

Project Title:
Airline Data Management and Analysis Using Power BI

Problem Statement:
The airline industry operates with numerous complexities, requiring effective data management and insights into flight schedules, passenger details, and ticketing systems. This project aims to analyze airline operations for improving efficiency and customer satisfaction.

Objective:
To analyze and visualize airline data for operational insights, passenger management, and ticket booking trends using Power BI.

1. Data Preparation and Cleaning

Table: SelectRows(("*Removed Duplicates", each true))

FlightID	FlightNumber	Airline	Destination	Status
1	1001 FL1102	Airline D	Houston	On Time
2	1002 FL1435	Airline B	Chicago	On Time
3	1003 FL1860	Airline A	New York	Cancelled
4	1004 FL1270	Airline C	Chicago	Delayed
5	1005 FL1106	Airline C	New York	Delayed
6	1006 FL1071	Airline A	Phoenix	On Time
7	1007 FL1700	Airline C	Los Angeles	Cancelled
8	1008 FL1020	Airline C	Los Angeles	Delayed
9	1009 FL1614	Airline A	Los Angeles	Cancelled
10	1010 FL1121	Airline D	Chicago	Cancelled
11	1011 FL1466	Airline A	Phoenix	On Time
12	1012 FL1214	Airline D	New York	Delayed
13	1013 FL1330	Airline C	Houston	On Time
14	1014 FL1458	Airline C	New York	Delayed
15	1015 FL1087	Airline C	Houston	Delayed
16	1016 FL1372	Airline B	New York	Delayed
17	1017 FL1099	Airline D	Phoenix	Delayed
18	1018 FL1871	Airline B	Houston	Delayed
19	1019 FL1663	Airline B	Chicago	Cancelled
20	1020 FL1130	Airline A	New York	On Time
21	1021 FL1661	Airline B	New York	Cancelled
22	1022 FL1308	Airline A	Houston	Delayed
23	1023 FL1769	Airline A	Chicago	On Time
24	1024 FL1343	Airline B	Chicago	Delayed
25	1025 FL1491	Airline D	Phoenix	On Time

Flight Information Transformation Screenshot

Untitled - Power Query Editor

File Home Transform Add Column View Tools Help

Close & Apply New Recent Enter Data source settings Manage Parameters Refresh Preview Advanced Editor Choose Columns Remove Columns Keep Rows Remove Rows Split Column Group By Data Type: Whole Number Use First Row as Headers Replace Values Merge Queries Append Queries Combine Files Text Analytics Vision Azure Machine Learning

Queries [3]

flight_information
passenger_information
ticket_information

Table.SelectRows(*Removed Duplicates*, each true)

	P3 PassengerID	P3 FlightID	A3 SeatNumber
1	1	1	1161 38A
2	2	2	1157 24D
3	3	3	1141 30B
4	4	4	1046 17E
5	5	5	1015 29D
6	6	6	1134 10A
7	7	7	1082 10A
8	8	8	1115 20E
9	9	9	1197 34E
10	10	10	1047 2E
11	11	11	1153 43C
12	12	12	1154 48C
13	13	13	1010 47A
14	14	14	1056 23C
15	15	15	1030 14D
16	16	16	1109 40D
17	17	17	1005 25C
18	18	18	1119 32C
19	19	19	1033 27E
20	20	20	1118 30B
21	21	21	1065 18E
22	22	22	1146 5B
23	23	23	1177 28B
24	24	24	1011 22E
25	25	25	1085 6A

3 COLUMNS, 100 ROWS Column profiling based on top 1000 rows

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Search

11:47 PM 19-Aug-25

Passenger Information Transformation Screenshot

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Queries [3]

flight_information
passenger_information
ticket_information

Table.SelectRows(*Removed Duplicates*, each true)

	P3 TicketID	P3 FlightID	A3 BookingStatus
1	5001	1178	Pending
2	5002	1078	Confirmed
3	5003	1117	Cancelled
4	5004	1120	Cancelled
5	5005	1137	Cancelled
6	5006	1162	Pending
7	5007	1076	Pending
8	5008	1035	Cancelled
9	5009	1001	Cancelled
10	5010	1040	Cancelled
11	5011	1064	Pending
12	5012	1150	Cancelled
13	5013	1060	Cancelled
14	5014	1064	Confirmed
15	5015	1093	Confirmed
16	5016	1072	Pending
17	5017	1011	Cancelled
18	5018	1105	Cancelled
19	5019	1014	Confirmed
20	5020	1060	Pending
21	5021	1030	Confirmed
22	5022	1035	Confirmed
23	5023	1165	Confirmed
24	5024	1005	Confirmed
25	5025	1083	Cancelled

