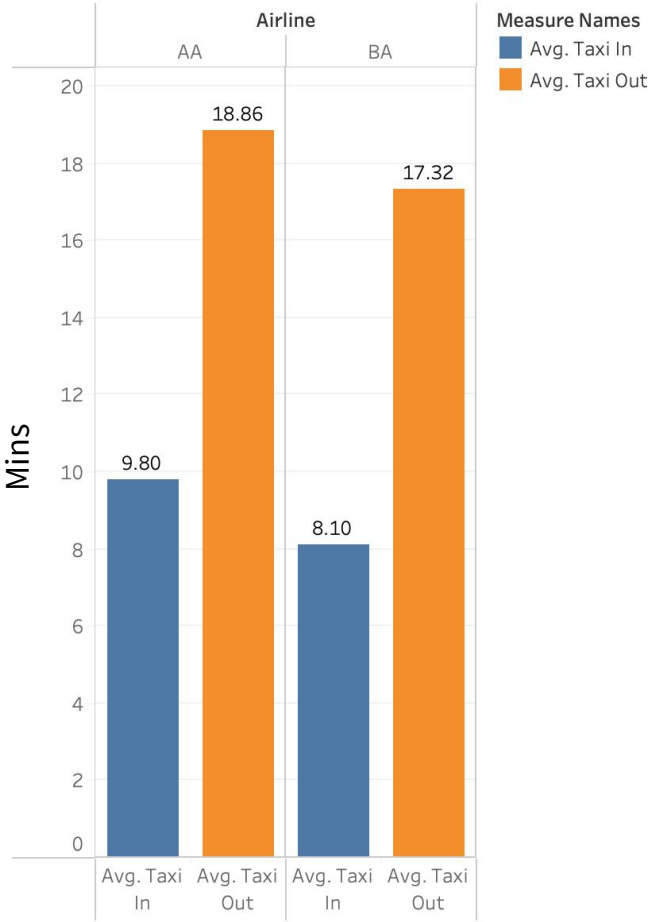
Diversion

Proportion of diverted flights

- Diversion rate:
  Acorn Airline: 0.385%
  Berry Airline: 0.321%
- Though the difference seems not significant, the situation can not be estimated positively.



Detail

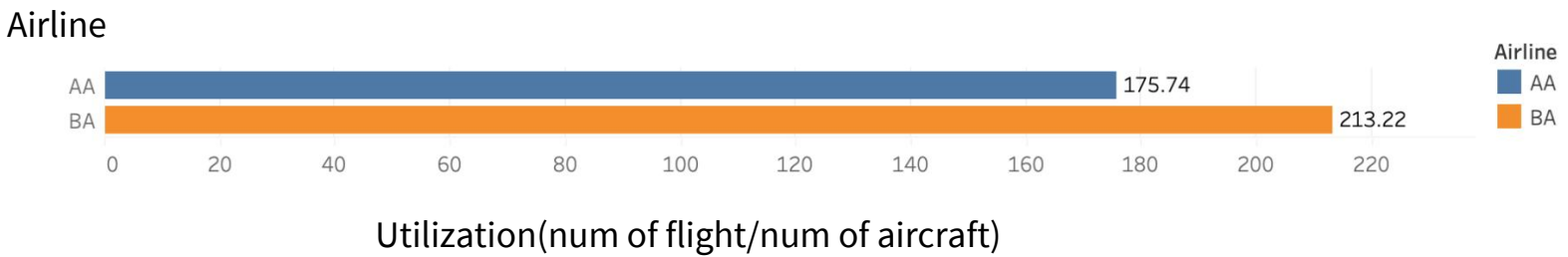


Average Taxi-in & Taxi-out Time (in mins)

- The average taxi-in and taxi-out time of AA are slightly higher, with a 1-min difference
- The average taxi-out time nearly doubles the average taxi-in time, which shows higher congestion level at the original airport.

Detail

Aircrafts utilization



Utilization(num of flight/num of aircraft)

- Acorn Airline aircrafts are much less efficient compared to Berry Airline
- Difference: ~40 flights/aircraft over 2 months period

Mr.B’s concern

“More than 30% of the flights would be delayed, I hope this don’t mess up my schedule.”

Why so many flights are being delayed? Let’s find out more!

