flight-copy1

September 1, 2024

```
[1]: import pymongo
     import pandas as pd
     import numpy as np
     import matplotlib.pyplot as plt
     import seaborn as sns
     import warnings
     warnings.filterwarnings('ignore')
```

a)Create collections "flights" inside database "airline_delayDB"

```
[7]: client=pymongo.MongoClient("localhost:27017")
     database=client['airline_delayDB']
     try:
         database.flights.drop()
     except:
         print("Collection doesn't exist")
     collection= database['flights']
```

**b)How would you insert this entire dataset into a MongoDB collection named flights?
Describe the structure of each document**

```
[9]: #Cleaning the data
     flight_df=pd.read_csv("C:/Users/Administrator/Downloads/Flights_Delay.csv")
     ard_mean = flight_df['ARRIVAL_DELAY'].mean()
     flight_df['ARRIVAL_DELAY'] = flight_df['ARRIVAL_DELAY'].fillna(ard_mean)
     dpd_mean = flight_df['DEPARTURE_DELAY'].mean()
     flight_df['DEPARTURE_DELAY'] = flight_df['DEPARTURE_DELAY'].fillna(dpd_mean)
     at_mean = flight_df['AIR_TIME'].mean()
     flight_df['AIR_TIME'] = flight_df['AIR_TIME'].fillna(at_mean)
```

```
[11]: flight_df['DEPARTURE_TIME'] = flight_df['DEPARTURE_TIME'].fillna(0)
      flight_df['ARRIVAL_TIME'] = flight_df['ARRIVAL_TIME'].fillna(0)

      flight_df['DEPARTURE_TIME'] = flight_df['DEPARTURE_TIME'].astype('int')
      flight_df['DEPARTURE_TIME'] = flight_df['DEPARTURE_TIME'].apply(lambda x : x //
       ↪100 )

      flight_df['ARRIVAL_TIME'] = flight_df['ARRIVAL_TIME'].astype('int')
```

```
flight_df['ARRIVAL_TIME'] = flight_df['ARRIVAL_TIME'].apply(lambda x : x //100 )
```

```
[13]: data=flight_df.to_dict(orient="records")
      if data:
          collection.insert_many(data)
      all_docs=collection.find()
      for item in all_docs:
          print(item)
```

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96.0, 'AIR_TIME': 59.0, 'DISTANCE': 398, 'WHEELS_ON': 1538.0, 'TAXI_IN': 10.0,
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114.0, 'AIR_TIME': 90.0, 'DISTANCE': 474, 'WHEELS_ON': 2059.0, 'TAXI_IN': 2.0,
'SCHEDULED_ARRIVAL': 2107, 'ARRIVAL_TIME': 21, 'ARRIVAL_DELAY': -6.0,
'DIVERTED': 0, 'CANCELLED': 0, 'CANCELLATION_REASON': nan, 'AIR_SYSTEM_DELAY':
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'SCHEDULED_DEPARTURE': 1156, 'DEPARTURE_TIME': 13, 'DEPARTURE_DELAY': 68.0,
'TAXI_OUT': 10.0, 'WHEELS_OFF': 1314.0, 'SCHEDULED_TIME': 154, 'ELAPSED_TIME':
140.0, 'AIR_TIME': 122.0, 'DISTANCE': 951, 'WHEELS_ON': 1516.0, 'TAXI_IN': 8.0,
'SCHEDULED_ARRIVAL': 1430, 'ARRIVAL_TIME': 15, 'ARRIVAL_DELAY': 54.0,
'DIVERTED': 0, 'CANCELLED': 0, 'CANCELLATION_REASON': nan, 'AIR_SYSTEM_DELAY':
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'WEATHER_DELAY': 0.0}

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'SCHEDULED_DEPARTURE': 1801, 'DEPARTURE_TIME': 18, 'DEPARTURE_DELAY': 10.0,
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135.0, 'AIR_TIME': 97.0, 'DISTANCE': 612, 'WHEELS_ON': 2123.0, 'TAXI_IN': 3.0,
'SCHEDULED_ARRIVAL': 2055, 'ARRIVAL_TIME': 21, 'ARRIVAL_DELAY': 31.0,
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'WEATHER_DELAY': 10.0}
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2, 'DAY': 10, 'DAY_OF_WEEK': 2, 'AIRLINE': 'AA', 'FLIGHT_NUMBER': 1615,
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'TAXI_OUT': 13.0, 'WHEELS_OFF': 1154.0, 'SCHEDULED_TIME': 202, 'ELAPSED_TIME':
183.0, 'AIR_TIME': 163.0, 'DISTANCE': 1121, 'WHEELS_ON': 1337.0, 'TAXI_IN': 7.0,
'SCHEDULED_ARRIVAL': 1407, 'ARRIVAL_TIME': 13, 'ARRIVAL_DELAY': -23.0,
'DIVERTED': 0, 'CANCELLED': 0, 'CANCELLATION_REASON': nan, 'AIR_SYSTEM_DELAY':
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'WEATHER_DELAY': nan}
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'TAXI_OUT': 24.0, 'WHEELS_OFF': 829.0, 'SCHEDULED_TIME': 142, 'ELAPSED_TIME':
135.0, 'AIR_TIME': 105.0, 'DISTANCE': 689, 'WHEELS_ON': 914.0, 'TAXI_IN': 6.0,
'SCHEDULED_ARRIVAL': 933, 'ARRIVAL_TIME': 9, 'ARRIVAL_DELAY': -13.0, 'DIVERTED':
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'SECURITY_DELAY': nan, 'AIRLINE_DELAY': nan, 'LATE_AIRCRAFT_DELAY': nan,
'WEATHER_DELAY': nan}
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'SCHEDULED_DEPARTURE': 1245, 'DEPARTURE_TIME': 12, 'DEPARTURE_DELAY': -2.0,
'TAXI_OUT': 14.0, 'WHEELS_OFF': 1257.0, 'SCHEDULED_TIME': 270, 'ELAPSED_TIME':
272.0, 'AIR_TIME': 250.0, 'DISTANCE': 1694, 'WHEELS_ON': 1507.0, 'TAXI_IN': 8.0,
'SCHEDULED_ARRIVAL': 1515, 'ARRIVAL_TIME': 15, 'ARRIVAL_DELAY': 0.0, 'DIVERTED':
0, 'CANCELLED': 0, 'CANCELLATION_REASON': nan, 'AIR_SYSTEM_DELAY': nan,
'SECURITY_DELAY': nan, 'AIRLINE_DELAY': nan, 'LATE_AIRCRAFT_DELAY': nan,
'WEATHER_DELAY': nan}
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1, 'DAY': 30, 'DAY_OF_WEEK': 5, 'AIRLINE': 'VX', 'FLIGHT_NUMBER': 251,
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'SCHEDULED_DEPARTURE': 1335, 'DEPARTURE_TIME': 14, 'DEPARTURE_DELAY': 31.0,
'TAXI_OUT': 29.0, 'WHEELS_OFF': 1435.0, 'SCHEDULED_TIME': 95, 'ELAPSED_TIME':
95.0, 'AIR_TIME': 63.0, 'DISTANCE': 414, 'WHEELS_ON': 1538.0, 'TAXI_IN': 3.0,

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'DIVERTED': 0, 'CANCELLED': 0, 'CANCELLATION_REASON': nan, 'AIR_SYSTEM_DELAY':
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'SCHEDULED_DEPARTURE': 1536, 'DEPARTURE_TIME': 15, 'DEPARTURE_DELAY': -6.0,
'TAXI_OUT': 8.0, 'WHEELS_OFF': 1538.0, 'SCHEDULED_TIME': 82, 'ELAPSED_TIME':
76.0, 'AIR_TIME': 63.0, 'DISTANCE': 310, 'WHEELS_ON': 1641.0, 'TAXI_IN': 5.0,
'SCHEDULED_ARRIVAL': 1658, 'ARRIVAL_TIME': 16, 'ARRIVAL_DELAY': -12.0,
'DIVERTED': 0, 'CANCELLED': 0, 'CANCELLATION_REASON': nan, 'AIR_SYSTEM_DELAY':
nan, 'SECURITY_DELAY': nan, 'AIRLINE_DELAY': nan, 'LATE_AIRCRAFT_DELAY': nan,
'WEATHER_DELAY': nan}
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'SCHEDULED_DEPARTURE': 1310, 'DEPARTURE_TIME': 14, 'DEPARTURE_DELAY': 80.0,
'TAXI_OUT': 10.0, 'WHEELS_OFF': 1440.0, 'SCHEDULED_TIME': 153, 'ELAPSED_TIME':
155.0, 'AIR_TIME': 135.0, 'DISTANCE': 967, 'WHEELS_ON': 1555.0, 'TAXI_IN': 10.0,
'SCHEDULED_ARRIVAL': 1443, 'ARRIVAL_TIME': 16, 'ARRIVAL_DELAY': 82.0,
'DIVERTED': 0, 'CANCELLED': 0, 'CANCELLATION_REASON': nan, 'AIR_SYSTEM_DELAY':
77.0, 'SECURITY_DELAY': 0.0, 'AIRLINE_DELAY': 4.0, 'LATE_AIRCRAFT_DELAY': 1.0,
'WEATHER_DELAY': 0.0}
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3, 'DAY': 2, 'DAY_OF_WEEK': 1, 'AIRLINE': 'US', 'FLIGHT_NUMBER': 686,
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'SCHEDULED_DEPARTURE': 1340, 'DEPARTURE_TIME': 15, 'DEPARTURE_DELAY': 100.0,
'TAXI_OUT': 11.0, 'WHEELS_OFF': 1531.0, 'SCHEDULED_TIME': 322, 'ELAPSED_TIME':
322.0, 'AIR_TIME': 308.0, 'DISTANCE': 2075, 'WHEELS_ON': 1839.0, 'TAXI_IN': 3.0,
'SCHEDULED_ARRIVAL': 1702, 'ARRIVAL_TIME': 18, 'ARRIVAL_DELAY': 100.0,
'DIVERTED': 0, 'CANCELLED': 0, 'CANCELLATION_REASON': nan, 'AIR_SYSTEM_DELAY':
0.0, 'SECURITY_DELAY': 0.0, 'AIRLINE_DELAY': 22.0, 'LATE_AIRCRAFT_DELAY': 78.0,
'WEATHER_DELAY': 0.0}
{'_id': ObjectId('66d4ada4a3f35ec9b6c2f680'), 'ID': 36, 'YEAR': 2015, 'MONTH':
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'SCHEDULED_DEPARTURE': 755, 'DEPARTURE_TIME': 7, 'DEPARTURE_DELAY': -2.0,
'TAXI_OUT': 23.0, 'WHEELS_OFF': 816.0, 'SCHEDULED_TIME': 95, 'ELAPSED_TIME':
93.0, 'AIR_TIME': 66.0, 'DISTANCE': 361, 'WHEELS_ON': 922.0, 'TAXI_IN': 4.0,
'SCHEDULED_ARRIVAL': 930, 'ARRIVAL_TIME': 9, 'ARRIVAL_DELAY': -4.0, 'DIVERTED':
0, 'CANCELLED': 0, 'CANCELLATION_REASON': nan, 'AIR_SYSTEM_DELAY': nan,
'SECURITY_DELAY': nan, 'AIRLINE_DELAY': nan, 'LATE_AIRCRAFT_DELAY': nan,
'WEATHER_DELAY': nan}
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1, 'DAY': 3, 'DAY_OF_WEEK': 6, 'AIRLINE': 'WN', 'FLIGHT_NUMBER': 3563,
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'SCHEDULED_DEPARTURE': 740, 'DEPARTURE_TIME': 7, 'DEPARTURE_DELAY': -1.0,

'TAXI_OUT': 7.0, 'WHEELS_OFF': 746.0, 'SCHEDULED_TIME': 205, 'ELAPSED_TIME':
202.0, 'AIR_TIME': 189.0, 'DISTANCE': 1180, 'WHEELS_ON': 1055.0, 'TAXI_IN': 6.0,
'SCHEDULED_ARRIVAL': 1105, 'ARRIVAL_TIME': 11, 'ARRIVAL_DELAY': -4.0,
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2, 'DAY': 12, 'DAY_OF_WEEK': 4, 'AIRLINE': 'US', 'FLIGHT_NUMBER': 2149,
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'SCHEDULED_DEPARTURE': 1700, 'DEPARTURE_TIME': 16, 'DEPARTURE_DELAY': -7.0,
'TAXI_OUT': 38.0, 'WHEELS_OFF': 1731.0, 'SCHEDULED_TIME': 101, 'ELAPSED_TIME':
116.0, 'AIR_TIME': 75.0, 'DISTANCE': 399, 'WHEELS_ON': 1846.0, 'TAXI_IN': 3.0,
'SCHEDULED_ARRIVAL': 1841, 'ARRIVAL_TIME': 18, 'ARRIVAL_DELAY': 8.0, 'DIVERTED':
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'SECURITY_DELAY': nan, 'AIRLINE_DELAY': nan, 'LATE_AIRCRAFT_DELAY': nan,
'WEATHER_DELAY': nan}
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2, 'DAY': 19, 'DAY_OF_WEEK': 4, 'AIRLINE': 'DL', 'FLIGHT_NUMBER': 765,
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'SCHEDULED_DEPARTURE': 102, 'DEPARTURE_TIME': 0, 'DEPARTURE_DELAY': -5.0,
'TAXI_OUT': 13.0, 'WHEELS_OFF': 110.0, 'SCHEDULED_TIME': 214, 'ELAPSED_TIME':
194.0, 'AIR_TIME': 176.0, 'DISTANCE': 1619, 'WHEELS_ON': 606.0, 'TAXI_IN': 5.0,
'SCHEDULED_ARRIVAL': 636, 'ARRIVAL_TIME': 6, 'ARRIVAL_DELAY': -25.0, 'DIVERTED':
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'SECURITY_DELAY': nan, 'AIRLINE_DELAY': nan, 'LATE_AIRCRAFT_DELAY': nan,
'WEATHER_DELAY': nan}
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'TAIL_NUMBER': 'N937EV', 'ORIGIN_AIRPORT': 'CHO', 'DESTINATION_AIRPORT': 'ATL',
'SCHEDULED_DEPARTURE': 1225, 'DEPARTURE_TIME': 12, 'DEPARTURE_DELAY': -14.0,
'TAXI_OUT': 20.0, 'WHEELS_OFF': 1231.0, 'SCHEDULED_TIME': 104, 'ELAPSED_TIME':
103.0, 'AIR_TIME': 79.0, 'DISTANCE': 457, 'WHEELS_ON': 1350.0, 'TAXI_IN': 4.0,
'SCHEDULED_ARRIVAL': 1409, 'ARRIVAL_TIME': 13, 'ARRIVAL_DELAY': -15.0,
'DIVERTED': 0, 'CANCELLED': 0, 'CANCELLATION_REASON': nan, 'AIR_SYSTEM_DELAY':
nan, 'SECURITY_DELAY': nan, 'AIRLINE_DELAY': nan, 'LATE_AIRCRAFT_DELAY': nan,
'WEATHER_DELAY': nan}
{'_id': ObjectId('66d4ada4a3f35ec9b6c2f685'), 'ID': 41, 'YEAR': 2015, 'MONTH':
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'SCHEDULED_DEPARTURE': 1935, 'DEPARTURE_TIME': 19, 'DEPARTURE_DELAY': -7.0,
'TAXI_OUT': 14.0, 'WHEELS_OFF': 1942.0, 'SCHEDULED_TIME': 138, 'ELAPSED_TIME':
140.0, 'AIR_TIME': 122.0, 'DISTANCE': 933, 'WHEELS_ON': 2144.0, 'TAXI_IN': 4.0,
'SCHEDULED_ARRIVAL': 2153, 'ARRIVAL_TIME': 21, 'ARRIVAL_DELAY': -5.0,
'DIVERTED': 0, 'CANCELLED': 0, 'CANCELLATION_REASON': nan, 'AIR_SYSTEM_DELAY':
nan, 'SECURITY_DELAY': nan, 'AIRLINE_DELAY': nan, 'LATE_AIRCRAFT_DELAY': nan,
'WEATHER_DELAY': nan}
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2, 'DAY': 15, 'DAY_OF_WEEK': 7, 'AIRLINE': 'WN', 'FLIGHT_NUMBER': 4157,

