

# Project 3

## Power BI

### Airline Data Management and Analysis Using Power BI

Video Link :

<https://www.loom.com/share/f2f966e8dee44bec9ad5cdf08ff9ff91?sid=bfff c19e-9ccb-4715-aeb7-e483521834da>

**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

- Extract and transform data in Power Query.
- Clean data: remove duplicates, handle missing values, and format columns.

In Power Query, I removed duplicate rows from the Passenger\_Information table, Flight\_Information table and Ticket\_Information Table, removed null values in the SeatNumber column. This ensured data consistency for analysis.

FlightID	FlightNumber	Airline	Destination	Status
31	1031 FL1276	Airline B	New York	On Time
32	1032 FL1160	Airline C	Houston	Delayed
33	1033 FL1459	Airline D	New York	On Time
34	1034 FL1313	Airline B	Phoenix	On Time
35	1035 FL1021	Airline C	Houston	Cancelled
36	1036 FL1252	Airline D	Phoenix	On Time
37	1037 FL1747	Airline A	Chicago	Cancelled
38	1038 FL1856	Airline C	Houston	Delayed
39	1039 FL1560	Airline B	Chicago	On Time
40	1040 FL1474	Airline A	New York	Cancelled
41	1041 FL1058	Airline A	New York	Cancelled
42	1042 FL1510	Airline A	Houston	Delayed
43	1043 FL1681	Airline C	Houston	On Time
44	1044 FL1475	Airline B	Phoenix	On Time
45	1045 FL1699	Airline A	Phoenix	Cancelled
46	1046 FL1995	Airline D	Chicago	On Time
47	1047 FL1782	Airline A	Houston	Cancelled
48	1048 FL1189	Airline A	New York	On Time
49	1049 FL1957	Airline C	Phoenix	Cancelled
50	1050 FL1686	Airline C	Phoenix	On Time
51	1052 FL1562	Airline D	Phoenix	On Time
52	1053 FL1875	Airline C	Chicago	On Time
53	1054 FL1566	Airline A	Houston	Delayed
54	1055 FL1243	Airline B	New York	On Time
55	1056 FL1831	Airline A	Houston	Delayed
56	1057 FL1504	Airline A	Phoenix	On Time
57	1058 FL1494	Airline B	New York	Cancelled

Untitled - Power Query Editor

Home Transform Add Column View Tools Help

Close & Apply New Source Recent Sources Enter Data Data source settings Data Sources Manage Parameters Choose Columns Remove Columns Keep Rows Remove Rows Sort Split Column Group By Data Type: Text Use First Row as Headers Replace Values Merge Queries Append Queries Combine Files Combine

Queries [3]

Table.SelectRows(\*"Replaced Value", each ([Flight\_Information.FlightNumber] <> " "))

Flight\_Information Ticket\_Information Passenger\_Information

	PassengerID	FlightID	SeatNumber	Flight_Information.FlightNumber
1	54	1001	20A	FL1102
2	44	1003	47C	FL1860
3	4	1040	17E	FL1975
4	5	1035	29D	FL1021
5	17	1005	25C	FL1106
6	39	1006	15B	FL1071
7	10	1047	2E	FL1782
8	13	1010	47A	FL1121
9	24	1011	22E	FL1466
10	74	1012	20D	FL1214
11	24	1056	23C	FL1831
12	15	1030	18D	FL1955
13	19	1033	27E	FL1459
14	21	1065	19E	FL1273
15	26	1026	5A	FL1413
16	27	1063	12B	FL1840
17	30	1027	45C	FL1805
18	29	1059	49B	FL1484
19	61	1032	44C	FL1160
20	62	1034	42A	FL1313
21	38	1055	35E	FL1243
22	91	1038	10E	FL1856
23	66	1039	33E	FL1560
24	47	1053	38C	FL1875
25	73	1050	36B	FL1686
26	100	1052	5D	FL1562

