PROJECT: AIRLINES DATA ANALYSIS IN MS POWER BI

- ANALYZING FLIGHT PERFORMANCE AND OPERATIONS

Presented by Peter Tinashe Mundowa

PROJECT OVERVIEW

- Objective: Analyze airline performance, identify trends, and uncover insights related to flight operations.
- Data Source: Airline operational dataset with columns for Origin, Destination, Distance, Elapsed Time, Delay, Reroute, Cancelled, Op_Carrier, Taxi_In, Taxi_Out, Wheel_On, Wheel_Off.
- Tools: Power BI for Data Visualization and Analysis

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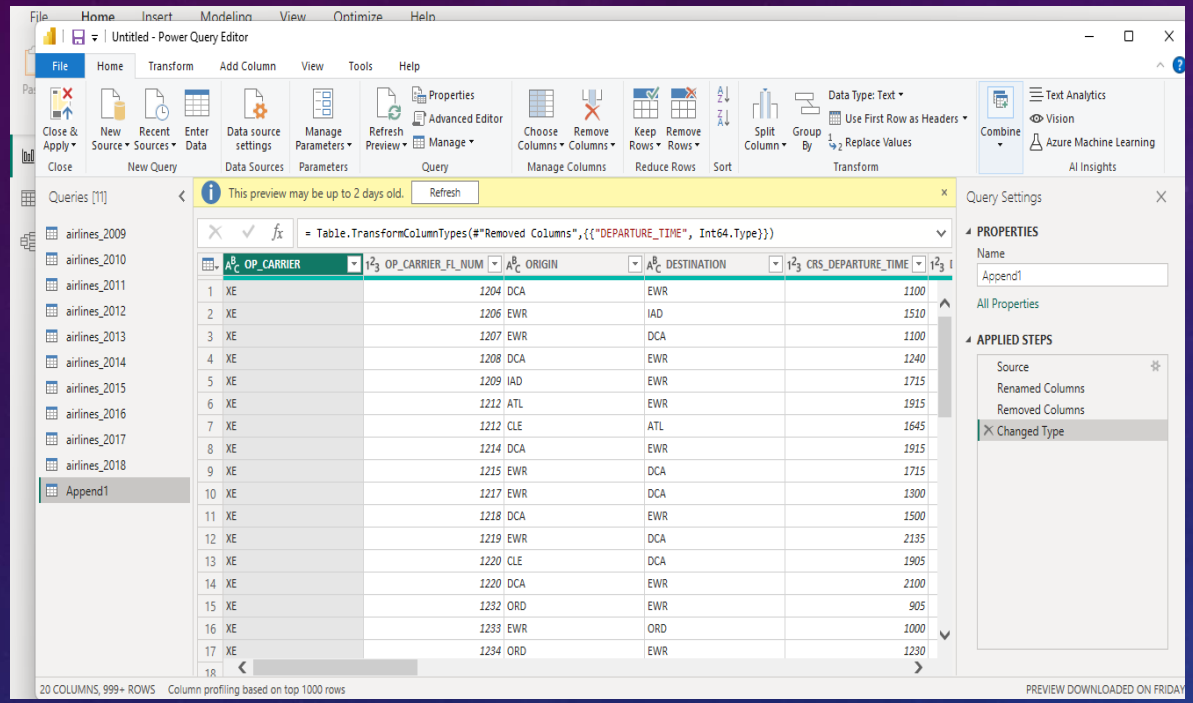
DATA PREPARATION AND TRANSFORMATION



- I checked for missing values and anomalies in the data.
- I deleted some other unnecessary columns in the data.
- Checked all columns and ensured they’re all in correct data types.
- Aggregated data by Career, Airport(either Origin or Destination).
- Joined the datasets for each year from 2009 to 2018 into one dataset called ‘Append1’ using Query Editor.

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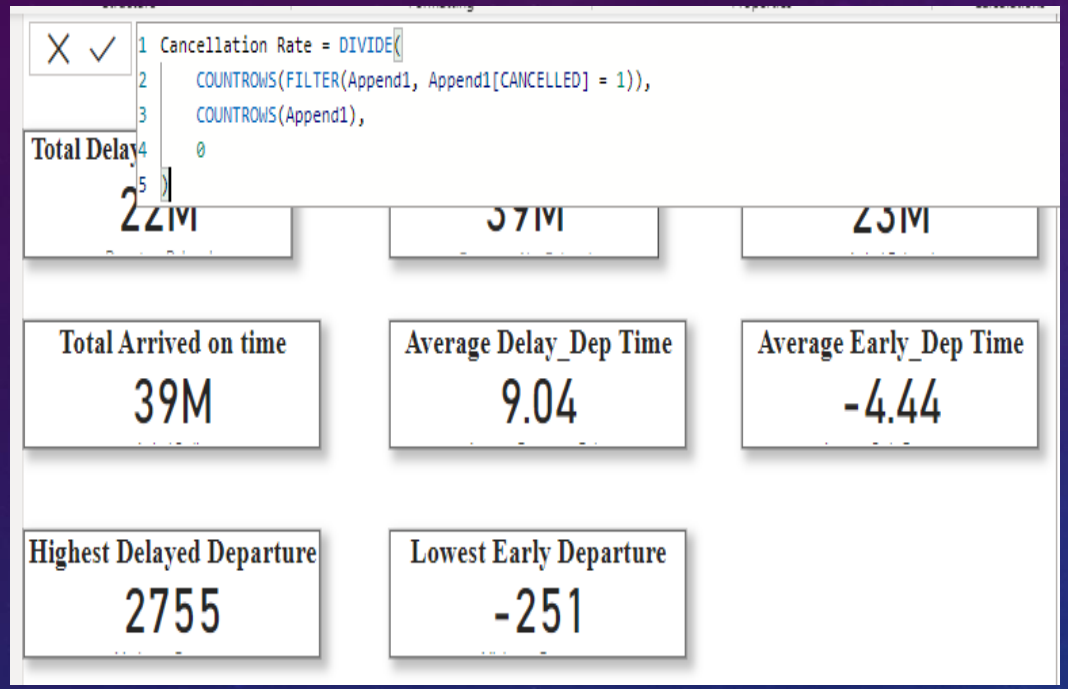
KEY METRICS AND MEASURES CALCULATED