'TAIL_NUMBER': 'N8657B', 'ORIGIN_AIRPORT': 'PHX', 'DESTINATION_AIRPORT': 'DEN',
'SCHEDULED_DEPARTURE': 2045, 'DEPARTURE_TIME': 20, 'DEPARTURE_DELAY': -2.0,
'TAXI_OUT': 6.0, 'WHEELS_OFF': 2049.0, 'SCHEDULED_TIME': 105, 'ELAPSED_TIME':
98.0, 'AIR_TIME': 79.0, 'DISTANCE': 602, 'WHEELS_ON': 2208.0, 'TAXI_IN': 13.0,
'SCHEDULED_ARRIVAL': 2230, 'ARRIVAL_TIME': 22, 'ARRIVAL_DELAY': -9.0,
'DIVERTED': 0, 'CANCELLED': 0, 'CANCELLATION_REASON': nan, 'AIR_SYSTEM_DELAY':
nan, 'SECURITY_DELAY': nan, 'AIRLINE_DELAY': nan, 'LATE_AIRCRAFT_DELAY': nan,
'WEATHER_DELAY': nan}
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3, 'DAY': 2, 'DAY_OF_WEEK': 1, 'AIRLINE': 'EV', 'FLIGHT_NUMBER': 4967,
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'SCHEDULED_DEPARTURE': 2140, 'DEPARTURE_TIME': 21, 'DEPARTURE_DELAY': -4.0,
'TAXI_OUT': 19.0, 'WHEELS_OFF': 2155.0, 'SCHEDULED_TIME': 113, 'ELAPSED_TIME':
105.0, 'AIR_TIME': 72.0, 'DISTANCE': 610, 'WHEELS_ON': 2307.0, 'TAXI_IN': 14.0,
'SCHEDULED_ARRIVAL': 2333, 'ARRIVAL_TIME': 23, 'ARRIVAL_DELAY': -12.0,
'DIVERTED': 0, 'CANCELLED': 0, 'CANCELLATION_REASON': nan, 'AIR_SYSTEM_DELAY':
nan, 'SECURITY_DELAY': nan, 'AIRLINE_DELAY': nan, 'LATE_AIRCRAFT_DELAY': nan,
'WEATHER_DELAY': nan}
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'SCHEDULED_DEPARTURE': 1925, 'DEPARTURE_TIME': 21, 'DEPARTURE_DELAY': 140.0,
'TAXI_OUT': 27.0, 'WHEELS_OFF': 2212.0, 'SCHEDULED_TIME': 89, 'ELAPSED_TIME':
102.0, 'AIR_TIME': 69.0, 'DISTANCE': 373, 'WHEELS_ON': 2321.0, 'TAXI_IN': 6.0,
'SCHEDULED_ARRIVAL': 2054, 'ARRIVAL_TIME': 23, 'ARRIVAL_DELAY': 153.0,
'DIVERTED': 0, 'CANCELLED': 0, 'CANCELLATION_REASON': nan, 'AIR_SYSTEM_DELAY':
13.0, 'SECURITY_DELAY': 0.0, 'AIRLINE_DELAY': 0.0, 'LATE_AIRCRAFT_DELAY': 140.0,
'WEATHER_DELAY': 0.0}
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2, 'DAY': 24, 'DAY_OF_WEEK': 2, 'AIRLINE': 'WN', 'FLIGHT_NUMBER': 695,
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'SCHEDULED_DEPARTURE': 605, 'DEPARTURE_TIME': 6, 'DEPARTURE_DELAY': -5.0,
'TAXI_OUT': 12.0, 'WHEELS_OFF': 612.0, 'SCHEDULED_TIME': 80, 'ELAPSED_TIME':
72.0, 'AIR_TIME': 56.0, 'DISTANCE': 345, 'WHEELS_ON': 708.0, 'TAXI_IN': 4.0,
'SCHEDULED_ARRIVAL': 725, 'ARRIVAL_TIME': 7, 'ARRIVAL_DELAY': -13.0, 'DIVERTED':
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'SECURITY_DELAY': nan, 'AIRLINE_DELAY': nan, 'LATE_AIRCRAFT_DELAY': nan,
'WEATHER_DELAY': nan}
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'SCHEDULED_DEPARTURE': 1715, 'DEPARTURE_TIME': 17, 'DEPARTURE_DELAY': -8.0,
'TAXI_OUT': 10.0, 'WHEELS_OFF': 1717.0, 'SCHEDULED_TIME': 150, 'ELAPSED_TIME':
133.0, 'AIR_TIME': 115.0, 'DISTANCE': 773, 'WHEELS_ON': 1812.0, 'TAXI_IN': 8.0,
'SCHEDULED_ARRIVAL': 1845, 'ARRIVAL_TIME': 18, 'ARRIVAL_DELAY': -25.0,
'DIVERTED': 0, 'CANCELLED': 0, 'CANCELLATION_REASON': nan, 'AIR_SYSTEM_DELAY':
nan, 'SECURITY_DELAY': nan, 'AIRLINE_DELAY': nan, 'LATE_AIRCRAFT_DELAY': nan,
'WEATHER_DELAY': nan}

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{'_id': ObjectId('66d4ada4a3f35ec9b6c2f68e'), 'ID': 50, 'YEAR': 2015, 'MONTH': 1, 'DAY': 18, 'DAY_OF_WEEK': 7, 'AIRLINE': 'US', 'FLIGHT_NUMBER': 506, 'TAIL_NUMBER': 'N764US', 'ORIGIN_AIRPORT': 'MKE', 'DESTINATION_AIRPORT': 'PHX', 'SCHEDULED_DEPARTURE': 705, 'DEPARTURE_TIME': 6, 'DEPARTURE_DELAY': -8.0, 'TAXI_OUT': 18.0, 'WHEELS_OFF': 715.0, 'SCHEDULED_TIME': 249, 'ELAPSED_TIME': 219.0, 'AIR_TIME': 197.0, 'DISTANCE': 1460, 'WHEELS_ON': 932.0, 'TAXI_IN': 4.0, 'SCHEDULED_ARRIVAL': 1014, 'ARRIVAL_TIME': 9, 'ARRIVAL_DELAY': -38.0, 'DIVERTED': 0, 'CANCELLED': 0, 'CANCELLATION_REASON': nan, 'AIR_SYSTEM_DELAY': nan, 'SECURITY_DELAY': nan, 'AIRLINE_DELAY': nan, 'LATE_AIRCRAFT_DELAY': nan, 'WEATHER_DELAY': nan}
{'_id': ObjectId('66d4ada4a3f35ec9b6c2f68f'), 'ID': 51, 'YEAR': 2015, 'MONTH': 2, 'DAY': 23, 'DAY_OF_WEEK': 1, 'AIRLINE': 'WN', 'FLIGHT_NUMBER': 3133, 'TAIL_NUMBER': 'N657SW', 'ORIGIN_AIRPORT': 'MCO', 'DESTINATION_AIRPORT': 'BHM', 'SCHEDULED_DEPARTURE': 900, 'DEPARTURE_TIME': 8, 'DEPARTURE_DELAY': -2.0, 'TAXI_OUT': 12.0, 'WHEELS_OFF': 910.0, 'SCHEDULED_TIME': 95, 'ELAPSED_TIME': 96.0, 'AIR_TIME': 81.0, 'DISTANCE': 479, 'WHEELS_ON': 931.0, 'TAXI_IN': 3.0, 'SCHEDULED_ARRIVAL': 935, 'ARRIVAL_TIME': 9, 'ARRIVAL_DELAY': -1.0, 'DIVERTED': 0, 'CANCELLED': 0, 'CANCELLATION_REASON': nan, 'AIR_SYSTEM_DELAY': nan,

'SECURITY_DELAY': nan, 'AIRLINE_DELAY': nan, 'LATE_AIRCRAFT_DELAY': nan,
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'SCHEDULED_DEPARTURE': 1620, 'DEPARTURE_TIME': 16, 'DEPARTURE_DELAY': 17.0,
'TAXI_OUT': 19.0, 'WHEELS_OFF': 1656.0, 'SCHEDULED_TIME': 338, 'ELAPSED_TIME':
316.0, 'AIR_TIME': 294.0, 'DISTANCE': 2614, 'WHEELS_ON': 2350.0, 'TAXI_IN': 3.0,
'SCHEDULED_ARRIVAL': 2358, 'ARRIVAL_TIME': 23, 'ARRIVAL_DELAY': -5.0,
'DIVERTED': 0, 'CANCELLED': 0, 'CANCELLATION_REASON': nan, 'AIR_SYSTEM_DELAY':
nan, 'SECURITY_DELAY': nan, 'AIRLINE_DELAY': nan, 'LATE_AIRCRAFT_DELAY': nan,
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{'_id': ObjectId('66d4ada4a3f35ec9b6c2f691'), 'ID': 53, 'YEAR': 2015, 'MONTH':
2, 'DAY': 2, 'DAY_OF_WEEK': 1, 'AIRLINE': 'EV', 'FLIGHT_NUMBER': 3936,
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'SCHEDULED_DEPARTURE': 1543, 'DEPARTURE_TIME': 20, 'DEPARTURE_DELAY': 278.0,
'TAXI_OUT': 53.0, 'WHEELS_OFF': 2114.0, 'SCHEDULED_TIME': 65, 'ELAPSED_TIME':
131.0, 'AIR_TIME': 39.0, 'DISTANCE': 179, 'WHEELS_ON': 2053.0, 'TAXI_IN': 39.0,
'SCHEDULED_ARRIVAL': 1548, 'ARRIVAL_TIME': 21, 'ARRIVAL_DELAY': 344.0,
'DIVERTED': 0, 'CANCELLED': 0, 'CANCELLATION_REASON': nan, 'AIR_SYSTEM_DELAY':
344.0, 'SECURITY_DELAY': 0.0, 'AIRLINE_DELAY': 0.0, 'LATE_AIRCRAFT_DELAY': 0.0,
'WEATHER_DELAY': 0.0}
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2, 'DAY': 19, 'DAY_OF_WEEK': 4, 'AIRLINE': 'DL', 'FLIGHT_NUMBER': 1323,
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'SCHEDULED_DEPARTURE': 1005, 'DEPARTURE_TIME': 10, 'DEPARTURE_DELAY': -1.0,
'TAXI_OUT': 14.0, 'WHEELS_OFF': 1018.0, 'SCHEDULED_TIME': 90, 'ELAPSED_TIME':
97.0, 'AIR_TIME': 75.0, 'DISTANCE': 456, 'WHEELS_ON': 1233.0, 'TAXI_IN': 8.0,
'SCHEDULED_ARRIVAL': 1235, 'ARRIVAL_TIME': 12, 'ARRIVAL_DELAY': 6.0, 'DIVERTED':
0, 'CANCELLED': 0, 'CANCELLATION_REASON': nan, 'AIR_SYSTEM_DELAY': nan,
'SECURITY_DELAY': nan, 'AIRLINE_DELAY': nan, 'LATE_AIRCRAFT_DELAY': nan,
'WEATHER_DELAY': nan}
{'_id': ObjectId('66d4ada4a3f35ec9b6c2f693'), 'ID': 55, 'YEAR': 2015, 'MONTH':
1, 'DAY': 22, 'DAY_OF_WEEK': 4, 'AIRLINE': 'WN', 'FLIGHT_NUMBER': 1179,
'TAIL_NUMBER': 'N8641B', 'ORIGIN_AIRPORT': 'MSP', 'DESTINATION_AIRPORT': 'DEN',
'SCHEDULED_DEPARTURE': 645, 'DEPARTURE_TIME': 6, 'DEPARTURE_DELAY': -1.0,
'TAXI_OUT': 10.0, 'WHEELS_OFF': 654.0, 'SCHEDULED_TIME': 135, 'ELAPSED_TIME':
107.0, 'AIR_TIME': 89.0, 'DISTANCE': 680, 'WHEELS_ON': 723.0, 'TAXI_IN': 8.0,
'SCHEDULED_ARRIVAL': 800, 'ARRIVAL_TIME': 7, 'ARRIVAL_DELAY': -29.0, 'DIVERTED':
0, 'CANCELLED': 0, 'CANCELLATION_REASON': nan, 'AIR_SYSTEM_DELAY': nan,
'SECURITY_DELAY': nan, 'AIRLINE_DELAY': nan, 'LATE_AIRCRAFT_DELAY': nan,
'WEATHER_DELAY': nan}
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1, 'DAY': 6, 'DAY_OF_WEEK': 2, 'AIRLINE': 'AA', 'FLIGHT_NUMBER': 989,
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'SCHEDULED_DEPARTURE': 1500, 'DEPARTURE_TIME': 14, 'DEPARTURE_DELAY': -4.0,
'TAXI_OUT': 16.0, 'WHEELS_OFF': 1512.0, 'SCHEDULED_TIME': 268, 'ELAPSED_TIME':
275.0, 'AIR_TIME': 246.0, 'DISTANCE': 2174, 'WHEELS_ON': 2218.0, 'TAXI_IN':