4 COLUMNS, 65 ROWS Column profiling based on top 1000 rows

PREVIEW DOWNLOADED AT 23:17

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Search

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Query Settings

PROPERTIES

Name

Passenger\_Information

APPLIED STEPS

Source

Use First Row as Headers

Change Type

Filtered Rows

Removed Duplicates

Filtered Rows1

Removed Duplicates1

Merged Queries

Expanded Flight\_Information

Replaced Value

Filtered Rows2

Untitled - Power Query Editor

Home Transform Add Column View Tools Help

Close & Apply New Source Recent Sources Enter Data Data source settings Data Sources Manage Parameters Choose Columns Remove Columns Keep Rows Remove Rows Sort Split Column Group By Data Type: Whole Number Merge Queries Append Queries Combine Files Combine

Queries [3]

Table.SelectRows(\*"Expanded Flight\_Information", each ([Flight\_Information.FlightNumber] <> null))

Flight\_Information Ticket\_Information Passenger\_Information

	TicketID	FlightID	BookingStatus	Flight_Information.FlightNumber
1	5009	1001	Cancelled	FL1102
2	5024	1005	Confirmed	FL1106
3	5008	1035	Cancelled	FL1021
4	5010	1040	Cancelled	FL1474
5	5017	1011	Cancelled	FL1466
6	5019	1014	Confirmed	FL1458
7	5021	1030	Confirmed	FL1955
8	5043	1023	Confirmed	FL1749
9	5012	1042	Confirmed	FL1510
10	5017	1039	Pending	FL1560
11	5040	1032	Cancelled	FL1160
12	5013	1040	Cancelled	FL1818
13	5046	1063	Cancelled	FL1840
14	5011	1064	Pending	FL1166
15	5018	1072	Pending	FL1345
16	5007	1070	Pending	FL1091
17	5025	1063	Cancelled	FL1942
18	5015	1053	Confirmed	FL1565
19	5044	1097	Confirmed	FL1476
20	5018	1105	Cancelled	FL1995
21	5003	1117	Cancelled	FL1719
22	5004	1120	Cancelled	FL1878
23	5026	1123	Cancelled	FL1921
24	5042	1125	Cancelled	FL1763
25	5030	1132	Pending	FL1812
26	5047	1143	Confirmed	FL1498