- Calculated many, different measures to assist with insights into the dataset using DAX formulas.
- Measures include Average Delay Time, Total Delayed Flights, Cancellation Rate, Total Cancelled Flights etc.

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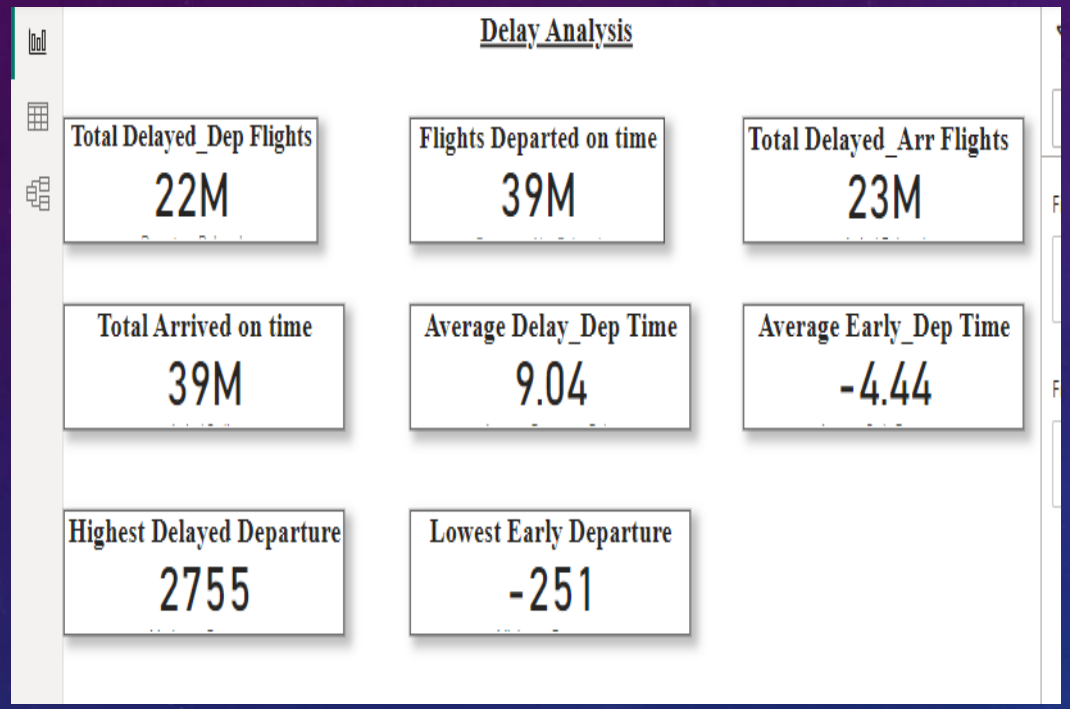
KEY METRICS AND MEASURES



- Chose cards to display Key delay metrics.
- From the picture, total flights that were delayed of all 61M flights were 22M. On average, those 22M delayed their departure time by 9.04 minutes. This indicates that there's need to improve time management so that flights depart at their stipulated time.
- The highest delay time was 2755 minutes which is almost 2 days. Since the figure is too high, it means it was a flight cancelled to depart on stipulated date and departed later after 2 days.

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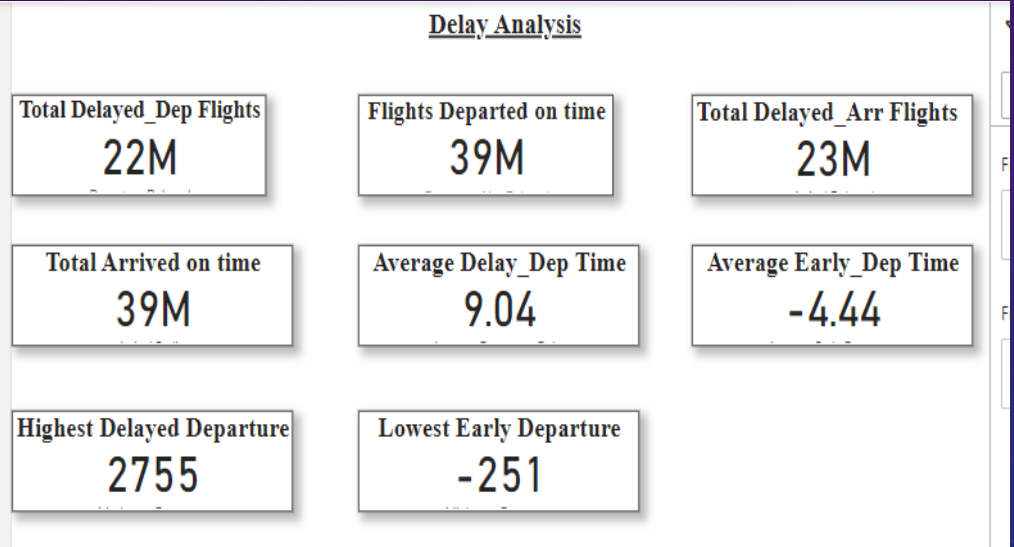
KEY METRICS AND MEASURES CONT…