13.0, 'SCHEDULED_ARRIVAL': 2228, 'ARRIVAL_TIME': 22, 'ARRIVAL_DELAY': 3.0, 'DIVERTED': 0, 'CANCELLED': 0, 'CANCELLATION_REASON': nan, 'AIR_SYSTEM_DELAY': nan, 'SECURITY_DELAY': nan, 'AIRLINE_DELAY': nan, 'LATE_AIRCRAFT_DELAY': nan, 'WEATHER_DELAY': nan}
{'_id': ObjectId('66d4ada4a3f35ec9b6c2f695'), 'ID': 57, 'YEAR': 2015, 'MONTH': 1, 'DAY': 9, 'DAY_OF_WEEK': 5, 'AIRLINE': 'MQ', 'FLIGHT_NUMBER': 3337, 'TAIL_NUMBER': 'N848MQ', 'ORIGIN_AIRPORT': 'DFW', 'DESTINATION_AIRPORT': 'LEX', 'SCHEDULED_DEPARTURE': 910, 'DEPARTURE_TIME': 9, 'DEPARTURE_DELAY': 44.0, 'TAXI_OUT': 26.0, 'WHEELS_OFF': 1020.0, 'SCHEDULED_TIME': 125, 'ELAPSED_TIME': 131.0, 'AIR_TIME': 101.0, 'DISTANCE': 785, 'WHEELS_ON': 1301.0, 'TAXI_IN': 4.0, 'SCHEDULED_ARRIVAL': 1215, 'ARRIVAL_TIME': 13, 'ARRIVAL_DELAY': 50.0, 'DIVERTED': 0, 'CANCELLED': 0, 'CANCELLATION_REASON': nan, 'AIR_SYSTEM_DELAY': 6.0, 'SECURITY_DELAY': 0.0, 'AIRLINE_DELAY': 44.0, 'LATE_AIRCRAFT_DELAY': 0.0, 'WEATHER_DELAY': 0.0}
{'_id': ObjectId('66d4ada4a3f35ec9b6c2f696'), 'ID': 58, 'YEAR': 2015, 'MONTH': 2, 'DAY': 4, 'DAY_OF_WEEK': 3, 'AIRLINE': 'AA', 'FLIGHT_NUMBER': 1208, 'TAIL_NUMBER': 'N493AA', 'ORIGIN_AIRPORT': 'RNO', 'DESTINATION_AIRPORT': 'DFW', 'SCHEDULED_DEPARTURE': 714, 'DEPARTURE_TIME': 7, 'DEPARTURE_DELAY': -8.0, 'TAXI_OUT': 13.0, 'WHEELS_OFF': 719.0, 'SCHEDULED_TIME': 196, 'ELAPSED_TIME': 182.0, 'AIR_TIME': 166.0, 'DISTANCE': 1345, 'WHEELS_ON': 1205.0, 'TAXI_IN': 3.0, 'SCHEDULED_ARRIVAL': 1230, 'ARRIVAL_TIME': 12, 'ARRIVAL_DELAY': -22.0, 'DIVERTED': 0, 'CANCELLED': 0, 'CANCELLATION_REASON': nan, 'AIR_SYSTEM_DELAY': nan, 'SECURITY_DELAY': nan, 'AIRLINE_DELAY': nan, 'LATE_AIRCRAFT_DELAY': nan, 'WEATHER_DELAY': nan}
{'_id': ObjectId('66d4ada4a3f35ec9b6c2f697'), 'ID': 59, 'YEAR': 2015, 'MONTH': 2, 'DAY': 3, 'DAY_OF_WEEK': 2, 'AIRLINE': 'WN', 'FLIGHT_NUMBER': 525, 'TAIL_NUMBER': 'N919WN', 'ORIGIN_AIRPORT': 'BHM', 'DESTINATION_AIRPORT': 'MDW', 'SCHEDULED_DEPARTURE': 1825, 'DEPARTURE_TIME': 18, 'DEPARTURE_DELAY': -5.0, 'TAXI_OUT': 8.0, 'WHEELS_OFF': 1828.0, 'SCHEDULED_TIME': 115, 'ELAPSED_TIME': 113.0, 'AIR_TIME': 87.0, 'DISTANCE': 570, 'WHEELS_ON': 1955.0, 'TAXI_IN': 18.0, 'SCHEDULED_ARRIVAL': 2020, 'ARRIVAL_TIME': 20, 'ARRIVAL_DELAY': -7.0, 'DIVERTED': 0, 'CANCELLED': 0, 'CANCELLATION_REASON': nan, 'AIR_SYSTEM_DELAY': nan, 'SECURITY_DELAY': nan, 'AIRLINE_DELAY': nan, 'LATE_AIRCRAFT_DELAY': nan, 'WEATHER_DELAY': nan}
{'_id': ObjectId('66d4ada4a3f35ec9b6c2f698'), 'ID': 60, 'YEAR': 2015, 'MONTH': 1, 'DAY': 8, 'DAY_OF_WEEK': 4, 'AIRLINE': 'EV', 'FLIGHT_NUMBER': 5006, 'TAIL_NUMBER': 'N920EV', 'ORIGIN_AIRPORT': 'ATL', 'DESTINATION_AIRPORT': 'DHN', 'SCHEDULED_DEPARTURE': 1339, 'DEPARTURE_TIME': 13, 'DEPARTURE_DELAY': -3.0, 'TAXI_OUT': 9.0, 'WHEELS_OFF': 1345.0, 'SCHEDULED_TIME': 58, 'ELAPSED_TIME': 41.0, 'AIR_TIME': 29.0, 'DISTANCE': 170, 'WHEELS_ON': 1314.0, 'TAXI_IN': 3.0, 'SCHEDULED_ARRIVAL': 1337, 'ARRIVAL_TIME': 13, 'ARRIVAL_DELAY': -20.0, 'DIVERTED': 0, 'CANCELLED': 0, 'CANCELLATION_REASON': nan, 'AIR_SYSTEM_DELAY': nan, 'SECURITY_DELAY': nan, 'AIRLINE_DELAY': nan, 'LATE_AIRCRAFT_DELAY': nan, 'WEATHER_DELAY': nan}
{'_id': ObjectId('66d4ada4a3f35ec9b6c2f699'), 'ID': 61, 'YEAR': 2015, 'MONTH': 1, 'DAY': 6, 'DAY_OF_WEEK': 2, 'AIRLINE': 'AA', 'FLIGHT_NUMBER': 1419, 'TAIL_NUMBER': 'N3APAA', 'ORIGIN_AIRPORT': 'MIA', 'DESTINATION_AIRPORT': 'BDL', 'SCHEDULED_DEPARTURE': 2005, 'DEPARTURE_TIME': 20, 'DEPARTURE_DELAY': 22.0,

'TAXI_OUT': 33.0, 'WHEELS_OFF': 2100.0, 'SCHEDULED_TIME': 182, 'ELAPSED_TIME':
193.0, 'AIR_TIME': 149.0, 'DISTANCE': 1194, 'WHEELS_ON': 2329.0, 'TAXI_IN':
11.0, 'SCHEDULED_ARRIVAL': 2307, 'ARRIVAL_TIME': 23, 'ARRIVAL_DELAY': 33.0,
'DIVERTED': 0, 'CANCELLED': 0, 'CANCELLATION_REASON': nan, 'AIR_SYSTEM_DELAY':
11.0, 'SECURITY_DELAY': 0.0, 'AIRLINE_DELAY': 0.0, 'LATE_AIRCRAFT_DELAY': 22.0,
'WEATHER_DELAY': 0.0}
{'_id': ObjectId('66d4ada4a3f35ec9b6c2f69a'), 'ID': 62, 'YEAR': 2015, 'MONTH':
3, 'DAY': 2, 'DAY_OF_WEEK': 1, 'AIRLINE': 'OO', 'FLIGHT_NUMBER': 5638,
'TAIL_NUMBER': 'N561SW', 'ORIGIN_AIRPORT': 'SFO', 'DESTINATION_AIRPORT': 'MRY',
'SCHEDULED_DEPARTURE': 1625, 'DEPARTURE_TIME': 16, 'DEPARTURE_DELAY': -4.0,
'TAXI_OUT': 18.0, 'WHEELS_OFF': 1639.0, 'SCHEDULED_TIME': 45, 'ELAPSED_TIME':
43.0, 'AIR_TIME': 22.0, 'DISTANCE': 77, 'WHEELS_ON': 1701.0, 'TAXI_IN': 3.0,
'SCHEDULED_ARRIVAL': 1710, 'ARRIVAL_TIME': 17, 'ARRIVAL_DELAY': -6.0,
'DIVERTED': 0, 'CANCELLED': 0, 'CANCELLATION_REASON': nan, 'AIR_SYSTEM_DELAY':
nan, 'SECURITY_DELAY': nan, 'AIRLINE_DELAY': nan, 'LATE_AIRCRAFT_DELAY': nan,
'WEATHER_DELAY': nan}
{'_id': ObjectId('66d4ada4a3f35ec9b6c2f69b'), 'ID': 63, 'YEAR': 2015, 'MONTH':
3, 'DAY': 9, 'DAY_OF_WEEK': 1, 'AIRLINE': 'EV', 'FLIGHT_NUMBER': 5950,
'TAIL_NUMBER': 'N13997', 'ORIGIN_AIRPORT': 'ORD', 'DESTINATION_AIRPORT': 'XNA',
'SCHEDULED_DEPARTURE': 1209, 'DEPARTURE_TIME': 12, 'DEPARTURE_DELAY': 4.0,
'TAXI_OUT': 24.0, 'WHEELS_OFF': 1237.0, 'SCHEDULED_TIME': 113, 'ELAPSED_TIME':
117.0, 'AIR_TIME': 90.0, 'DISTANCE': 522, 'WHEELS_ON': 1407.0, 'TAXI_IN': 3.0,
'SCHEDULED_ARRIVAL': 1402, 'ARRIVAL_TIME': 14, 'ARRIVAL_DELAY': 8.0, 'DIVERTED':
0, 'CANCELLED': 0, 'CANCELLATION_REASON': nan, 'AIR_SYSTEM_DELAY': nan,
'SECURITY_DELAY': nan, 'AIRLINE_DELAY': nan, 'LATE_AIRCRAFT_DELAY': nan,
'WEATHER_DELAY': nan}
{'_id': ObjectId('66d4ada4a3f35ec9b6c2f69c'), 'ID': 64, 'YEAR': 2015, 'MONTH':
2, 'DAY': 2, 'DAY_OF_WEEK': 1, 'AIRLINE': 'EV', 'FLIGHT_NUMBER': 6172,
'TAIL_NUMBER': 'N12145', 'ORIGIN_AIRPORT': 'MLI', 'DESTINATION_AIRPORT': 'ORD',
'SCHEDULED_DEPARTURE': 1114, 'DEPARTURE_TIME': 0, 'DEPARTURE_DELAY':
11.329091145205275, 'TAXI_OUT': nan, 'WHEELS_OFF': nan, 'SCHEDULED_TIME': 61,
'ELAPSED_TIME': nan, 'AIR_TIME': 112.64454914521956, 'DISTANCE': 139,
'WHEELS_ON': nan, 'TAXI_IN': nan, 'SCHEDULED_ARRIVAL': 1215, 'ARRIVAL_TIME': 0,
'ARRIVAL_DELAY': 7.545457931394093, 'DIVERTED': 0, 'CANCELLED': 1,
'CANCELLATION_REASON': 'C', 'AIR_SYSTEM_DELAY': nan, 'SECURITY_DELAY': nan,
'AIRLINE_DELAY': nan, 'LATE_AIRCRAFT_DELAY': nan, 'WEATHER_DELAY': nan}
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58.0, 'AIR_TIME': 36.0, 'DISTANCE': 158, 'WHEELS_ON': 738.0, 'TAXI_IN': 9.0,
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53.0, 'AIR_TIME': 41.0, 'DISTANCE': 239, 'WHEELS_ON': 1148.0, 'TAXI_IN': 4.0,
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157.0, 'AIR_TIME': 106.0, 'DISTANCE': 717, 'WHEELS_ON': 727.0, 'TAXI_IN': 5.0,
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'WEATHER_DELAY': nan}
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'SCHEDULED_DEPARTURE': 2145, 'DEPARTURE_TIME': 22, 'DEPARTURE_DELAY': 63.0,
'TAXI_OUT': 23.0, 'WHEELS_OFF': 2311.0, 'SCHEDULED_TIME': 315, 'ELAPSED_TIME':
308.0, 'AIR_TIME': 281.0, 'DISTANCE': 2519, 'WHEELS_ON': 652.0, 'TAXI_IN': 4.0,
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136.0, 'AIR_TIME': 125.0, 'DISTANCE': 1011, 'WHEELS_ON': 1703.0, 'TAXI_IN': 3.0,
'SCHEDULED_ARRIVAL': 1740, 'ARRIVAL_TIME': 17, 'ARRIVAL_DELAY': -34.0,
'DIVERTED': 0, 'CANCELLED': 0, 'CANCELLATION_REASON': nan, 'AIR_SYSTEM_DELAY':
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130.0, 'AIR_TIME': 101.0, 'DISTANCE': 680, 'WHEELS_ON': 702.0, 'TAXI_IN': 7.0,
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'TAXI_OUT': 18.0, 'WHEELS_OFF': 809.0, 'SCHEDULED_TIME': 169, 'ELAPSED_TIME':
165.0, 'AIR_TIME': 144.0, 'DISTANCE': 954, 'WHEELS_ON': 1033.0, 'TAXI_IN': 3.0,
'SCHEDULED_ARRIVAL': 1049, 'ARRIVAL_TIME': 10, 'ARRIVAL_DELAY': -13.0,
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169.0, 'AIR_TIME': 155.0, 'DISTANCE': 1127, 'WHEELS_ON': 2038.0, 'TAXI_IN': 7.0,
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'DIVERTED': 0, 'CANCELLED': 0, 'CANCELLATION_REASON': nan, 'AIR_SYSTEM_DELAY':
1.0, 'SECURITY_DELAY': 0.0, 'AIRLINE_DELAY': 17.0, 'LATE_AIRCRAFT_DELAY': 15.0,
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89.0, 'AIR_TIME': 70.0, 'DISTANCE': 462, 'WHEELS_ON': 1116.0, 'TAXI_IN': 10.0,

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'DIVERTED': 0, 'CANCELLED': 0, 'CANCELLATION_REASON': nan, 'AIR_SYSTEM_DELAY':
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230.0, 'AIR_TIME': 206.0, 'DISTANCE': 1598, 'WHEELS_ON': 2044.0, 'TAXI_IN':
12.0, 'SCHEDULED_ARRIVAL': 2047, 'ARRIVAL_TIME': 20, 'ARRIVAL_DELAY': 9.0,
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'SCHEDULED_DEPARTURE': 710, 'DEPARTURE_TIME': 7, 'DEPARTURE_DELAY': -4.0,
'TAXI_OUT': 9.0, 'WHEELS_OFF': 715.0, 'SCHEDULED_TIME': 85, 'ELAPSED_TIME':
91.0, 'AIR_TIME': 68.0, 'DISTANCE': 407, 'WHEELS_ON': 823.0, 'TAXI_IN': 14.0,
'SCHEDULED_ARRIVAL': 835, 'ARRIVAL_TIME': 8, 'ARRIVAL_DELAY': 2.0, 'DIVERTED':
0, 'CANCELLED': 0, 'CANCELLATION_REASON': nan, 'AIR_SYSTEM_DELAY': nan,
'SECURITY_DELAY': nan, 'AIRLINE_DELAY': nan, 'LATE_AIRCRAFT_DELAY': nan,
'WEATHER_DELAY': nan}
{'_id': ObjectId('66d4ada4a3f35ec9b6c2f6af'), 'ID': 83, 'YEAR': 2015, 'MONTH':
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'SCHEDULED_DEPARTURE': 1120, 'DEPARTURE_TIME': 11, 'DEPARTURE_DELAY': 9.0,
'TAXI_OUT': 11.0, 'WHEELS_OFF': 1140.0, 'SCHEDULED_TIME': 150, 'ELAPSED_TIME':
151.0, 'AIR_TIME': 115.0, 'DISTANCE': 862, 'WHEELS_ON': 1235.0, 'TAXI_IN': 25.0,
'SCHEDULED_ARRIVAL': 1250, 'ARRIVAL_TIME': 13, 'ARRIVAL_DELAY': 10.0,
'DIVERTED': 0, 'CANCELLED': 0, 'CANCELLATION_REASON': nan, 'AIR_SYSTEM_DELAY':
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'WEATHER_DELAY': nan}
{'_id': ObjectId('66d4ada4a3f35ec9b6c2f6b0'), 'ID': 84, 'YEAR': 2015, 'MONTH':
2, 'DAY': 28, 'DAY_OF_WEEK': 6, 'AIRLINE': 'AA', 'FLIGHT_NUMBER': 2259,
'TAIL_NUMBER': 'N3BHAA', 'ORIGIN_AIRPORT': 'ORD', 'DESTINATION_AIRPORT': 'MIA',
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'TAXI_OUT': 13.0, 'WHEELS_OFF': 929.0, 'SCHEDULED_TIME': 185, 'ELAPSED_TIME':
177.0, 'AIR_TIME': 156.0, 'DISTANCE': 1197, 'WHEELS_ON': 1305.0, 'TAXI_IN': 8.0,
'SCHEDULED_ARRIVAL': 1320, 'ARRIVAL_TIME': 13, 'ARRIVAL_DELAY': -7.0,
'DIVERTED': 0, 'CANCELLED': 0, 'CANCELLATION_REASON': nan, 'AIR_SYSTEM_DELAY':
nan, 'SECURITY_DELAY': nan, 'AIRLINE_DELAY': nan, 'LATE_AIRCRAFT_DELAY': nan,
'WEATHER_DELAY': nan}
{'_id': ObjectId('66d4ada4a3f35ec9b6c2f6b1'), 'ID': 85, 'YEAR': 2015, 'MONTH':
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'SCHEDULED_DEPARTURE': 2005, 'DEPARTURE_TIME': 0, 'DEPARTURE_DELAY':