4 COLUMNS, 36 ROWS Column profiling based on top 1000 rows

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Search

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Query Settings

PROPERTIES

Name

Ticket\_Information

APPLIED STEPS

Source

Use First Row as Headers

Change Type

Removed Duplicates

Removed Duplicates1

Merged Queries

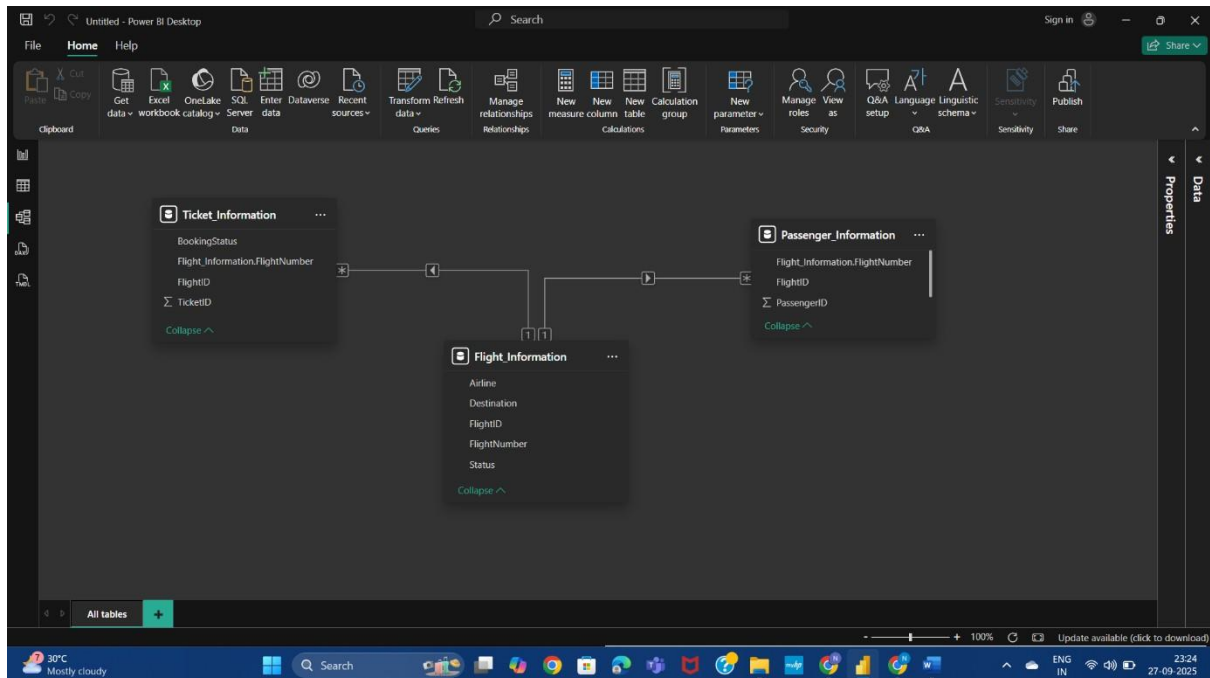
Expanded Flight\_Information

Filtered Rows

## 2. Data Modeling

- Create relationships between datasets (FlightID as the key).
- Understand cardinality and configure the model appropriately

I created relationships using FlightID as the primary key between the three datasets. The model has a **one-to-many relationship** between Flight\_Information (one) and both Passenger\_Information (many) and Ticket\_Information (many). This allows filtering of passenger and ticket data based on flight details.



### 3. Enhanced Data Insights

- Add a conditional column to classify flights as "Best" or "To Be Improved" based on status.
- Use "Column from Examples" to extract the flight number from FlightNumber.

I added a conditional column that classifies flights as **'Best'** if the status was 'On Time' or 'Completed,' and **'To Be Improved'** if the status was 'Delayed' or 'Cancelled.'

Using the 'Column from Examples' feature, I extracted the numeric part of the Flight Number (e.g., AI-203 → 203), which helps in creating cleaner visuals.

The screenshot shows the Microsoft Power Query Editor interface. The main data table has the following columns: FlightID, FlightNumber, New Flight Number, Airline, Destination, Status, and Outcome. The data is as follows:

FlightID	FlightNumber	New Flight Number	Airline	Destination	Status	Outcome
1	1001 FL1302	1302	Airline D	Houston	On Time	Best
2	1002 FL1435	1435	Airline B	Chicago	On Time	Best
3	1003 FL1860	1860	Airline A	New York	Cancelled	To Be Improved
4	1004 FL1270	1270	Airline C	Chicago	Delayed	To Be Improved
5	1005 FL1106	1106	Airline C	New York	Delayed	To Be Improved
6	1006 FL1071	1071	Airline A	Phoenix	On Time	Best
7	1007 FL1700	1700	Airline C	Los Angeles	Cancelled	To Be Improved
8	1008 FL1020	1020	Airline C	Los Angeles	Delayed	To Be Improved
9	1009 FL1614	1614	Airline A	Los Angeles	Cancelled	To Be Improved
10	1010 FL1121	1121	Airline D	Chicago	Cancelled	To Be Improved
11	1011 FL1466	1466	Airline A	Phoenix	On Time	Best
12	1012 FL1214	1214	Airline D	New York	Delayed	To Be Improved
13	1013 FL1330	1330	Airline C	Houston	On Time	Best
14	1014 FL1458	1458	Airline C	New York	Delayed	To Be Improved
15	1015 FL1087	1087	Airline C	Houston	Delayed	To Be Improved
16	1016 FL1372	1372	Airline B	New York	Delayed	To Be Improved
17	1017 FL1099	1099	Airline D	Phoenix	Delayed	To Be Improved
18	1018 FL1871	1871	Airline B	Houston	Delayed	To Be Improved
19	1019 FL1663	1663	Airline B	Chicago	Cancelled	To Be Improved
20	1020 FL1130	1130	Airline A	New York	On Time	Best
21	1021 FL1661	1661	Airline B	New York	Cancelled	To Be Improved
22	1022 FL1308	1308	Airline A	Houston	Delayed	To Be Improved
23	1023 FL1789	1789	Airline A	Chicago	On Time	Best
24	1024 FL1343	1343	Airline B	Chicago	Delayed	To Be Improved
25	1025 FL1491	1491	Airline D	Phoenix	On Time	Best
26	1026 FL1413	1413	Airline D	Chicago	Cancelled	To Be Improved