- Total flights that departed earlier or on time were 39M out of 61M flights.
- Also, flights that arrived in time or earlier to their destination were 39M indicating that fights flights that depart in stipulated time have very high chance that they will arrive in stipulated arrival time.
- On average, flights that departed earlier were early by 4.44 minutes.
- The earliest departure was by 251 minutes.
- Total flights with delayed arrivals were 23M, compared to 22M delayed departures, indicating that there ‘s higher chance that a delayed to depart flight is most likely to be arrive late than expected time.

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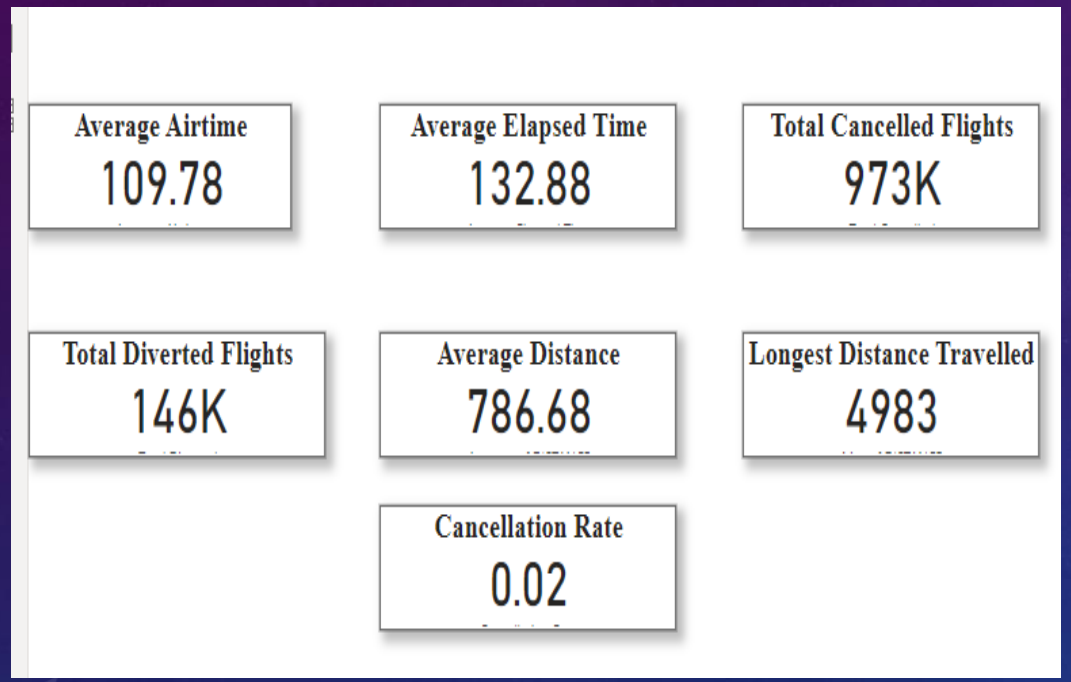
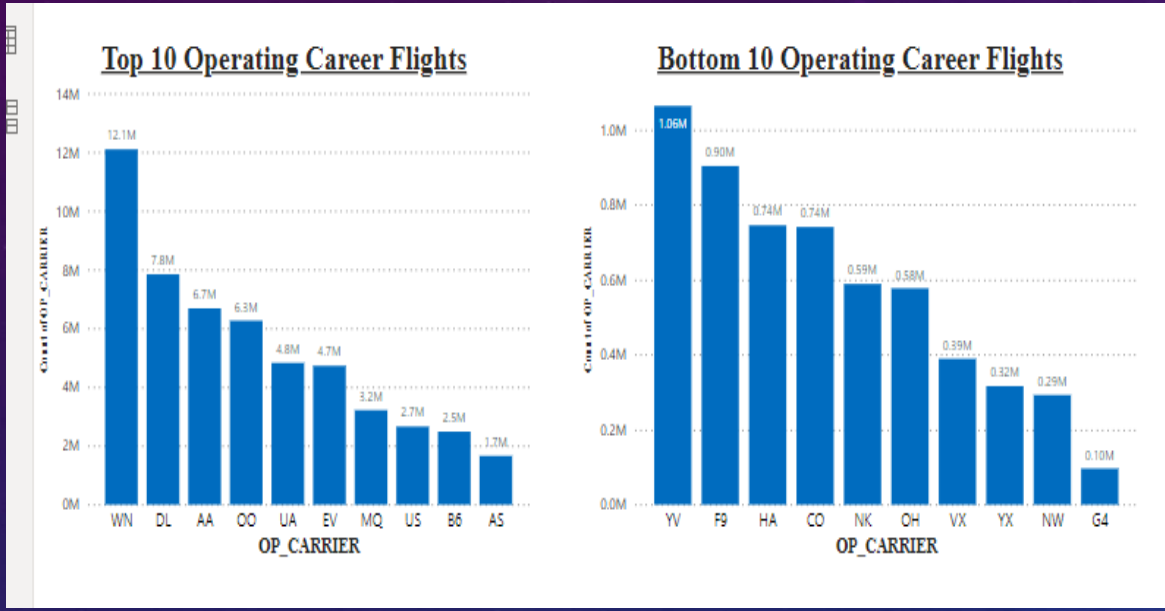
KEY METRICS AND MEASURES CONT…