11.329091145205275, 'TAXI_OUT': nan, 'WHEELS_OFF': nan, 'SCHEDULED_TIME': 70,
'ELAPSED_TIME': nan, 'AIR_TIME': 112.64454914521956, 'DISTANCE': 327,
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'AIRLINE_DELAY': nan, 'LATE_AIRCRAFT_DELAY': nan, 'WEATHER_DELAY': nan}
{'_id': ObjectId('66d4ada4a3f35ec9b6c2f6b2'), 'ID': 86, 'YEAR': 2015, 'MONTH':
1, 'DAY': 27, 'DAY_OF_WEEK': 2, 'AIRLINE': 'OO', 'FLIGHT_NUMBER': 4720,
'TAIL_NUMBER': 'N549CA', 'ORIGIN_AIRPORT': 'SEA', 'DESTINATION_AIRPORT': 'PHX',
'SCHEDULED_DEPARTURE': 620, 'DEPARTURE_TIME': 6, 'DEPARTURE_DELAY': -9.0,
'TAXI_OUT': 14.0, 'WHEELS_OFF': 625.0, 'SCHEDULED_TIME': 168, 'ELAPSED_TIME':
170.0, 'AIR_TIME': 153.0, 'DISTANCE': 1107, 'WHEELS_ON': 958.0, 'TAXI_IN': 3.0,
'SCHEDULED_ARRIVAL': 1008, 'ARRIVAL_TIME': 10, 'ARRIVAL_DELAY': -7.0,
'DIVERTED': 0, 'CANCELLED': 0, 'CANCELLATION_REASON': nan, 'AIR_SYSTEM_DELAY':
nan, 'SECURITY_DELAY': nan, 'AIRLINE_DELAY': nan, 'LATE_AIRCRAFT_DELAY': nan,
'WEATHER_DELAY': nan}
{'_id': ObjectId('66d4ada4a3f35ec9b6c2f6b3'), 'ID': 87, 'YEAR': 2015, 'MONTH':
2, 'DAY': 19, 'DAY_OF_WEEK': 4, 'AIRLINE': 'AA', 'FLIGHT_NUMBER': 1529,
'TAIL_NUMBER': 'N3CKAA', 'ORIGIN_AIRPORT': 'DFW', 'DESTINATION_AIRPORT': 'PHX',
'SCHEDULED_DEPARTURE': 1710, 'DEPARTURE_TIME': 17, 'DEPARTURE_DELAY': 6.0,
'TAXI_OUT': 15.0, 'WHEELS_OFF': 1731.0, 'SCHEDULED_TIME': 161, 'ELAPSED_TIME':
165.0, 'AIR_TIME': 139.0, 'DISTANCE': 868, 'WHEELS_ON': 1850.0, 'TAXI_IN': 11.0,
'SCHEDULED_ARRIVAL': 1851, 'ARRIVAL_TIME': 19, 'ARRIVAL_DELAY': 10.0,
'DIVERTED': 0, 'CANCELLED': 0, 'CANCELLATION_REASON': nan, 'AIR_SYSTEM_DELAY':
nan, 'SECURITY_DELAY': nan, 'AIRLINE_DELAY': nan, 'LATE_AIRCRAFT_DELAY': nan,
'WEATHER_DELAY': nan}
{'_id': ObjectId('66d4ada4a3f35ec9b6c2f6b4'), 'ID': 88, 'YEAR': 2015, 'MONTH':
1, 'DAY': 26, 'DAY_OF_WEEK': 1, 'AIRLINE': 'WN', 'FLIGHT_NUMBER': 4211,
'TAIL_NUMBER': 'N367SW', 'ORIGIN_AIRPORT': 'LAX', 'DESTINATION_AIRPORT': 'ABQ',
'SCHEDULED_DEPARTURE': 1840, 'DEPARTURE_TIME': 18, 'DEPARTURE_DELAY': 12.0,
'TAXI_OUT': 7.0, 'WHEELS_OFF': 1859.0, 'SCHEDULED_TIME': 105, 'ELAPSED_TIME':
105.0, 'AIR_TIME': 92.0, 'DISTANCE': 677, 'WHEELS_ON': 2131.0, 'TAXI_IN': 6.0,
'SCHEDULED_ARRIVAL': 2125, 'ARRIVAL_TIME': 21, 'ARRIVAL_DELAY': 12.0,
'DIVERTED': 0, 'CANCELLED': 0, 'CANCELLATION_REASON': nan, 'AIR_SYSTEM_DELAY':
nan, 'SECURITY_DELAY': nan, 'AIRLINE_DELAY': nan, 'LATE_AIRCRAFT_DELAY': nan,
'WEATHER_DELAY': nan}
{'_id': ObjectId('66d4ada4a3f35ec9b6c2f6b5'), 'ID': 89, 'YEAR': 2015, 'MONTH':
1, 'DAY': 1, 'DAY_OF_WEEK': 4, 'AIRLINE': 'UA', 'FLIGHT_NUMBER': 1739,
'TAIL_NUMBER': 'N73275', 'ORIGIN_AIRPORT': 'SFO', 'DESTINATION_AIRPORT': 'EWR',
'SCHEDULED_DEPARTURE': 823, 'DEPARTURE_TIME': 8, 'DEPARTURE_DELAY': -1.0,
'TAXI_OUT': 14.0, 'WHEELS_OFF': 836.0, 'SCHEDULED_TIME': 336, 'ELAPSED_TIME':
320.0, 'AIR_TIME': 294.0, 'DISTANCE': 2565, 'WHEELS_ON': 1630.0, 'TAXI_IN':
12.0, 'SCHEDULED_ARRIVAL': 1659, 'ARRIVAL_TIME': 16, 'ARRIVAL_DELAY': -17.0,
'DIVERTED': 0, 'CANCELLED': 0, 'CANCELLATION_REASON': nan, 'AIR_SYSTEM_DELAY':
nan, 'SECURITY_DELAY': nan, 'AIRLINE_DELAY': nan, 'LATE_AIRCRAFT_DELAY': nan,
'WEATHER_DELAY': nan}
{'_id': ObjectId('66d4ada4a3f35ec9b6c2f6b6'), 'ID': 90, 'YEAR': 2015, 'MONTH':
3, 'DAY': 2, 'DAY_OF_WEEK': 1, 'AIRLINE': 'OO', 'FLIGHT_NUMBER': 3446,

'TAIL_NUMBER': 'N223AG', 'ORIGIN_AIRPORT': 'SEA', 'DESTINATION_AIRPORT': 'ONT',
'SCHEDULED_DEPARTURE': 1415, 'DEPARTURE_TIME': 14, 'DEPARTURE_DELAY': -9.0,
'TAXI_OUT': 14.0, 'WHEELS_OFF': 1420.0, 'SCHEDULED_TIME': 147, 'ELAPSED_TIME':
141.0, 'AIR_TIME': 123.0, 'DISTANCE': 956, 'WHEELS_ON': 1623.0, 'TAXI_IN': 4.0,
'SCHEDULED_ARRIVAL': 1642, 'ARRIVAL_TIME': 16, 'ARRIVAL_DELAY': -15.0,
'DIVERTED': 0, 'CANCELLED': 0, 'CANCELLATION_REASON': nan, 'AIR_SYSTEM_DELAY':
nan, 'SECURITY_DELAY': nan, 'AIRLINE_DELAY': nan, 'LATE_AIRCRAFT_DELAY': nan,
'WEATHER_DELAY': nan}
{'_id': ObjectId('66d4ada4a3f35ec9b6c2f6b7'), 'ID': 91, 'YEAR': 2015, 'MONTH':
1, 'DAY': 3, 'DAY_OF_WEEK': 6, 'AIRLINE': 'OO', 'FLIGHT_NUMBER': 7420,
'TAIL_NUMBER': 'N457SW', 'ORIGIN_AIRPORT': 'IMT', 'DESTINATION_AIRPORT': 'MSP',
'SCHEDULED_DEPARTURE': 1305, 'DEPARTURE_TIME': 13, 'DEPARTURE_DELAY': 5.0,
'TAXI_OUT': 19.0, 'WHEELS_OFF': 1329.0, 'SCHEDULED_TIME': 78, 'ELAPSED_TIME':
71.0, 'AIR_TIME': 46.0, 'DISTANCE': 257, 'WHEELS_ON': 1415.0, 'TAXI_IN': 6.0,
'SCHEDULED_ARRIVAL': 1423, 'ARRIVAL_TIME': 14, 'ARRIVAL_DELAY': -2.0,
'DIVERTED': 0, 'CANCELLED': 0, 'CANCELLATION_REASON': nan, 'AIR_SYSTEM_DELAY':
nan, 'SECURITY_DELAY': nan, 'AIRLINE_DELAY': nan, 'LATE_AIRCRAFT_DELAY': nan,
'WEATHER_DELAY': nan}
{'_id': ObjectId('66d4ada4a3f35ec9b6c2f6b8'), 'ID': 92, 'YEAR': 2015, 'MONTH':
2, 'DAY': 2, 'DAY_OF_WEEK': 1, 'AIRLINE': 'MQ', 'FLIGHT_NUMBER': 3379,
'TAIL_NUMBER': 'N843MQ', 'ORIGIN_AIRPORT': 'LEX', 'DESTINATION_AIRPORT': 'ORD',
'SCHEDULED_DEPARTURE': 530, 'DEPARTURE_TIME': 5, 'DEPARTURE_DELAY': -1.0,
'TAXI_OUT': 16.0, 'WHEELS_OFF': 545.0, 'SCHEDULED_TIME': 98, 'ELAPSED_TIME':
102.0, 'AIR_TIME': 57.0, 'DISTANCE': 323, 'WHEELS_ON': 542.0, 'TAXI_IN': 29.0,
'SCHEDULED_ARRIVAL': 608, 'ARRIVAL_TIME': 6, 'ARRIVAL_DELAY': 3.0, 'DIVERTED':
0, 'CANCELLED': 0, 'CANCELLATION_REASON': nan, 'AIR_SYSTEM_DELAY': nan,
'SECURITY_DELAY': nan, 'AIRLINE_DELAY': nan, 'LATE_AIRCRAFT_DELAY': nan,
'WEATHER_DELAY': nan}
{'_id': ObjectId('66d4ada4a3f35ec9b6c2f6b9'), 'ID': 93, 'YEAR': 2015, 'MONTH':
1, 'DAY': 19, 'DAY_OF_WEEK': 1, 'AIRLINE': 'UA', 'FLIGHT_NUMBER': 1577,
'TAIL_NUMBER': 'N73299', 'ORIGIN_AIRPORT': 'LGA', 'DESTINATION_AIRPORT': 'ORD',
'SCHEDULED_DEPARTURE': 1500, 'DEPARTURE_TIME': 14, 'DEPARTURE_DELAY': -4.0,
'TAXI_OUT': 15.0, 'WHEELS_OFF': 1511.0, 'SCHEDULED_TIME': 159, 'ELAPSED_TIME':
131.0, 'AIR_TIME': 110.0, 'DISTANCE': 733, 'WHEELS_ON': 1601.0, 'TAXI_IN': 6.0,
'SCHEDULED_ARRIVAL': 1639, 'ARRIVAL_TIME': 16, 'ARRIVAL_DELAY': -32.0,
'DIVERTED': 0, 'CANCELLED': 0, 'CANCELLATION_REASON': nan, 'AIR_SYSTEM_DELAY':
nan, 'SECURITY_DELAY': nan, 'AIRLINE_DELAY': nan, 'LATE_AIRCRAFT_DELAY': nan,
'WEATHER_DELAY': nan}
{'_id': ObjectId('66d4ada4a3f35ec9b6c2f6ba'), 'ID': 94, 'YEAR': 2015, 'MONTH':
2, 'DAY': 12, 'DAY_OF_WEEK': 4, 'AIRLINE': 'EV', 'FLIGHT_NUMBER': 4259,
'TAIL_NUMBER': 'N11548', 'ORIGIN_AIRPORT': 'IAH', 'DESTINATION_AIRPORT': 'LBB',
'SCHEDULED_DEPARTURE': 1749, 'DEPARTURE_TIME': 17, 'DEPARTURE_DELAY': -2.0,
'TAXI_OUT': 19.0, 'WHEELS_OFF': 1806.0, 'SCHEDULED_TIME': 97, 'ELAPSED_TIME':
94.0, 'AIR_TIME': 71.0, 'DISTANCE': 458, 'WHEELS_ON': 1917.0, 'TAXI_IN': 4.0,
'SCHEDULED_ARRIVAL': 1926, 'ARRIVAL_TIME': 19, 'ARRIVAL_DELAY': -5.0,
'DIVERTED': 0, 'CANCELLED': 0, 'CANCELLATION_REASON': nan, 'AIR_SYSTEM_DELAY':
nan, 'SECURITY_DELAY': nan, 'AIRLINE_DELAY': nan, 'LATE_AIRCRAFT_DELAY': nan,
'WEATHER_DELAY': nan}