The right-hand pane shows the 'Query Settings' for 'Flight Information'. The 'APPLIED STEPS' list includes: Source, Use First Row as Headers, Change Type, Filtered Rows, Removed Duplicates, Filtered Rows1, Added Conditional Column, Inserted Text After Delimiter, Reordered Columns, and Renamed Columns.

### 4. Calculations Using DAX

- Calculate:
  - Total passengers for a specific flight.
  - Total tickets booked.
  - Filtered table showing "Best" flights only.

The screenshot shows the Microsoft Power BI Desktop interface. The main window displays a DAX query in the query editor. The query is as follows:

```

1 // Welcome to DAX query view! Learn more about DAX queries at https://aka.ms/dax-queries.
2 // Right-click on tables, columns, or measures in the data pane to access quick queries, or ask Copilot for help writing DAX.
3
4 //Total passengers for a specific flight.//
5 EVALUATE
6 SUMMARIZE(Flight_Information, Flight_Information[Airline], "Total Passengers", COUNT(Passenger_Information[PassengerID]))
7
8
9
10
11
12

```

Below the query editor, the 'Results' pane shows the output of the query. It displays a table with 2 columns and 4 rows:

	Flight_Information[Airline]	Total Passengers
1	Airline D	22
2	Airline B	11
3	Airline A	17
4	Airline C	15

The 'Data' pane on the right shows the model structure, including tables like Flight\_Information, Passenger\_Information, and Ticket\_Information, and their relationships.

Untitled - Power BI Desktop

File Home Help

Clipboard: Paste, Cut, Copy, Format, Comment, Uncomment, Find, Replace, Command palette, Copilot (preview), Copilot

Editing

Run: Update model with changes (0)

Share feedback

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

```
// Total tickets booked.//  
EVALUATE  
ROW("Total Tickets Booked", COUNT(Ticket_Information[TicketID]))
```

Results: Result 1 of 1

[Total Tickets Booked]
36

Query 1

Success (28.7 ms) Query 1 of 1 Result 1 of 1 1 column, 1 row

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File Home Help

Clipboard: Paste, Cut, Copy, Format, Comment, Uncomment, Find, Replace, Command palette, Copilot (preview), Copilot

Editing

Run: Update model with changes (0)

Share feedback

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

```
//Filtered table showing "Best" flights only.//  
EVALUATE  
FILTER(SUMMARIZE(Flight_Information,Flight_Information[FlightID], Flight_Information[Airline],Flight_Information[Destination],Flight_Information  
[FlightNumber],Flight_Information[Outcome]  
),Flight_Information[Outcome]="Best")
```

Results: Result 1 of 1

Flight_Information[FlightID]	Flight_Information[Airline]	Flight_Information[Destination]	Flight_Information[FlightNumber]	Flight_Information[Outcome]
1001	Airline D	Houston	FL1102	Best
1002	Airline B	Chicago	FL1435	Best
1006	Airline A	Phoenix	FL1071	Best
1011	Airline A	Phoenix	FL1466	Best
1013	Airline C	Houston	FL1330	Best
1020	Airline A	New York	FL1130	Best
1023	Airline A	Chicago	FL1769	Best
1025	Airline D	Phoenix	FL1491	Best
1027	Airline D	Chicago	FL1805	Best