03

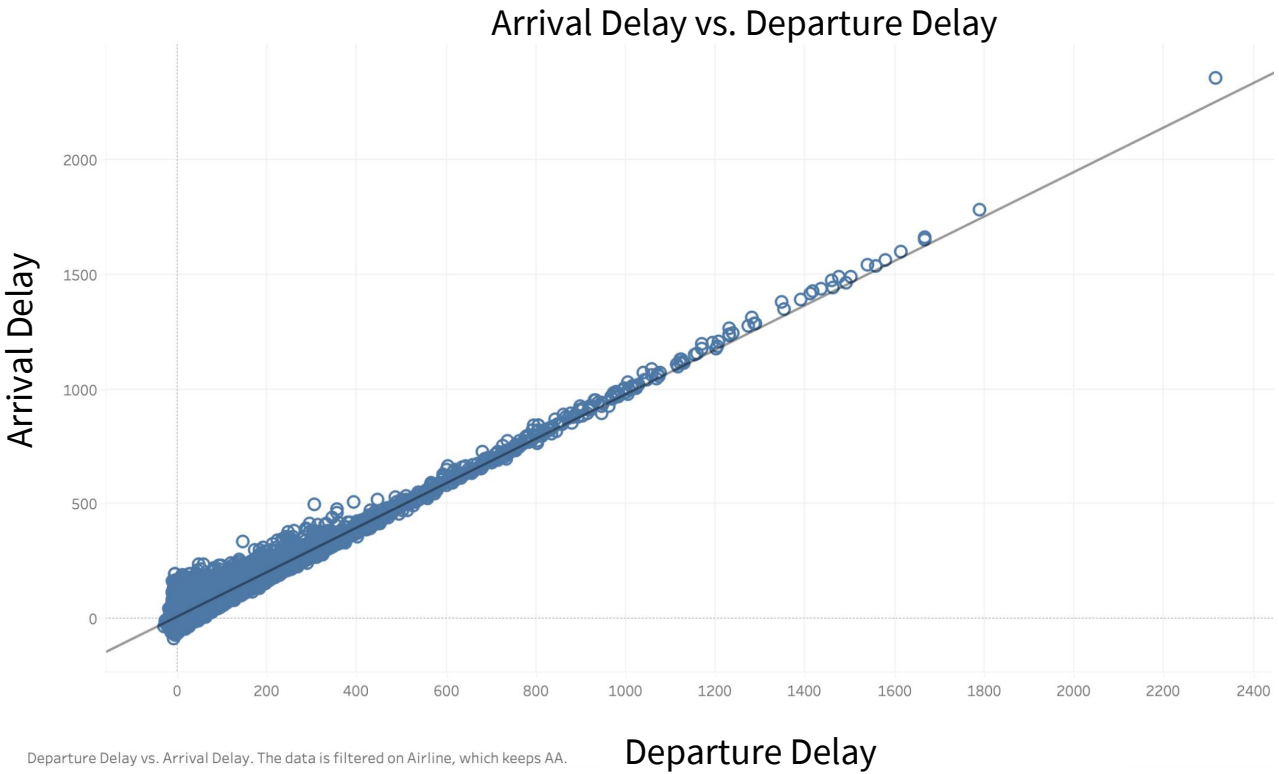
Reasoning

Factors of arrival delay for Acorn Airlines and how they compare against Berry Airlines

Relationship between Arrival Delay and Departure Delay in Acorn Airline

Model:
Arrival delay =
0.967071 * Departure delay + 8.71715

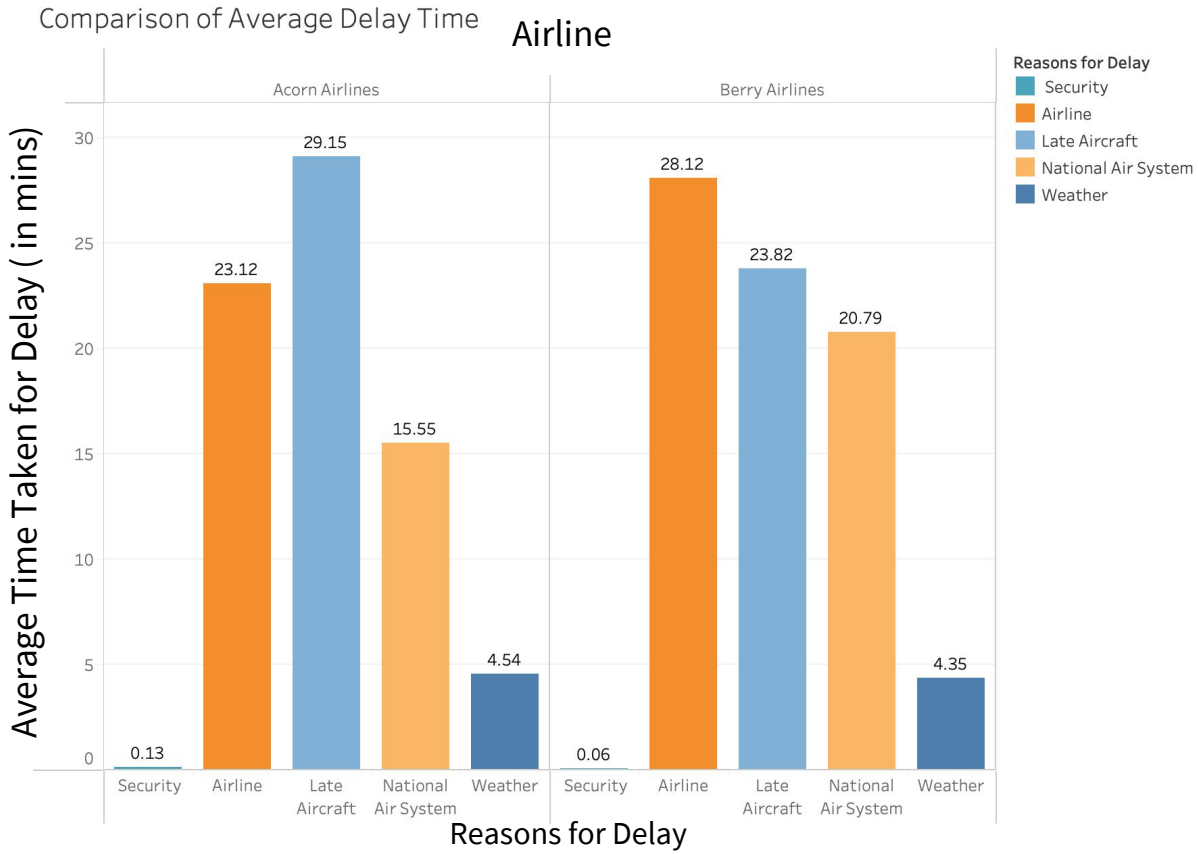
(p-value < 0.0001)