{'_id': ObjectId('66d4ada4a3f35ec9b6c2f6bb'), 'ID': 95, 'YEAR': 2015, 'MONTH': 3, 'DAY': 5, 'DAY_OF_WEEK': 4, 'AIRLINE': 'US', 'FLIGHT_NUMBER': 1784, 'TAIL_NUMBER': 'N176UW', 'ORIGIN_AIRPORT': 'BWI', 'DESTINATION_AIRPORT': 'PHX', 'SCHEDULED_DEPARTURE': 2010, 'DEPARTURE_TIME': 21, 'DEPARTURE_DELAY': 79.0, 'TAXI_OUT': 54.0, 'WHEELS_OFF': 2223.0, 'SCHEDULED_TIME': 312, 'ELAPSED_TIME': 339.0, 'AIR_TIME': 281.0, 'DISTANCE': 1999, 'WHEELS_ON': 104.0, 'TAXI_IN': 4.0, 'SCHEDULED_ARRIVAL': 2322, 'ARRIVAL_TIME': 1, 'ARRIVAL_DELAY': 106.0, 'DIVERTED': 0, 'CANCELLED': 0, 'CANCELLATION_REASON': nan, 'AIR_SYSTEM_DELAY': 27.0, 'SECURITY_DELAY': 0.0, 'AIRLINE_DELAY': 0.0, 'LATE_AIRCRAFT_DELAY': 23.0, 'WEATHER_DELAY': 56.0}
{'_id': ObjectId('66d4ada4a3f35ec9b6c2f6bc'), 'ID': 96, 'YEAR': 2015, 'MONTH': 1, 'DAY': 4, 'DAY_OF_WEEK': 7, 'AIRLINE': 'EV', 'FLIGHT_NUMBER': 5205, 'TAIL_NUMBER': 'N840AS', 'ORIGIN_AIRPORT': 'ATL', 'DESTINATION_AIRPORT': 'EVV', 'SCHEDULED_DEPARTURE': 1212, 'DEPARTURE_TIME': 12, 'DEPARTURE_DELAY': 24.0, 'TAXI_OUT': 16.0, 'WHEELS_OFF': 1252.0, 'SCHEDULED_TIME': 82, 'ELAPSED_TIME': 72.0, 'AIR_TIME': 53.0, 'DISTANCE': 350, 'WHEELS_ON': 1245.0, 'TAXI_IN': 3.0, 'SCHEDULED_ARRIVAL': 1234, 'ARRIVAL_TIME': 12, 'ARRIVAL_DELAY': 14.0, 'DIVERTED': 0, 'CANCELLED': 0, 'CANCELLATION_REASON': nan, 'AIR_SYSTEM_DELAY': nan, 'SECURITY_DELAY': nan, 'AIRLINE_DELAY': nan, 'LATE_AIRCRAFT_DELAY': nan, 'WEATHER_DELAY': nan}
{'_id': ObjectId('66d4ada4a3f35ec9b6c2f6bd'), 'ID': 97, 'YEAR': 2015, 'MONTH': 2, 'DAY': 19, 'DAY_OF_WEEK': 4, 'AIRLINE': 'UA', 'FLIGHT_NUMBER': 1205, 'TAIL_NUMBER': 'N36476', 'ORIGIN_AIRPORT': 'LAX', 'DESTINATION_AIRPORT': 'LAS', 'SCHEDULED_DEPARTURE': 2234, 'DEPARTURE_TIME': 22, 'DEPARTURE_DELAY': 10.0, 'TAXI_OUT': 12.0, 'WHEELS_OFF': 2256.0, 'SCHEDULED_TIME': 73, 'ELAPSED_TIME': 62.0, 'AIR_TIME': 43.0, 'DISTANCE': 236, 'WHEELS_ON': 2339.0, 'TAXI_IN': 7.0, 'SCHEDULED_ARRIVAL': 2347, 'ARRIVAL_TIME': 23, 'ARRIVAL_DELAY': -1.0, 'DIVERTED': 0, 'CANCELLED': 0, 'CANCELLATION_REASON': nan, 'AIR_SYSTEM_DELAY': nan, 'SECURITY_DELAY': nan, 'AIRLINE_DELAY': nan, 'LATE_AIRCRAFT_DELAY': nan, 'WEATHER_DELAY': nan}
{'_id': ObjectId('66d4ada4a3f35ec9b6c2f6be'), 'ID': 98, 'YEAR': 2015, 'MONTH': 1, 'DAY': 29, 'DAY_OF_WEEK': 4, 'AIRLINE': 'DL', 'FLIGHT_NUMBER': 783, 'TAIL_NUMBER': 'N904DE', 'ORIGIN_AIRPORT': 'MSP', 'DESTINATION_AIRPORT': 'ATL', 'SCHEDULED_DEPARTURE': 620, 'DEPARTURE_TIME': 6, 'DEPARTURE_DELAY': -2.0, 'TAXI_OUT': 29.0, 'WHEELS_OFF': 647.0, 'SCHEDULED_TIME': 159, 'ELAPSED_TIME': 153.0, 'AIR_TIME': 114.0, 'DISTANCE': 907, 'WHEELS_ON': 941.0, 'TAXI_IN': 10.0, 'SCHEDULED_ARRIVAL': 959, 'ARRIVAL_TIME': 9, 'ARRIVAL_DELAY': -8.0, 'DIVERTED': 0, 'CANCELLED': 0, 'CANCELLATION_REASON': nan, 'AIR_SYSTEM_DELAY': nan, 'SECURITY_DELAY': nan, 'AIRLINE_DELAY': nan, 'LATE_AIRCRAFT_DELAY': nan, 'WEATHER_DELAY': nan}
{'_id': ObjectId('66d4ada4a3f35ec9b6c2f6bf'), 'ID': 99, 'YEAR': 2015, 'MONTH': 1, 'DAY': 31, 'DAY_OF_WEEK': 6, 'AIRLINE': 'EV', 'FLIGHT_NUMBER': 4258, 'TAIL_NUMBER': 'N12567', 'ORIGIN_AIRPORT': 'CLT', 'DESTINATION_AIRPORT': 'IAH', 'SCHEDULED_DEPARTURE': 840, 'DEPARTURE_TIME': 8, 'DEPARTURE_DELAY': -5.0, 'TAXI_OUT': 28.0, 'WHEELS_OFF': 903.0, 'SCHEDULED_TIME': 184, 'ELAPSED_TIME': 202.0, 'AIR_TIME': 161.0, 'DISTANCE': 912, 'WHEELS_ON': 1044.0, 'TAXI_IN': 13.0, 'SCHEDULED_ARRIVAL': 1044, 'ARRIVAL_TIME': 10, 'ARRIVAL_DELAY': 13.0, 'DIVERTED': 0, 'CANCELLED': 0, 'CANCELLATION_REASON': nan, 'AIR_SYSTEM_DELAY':

```
nan, 'SECURITY_DELAY': nan, 'AIRLINE_DELAY': nan, 'LATE_AIRCRAFT_DELAY': nan,
'WEATHER_DELAY': nan}
{'_id': ObjectId('66d4ada4a3f35ec9b6c2f6c0'), 'ID': 100, 'YEAR': 2015, 'MONTH':
1, 'DAY': 29, 'DAY_OF_WEEK': 4, 'AIRLINE': 'DL', 'FLIGHT_NUMBER': 1120,
'TAIL_NUMBER': 'N916DL', 'ORIGIN_AIRPORT': 'BDL', 'DESTINATION_AIRPORT': 'DTW',
'SCHEDULED_DEPARTURE': 905, 'DEPARTURE_TIME': 8, 'DEPARTURE_DELAY': -6.0,
'TAXI_OUT': 13.0, 'WHEELS_OFF': 912.0, 'SCHEDULED_TIME': 129, 'ELAPSED_TIME':
114.0, 'AIR_TIME': 90.0, 'DISTANCE': 549, 'WHEELS_ON': 1042.0, 'TAXI_IN': 11.0,
'SCHEDULED_ARRIVAL': 1114, 'ARRIVAL_TIME': 10, 'ARRIVAL_DELAY': -21.0,
'DIVERTED': 0, 'CANCELLED': 0, 'CANCELLATION_REASON': nan, 'AIR_SYSTEM_DELAY':
nan, 'SECURITY_DELAY': nan, 'AIRLINE_DELAY': nan, 'LATE_AIRCRAFT_DELAY': nan,
'WEATHER_DELAY': nan}

IOPub data rate exceeded.
The Jupyter server will temporarily stop sending output
to the client in order to avoid crashing it.
To change this limit, set the config variable
`--ServerApp.iopub_data_rate_limit`.

Current values:
ServerApp.iopub_data_rate_limit=1000000.0 (bytes/sec)
ServerApp.rate_limit_window=3.0 (secs)
```

c)Write a MongoDB command to insert a single flight record from the dataset.

```
[71]: collection.insert_one({'ID': 0, 'YEAR': 2015, 'MONTH': 3, 'DAY': 4,
      ↪'DAY_OF_WEEK': 3, 'AIRLINE': 'EV', 'FLIGHT_NUMBER': 5170, 'TAIL_NUMBER':
      ↪'N842AS', 'ORIGIN_AIRPORT': 'CVG', 'DESTINATION_AIRPORT': 'XNA',
      ↪'SCHEDULED_DEPARTURE': 935, 'DEPARTURE_TIME': 954.0, 'DEPARTURE_DELAY': 19.
      ↪0, 'TAXI_OUT': 16.0, 'WHEELS_OFF': 1010.0, 'SCHEDULED_TIME': 115,
      ↪'ELAPSED_TIME': 129.0, 'AIR_TIME': 108.0, 'DISTANCE': 562, 'WHEELS_ON': 1058.
      ↪0, 'TAXI_IN': 5.0, 'SCHEDULED_ARRIVAL': 1030, 'ARRIVAL_TIME': 1103.0,
      ↪'ARRIVAL_DELAY': 33.0, 'DIVERTED': 0, 'CANCELLED': 0, 'CANCELLATION_REASON':
      ↪np.nan, 'AIR_SYSTEM_DELAY': 14.0, 'SECURITY_DELAY': 0.0, 'AIRLINE_DELAY': 19.
      ↪0, 'LATE_AIRCRAFT_DELAY': 0.0, 'WEATHER_DELAY': 0.0})
```

```
[71]: InsertOneResult(ObjectId('66d1534371e9a3ff49573360'), acknowledged=True)
```

```
[ ]: """
     one= collection.find({"ID" : 0})
     for item in one:
         print(item)
```

d)Write a MongoDB query to find all flights that were delayed by more than 60 minutes.

```
[73]: pd.DataFrame(database.flights.find({
         "$or": [
```

```
      { "DEPARTURE_DELAY": { "$gt": 60 } },
      { "ARRIVAL_DELAY": { "$gt": 60 } }
    ]
}))
```

[73]:   _id   ID YEAR MONTH DAY DAY_OF_WEEK AIRLINE \
0   66d4ada4a3f35ec9b6c2f65e   2 2015   1   27   2   B6
1   66d4ada4a3f35ec9b6c2f66e   18 2015   2   24   2   OO
2   66d4ada4a3f35ec9b6c2f672   22 2015   1   18   7   US
3   66d4ada4a3f35ec9b6c2f677   27 2015   2   1   7   OO
4   66d4ada4a3f35ec9b6c2f67e   34 2015   1   4   7   F9
...   .
4095 66d4ada5a3f35ec9b6c3d0e7   55947 2015   1   30   5   US
4096 66d4ada5a3f35ec9b6c3d0f3   55959 2015   3   3   2   EV
4097 66d4ada5a3f35ec9b6c3d0f8   55964 2015   1   4   7   UA
4098 66d4ada5a3f35ec9b6c3d10d   55985 2015   3   3   2   MQ
4099 66d4ada5a3f35ec9b6c3d117   55995 2015   2   4   3   B6

      FLIGHT_NUMBER TAIL_NUMBER ORIGIN_AIRPORT ... ARRIVAL_TIME \
0   716   N309JB   JAX   ...   16
1   6196   N751SK   ONT   ...   13
2   1756   N823AW   PBI   ...   15
3   2699   N897SK   PHX   ...   20
4   661   N922FR   DEN   ...   16
...   .
4095   483   N835AW   MSP   ...   18
4096   4415   N15973   SAV   ...   17
4097   660   N475UA   TPA   ...   22
4098   3158   N664MQ   SGF   ...   15
4099   1567   N508JB   HPN   ...   13

      ARRIVAL_DELAY DIVERTED CANCELLED CANCELLATION_REASON \
0   96.0   0   0   NaN
1   56.0   0   0   NaN
2   54.0   0   0   NaN
3   293.0   0   0   NaN
4   82.0   0   0   NaN
...   .
4095   120.0   0   0   NaN
4096   102.0   0   0   NaN
4097   104.0   0   0   NaN
4098   120.0   0   0   NaN
4099   174.0   0   0   NaN

      AIR_SYSTEM_DELAY SECURITY_DELAY AIRLINE_DELAY LATE_AIRCRAFT_DELAY \
0   6.0   0.0   90.0   0.0
1   0.0   0.0   56.0   0.0
```

|      |        |     |       |       |
|------|--------|-----|-------|-------|
| 2    | 0.0    | 0.0 | 21.0  | 33.0  |
| 3    | 0.0    | 0.0 | 0.0   | 293.0 |
| 4    | 77.0   | 0.0 | 4.0   | 1.0   |
| ...  | ...    | ... | ...   | ...   |
| 4095 | 120.0  | 0.0 | 0.0   | 0.0   |
| 4096 | 0.0    | 0.0 | 0.0   | 102.0 |
| 4097 | 104.0  | 0.0 | 0.0   | 0.0   |
| 4098 | 0.0    | 0.0 | 0.0   | 120.0 |
| 4099 | 10.0   | 0.0 | 164.0 | 0.0   |

```
        WEATHER_DELAY
0                 0.0
1                 0.0
2                 0.0
3                 0.0
4                 0.0
...               ...
4095              0.0
4096              0.0
4097              0.0
4098              0.0
4099              0.0

[4100 rows x 33 columns]
```

e) How would you query all flights that were cancelled (CANCELLED flag set to 1) and return only the AIRLINE, ORIGIN_AIRPORT, and CANCELLATION_REASON fields?

```python
[75]: pd.DataFrame(database.flights.find(
          { "CANCELLED": 1 },
          { "AIRLINE": 1, "ORIGIN_AIRPORT": 1, "CANCELLATION_REASON": 1, "_id": 0 }
      ))
```

```
[75]:      AIRLINE ORIGIN_AIRPORT CANCELLATION_REASON
      0         EV            MLI                   C
      1         WN            BWI                   B
      2         DL            SFO                   B
      3         AA            DFW                   B
      4         MQ            LGA                   B
      ...       ...           ...                 ...
      2146      MQ            LGA                   B
      2147      AA            BOS                   A
      2148      MQ            DFW                   B
      2149      EV            SGF                   B
      2150      US            MIA                   B
```

[2151 rows x 3 columns]

f)Using MongoDB's aggregation framework, how would you calculate the average arrival delay (ARRIVAL_DELAY) for each airline? [Create a suitable plot using matplotlib/seaborn]