- The total average airtime was 109.78 minutes, with elapsed average time being 132.88 minutes.
- Total cancelled flights were 973K out of 61M, giving a cancellation rate of 0.02, indicating that chances are so slim that a flight will be cancelled.
- Total diverted flights were 146k.
- The average distance for the flights was 786.68km with the longest distance being 4983km.

CAREER ANALYSIS



- The career with highest number of flights is WN with 12M, followed by DL with 7.2M going down the bar chart with Top 10 operating career flights.
- On the other hand, the career with the least flights is G4 with 0.10M, followed by NW with 0.29M going up the bar chart with Bottom 10.

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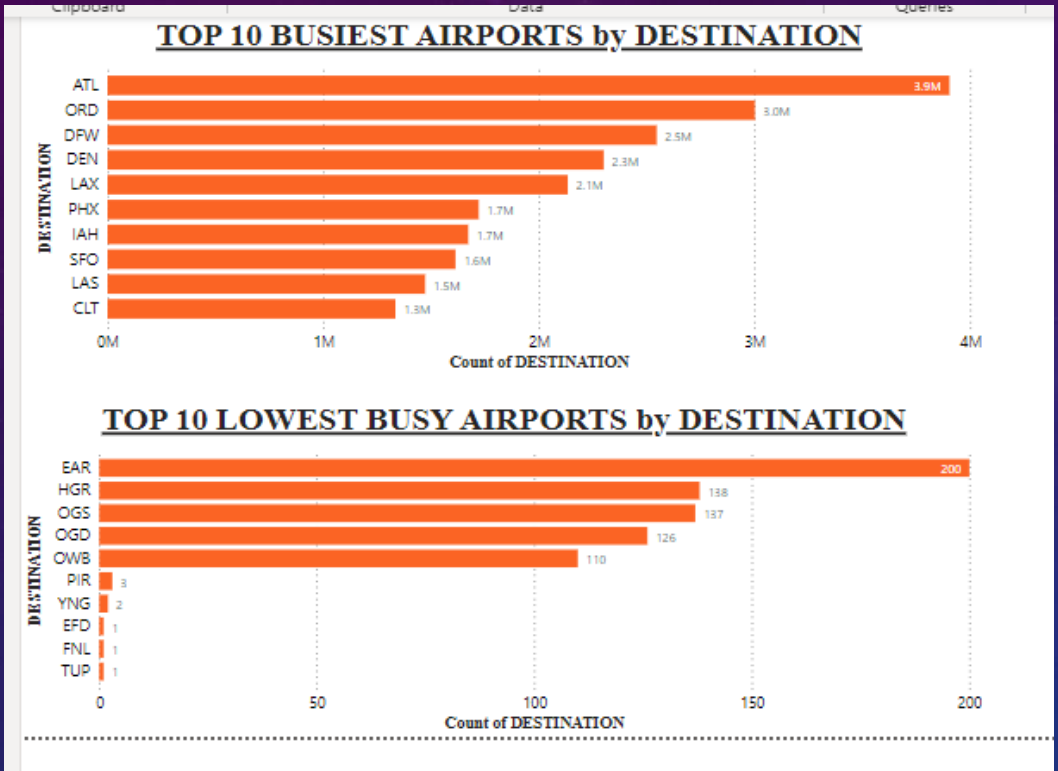
PERFORMANCE OF AIRPORTS BY DESTINATION



- Used bar charts to show the Top 10 destination airports that received highest number of flights as well as Bottom 10.
- From the graph, ATL is the best performing Airport with 3.9M arrived flights, followed by ORD with 3.0M going down below the graph with Top 10 busiest airports.
- On the other hand, the least performing Airport which received the smallest number of flights is TUP with a single incoming flight, followed by FNL and EFD with single incoming flights.