3 COLUMNS, 50 ROWS Column profiling based on top 1000 rows

PREVIEW DOWNLOADED AT 10:49 PM

21°C Mostly cloudy

Search

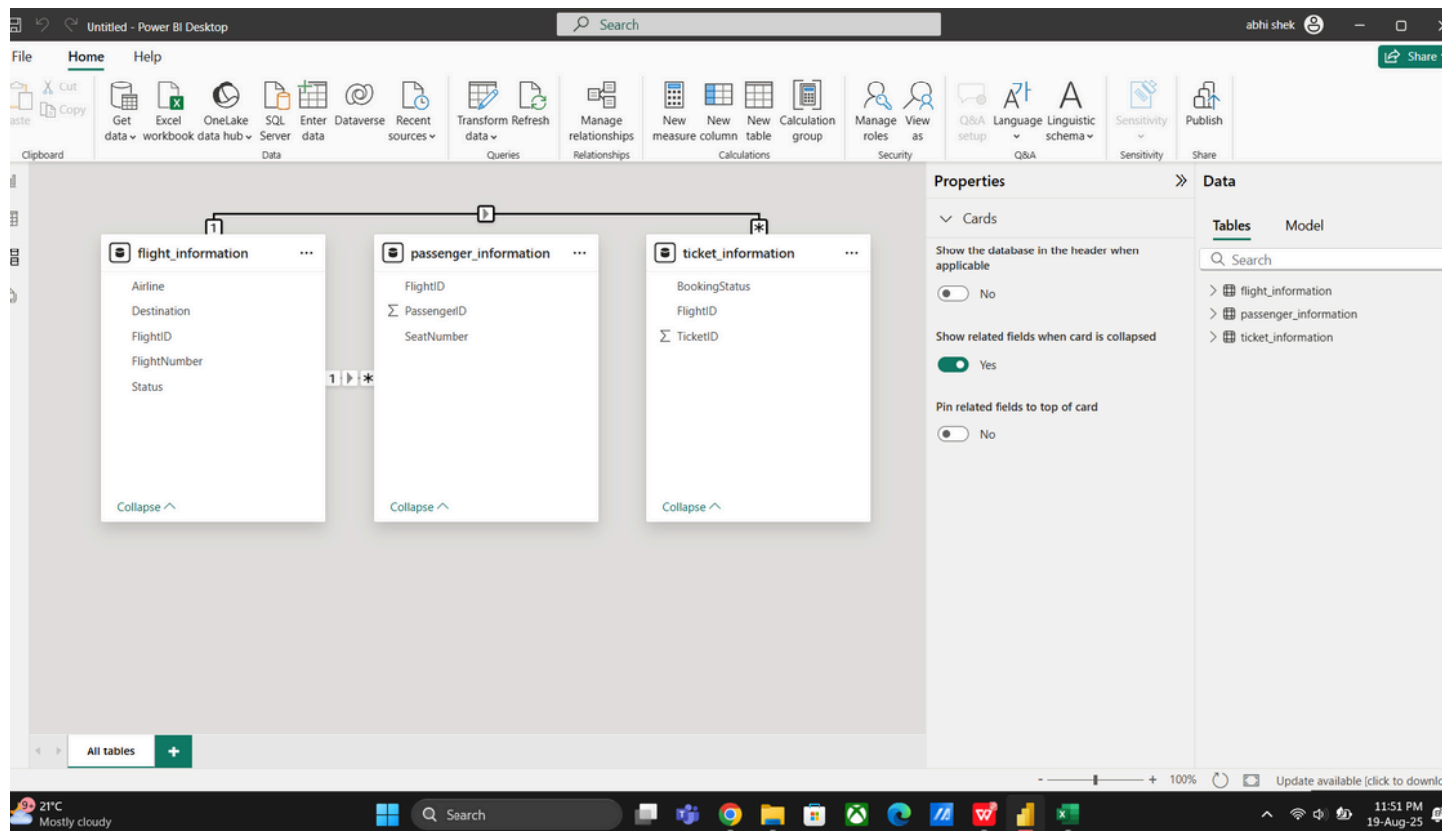
11:48 PM 19-Aug-25

Ticket Information Transformation Screenshot

Summary

- No Duplicate records found in any of the data.
- Every Column has proper data types.
- No missing values found in any data.

2. Data Modeling



FlightID is a primary key in flight_imformation table and it is connected to passenger_imformation table and ticket_imformation table using foreign key which is flightID and It is connected by One to Many relationship.

3. Enhanced Data Insights

FlightID	FlightNumber	Airline	Destination	Status	FlightStatusCategory	flight number
1001	FL1102	Airline D	Houston	On Time	Best	1102
1002	FL1435	Airline B	Chicago	On Time	Best	1435
1003	FL1860	Airline A	New York	Cancelled	To Be Improved	1860
1004	FL1270	Airline C	Chicago	Delayed	To Be Improved	1270
1005	FL1106	Airline C	New York	Delayed	To Be Improved	1106
1006	FL1071	Airline A	Phoenix	On Time	Best	1071
1007	FL1700	Airline C	Los Angeles	Cancelled	To Be Improved	1700
1008	FL1020	Airline C	Los Angeles	Delayed	To Be Improved	1020
1009	FL1614	Airline A	Los Angeles	Cancelled	To Be Improved	1614
1010	FL1121	Airline D	Chicago	Cancelled	To Be Improved	1121
1011	FL1466	Airline A	Phoenix	On Time	Best	1466
1012	FL1214	Airline D	New York	Delayed	To Be Improved	1214
1013	FL1330	Airline C	Houston	On Time	Best	1330
1014	FL1458	Airline C	New York	Delayed	To Be Improved	1458
1015	FL1087	Airline C	Houston	Delayed	To Be Improved	1087
1016	FL1372	Airline B	New York	Delayed	To Be Improved	1372
1017	FL1099	Airline D	Phoenix	Delayed	To Be Improved	1099
1018	FL1871	Airline B	Houston	Delayed	To Be Improved	1871
1019	FL1663	Airline B	Chicago	Cancelled	To Be Improved	1663
1020	FL1130	Airline A	New York	On Time	Best	1130
1021	FL1661	Airline B	New York	Cancelled	To Be Improved	1661
1022	FL1308	Airline A	Houston	Delayed	To Be Improved	1308
1023	FL1769	Airline A	Chicago	On Time	Best	1769
1024	FL1343	Airline B	Chicago	Delayed	To Be Improved	1343
1025	FL1101	Airline D	Chicago	On Time	Best	1101

flights were categorized into “Best” and “To Be Improved” category in FlightStatusCategory and flight number was extracted from FlightNumber Column.

4. Calculations Using DAX

FileHomeHelp

PasteCutCopy

Format Comment Uncomment

Find Replace Command palette

Copilot (preview) Copilot

DAX queries will be saved to your model They won't be visible when published in the Power BI service. [Learn more](#)

Run

Update model with changes (0)

1 // Total passengers for a specific flight?

2 EVALUATE

3 SUMMARIZE(passenger_information,passenger_information[FlightID],"Total Passengers",count(passenger_information[PassengerID]))

4

5

6

7

8

9

10

11

12

13

Results

Result 1 of 1

Copy

	passenger_information[...]	[Total Passengers]
1	1161	2
2	1157	1
3	1141	1
4	1046	1
5	1035	1
6	1134	1
7	1082	2
8	1115	1

Calculated number of passenger for each flight.

Airline_data_analysis • Last saved: Today at 12:47 AM

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Copilot

(preview)

Copilot

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DAX queries will be saved to your model

They won't be visible when published in the Power BI service.

[Learn more](#)

Run

Update model with changes (0)

16

// Total tickets booked?

17

EVALUATE

18

ROW("Total Tickets Booked",CALCULATE(count(ticket_information[TicketID]),ticket_information[BookingStatus]="Confirmed"))

19

20

21

22

23

24

25

26

27

28

Results

Result 1 of 1

Copy

	[Total Tickets Booked]
1	17

Total Tickets Booked

Airline_data_analysis • Last saved: Today at 12:47 AM

Search

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Copy

Format

Comment

Uncomment

query

Find

Replace

Command

palette

Copilot

(preview)

Copilot

ClipboardEditingCopilot

DAX queries will be saved to your model

They won't be visible when published in the Power BI service.

[Learn more](#)

Run

Update model with changes (0)

10

// Filtered table showing "Best" flights only?

11

EVALUATE

12

FILTER(flight_information,flight_information[FlightStatusCategory]="Best")

13

14

15

16

17

18

19

20

21

Results

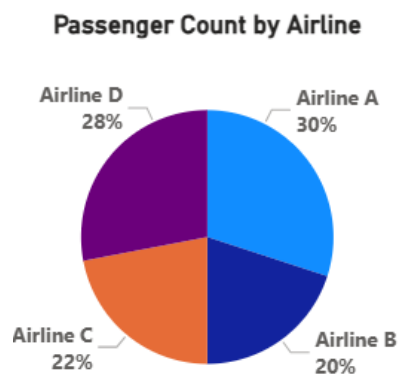
Result 1 of 1

Copy

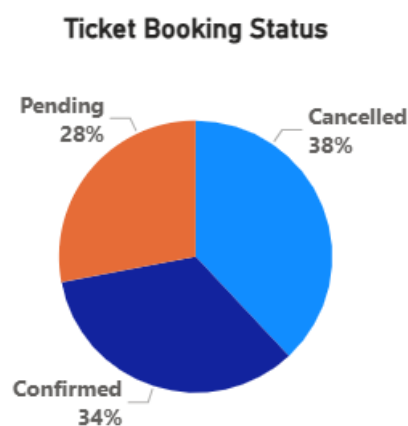
	flight_information[Flight...	flight_information[Flight...	flight_information[Airline]	flight_information[Desti...	flight_information[Status]	flight_information[Flight...	flight_information[flight...
1	1001	FL1102	Airline D	Houston	On Time	Best	1102
2	1002	FL1435	Airline B	Chicago	On Time	Best	1435
3	1006	FL1071	Airline A	Phoenix	On Time	Best	1071
4	1011	FL1466	Airline A	Phoenix	On Time	Best	1466
5	1013	FL1330	Airline C	Houston	On Time	Best	1330
6	1020	FL1130	Airline A	New York	On Time	Best	1130
7	1023	FL1769	Airline A	Chicago	On Time	Best	1769
8	1025	FL1491	Airline D	Phoenix	On Time	Best	1491