```
[77]: delay_df = pd.DataFrame(database.flights.aggregate([
          {"$group": {"_id": "$AIRLINE","averageArrivalDelay": { "$avg":␣
      ↪"$ARRIVAL_DELAY" }}},
          {"$sort": { "averageArrivalDelay": 1 }}]))

      plt.figure(figsize=(8, 6))
      sns.set_style('whitegrid')
      sns.barplot(data=delay_df, x='_id', y='averageArrivalDelay', palette='Set1')
      plt.xlabel('AIRLINE')
      plt.ylabel('AVERAGE ARRIVAL DELAY')
      plt.title('Average Arrival Delay by Airline')
      plt.show()
```
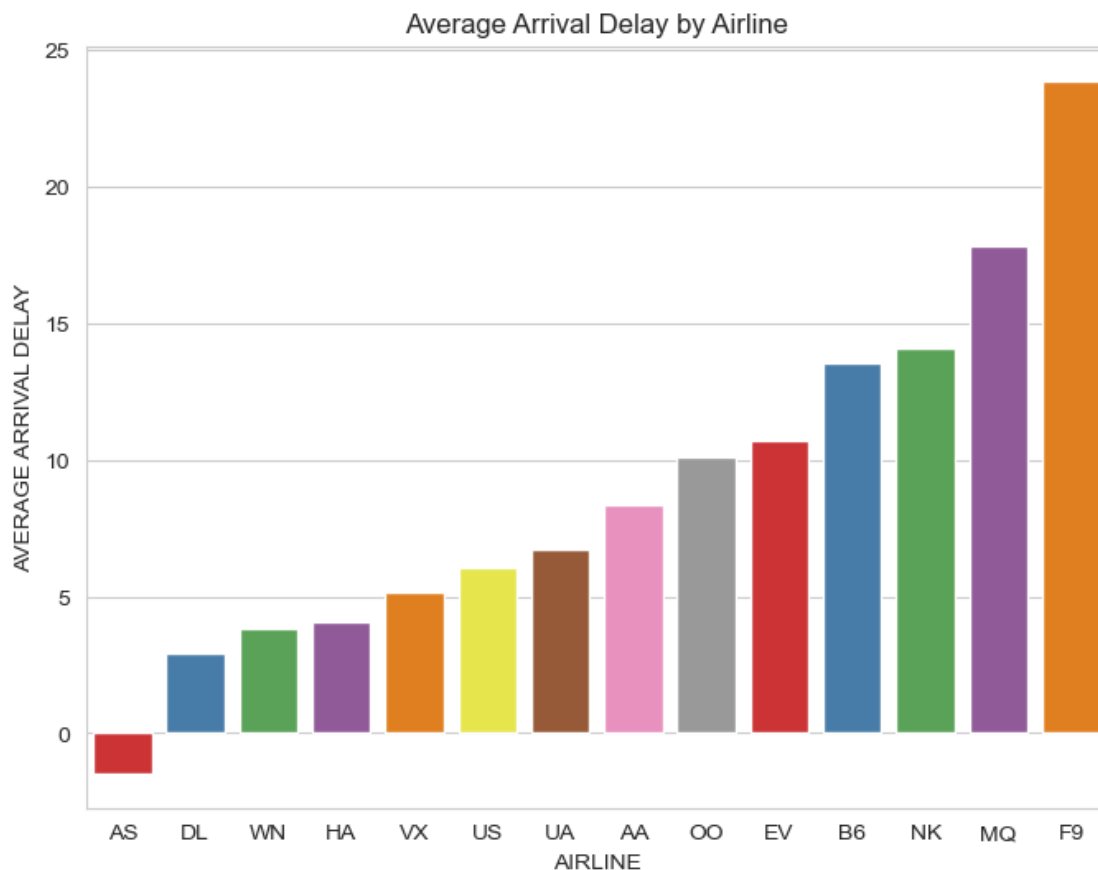
g)Days of months with respect to average of arrival delays. [Create a suitable plot using matplotlib/seaborn]

```python
[79]: delay_df = pd.DataFrame(database.flights.aggregate([
          {"$group": {"_id": "$DAY","averageArrivalDelay": { "$avg": "$ARRIVAL_DELAY"
      ↪}}},
          {"$sort": { "_id": 1 }}]))

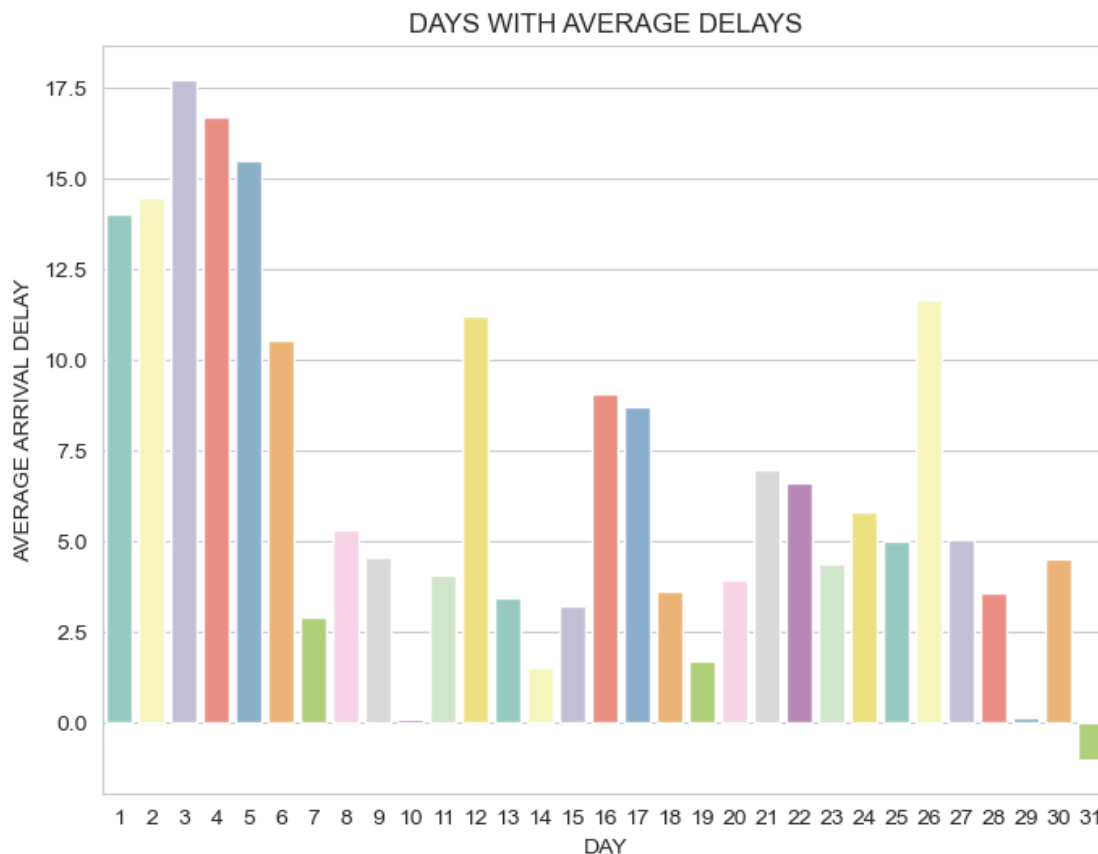      plt.figure(figsize=(8, 6))
      sns.set_style('whitegrid')
      sns.barplot(data=delay_df, x='_id', y='averageArrivalDelay', palette='Set3')
      plt.xlabel('DAY')
      plt.ylabel('AVERAGE ARRIVAL DELAY')
      plt.title('DAYS WITH AVERAGE DELAYS')
      plt.show()
```


h)Write a MongoDB aggregation pipeline to find the top 10 airports with the highest average total delay (DEPARTURE_DELAY + ARRIVAL DELAY).

```
[81]:  pd.DataFrame(database.flights.aggregate([
           {"$group": {"_id": "$ORIGIN_AIRPORT","averageDelay": { "$avg": {'$add' :
        ↪['$DEPARTURE_DELAY','$ARRIVAL_DELAY'] }}}},
           {"$sort": { "averageDelay": -1 }},{'$limit':10}]))
```

```
[81]:      _id  averageDelay
       0   HOB    250.666667
       1   CDC    210.200000
       2   PIH    191.200000
       3   ILG    168.666667
       4   HIB    168.250000
       5   SCE    128.714286
       6   TTN     97.891436
       7   JLN     95.742001
       8   SPS     93.339221
       9   MBS     77.910650
```

i)Explain how you would create an index on the ORIGIN_AIRPORT and DESTINA-TION_AIRPORT fields to optimize queries filtering by these fields.

```
[141]:  collection.create_index(['ORIGIN_AIRPORT','DESTINATION_AIRPORT'])

        #for i in collection.find({},{'_id':0,'ORIGIN_AIRPORT':1,'DESTINATION_AIRPORT':
        ↪1}):
            #print(i)
```

```
[141]:  'ORIGIN_AIRPORT_1_DESTINATION_AIRPORT_1'
```

j)Arrange weekdays with respect to the average arrival delays caused. [Create a suitable plot using matplotlib/seaborn]

```
[85]:  delay_df = pd.DataFrame(database.flights.aggregate([
           {"$group": {"_id": "$DAY_OF_WEEK","averageArrivalDelay": { "$avg":␣
        ↪"$ARRIVAL_DELAY" }}},
           {"$sort": { "averageDelay": -1 }},{'$limit':10}]))

       weekday_mapping = {
           1: 'Monday',
           2: 'Tuesday',
           3: 'Wednesday',
           4: 'Thursday',
           5: 'Friday',
           6: 'Saturday',
           7: 'Sunday'
       }
       delay_df['_id'] = delay_df['_id'].map(weekday_mapping)
```

```
plt.figure(figsize=(8, 6))
sns.set_style('whitegrid')
sns.barplot(data=delay_df, x='_id', y='averageArrivalDelay', order=['Monday',⊔
 ↪'Tuesday', 'Wednesday', 'Thursday', 'Friday', 'Saturday', 'Sunday'])
plt.xlabel('Day of the Week')
plt.ylabel('Average Arrival Delay (minutes)')
plt.title('Average Arrival Delay by Weekday')
plt.show()
```
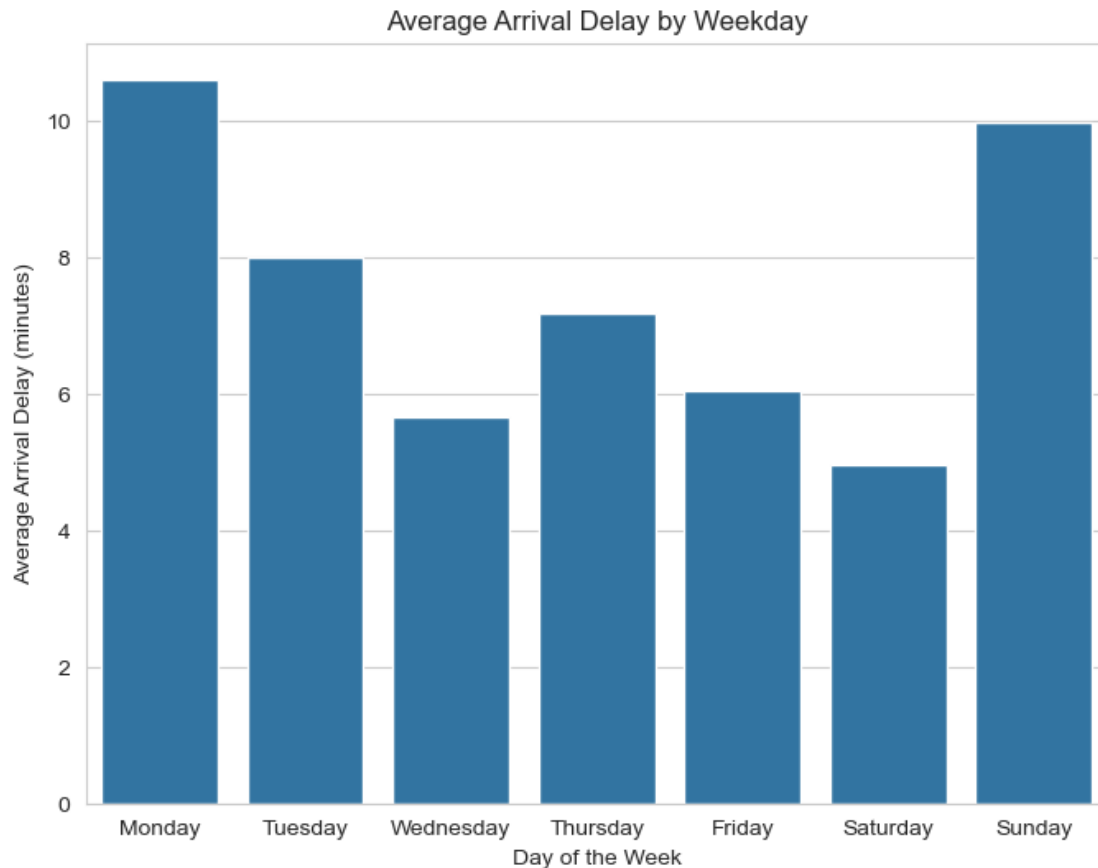

k) Arrange Days of month as per cancellations done in descending order. [Create a suitable plot using matplotlib/seaborn]

[87]:
```
cancel_df = pd.DataFrame(collection.aggregate([
    {'$match': {'CANCELLED' : 1}},
    {'$group': {'_id': '$DAY','cancellations': {'$sum': '$CANCELLED'}}},
    {'$project': {'_id': 0, 'DAY': '$_id', 'cancellations': 1}},
    {'$sort': {'cancellations': -1}}
]))
plt.figure(figsize=(9, 6))
```

```
sns.barplot(data=cancel_df, x='DAY', y='cancellations')
plt.xlabel('Day of the Month')
plt.ylabel('Total Cancellations')
plt.title('Total Cancellations by Day of the Month')
plt.show()
```


Total Cancellations by Day of the Month
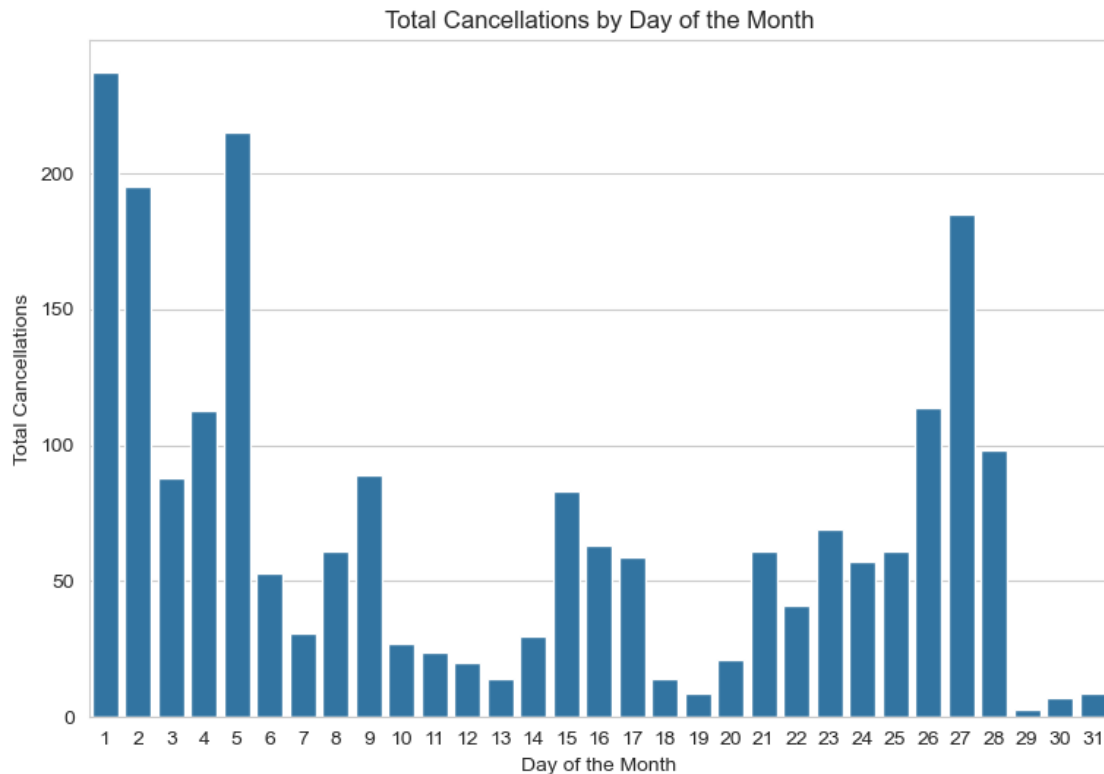
l)Find the busiest airports with respect to day of week. Represent it by using suitable plot.