Average delay time for different reasons

Trends:

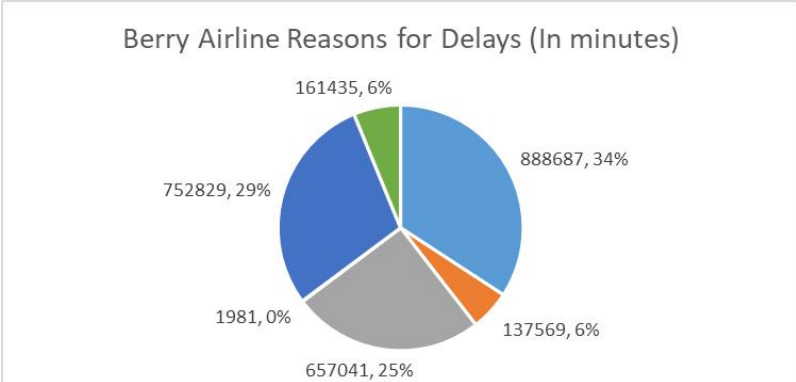
- Both airlines take similar durations in handling delays
- Berry airlines takes longer time in handling delays that is caused by the National Air System.

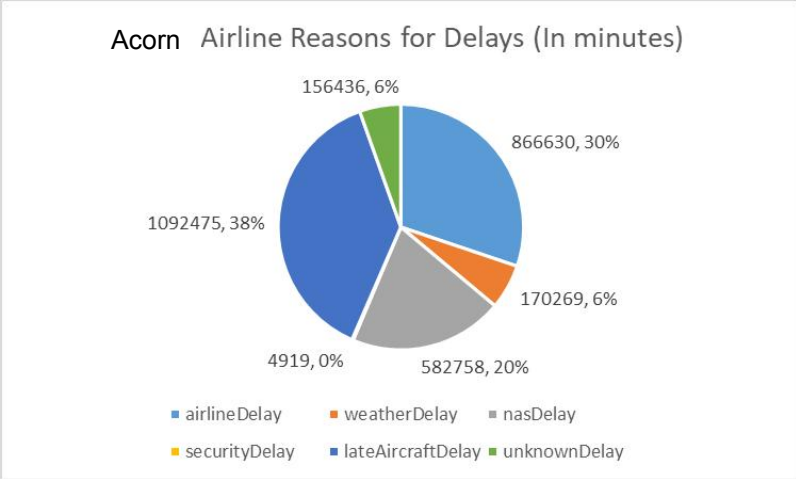