Filtered out Best flights

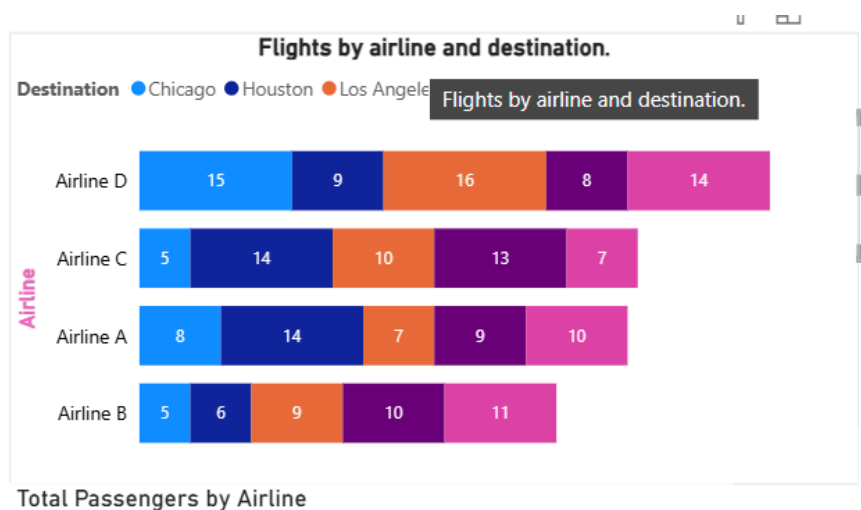
5. Visualization and Interactive Features



Insights: Airline A has constitute almost 30% of passengers which is maximum among all the airlines.Airline B has lowest number of passengers.



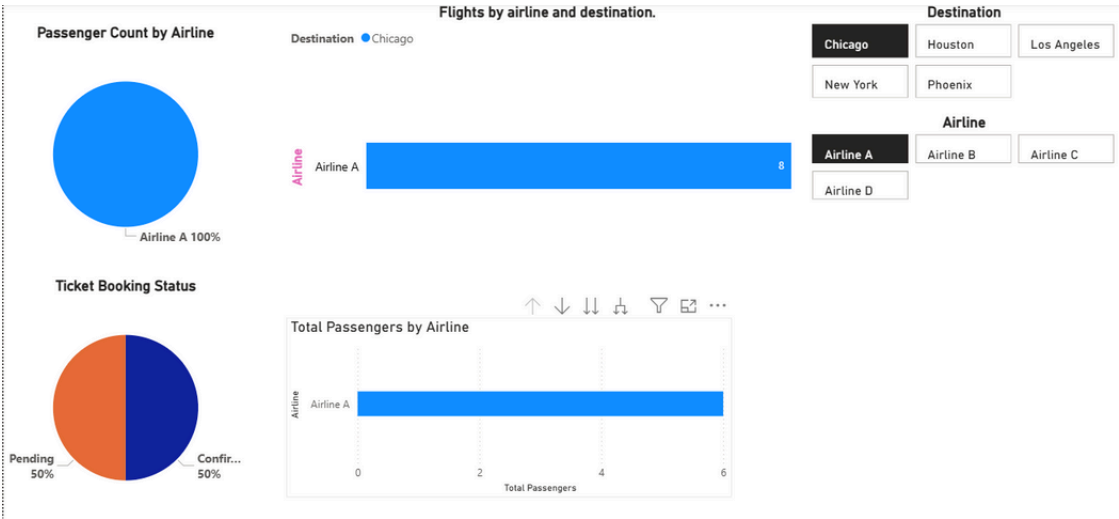
Insights: Most of the tickets have been cancelled and also in pending status which means that the platform in which ticket is booked offers really poor service.



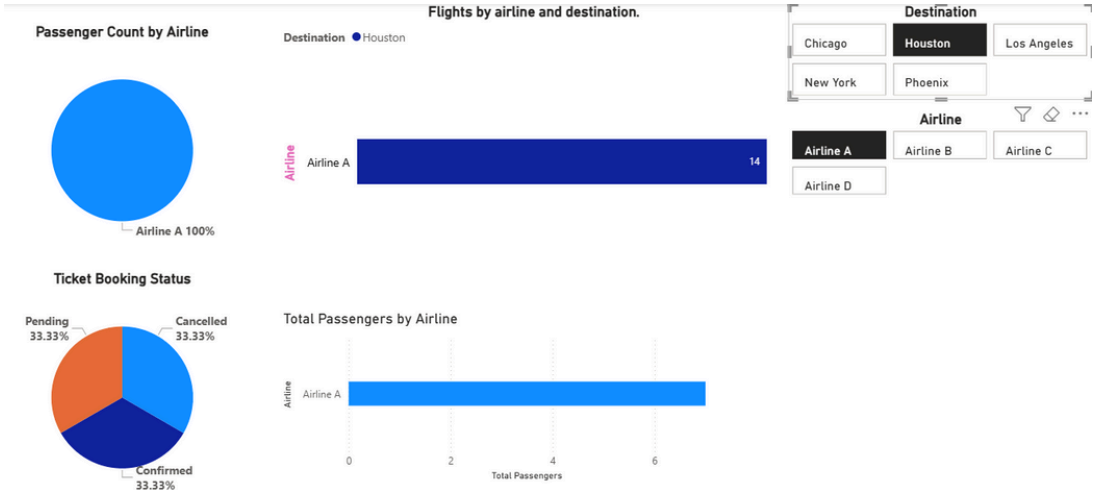
Insights: In Airline D, most of the flights gone to Los Angeles.similarly in Airline C majourity of the flights went to Houston.Similarly in Airline A Most of the flights went to Houston.Airline B Maximum flights went to New York.

Add interactive features for:

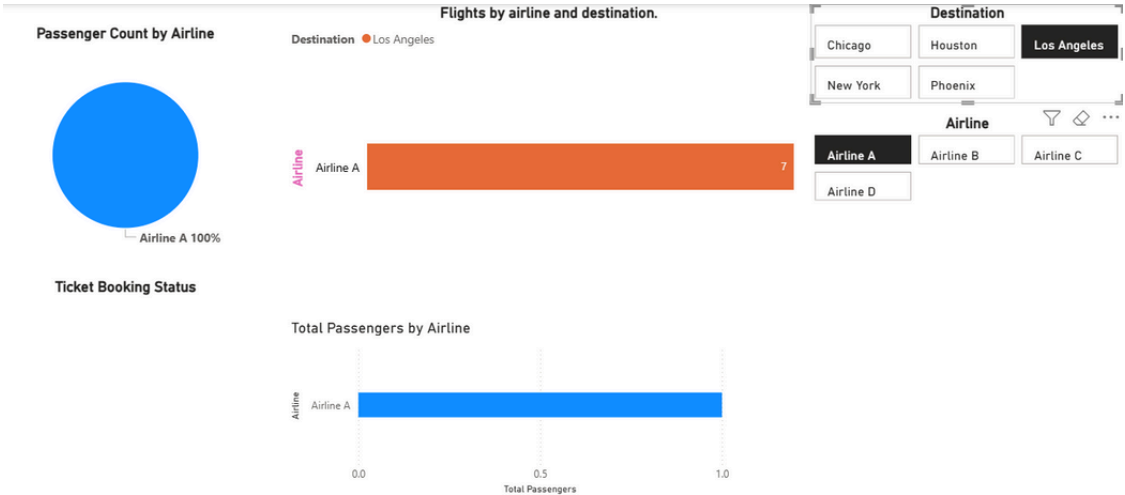
○ **Destination and Airline:** Added Slicers for Destination and Airlines.