```
[89]: airport_df = pd.DataFrame(collection.aggregate([
          {'$group': {'_id': {'AIRPORT': '$ORIGIN_AIRPORT', 'DAY_OF_WEEK':
      ↪'$DAY_OF_WEEK'},'count': {'$sum': 1}}},
          {'$project': {'_id': 0,'AIRPORT': '$_id.AIRPORT','DAY_OF_WEEK': '$_id.
      ↪DAY_OF_WEEK','count': 1}},
          {'$sort': {'DAY_OF_WEEK': 1,'count': -1}},
          {'$group': {'_id': '$DAY_OF_WEEK','AIRPORT': {'$first': '$AIRPORT'},'COUNT':
      ↪ {'$first': '$count'}}},
          {'$project': {'_id': 0,'DAY_OF_WEEK': '$_id','AIRPORT': 1,'COUNT': 1}}]))

      plt.figure(figsize=(9,6))
      sns.barplot(data=airport_df, x='DAY_OF_WEEK', y='COUNT', palette='Set1')
      plt.title('Busiest Airports with respect to day of week')
```

```
plt.xlabel('Day of the Week')
plt.ylabel('Number of People')
plt.show()
```


Busiest Airports with respect to day of week
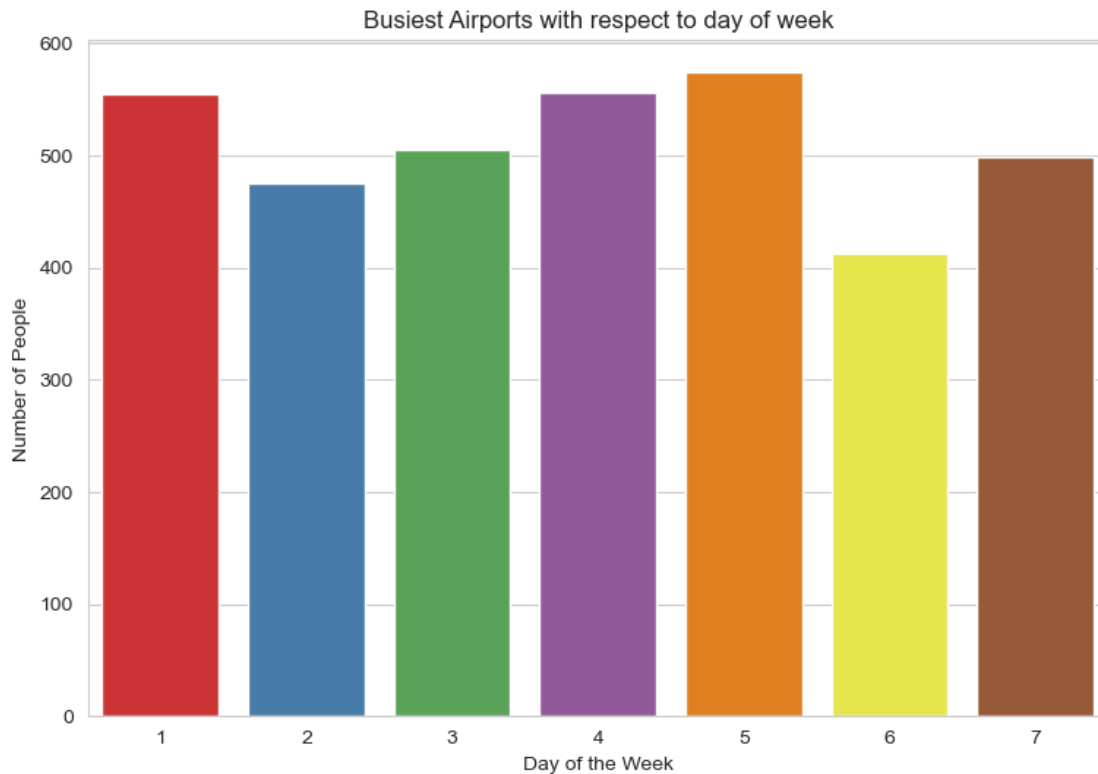
m) Find top 10 Airlines of US. Represent it by using suitable plot.

```
[91]: airline_df = pd.DataFrame(collection.aggregate([
          {'$match':{'AIRLINE':'US'}},
          {'$group':{'_id':'$FLIGHT_NUMBER','count':{'$sum' : 1}}},
          {'$project':{'_id':0,'FLIGHT_NUMBER':'$_id','count':1}},
          {'$sort':{'count':-1}},
          {'$limit':10}
      ]))

      plt.figure(figsize=(9, 6))
      sns.set_style('whitegrid')
      sns.barplot(data= airline_df, x= 'FLIGHT_NUMBER' , y="count")
      plt.xlabel('Flight Number')
      plt.ylabel('Number of Flights')
      plt.title('Top 10 Airlines of US')
      plt.show()
```

Top 10 Airlines of US
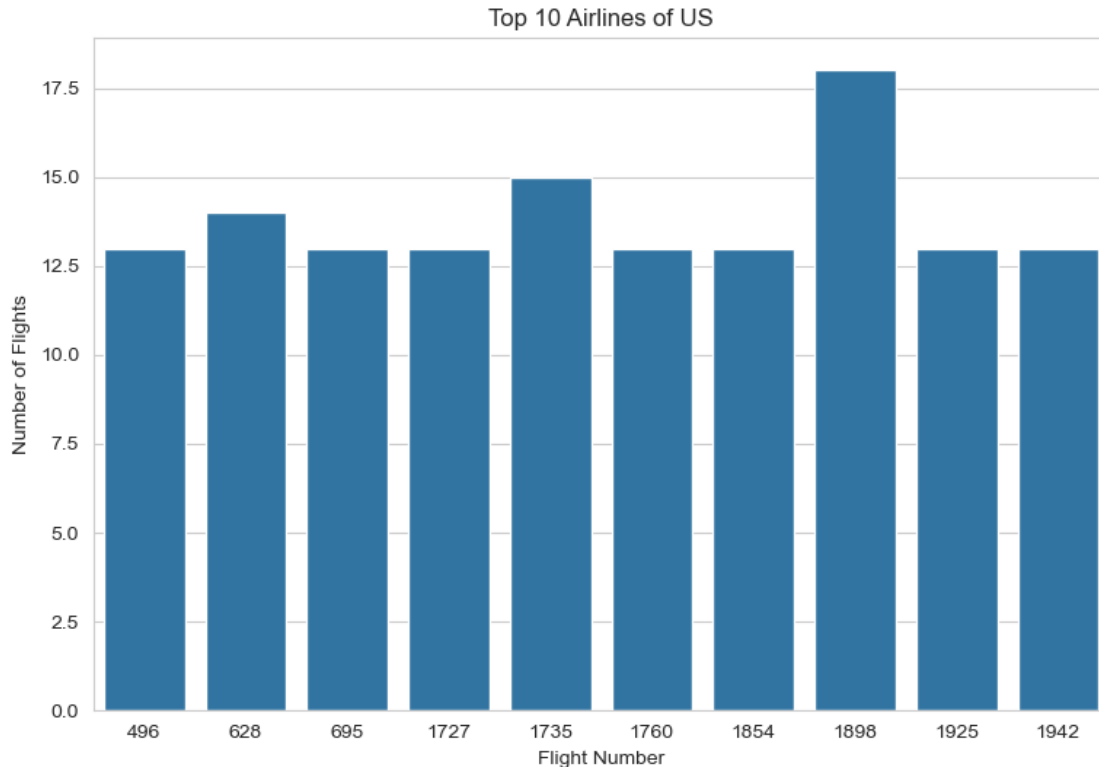
n)Finding airlines that make the maximum, minimum number of cancellations.

```
[93]: list(collection.aggregate([
          {'$match': {'CANCELLED': 1}},
          {'$group': {'_id': "$AIRLINE",'cancellations': {'$sum': 1}}},
          {'$facet':{'max_cancelled':[
                  {'$sort': {'cancellations':-1}},
                  {'$limit': 1},
                  { '$project': { '_id': 0,'AIRLINE': "$_id",'cancellations':1}}],
              'min_cancelled':[{'$sort': {'cancellations':1}}, {'$limit': 1},
                  { '$project': { '_id': 0,'AIRLINE': "$_id", 'cancellations':1}}]
          }}]))
```

```
[93]: [{'max_cancelled': [{'cancellations': 414, 'AIRLINE': 'MQ'}],
        'min_cancelled': [{'cancellations': 3, 'AIRLINE': 'HA'}]}]
```

o)Find and show airlines names in descending that make the most number of diversions made. [Create a suitable plot using matplotlib/seaborn]

```
[95]: diversion_df = pd.DataFrame(collection.aggregate([
          {'$match':{'DIVERTED':1}},
          {'$group': {'_id': "$AIRLINE",'diversions': {'$sum':'$DIVERTED'}}},
          {'$project': {'_id':0,'AIRLINE':'$_id','diversions':1}},
```

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```
    {'$sort':{'AIRLINE':-1}}
]))

plt.figure(figsize=(9,6))
sns.set_style('whitegrid')
sns.barplot(diversion_df,x='AIRLINE',y='diversions',palette='Set1')
plt.title('Airlines with more deviations made')
plt.xlabel('AIRLINES')
plt.ylabel('Diversions')
plt.show()
```
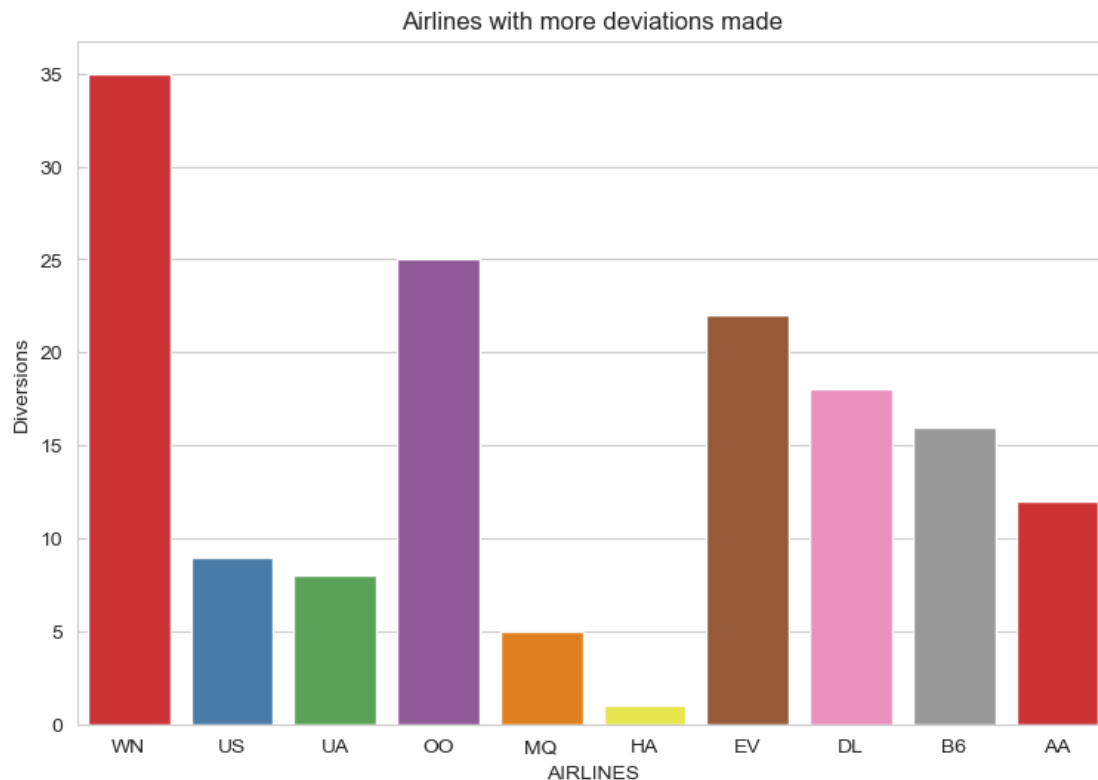

p)Finding days of month that see the most number of diversion and delays.

```
[97]: df = collection.aggregate([
    {'$group': {'_id': '$DAY','total_diversion': { '$sum': '$DIVERTED' },
                'total_delay': { '$sum': { '$add':␣
  ↪['$ARRIVAL_DELAY','$DEPARTURE_DELAY']}}}},
    {'$project': {'_id': 0,'DAY': '$_id','total_diversion': 1,'total_delay':␣
  ↪1}},
    {'$sort': {'total_diversion': -1,'total_delay': -1}}])
pd.DataFrame(df)
```

```
[97]:       total_diversion    total_delay  DAY
       0                15  83444.060757    2
       1                13  69743.055446    1
       2                12  93482.382267    4
       3                11  87888.040815    5
       4                 9  36363.756716    9
       5                 8  11124.271045   14
       6                 7  66690.840215    6
       7                 6  25587.409222    7
       8                 6  20852.616634   23
       9                 5  89013.042153    3
      10                 5  37673.087510    8
      11                 5  20776.716467   11
      12                 5  18703.970977   18
      13                 5  10682.520042   30
      14                 4  42470.343722   12
      15                 4  36335.291150   16
      16                 4  23647.871143   21
      17                 4  20973.560089   20
      18                 4  18519.887641   28
      19                 3  43927.005877   26
      20                 3  33324.247496   17
      21                 3  23647.769771   27
      22                 3   2888.507315   31
      23                 2  20210.005512   13
      24                 1  22466.563860   25
      25                 1  17531.803940   15
      26                 1  13801.416400   19
      27                 1   9446.158283   10
      28                 1   4191.169105   29
      29                 0  27578.527421   22
      30                 0  23988.849297   24
```

q)Write a MongoDB query to find the flights with the shortest and longest AIR_TIME. Return the flightNumber, airline, and AIR_TIME.

```
[99]: list(collection.aggregate([
          {'$facet':{
              'long': [ {'$project': {'_id': 0,'FLIGHT_NUMBER': 1,'AIRLINE':
      ↪1,'AIR_TIME':1}},
                  {'$sort': {'AIR_TIME':-1}},
                  {'$limit': 1}],
              'short': [{"$match": {"AIR_TIME": { "$ne": 0 }}},
                  {'$project': {'_id': 0,'FLIGHT_NUMBER': 1,'AIRLINE':1,'AIR_TIME':
      ↪1}},
                  {'$sort': {'AIR_TIME':1}},
                  {'$limit': 1}]}}]))
```

```
[99]: [{'long': [{'AIRLINE': 'UA', 'FLIGHT_NUMBER': 15, 'AIR_TIME': 654.0}],
       'short': [{'AIRLINE': 'AS', 'FLIGHT_NUMBER': 65, 'AIR_TIME': 9.0}]}]
```

r)Finding all diverted Route from a source to destination Airport & which route is the most diverted route.

```
[101]: list(collection.aggregate([
           {'$match' : {'DIVERTED':1}},
           {'$group' :
               {'_id':{'ORIGIN_AIRPORT':'$ORIGIN_AIRPORT','DESTINATION_AIRPORT':
           ↪'$DESTINATION_AIRPORT'},
                   'COUNT': {'$sum':1}}},
           {'$project':
               {'_id':0,'ORIGIN_AIRPORT':'$_id.ORIGIN_AIRPORT','DESTINATION_AIRPORT':
           ↪'$_id.DESTINATION_AIRPORT',
                   'COUNT':1}},
           {'$sort':{'COUNT':-1}},
           {'$limit':1}
       ]))
```

```
[101]: [{'COUNT': 2, 'ORIGIN_AIRPORT': 'HOU', 'DESTINATION_AIRPORT': 'DAL'}]
```