Proportion of different delay reasons

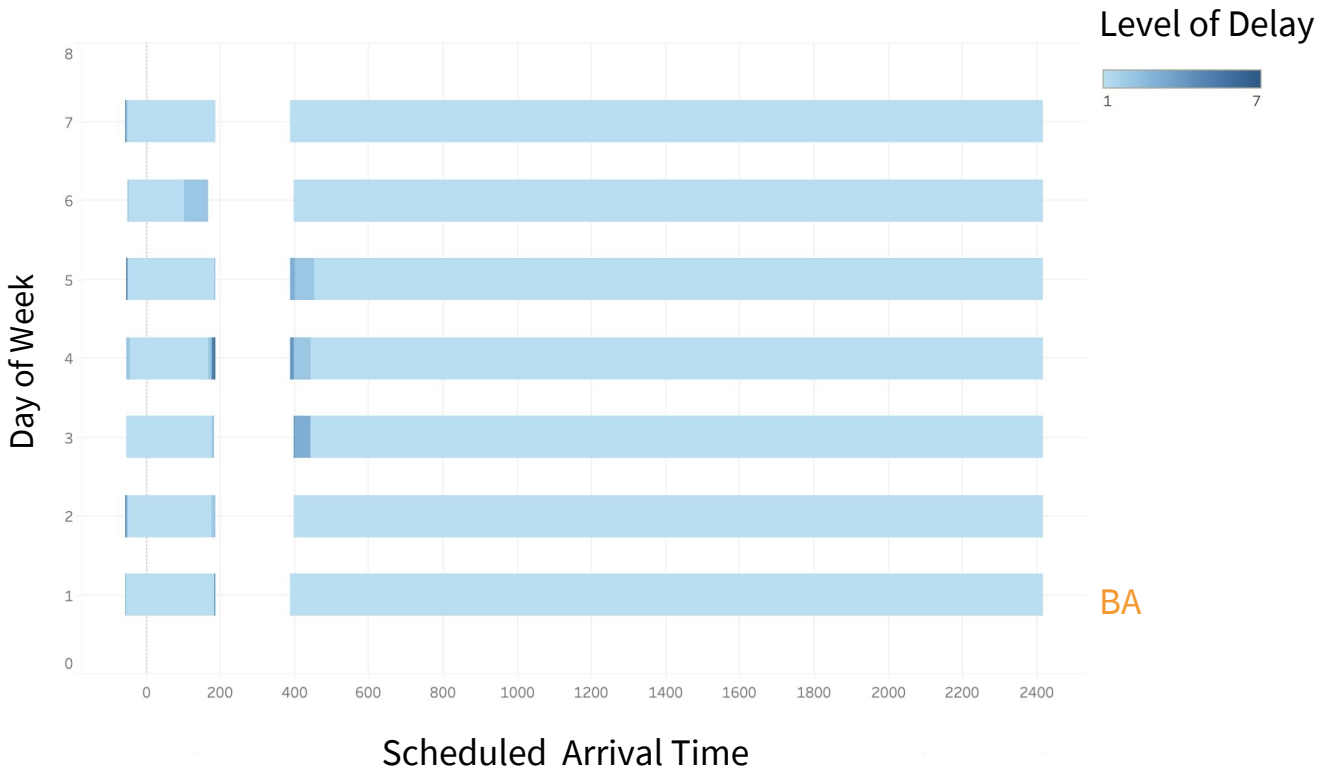
Trends:

- Airline Delay & Late Aircraft delay accounts for the most delays for both airlines
- Acorn Airline has higher percentage of Late Aircraft Delay

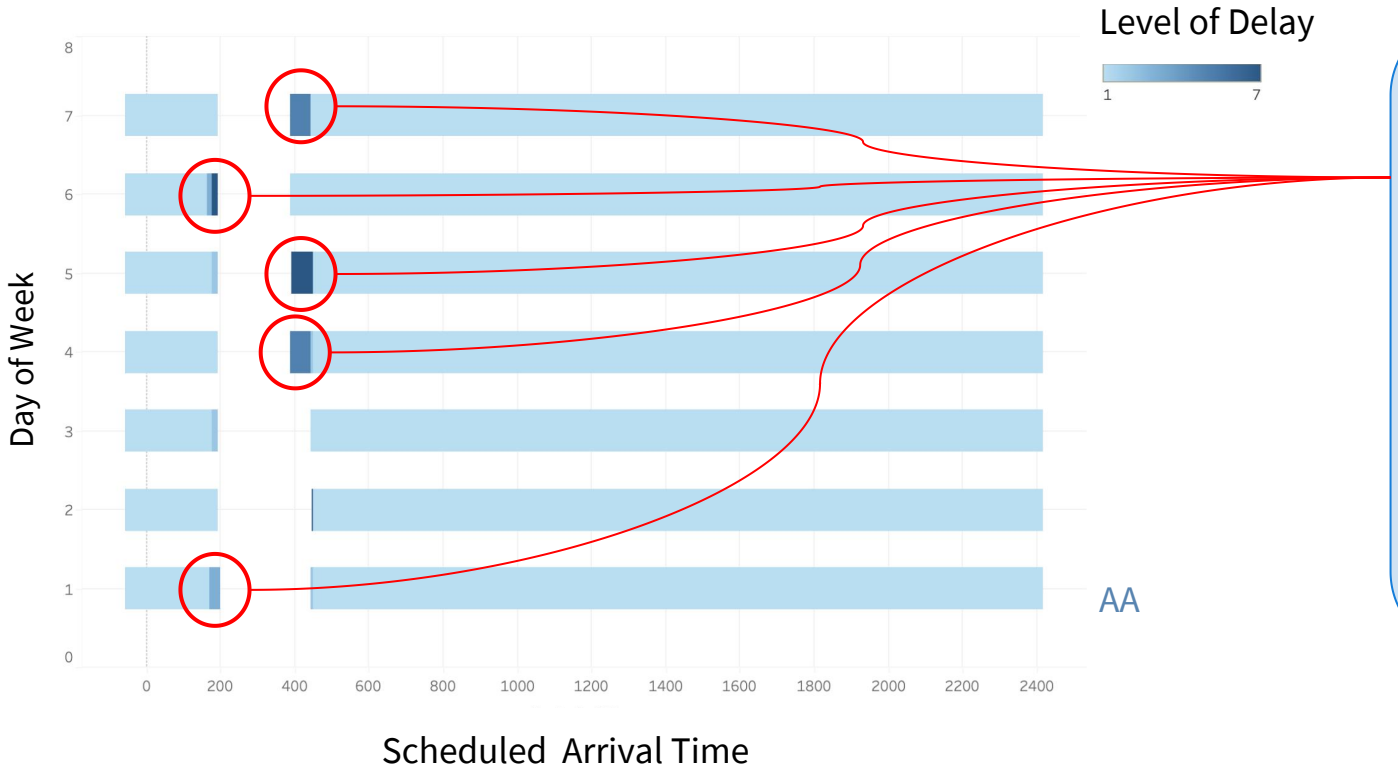




Arrival Delay (in time frame)