Airline A and Chicago Filters



Airline A and Houston filter



Airline A and Los Angeles Filter



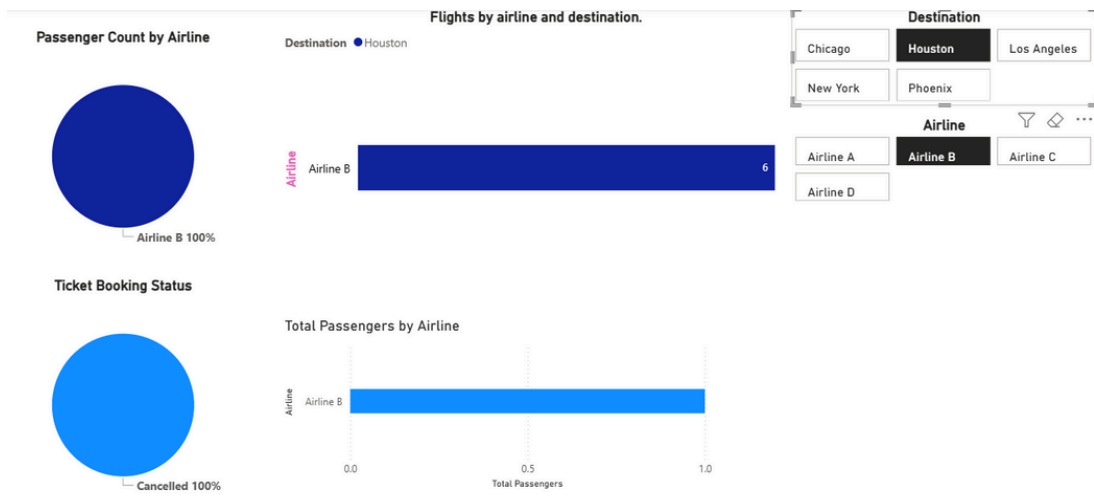
Airline A and New York Filter



Airline A and Phoenix Filter



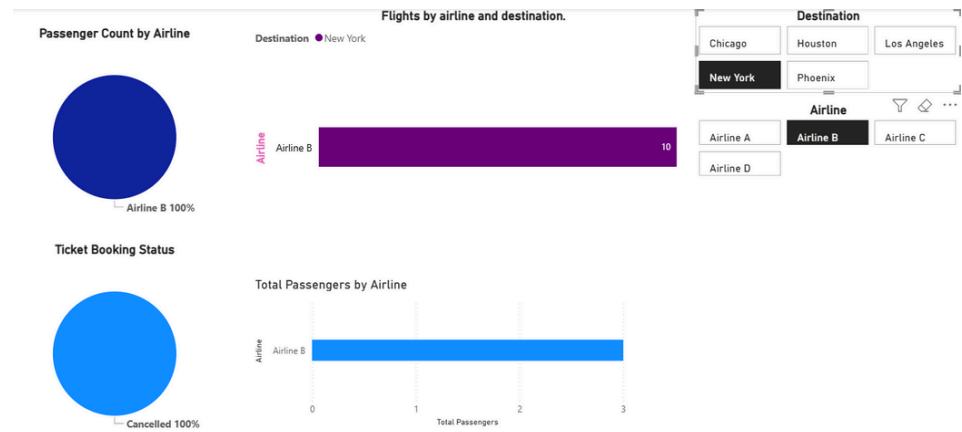
Airline B and Chicago filter



Airline B and Houston Filter



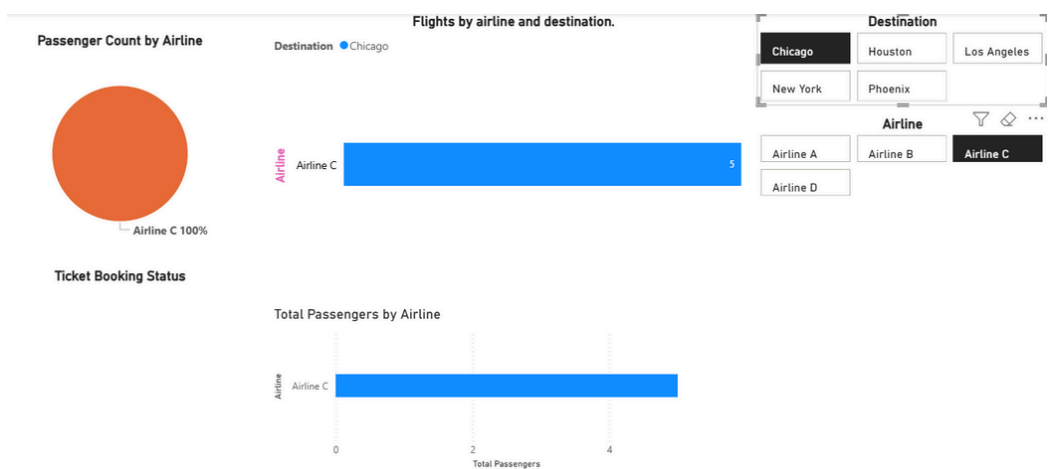
Airline B and Los Angeles Filter



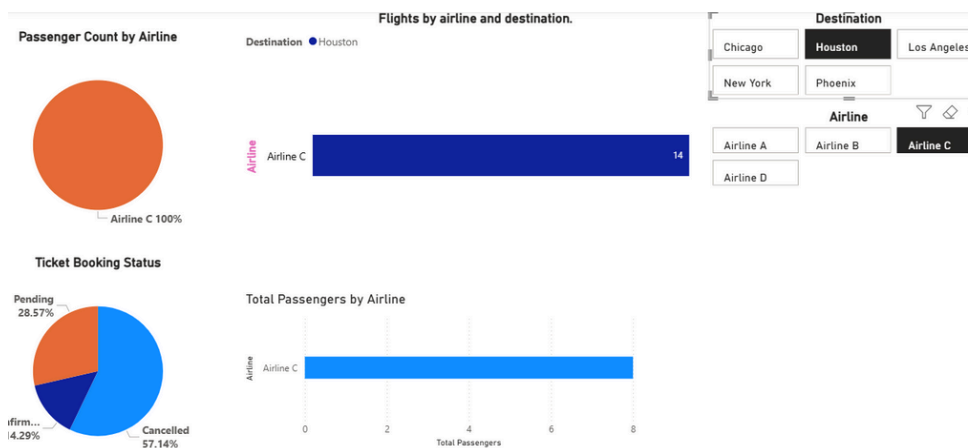
Airline B and New York filter



Airline B and Phoenix



Airline C and Chicago



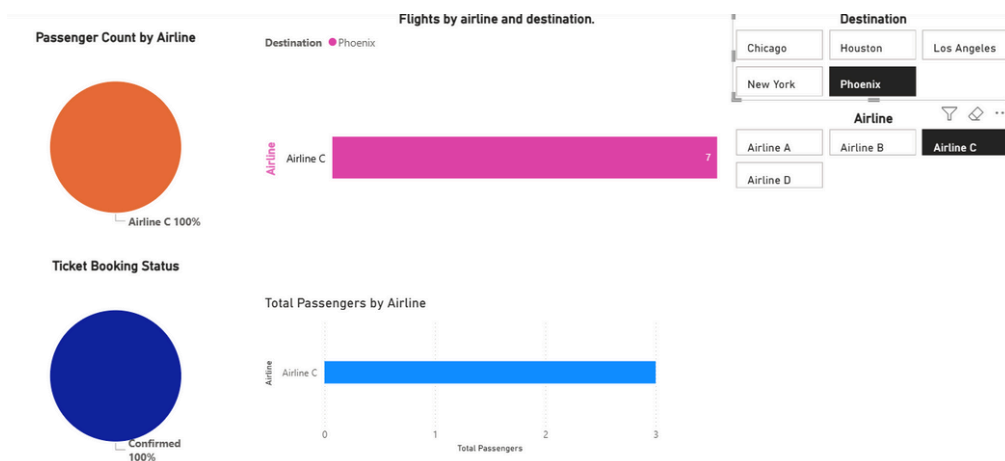