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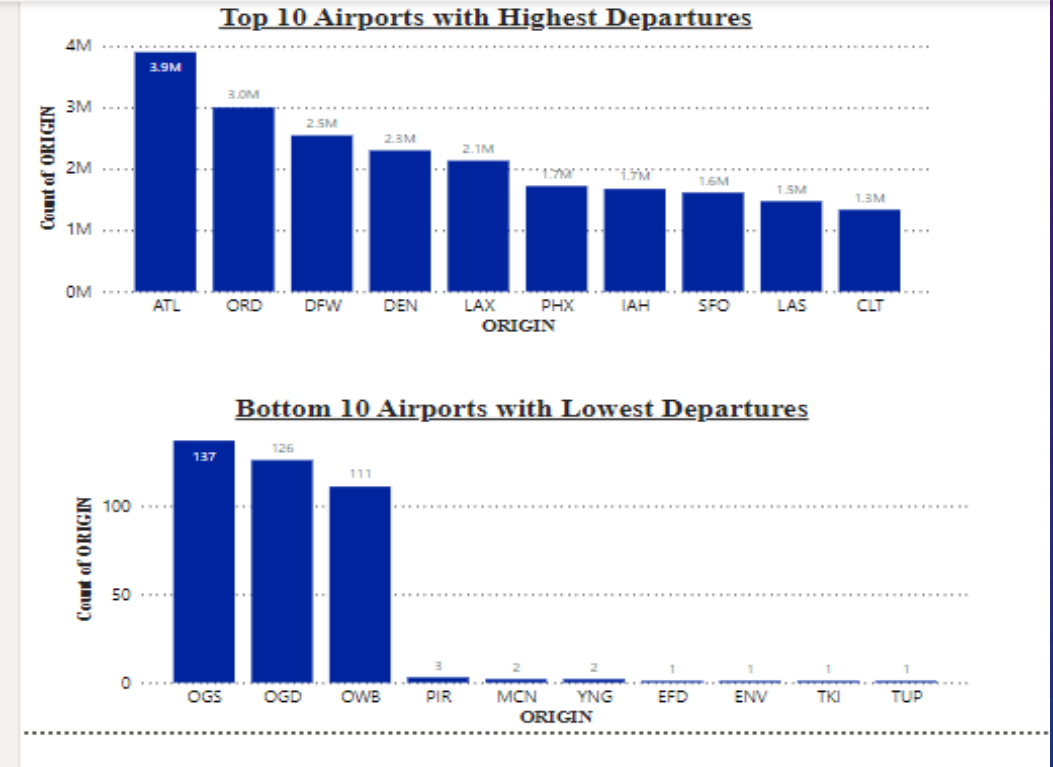
AIRPORT PERFORMANCE BY DEPARTURES



- Bar chart was chosen to show the top and bottom 10 performing airports by number of departures.
- ATL emerged as top performing Airport with highest number of departures as well as arrivals, followed by CRD as well.
- The least performing Airports are TUP, TKI, ENV, EFD all with a single departing flight followed by YNG and MCN with 2 flights that departed.

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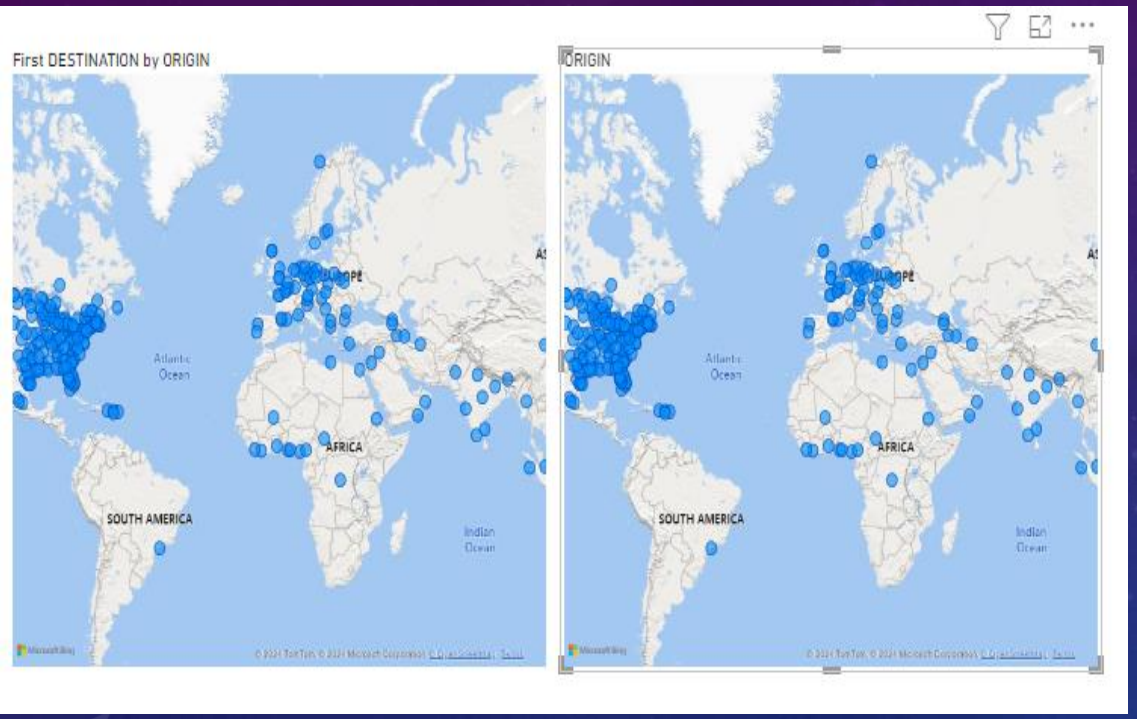
GIS MAP AIRPORT ANALYS



- Map was chosen to visualize locations by Departure and Arrival.
- From the map, Europe and North America has the most active and busy Airports, also indicating the Air is frequently used between US and Europe.