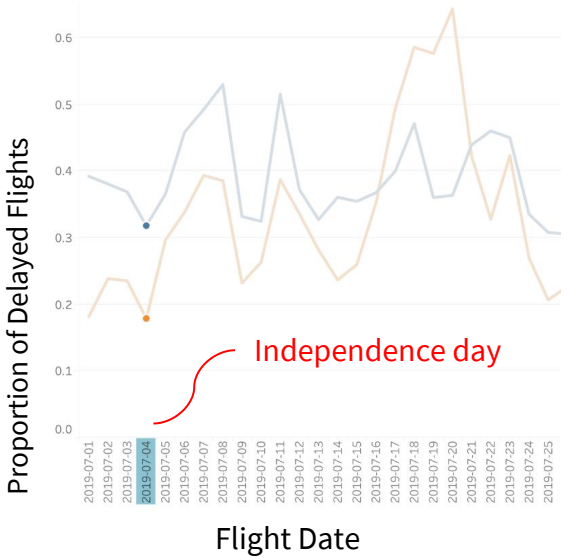
Arrival Delay (in time frame)



- The arrival delay level at following time points is relatively high:
  - Monday 2am
  - Thursday 4-5am
  - Friday 4-5am
  - Saturday 2am
  - Sunday 4-5am
- All in wee hours

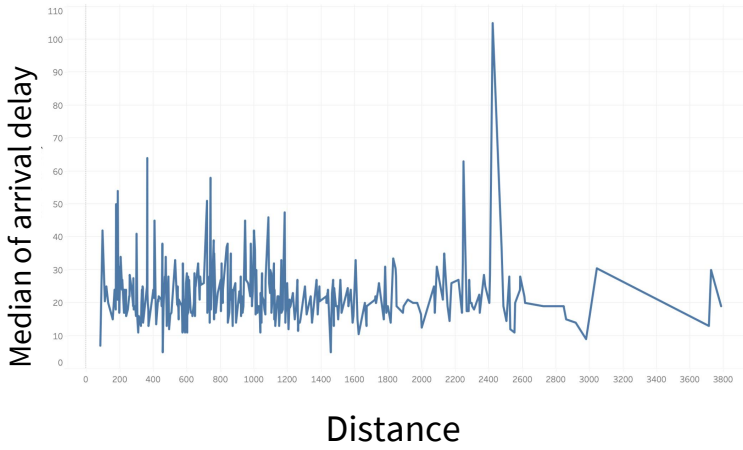
Other attempts

Holiday

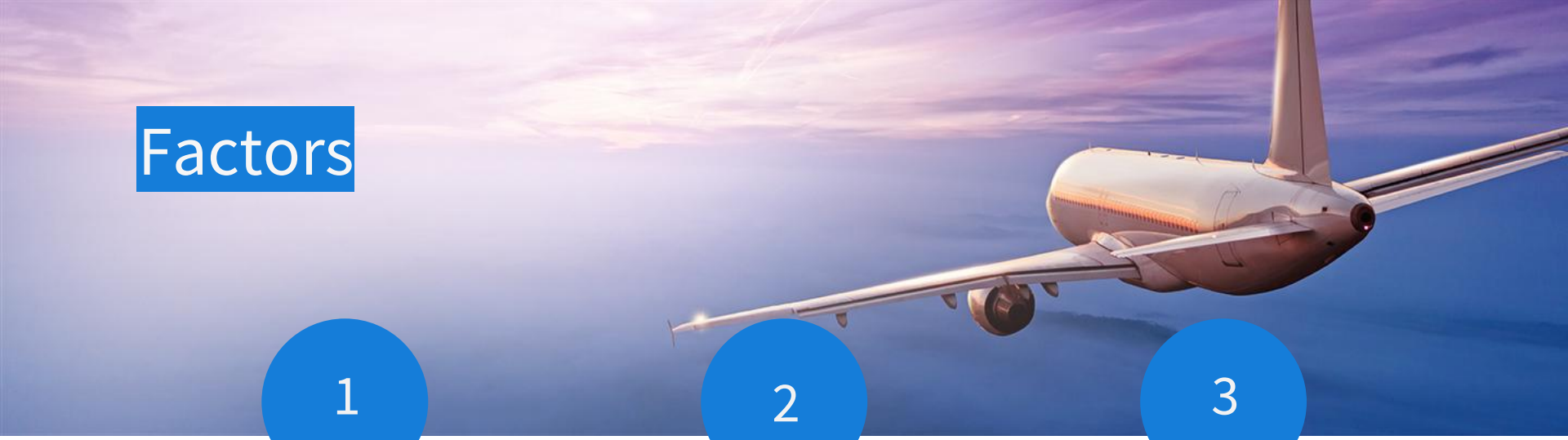


Lower

Distance



No Trend



Factors

1

Departure Delay

High correlation between departure and arrival delay (intuitively consistent)