Query 1

Success (25.6 ms) Query 1 of 1 Result 1 of 1 5 columns, 78 rows

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Data: Tables, Model

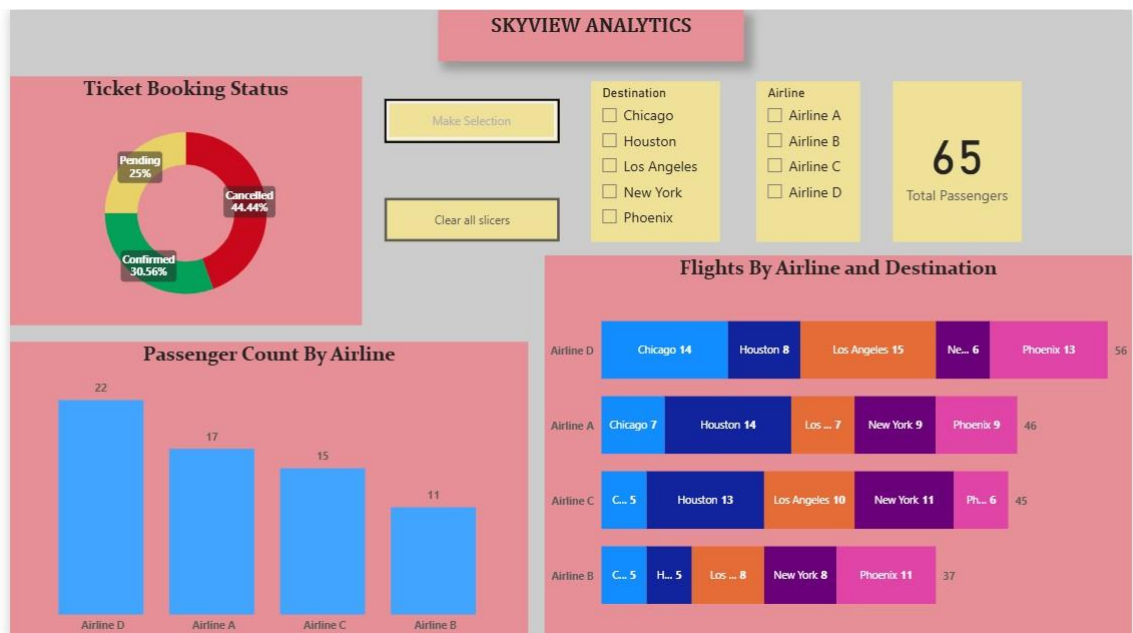
Search

- Flight\_Information
  - Airline
  - Destination
  - FlightID
  - FlightNumber
  - New Flight Number
  - Outcome
  - Status
- Passenger\_Information
  - Flight\_Information.FlightNumber
  - FlightID
  - PassengerID
  - SeatNumber
- Ticket\_Information
  - BookingStatus
  - Flight\_Information.FlightNumber
  - FlightID
  - Outcome for Booking Status
  - TicketID

## 5. Visualization and Interactive Features

- Create visuals for: ○ Passenger count by airline. ○ Ticket booking statuses. ○ Flights by airline and destination.
  - Add interactive features for: ○ Destination and Airline. ○ Quick views. ○ Airline-specific pages.
- The visuals highlight key insights:

- **Passenger Count by Airline:** Airline D carried the highest number of passengers, followed by Airline A.
- **Ticket Booking Status:** Around 30.56% of tickets were confirmed, while 44.44% were cancelled.
- **Flights by Destination:** Houston and Los Angeles were the top destinations served. I added slicers for Airline and Destination, as well as quick views to switch between airlinespecific dashboards.