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AIRPORTS ANALYSIS BY DELAYED DEPARTURE

Top 10 Airports with highest Delayed Departure Time

ORIGIN	Average Departure Delay
ENV	157.00
YNG	63.00
TKI	45.00
PIR	37.00
PPG	33.64
MCN	33.50
OWB	27.64
HGR	26.76
OTH	25.70
SCK	24.27
Total	26.30

Top 10 Airports with Lowest Delayed Departure Time

ORIGIN	Average Departure Delay
EAR	-7.58
YAK	-4.94
MWH	-3.99
LBF	-3.28
IYK	-2.81
CDV	-2.71
PIH	-2.11
TUP	-2.00
VEL	-1.94
OXR	-1.92
Total	-3.01

- Table was chosen to display the Top 10 Airports with the highest departure delay time and the bottom 10 with earliest departure time.
- ENV has the highest delay time of 157 minutes, followed by VNG with 63 minutes going down the table.
- On the other hand, EAR has an average of 7.58 minutes of early departures followed by YAK with 4.94 minutes of early departure going down the table.
- This indicates that these airports have a better time management system than other airports with late departures.

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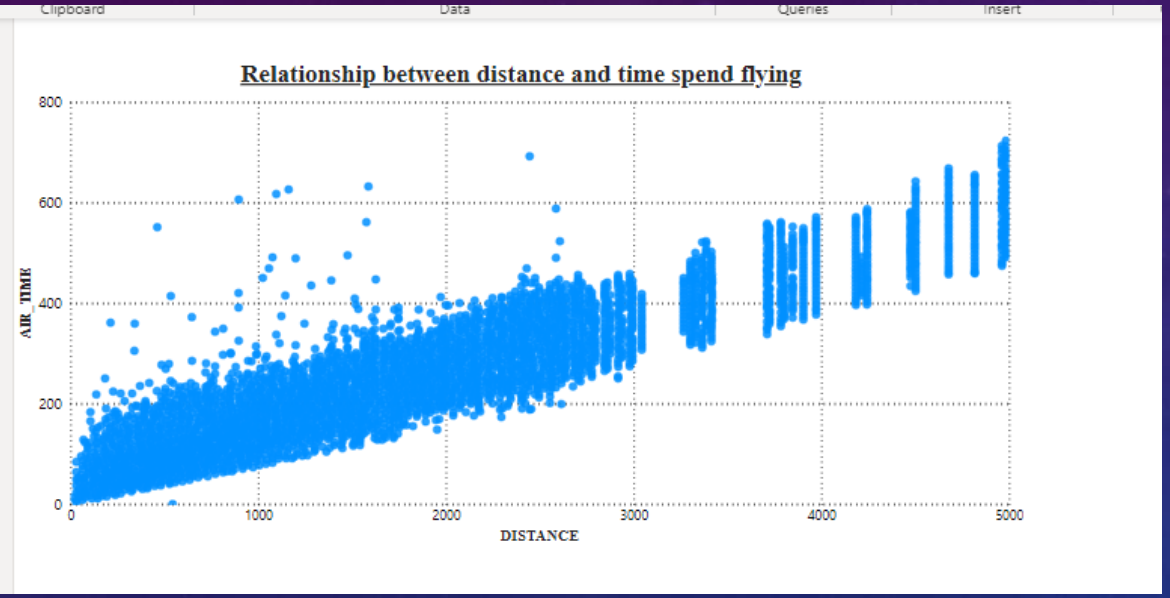
RELATIONSHIP BETWEEN DISTANCE AND AIRTIME



- Used scatterplot to visualize the relationship between distance and time spent in air.
- From the graph, the is a strong positive correlation between distance and airtime, meaning there's higher chance that a flight will take long flying if the distance is long.

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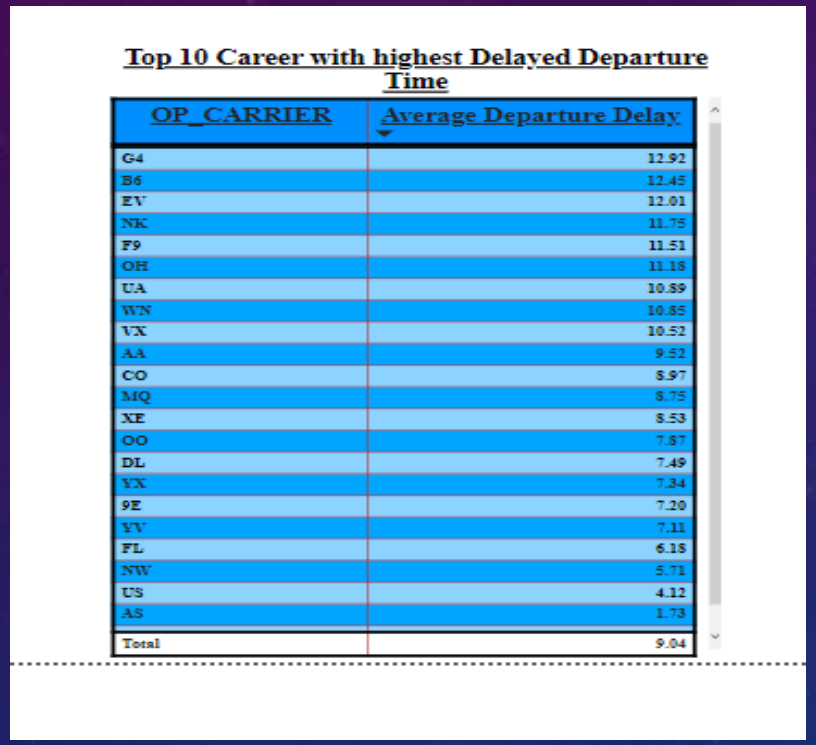
CAREER WITH TOTAL DELAYED TIME