Airline C and Houston



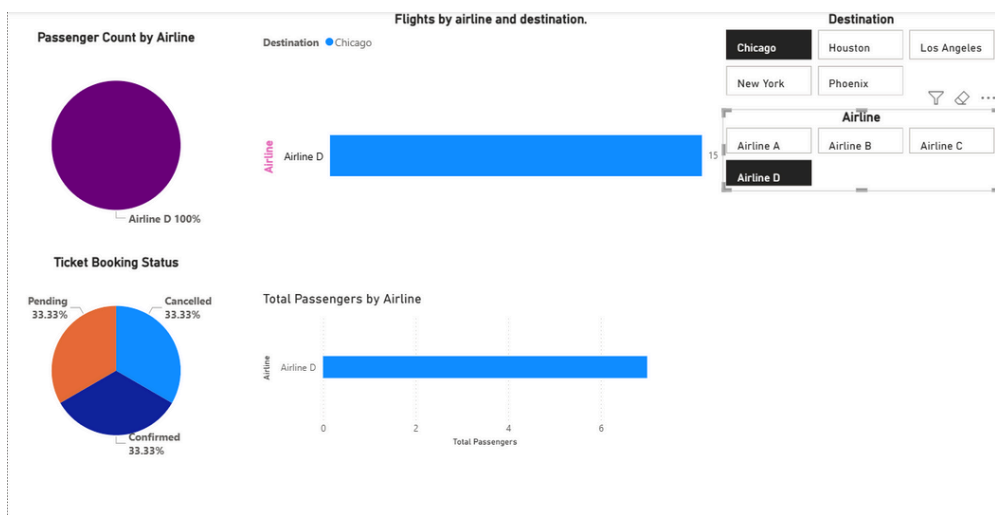
Airline C and Los Angeles



Airline C and New York



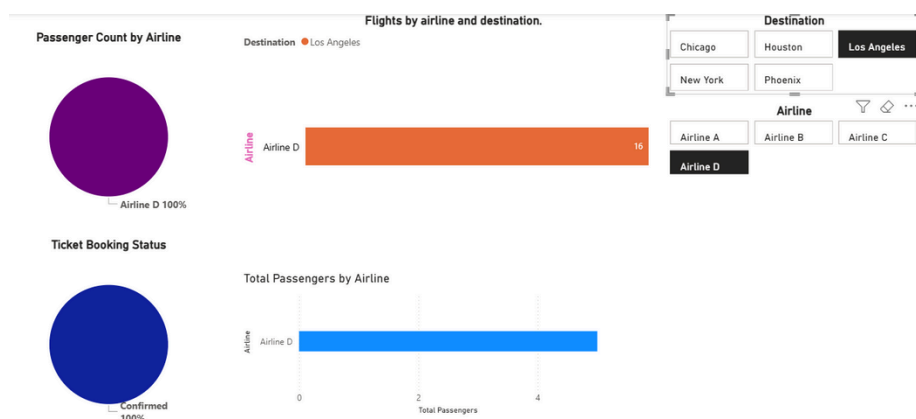
Airline C and Phoenix



Airline D and Chicago



Airline D and Houston

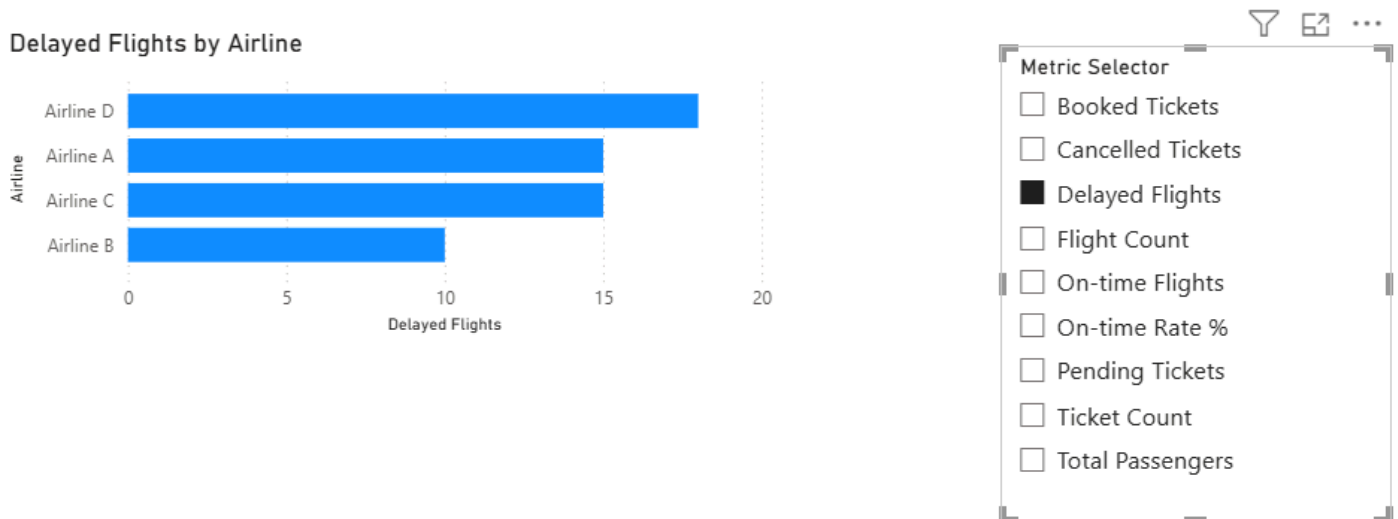


Airline D and Los Angeles



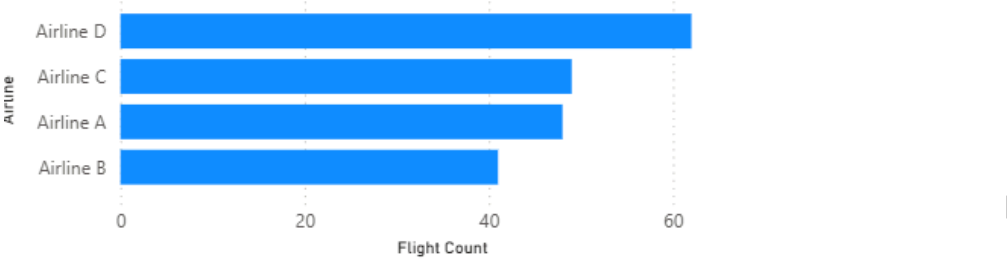
Airline D and New York

- o **Quick views:** combined multiple fields (like Passenger Count, Ticket Status, Flights by Destination) into a parameter table. Then added Parameter as slicers.