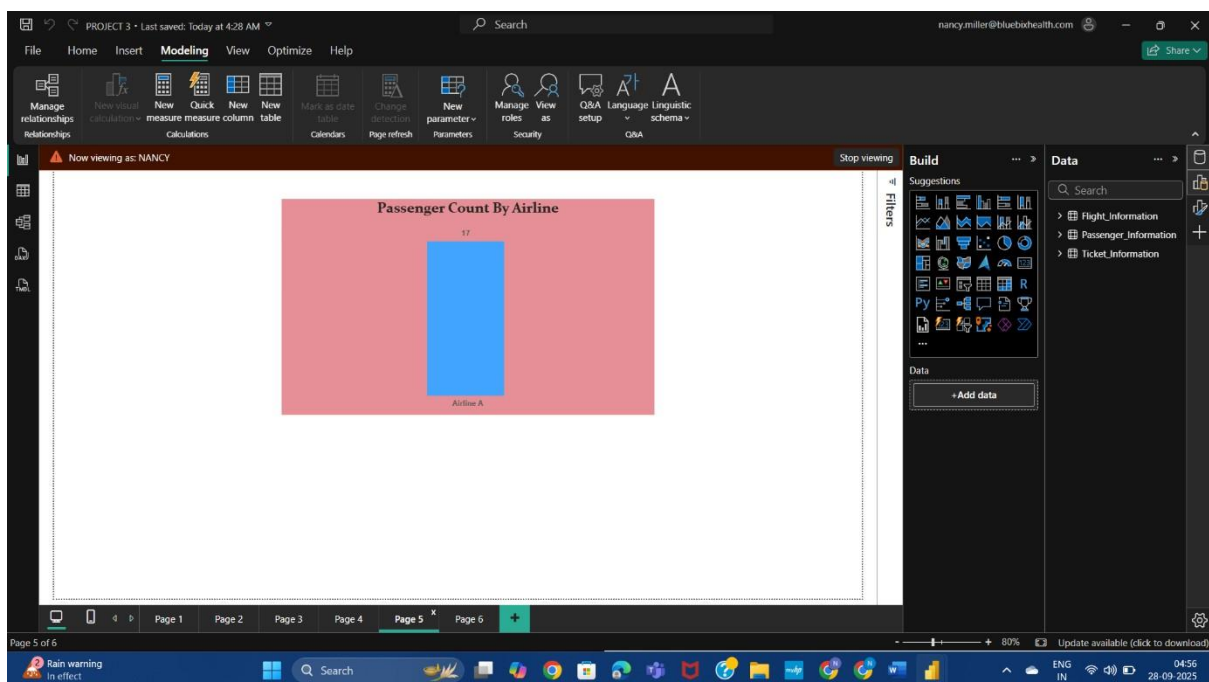
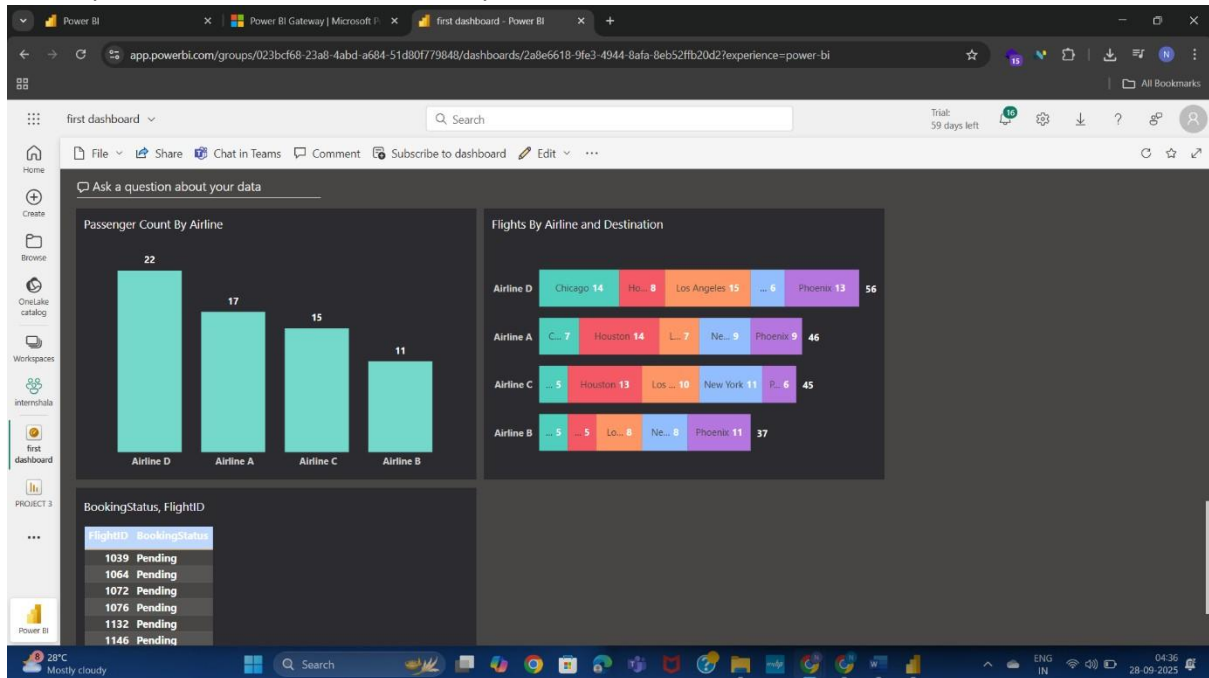
Airline	Destination	Count of PassengerID
Airline A	Chicago	3
Airline A	Houston	4
Airline A	Los Angeles	1
Airline A	New York	3
Airline A	Phoenix	6
Total		17