Top 10 Career with highest Delayed Departure Time

OP_CARRIER	Average Departure Delay
G4	12.92
B6	12.45
EV	12.01
NK	11.75
F9	11.51
OH	11.18
UA	10.89
WN	10.85
VX	10.52
AA	9.52
CO	8.97
MQ	8.75
XE	8.53
OO	7.87
DL	7.49
YX	7.34
9E	7.20
YV	7.11
FL	6.18
NW	5.71
US	4.12
AS	1.73
Total	9.04

- Table was used to show the average delay time per each career, sorted in descending order.
- G4 had the highest delay time of 12.92 minutes, followed by B6 with 12.45 minutes going down the table.

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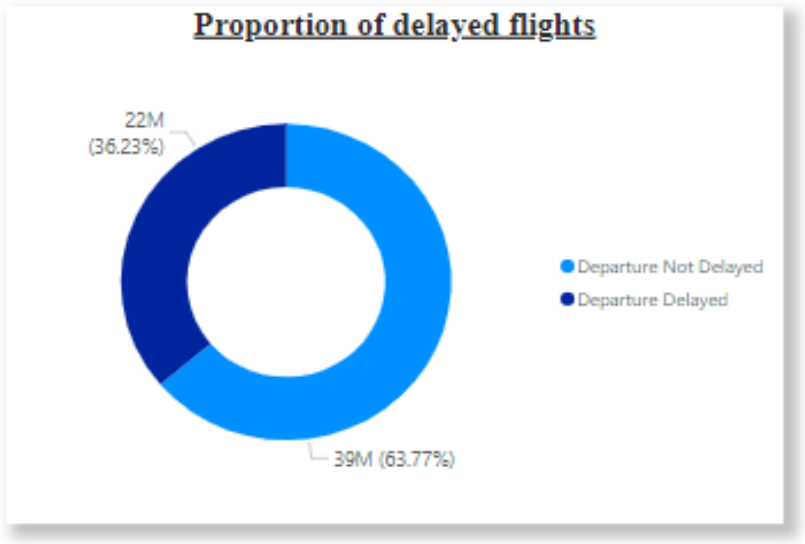
PROPORTION OF DELAYED FLIGHTS



- Donut chart was chosen to represent the proportion of delayed flights.
- From the graph, 63.77% of the total flight were not delayed, whereas 36.23% were not delayed.

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ORIGIN, DESTINATION AND DISTANCE

Clipboard | Data | Queries

ORIGIN	DESTINATION	DISTANCE
HNL	JFK	4983
JFK	HNL	4983
EWR	HNL	4963
HNL	EWR	4963
EWR	HNL	4962
HNL	EWR	4962
HNL	IAD	4817
IAD	HNL	4817
CLT	HNL	4678
HNL	CLT	4678
ATL	HNL	4502
HNL	ATL	4502
DTW	HNL	4475
HNL	DTW	4475
HNL	ORD	4244
ORD	HNL	4244
HNL	ORD	4243
ORD	HNL	4243
KOA	ORD	4213
OGG	ORD	4184
ORD	OGG	4184
HNL	MSP	3972
MSP	HNL	3972
HNL	IAH	3904
IAH	HNL	3904
DFW	LIH	3847
LIH	DFW	3847
GUM	HNL	3801
HNL	GUM	3801

ORIGIN	DESTINATION	DISTANCE
ABE	AVP	50
ESC	IMT	50
IMT	ESC	50
ABQ	SAF	49
CIU	PLN	49
DTW	TOL	49
IDA	PIH	49
LAX	OXR	49
OXR	LAX	49
PLN	CIU	49
TOL	DTW	49
HIB	DLH	48
ONT	LAX	47
ESC	MQT	46
MQT	ESC	46
SYR	ITH	46
GRR	AZO	45
ONT	BUR	45
LWB	ROA	43
LYH	ROA	43
ROA	LWB	43
AVL	GSP	42
GSP	AVL	42
ILM	OAJ	42
PBI	FLL	42
GSP	AVL	41
GST	JNU	41
JNU	GST	41
CLE	CAK	40

- I used a table to show Origin, Destination and Distance between them.
- The longest flight distance was between HNL and JFK which is 4983KM, followed by EWL to HNL with 4963KM going down the table.
- The shortest distance was between ABE and AVP which is 50KM.