Delayed Flight by Airline

Flight Count by Airline



Metric Selector

☐ Booked Tickets

☐ Cancelled Tickets

☐ Delayed Flights

☒ Flight Count

☐ On-time Flights

☐ On-time Rate %

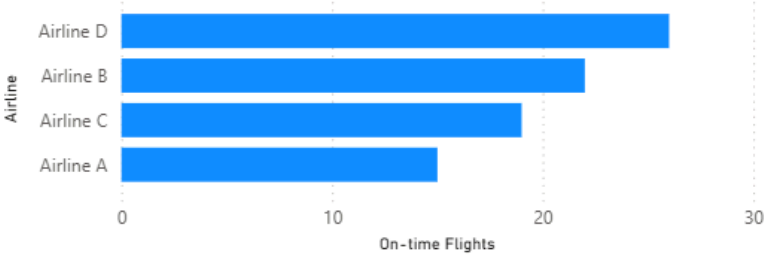
☐ Pending Tickets

☐ Ticket Count

☐ Total Passengers

Flight Count per Airline

On-time Flights by Airline



Metric Selector

☐ Booked Tickets

☐ Cancelled Tickets

☐ Delayed Flights

☐ Flight Count

☒ On-time Flights

☐ On-time Rate %

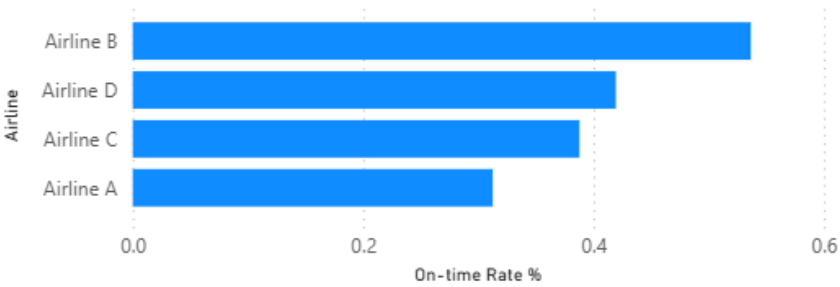
☐ Pending Tickets

☐ Ticket Count

☐ Total Passengers

On-Time Flights

On-time Rate % by Airline

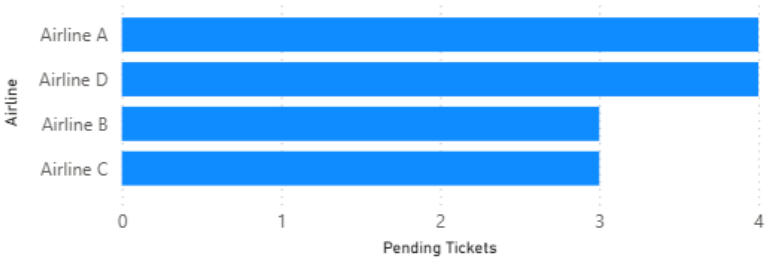


Metric Selector

- ☐ Booked Tickets
- ☐ Cancelled Tickets
- ☐ Delayed Flights
- ☐ Flight Count
- ☐ On-time Flights
- ☒ On-time Rate %
- ☐ Pending Tickets
- ☐ Ticket Count
- ☐ Total Passengers

On-Time Rate %

Pending Tickets by Airline

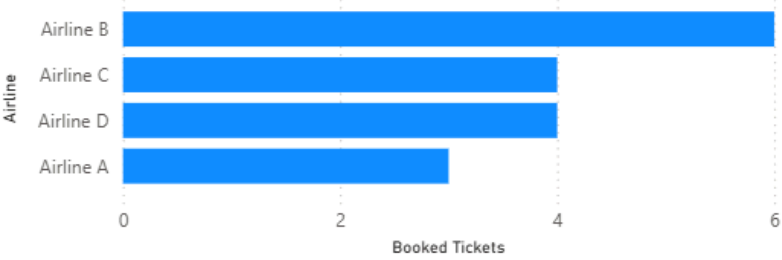


Metric Selector

- ☐ Booked Tickets
- ☐ Cancelled Tickets
- ☐ Delayed Flights
- ☐ Flight Count
- ☐ On-time Flights
- ☐ On-time Rate %
- ☒ Pending Tickets
- ☐ Ticket Count
- ☐ Total Passengers

Pending ticket

Booked Tickets by Airline



Metric Selector

Booked Tickets

Cancelled Tickets

Delayed Flights

Flight Count

On-time Flights

On-time Rate %

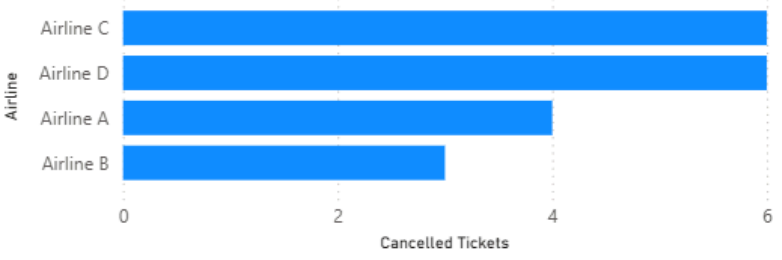
Pending Tickets

Ticket Count

Total Passengers

Booked Ticket

Cancelled Tickets by Airline



Metric Selector

Booked Tickets

Cancelled Tickets

Delayed Flights

Flight Count

On-time Flights

On-time Rate %

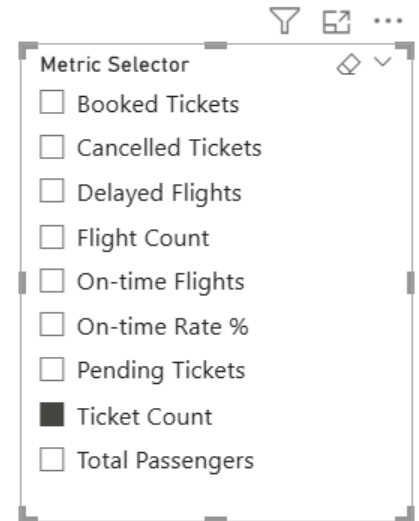
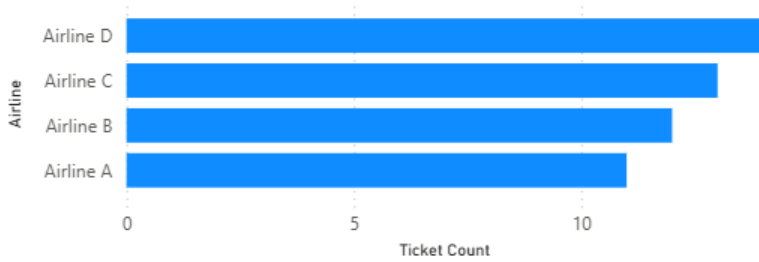
Pending Tickets

Ticket Count

Total Passengers

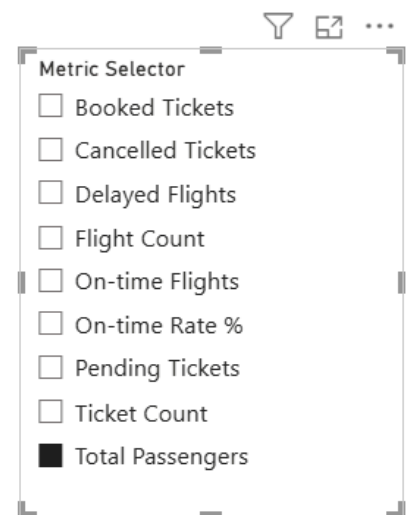
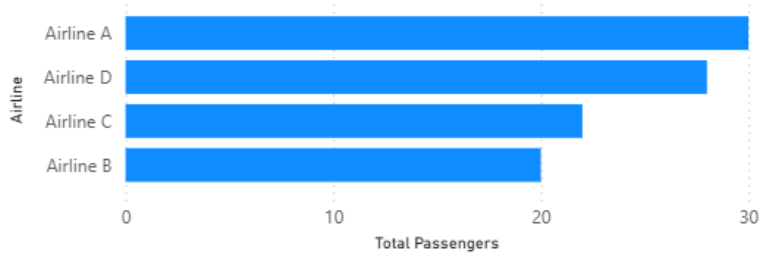
Cancelled Ticket

Ticket Count by Airline



Ticket Count

Total Passengers by Airline



Total Passengers

○ **Airline-specific pages:** Created a Airline Details Page and Performed a Drill-Through option to this Page from Main Page for Each Flight.