2

Regular Reasons

- Security
- Airline
- Late Aircraft
- National Air System
- Weather

3

Time points

Arrival delay is more severe at certain time in certain days

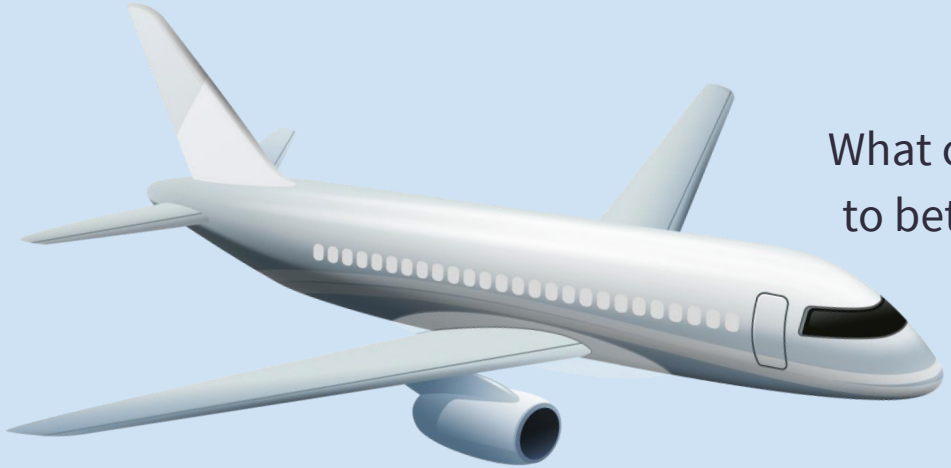
Mr.B’s needs to make a choice…

It seems that Mr.B is going to choose Berry Airlines instead of Acorn Airlines.

How to win Mr.B over?