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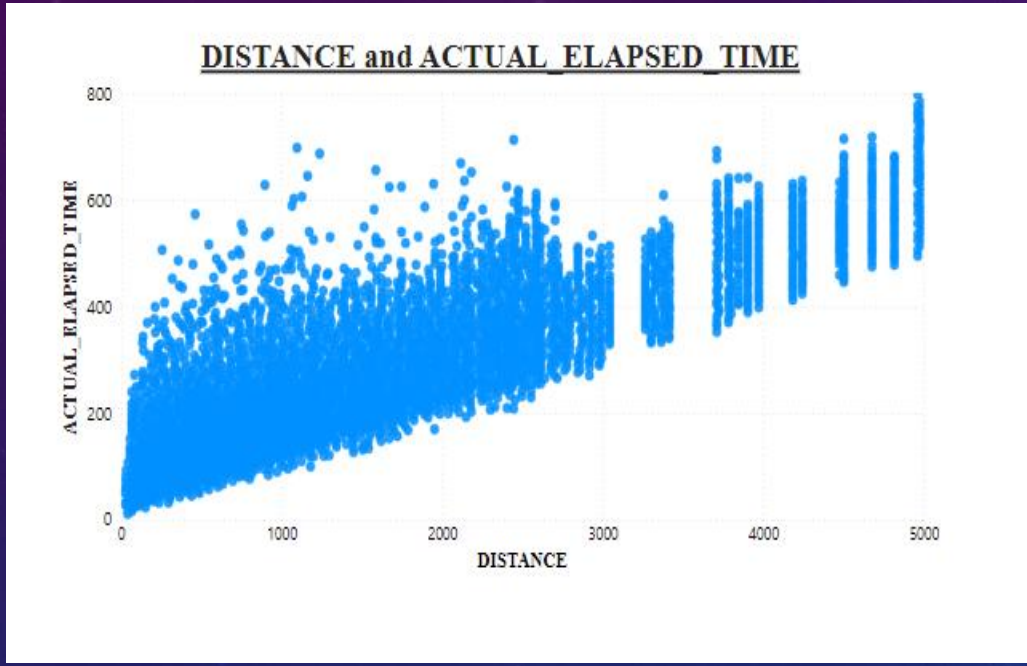
DISTANCE AND ELAPSED TIME RELATIONSHIP



- Used scatterplot to visualize the relationship between distance and elapsed time.
- From the graph, there is a strong positive relationship between distance and lapsed time.

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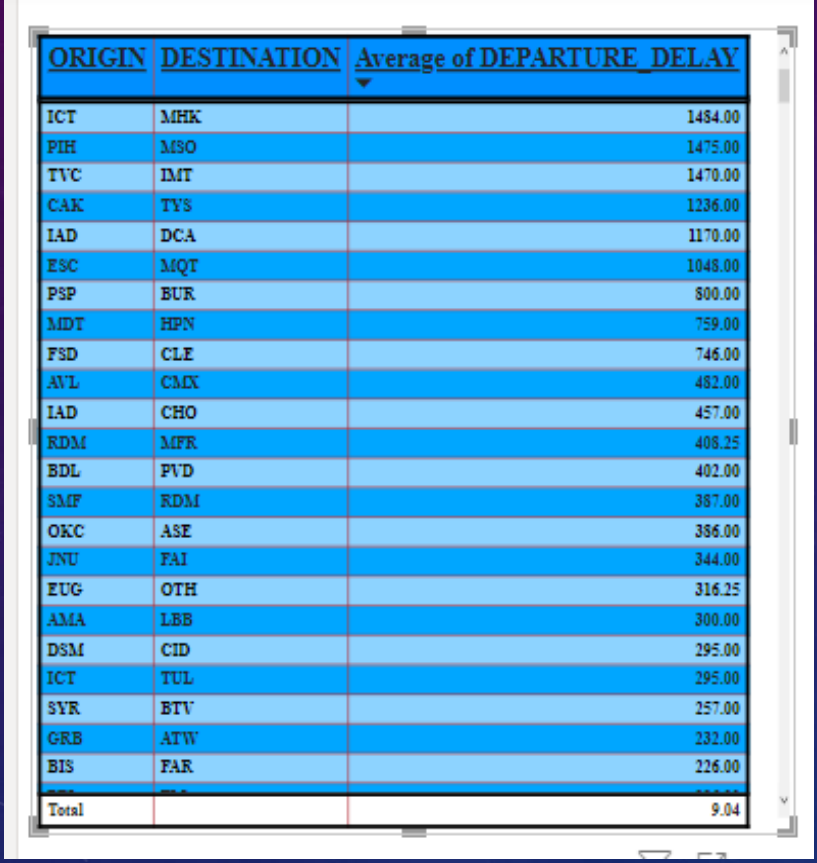
ANALYZING ROUTES WITH DELAY TIME



ORIGIN	DESTINATION	Average of DEPARTURE_DELAY
ICT	MHK	1484.00
PIH	MSO	1475.00
TVC	IMT	1470.00
CAK	TYS	1236.00
IAD	DCA	1170.00
ESC	MQT	1048.00
PSP	BUR	800.00
MDT	HPN	759.00
FSD	CLE	746.00
AVL	CMX	482.00
IAD	CHO	457.00
RDM	MFR	408.25
BDL	PVD	402.00
SMF	RDM	387.00
OKC	ASE	386.00
JNU	FAI	344.00
EUG	OTH	316.25
AMA	LBB	300.00
DSM	CID	295.00
ICT	TUL	295.00
SYR	BTV	257.00
GRB	ATW	232.00
BIS	FAR	226.00
Total		9.04

- Used a table to show the average amount of delay time per each route, sorted in descending order.
- ICT to MHK route has highest delay time of 1484 minutes, followed by PIH to MSO with 1475 minutes going down the table.

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RECOMMENDATIONS

- Improve operational efficiency on high-delay routes.
- Implement strategies to reduce taxi in/out times.
- Monitor and manage reroute incidents.

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