48

Flight Count

0.31

On-time Rate %

30

Total Passengers

4

Pending Tickets

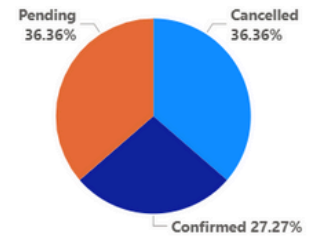
4

Cancelled Tickets

3

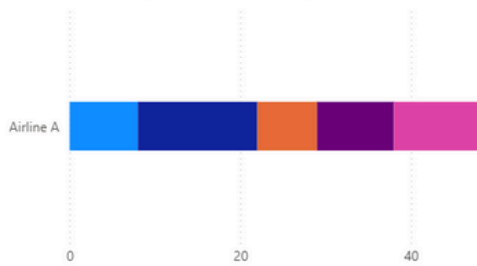
Booked Tickets

Ticket Booking Status



Airline by Destination

Destination Chicago Houston Los Angeles New York Phoenix



Airline A drill-through



41

Flight Count

0.54

On-time Rate %

20

Total Passengers

3

Pending Tickets

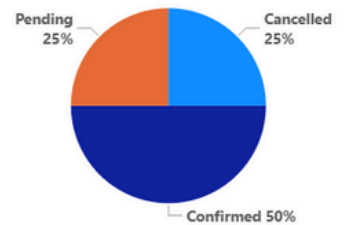
3

Cancelled Tickets

6

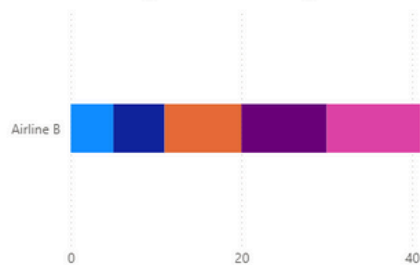
Booked Tickets

Ticket Booking Status



Airline by Destination

Destination Chicago Houston Los Angeles New York Phoenix



Airline B drill-through



49

Flight Count

0.39

On-time Rate %

22

Total Passengers

3

Pending Tickets

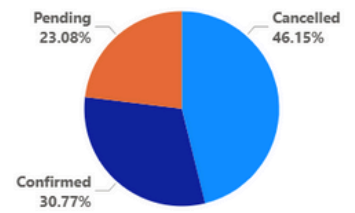
6

Cancelled Tickets

4

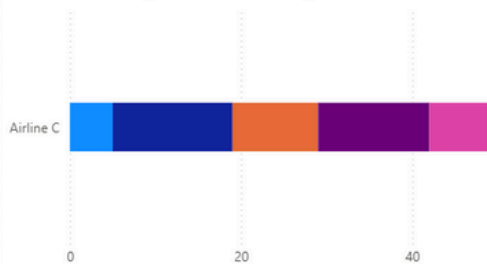
Booked Tickets

Ticket Booking Status



Airline by Destination

Destination Chicago Houston Los Angeles New York Phoenix



Airline C drill-through



62

Flight Count

0.42

On-time Rate %

28

Total Passengers

4

Pending Tickets

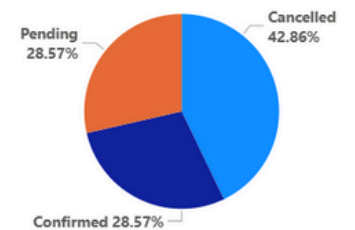
6

Cancelled Tickets

4

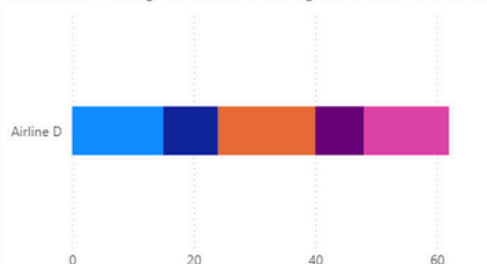
Booked Tickets

Ticket Booking Status



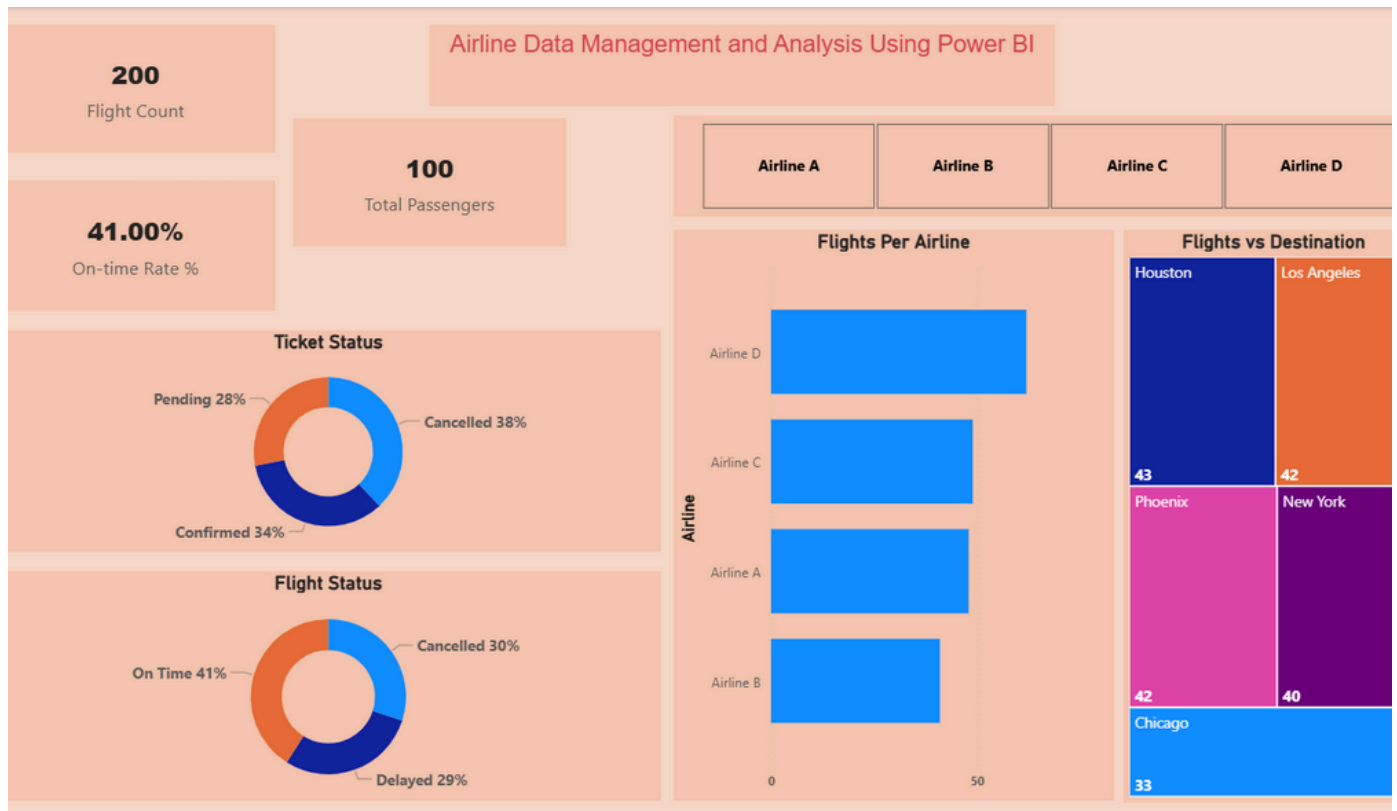
Airline by Destination

Destination Chicago Houston Los Angeles New York Phoenix



Airline D drill-through

6. Final Dashboard and Power BI Service



Main Dashboard

Insights:

Airline Operations Insights

- **Total Flights:** 200 flights were operated in the dataset.
- **Passenger Volume:** Only 100 passengers recorded, suggesting small-scale or filtered dataset.