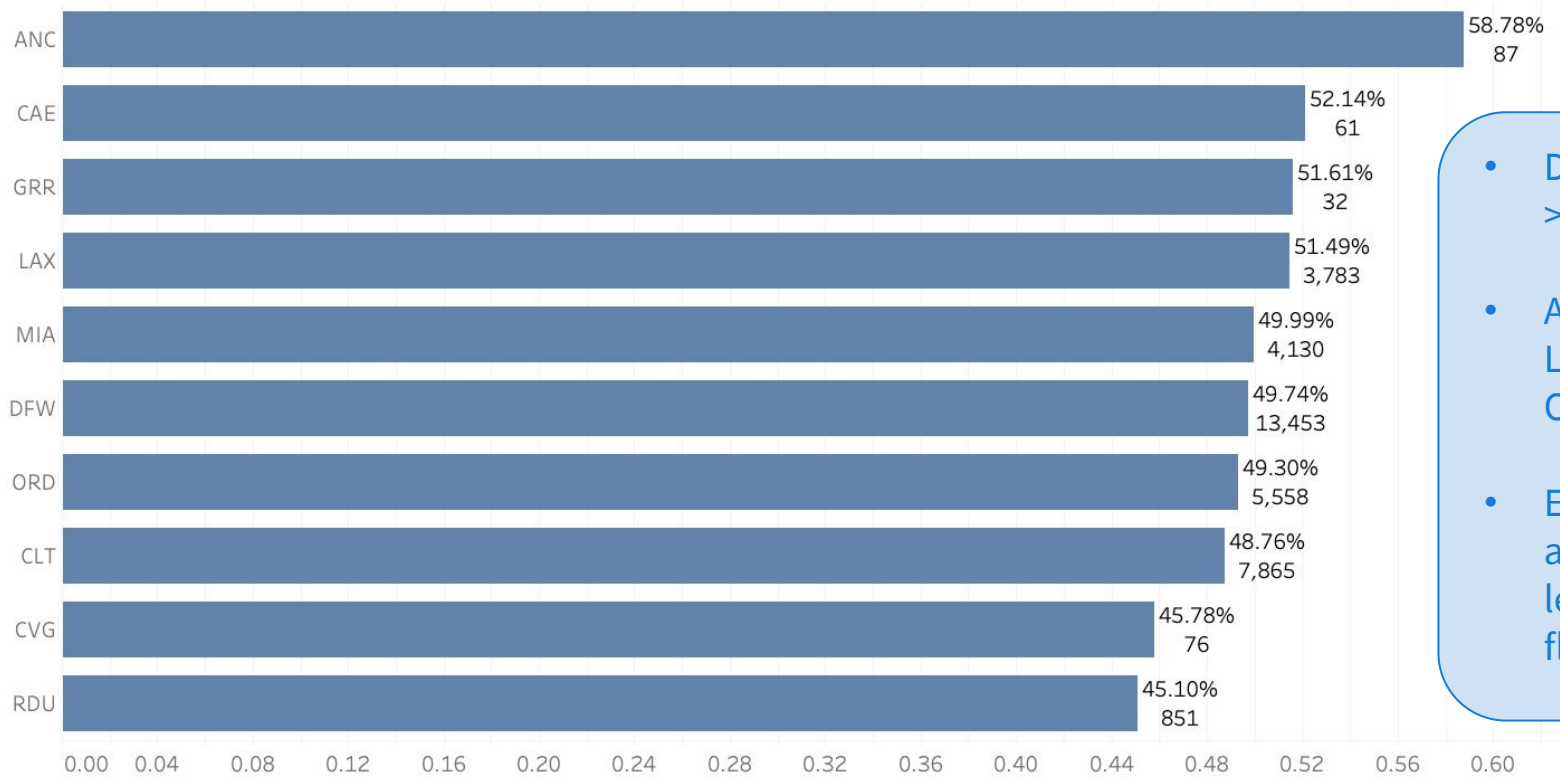
04

Suggestion for Improvement



What course of actions should Acorn Airlines take to better its performance against Berry Airlines?

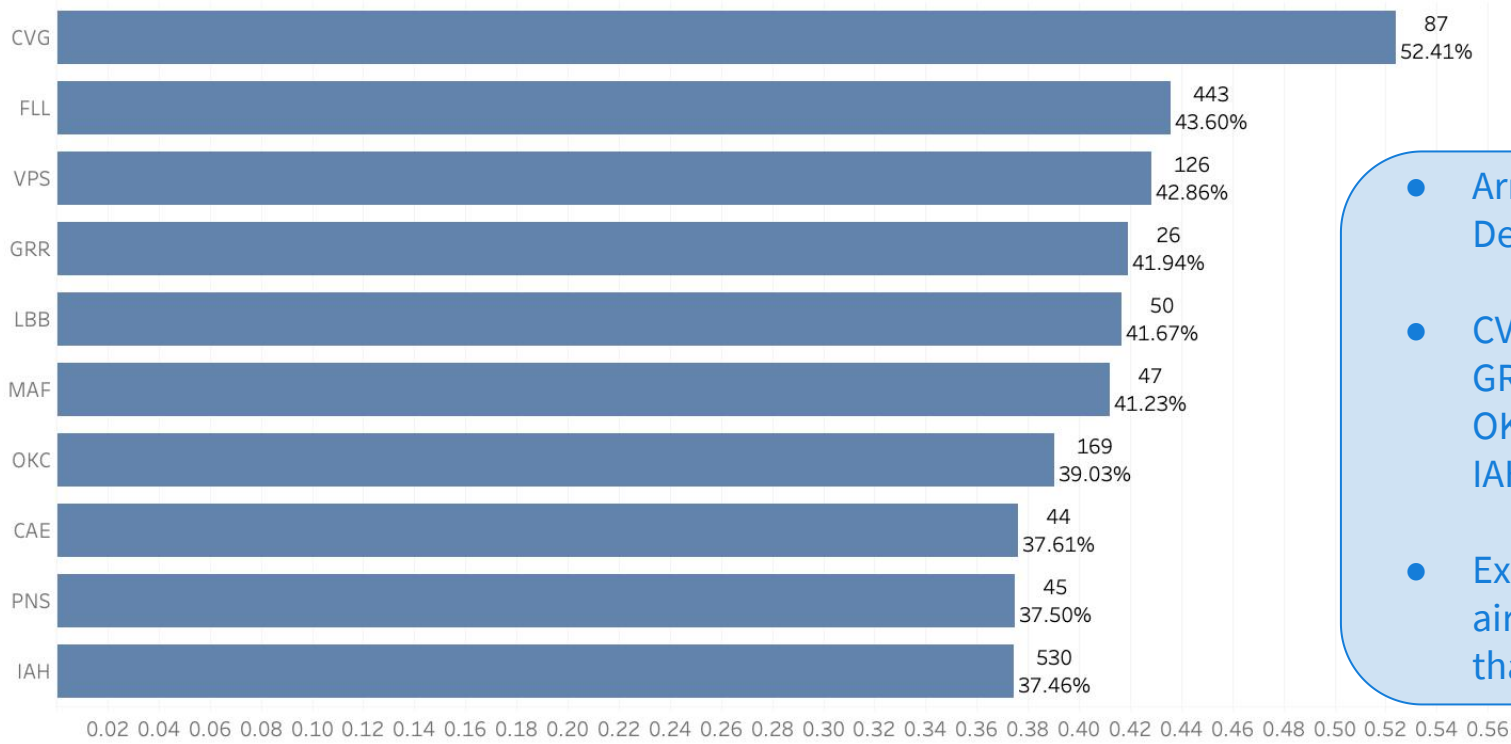
Top 10 Origin Airport where Departure Delay is Most Likely to Happen



- Departure Delay > 0
- ANC, CAE, GRR, LAX, MIA, DFW, ORD, CLT, CVG
- Excluding airports with less than 10 flights