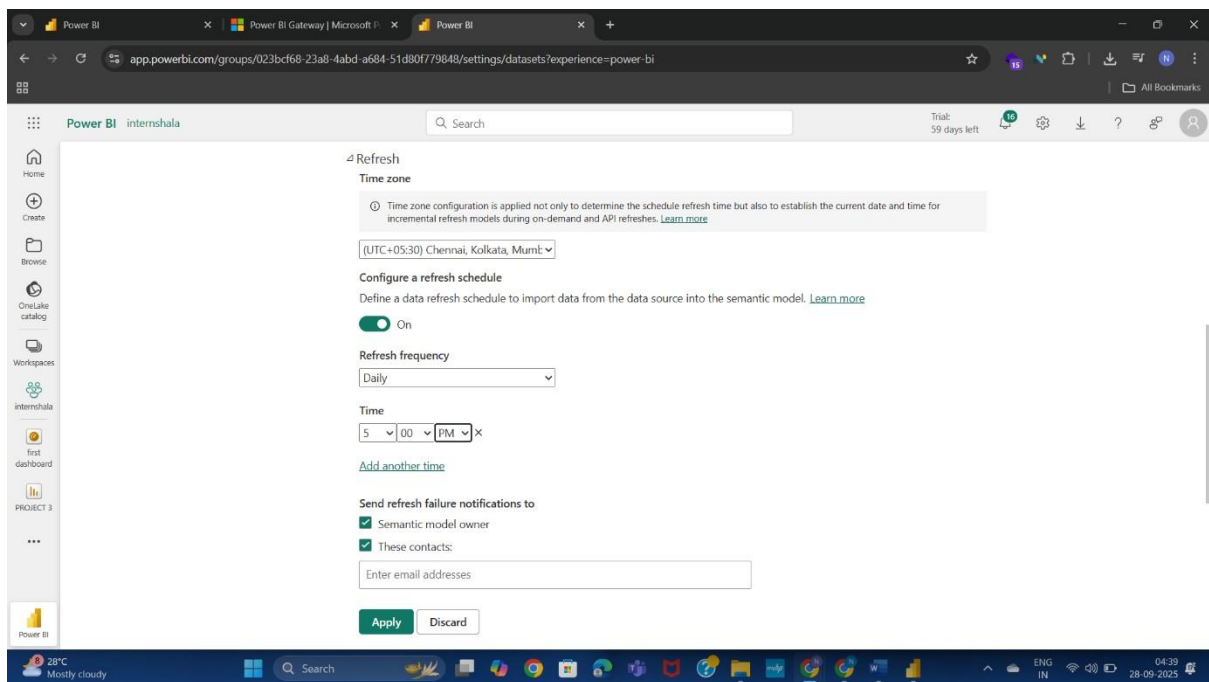
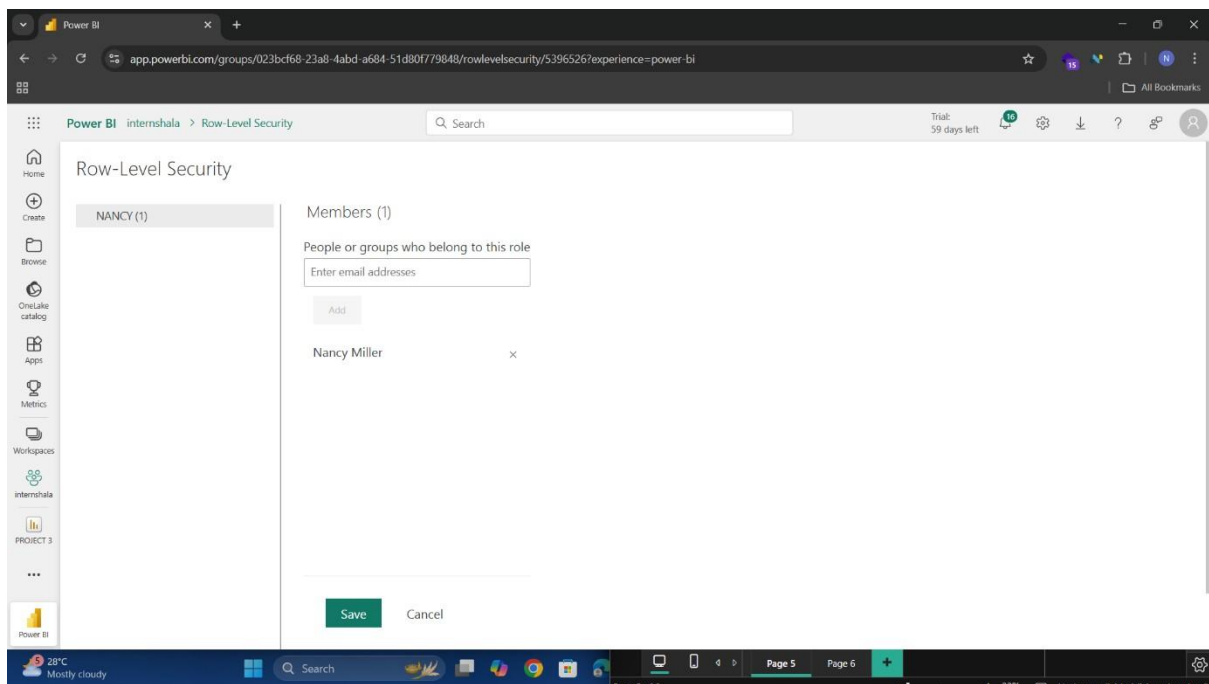


FlightID	BookingStatus
1039	Pending
1064	Pending
1072	Pending
1076	Pending
1132	Pending
1146	Pending
1154	Pending
1162	Pending
1178	Pending

## 6. Final Dashboard and Power BI Service

- Design a comprehensive dashboard with key visuals and insights.
- Configure Row-Level Security (RLS) for Airline A data and assign it to a user.
- Set up a schedule refresh at 5 PM daily.





I configured **Row-Level Security** for Airline A so that users assigned to that role can only view Airline A's data.

A **scheduled refresh at 5 PM daily** was set up in Power BI Service to keep the dashboard updated.