Ticket Status Insights

- **Cancelled Tickets:** 38% (highest share) → cancellation rate is a concern.
- **Confirmed Tickets:** 34% → slightly lower than cancellations.
- **Pending Tickets:** 28% → nearly 1/3rd of bookings still undecided.

Action Point: High cancellation and pending rates may indicate customer dissatisfaction or booking issues.

Flight Status Insights

- **On-Time Performance:** Only 41% flights were on-time.
- **Cancelled Flights:** 30% → a major operational issue.
- **Delayed Flights:** 29% → nearly 1 in 3 flights are delayed.

Action Point: Reliability is a key concern—over 59% flights are either delayed or cancelled.

Airline-Wise Performance

- Airline D operated the highest number of flights.
- Airline B operated the lowest number of flights.

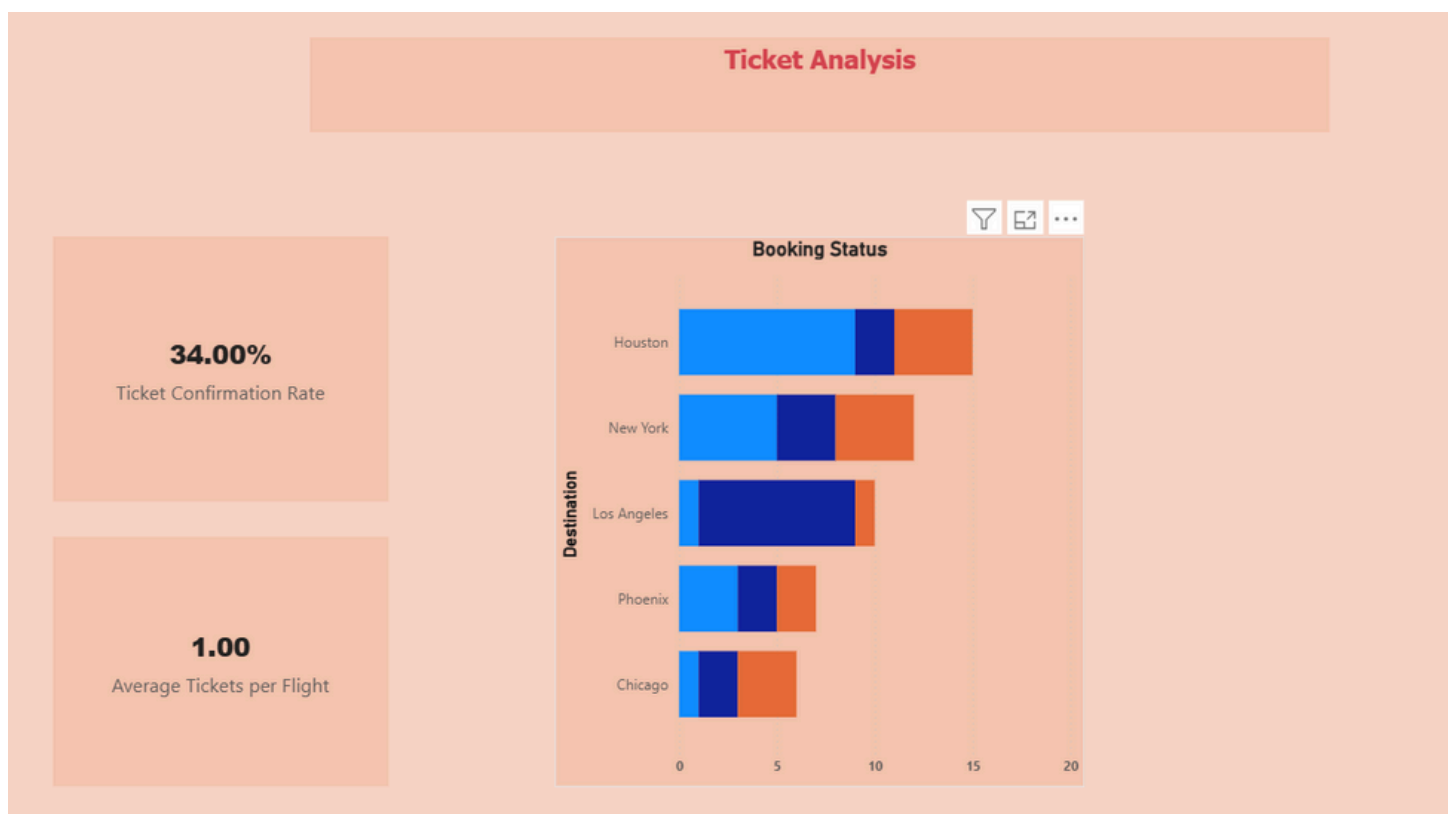
Action Point: Airline D dominates the operations, while Airline B may need support to improve competitiveness.

Destination Insights

- Top Destinations: Houston (43), Los Angeles (42), Phoenix (42).
- Lowest Destination: Chicago (33).
- Observation: Demand is highest for Houston and West Coast (Los Angeles, Phoenix).

Action Point: Airlines can allocate more flights to high-demand cities and optimize under-served routes like Chicago.

Note: The above dashboard is the overall summary dashboard.



Ticket Analysis

Insights:

Ticket Analysis Insights

- Low Ticket Confirmation Rate: Only 34% of tickets are confirmed, meaning 66% are either cancelled or pending → strong sign of customer dissatisfaction or booking inefficiency.

- **Very Low Passenger Load:** On average, there is just 1 ticket per flight, indicating under-utilization of flights.

Destination-Wise Booking Status

- Houston has the highest total bookings, but a large portion is still unconfirmed/cancelled.
- New York also shows high booking activity, but cancellations are relatively higher.
- Los Angeles has fewer bookings compared to Houston/New York, but still shows a healthy split of statuses.
- Phoenix and Chicago have the lowest bookings, highlighting weaker demand on these routes.



Destination Insights

Insights:

Flights per Destination

- Houston (43), Los Angeles (42), and Phoenix (42) received the highest flight allocations.
- New York (40) is close behind.
- Chicago (33) has the lowest number of flights assigned.

Observation: Flight allocation is fairly balanced across major destinations, but Chicago is under-served compared to others.

Cancelled Tickets by Destination

- Houston has the highest ticket cancellations (~10), even though it has the most flights.
- New York follows with significant cancellations (~5).
- Phoenix, Chicago, and Los Angeles have relatively fewer cancellations.

Observation: Popular destinations (Houston, New York) face higher cancellation rates, possibly due to overbooking, operational issues, or demand volatility.

Total Passengers by Destination

- Phoenix leads with 30 passengers despite not having the highest number of flights.
- Chicago (20) and Houston (21) show moderate passenger volumes.
- New York (18) lags behind despite being a major hub.
- Los Angeles (11) has the lowest passenger count.

Observation: Phoenix is performing strongly in terms of passenger demand relative to its flight allocation, while Los Angeles and New York are underperforming.

Configure Row-Level Security (RLS) for Airline A data and assign it to a user.

Manage security roles

Create new security roles and use filters to define row-level data restrictions.

Successfully applied role changes.

Roles

+ New

AirlineA_Role

Select tables

Category Sele...

flight_informat...

Metric Selector

passenger_inf...

ticket_informat...

Filter data

Switch to default editor

1 [Airline] = "Airline A"

Filter the data that this role can see by entering a DAX filter expression that returns a True/False value. For example: [Entity ID] = "Value"

Save

Close

Created a Role named "AirlineA_Role" and given access only to Airline A Details

Row-Level Security

AirlineA_Role (1)

Members (1)

People or groups who belong to this role

Enter email addresses

Add

abhi shek ×

Save

Cancel

Given Access to abhishek user

I am not able to schedule Refresh Rate because i am using free version Power Bi. Therefore not able to schedule Refresh Rate in free version.