Percentage of Departure Delay Over Total Number of Flights

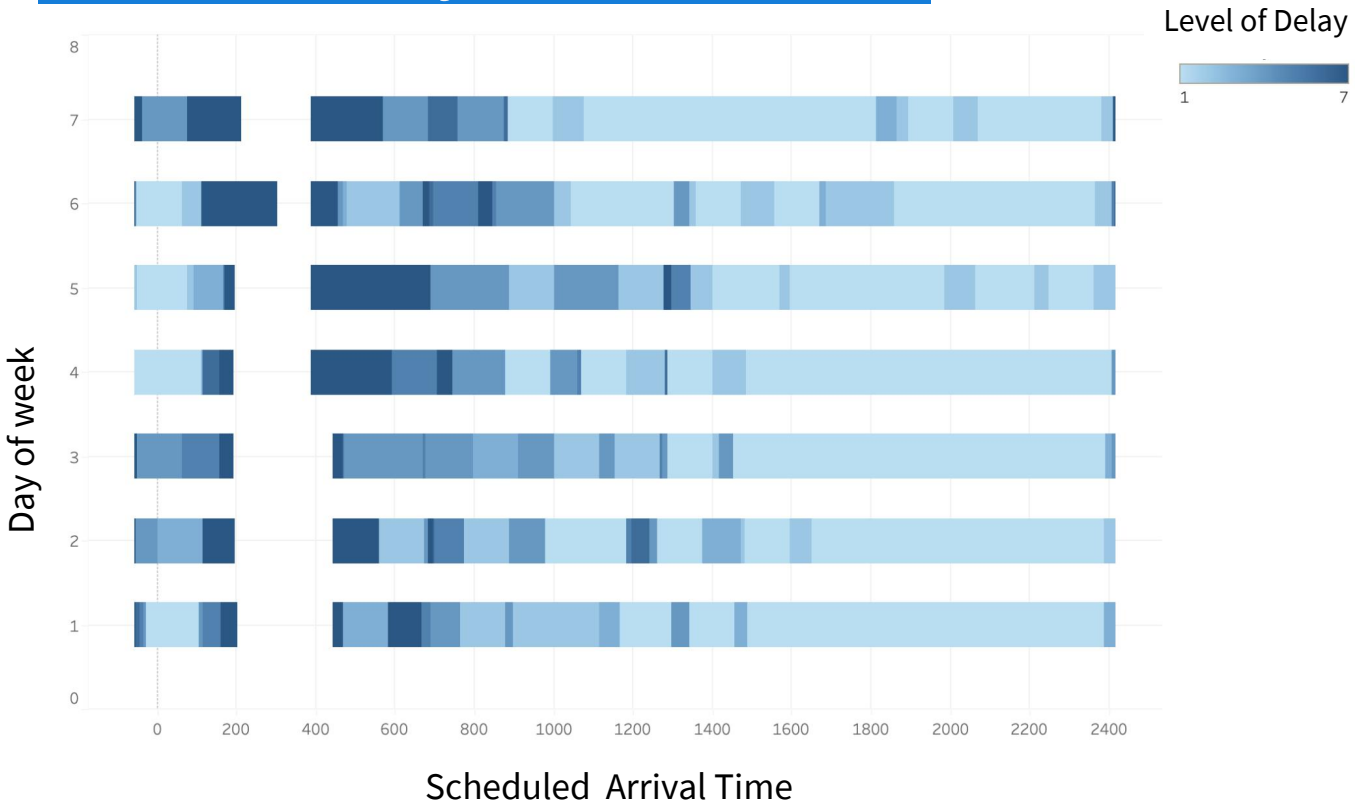
Top 10 Destination Airport where Delay is Most Likely to Happen



Percentage of Arrival Delay > Departure Delay Overall Total Number of Flights Arrived

- Arrival Delay > Departure Delay
- CVG, FLL, VPS, GRR, LBB, MAF, OKC, CAE, PNS, IAH
- Excluding airports with less than 10 flights

Weather delay (in time frame)



- The weather delay level at **midnight - 8am** is the highest.
- The weather conditions in the afternoon and in the evening are moderate.

Suggestions

- More flight options for its customers
  - Cooperate with airports in untouched areas (p11)
  - Increase the variety of air routes to achieve a balanced service across the country (p12-14)
  - Could also give more options for same air routes but different timings
- Resource Allocation Efficiency
  - Increase the efficiency of aircraft usage through better flight scheduling (p21)

Suggestions

- Improve on Arrival Delay
- Schedule for more buffer time
- Strengthen supervision over airports on their congestion level (p20)
- Pay special attention to Top 10 airports where arrival/departure delay are most likely to happen (p31-32)
- Can invest more in tackling late aircraft delay and airline delay first, since they make up more than 60% of arrival delay(p24-25)
  - Late aircraft - Properly schedule and utilize backup aircrafts (p24-25)
  - Security - Improve security screening efficiency: investing in better technology, training staff to be more efficient, and streamlining the process to reduce wait times. (p24-25)
  - Weather - Avoid bad weather by scheduling fewer flights at certain time points (p24-25,p33)
  - Airline - Invest in better technology and equipment, optimize staffing levels, and streamline procedures to reduce inefficiencies. (p24-25)

Mr.B is more likely to choose Acorn Airlines after such improvement!

Thank you !