s)Write a MongoDB aggregation pipeline to calculate the all aggregated values for departure delay (DEPARTURE_DELAY) and arrival delay (ARRIVAL_DELAY) for each airline, excluding flights that were either cancelled or diverted.

```
[103]: pd.DataFrame(collection.aggregate([
           {'$match': {'$and': [{'DIVERTED': 0},{'CANCELLED': 0}]}},
           {'$group': {'_id': '$AIRLINE', 'total_arrival_delay': { '$sum':
           ↪'$ARRIVAL_DELAY' },'total_departure_delay': { '$sum': '$DEPARTURE_DELAY' }}},
           {'$project': {'_id': 0,'AIRLINE': '$_id','total_arrival_delay':
           ↪1,'total_departure_delay': 1}}]))
```

```
[103]:     total_arrival_delay  total_departure_delay AIRLINE
       0               33319.0                37925.0      B6
       1               56156.0                63435.0      OO
       2               41952.0               114180.0      WN
       3               59291.0                51679.0      MQ
       4               -2411.0                 3640.0      AS
       5               22397.0                29051.0      US
       6                2924.0                  855.0      HA
       7               41908.0                57040.0      AA
       8               14590.0                15947.0      NK
       9               21936.0                77338.0      DL
       10               2872.0                 5520.0      VX
       11              60756.0                63771.0      EV
       12              30613.0                64760.0      UA
       13              18873.0                18412.0      F9
```

t) Write a MongoDB query to find all flights that were delayed due to **WEATHER_DELAY** but were not cancelled or diverted. Include the flightNumber, airline, originAirport, and destinationAirport in the results.

```
[105]: pd.DataFrame(collection.aggregate([
           {'$match': {'WEATHER_DELAY': {'$gt':0.0},'$and': [{'DIVERTED':
       ↪0},{'CANCELLED': 0}]}},
           {'$project': {'_id': 0,'FLIGHT_NUMBER': 1,'AIRLINE':
       ↪1,'DESTINATION_AIRPORT':1,'ORIGIN_AIRPORT':1}}
       ]))
```

```
[105]:     AIRLINE  FLIGHT_NUMBER ORIGIN_AIRPORT DESTINATION_AIRPORT
       0        UA            532            ORD                 DCA
       1        US           1784            BWI                 PHX
       2        MQ           3019            ORD                 OKC
       3        MQ           3564            GSO                 LGA
       4        UA           1667            ORD                 PDX
       ..       ...           ...            ...                 ...
       958      MQ           2942            ORD                 DAY
       959      UA           1549            MCO                 ORD
       960      MQ           3457            ROC                 ORD
       961      DL           2449            LGA                 DTW
       962      OO           6358            IDA                 DEN

       [963 rows x 4 columns]
```

u) Write a MongoDB query to find all flights that were delayed both at departure (**DEPARTURE_DELAY**) and arrival (**ARRIVAL_DELAY**). Return the count of such Flights which are delayed.

```
[107]: pd.DataFrame(collection.aggregate([
           {'$match': {'$and': [{'DEPARTURE_DELAY': {'$gt' : 0.0}},{'ARRIVAL_DELAY':
       ↪{'$gt' : 0.0}}]}},
           {'$group': {'_id':None,'COUNT':{'$sum':1}}},
           {'$project': {'_id': 0,'FLIGHT_NUMBER':1,'COUNT':1}}
       ])
       )
```

```
[107]:     COUNT
       0  18697
```

v) Write a MongoDB query to calculate the frequency of flight takeoffs and landings within defined time intervals (e.g., every hour) throughout the day. Generate a Suitable Plot.

```
[109]: freq_df = pd.DataFrame(collection.aggregate([
           {'$match': {'DEPARTURE_TIME': {'$gt': 0}, 'ARRIVAL_TIME': {'$gt': 0, '$lt':
       ↪1000}}},
```

```
        {'$group': {'_id': {'DEPARTURE_TIME': '$DEPARTURE_TIME', 'ARRIVAL_TIME':
    ↪'$ARRIVAL_TIME'}, 'COUNT': {'$sum': 1}}},
        {'$project' : {'_id':0,'DEPARTURE_TIME':'$_id.
    ↪DEPARTURE_TIME','ARRIVAL_TIME':'$_id.ARRIVAL_TIME','COUNT':1}}]))

plt.figure(figsize=(9, 6))
plt.title('Flight Frequencies by Departure and Arrival Time')
plt.xlabel('Arrival Time')
plt.ylabel('Departure Time')

heatmap_data = freq_df.pivot(index='DEPARTURE_TIME', columns='ARRIVAL_TIME',
    ↪values='COUNT')
sns.heatmap(heatmap_data, cmap='cividis', linewidths=0.5)
plt.show()
```
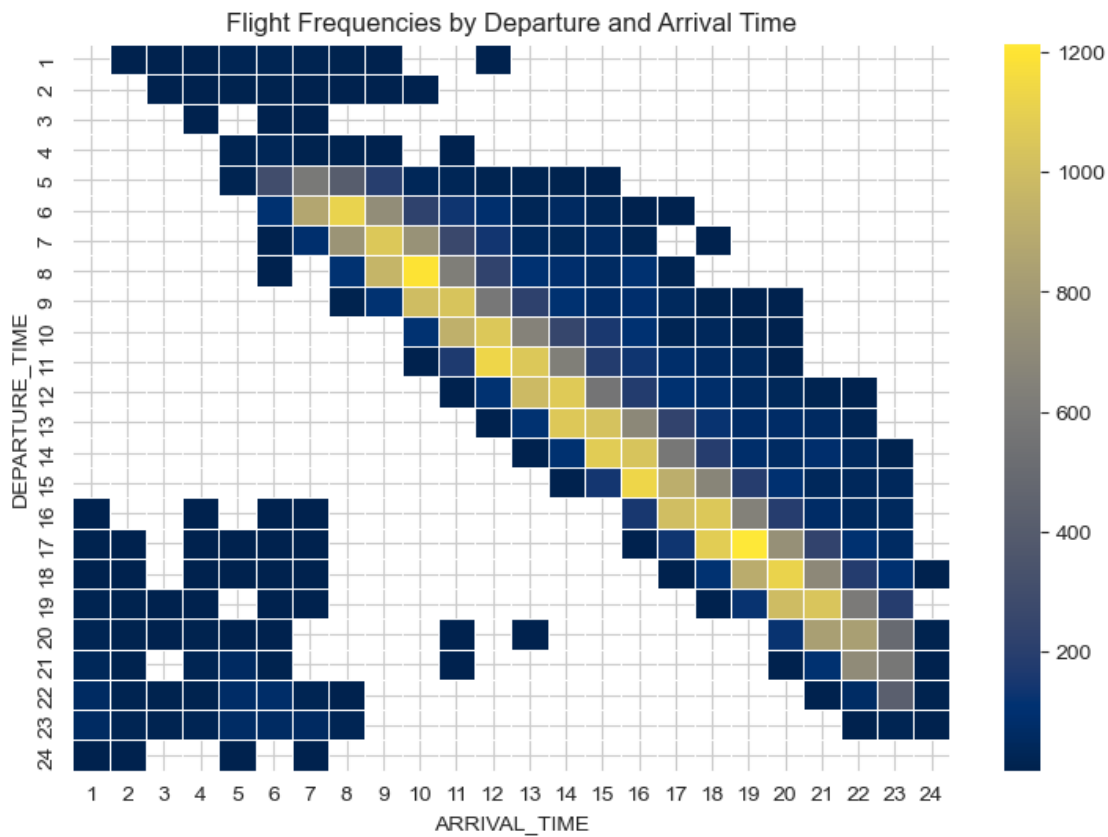

w)Write a MongoDB query to calculate the frequency of flight takeoffs and landings
within defined week of day. Generate a Suitable Plot.

```
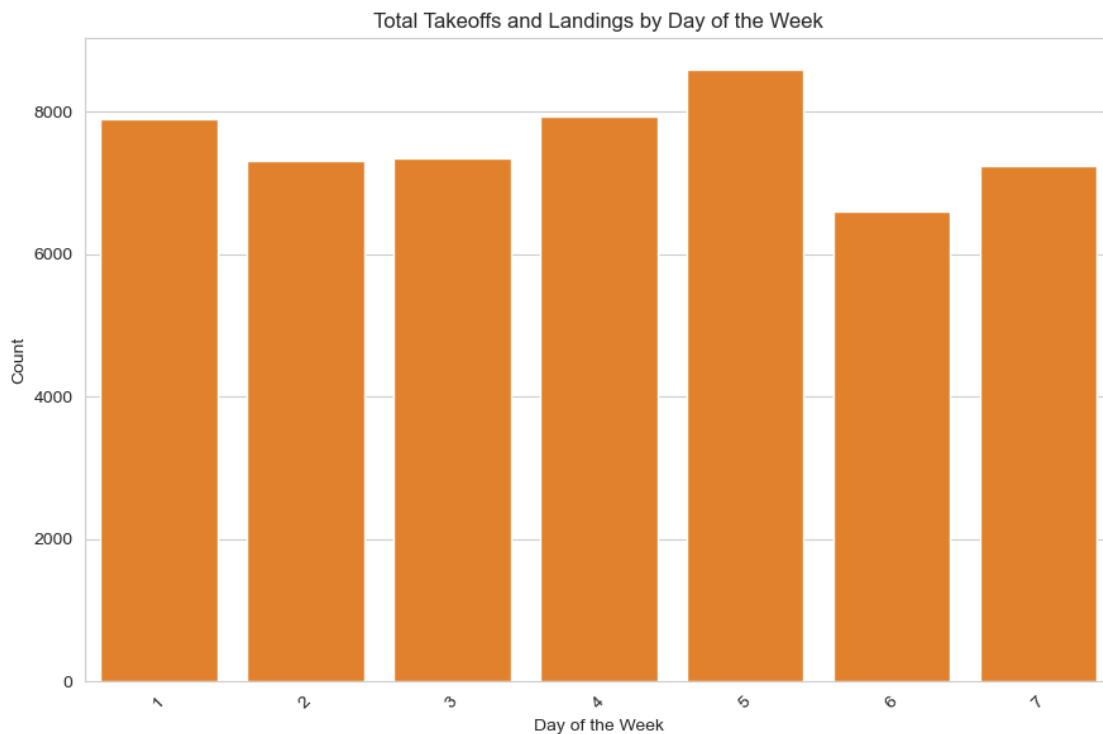[111]: freq_df = pd.DataFrame(collection.aggregate([
       {'$match': {'DEPARTURE_TIME': {'$gt': 0},'ARRIVAL_TIME': {'$gt': 0}}},
```

```
{'$group': {'_id': '$DAY_OF_WEEK','total_takeoffs': {'$sum':␣
↪1},'total_landings': {'$sum': 1}}},
{'$project': {'_id': 0,'DAY_OF_WEEK': '$_id','total_takeoffs':␣
↪1,'total_landings': 1}}]))
plt.figure(figsize=(9, 6))
sns.barplot(data=freq_df, x='DAY_OF_WEEK', y='total_takeoffs')
sns.barplot(data=freq_df, x='DAY_OF_WEEK', y='total_landings')
plt.xlabel('Day of the Week')
plt.ylabel('Count')
plt.title('Total Takeoffs and Landings by Day of the Week')
plt.xticks(rotation=45)
plt.tight_layout()
plt.show()
```


Total Takeoffs and Landings by Day of the Week

x)**Write a MongoDB query to find all flights that departed between 6 AM and 12 PM (noon) local time, regardless of the date. Return the flightNumber, airline, and departureTime. Generate a Bar Plot using Time (x-axis) and Frequency (y-axis).**

```
[113]: flight__df = pd.DataFrame(collection.aggregate([
           {'$match': {'DEPARTURE_TIME': {'$gte': 6, '$lte': 12}, 'ARRIVAL_TIME':␣
       ↪{'$gte': 6, '$lte':12}}},
           {'$project' : {'_id':0,'FLIGHT_NUMBER':1,'AIRLINE':1,'DEPARTURE_TIME':1}}]))
       freq = flight_df.groupby('DEPARTURE_TIME')['DEPARTURE_TIME'].value_counts()
```

```
plt.figure(figsize=(9, 6))
plt.bar(height=freq.values, x=freq.index)
plt.xlabel('Time of departure')
plt.ylabel('Count of departures')
plt.title('Flights departed between 6am and 12pm')
plt.xticks(rotation=45)
plt.show()
```


Flights departed between 6am and 12pm
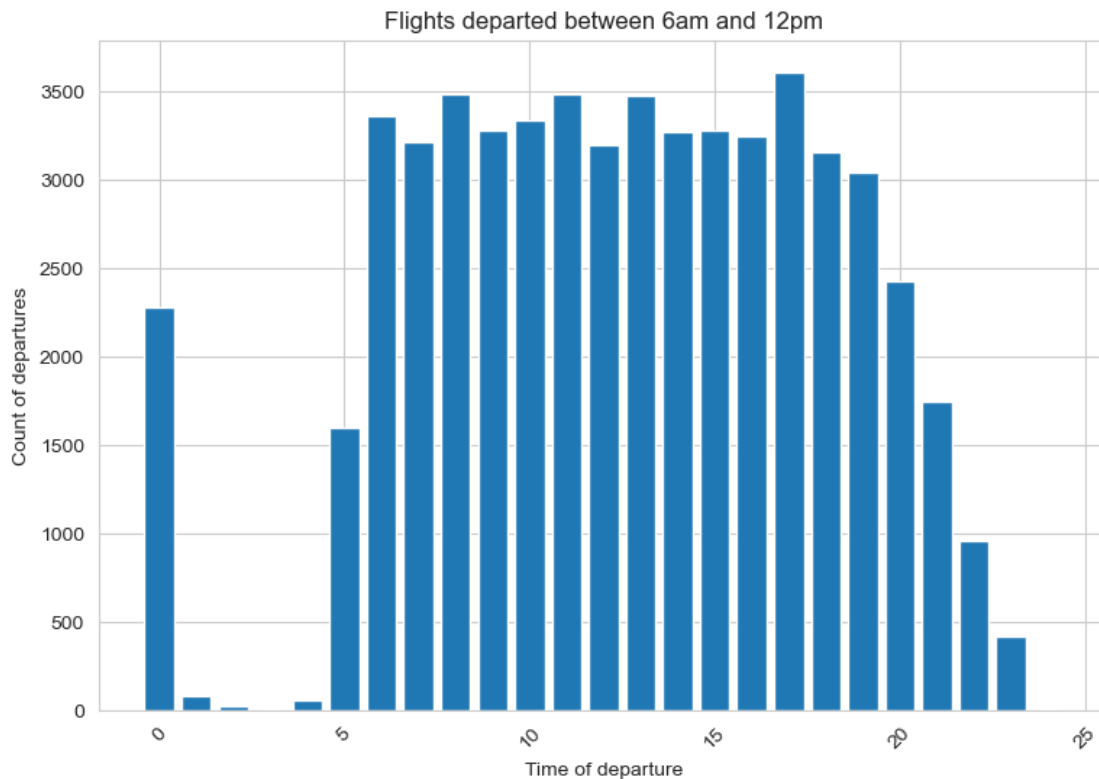
y)When is the best time of day/day of week/time of a year to fly with minimum delays?

```
[115]: day_df = pd.DataFrame(collection.aggregate([
           {'$group': {'_id':'$DAY', 'avgDelay': {'$avg':{'$add':␣
        ↪['$ARRIVAL_DELAY','$DEPARTURE_DELAY']}}}},
           {'$project': {'_id':0,'DAY':'$_id','avgDelay' :{'$round':␣
        ↪['$avgDelay',2]}}},
           {'$sort':{'avgDelay':1}}]))
       week_df = pd.DataFrame(collection.aggregate([
           {'$group': {'_id':'$DAY_OF_WEEK', 'avgDelay': {'$avg':{'$add':␣
        ↪['$ARRIVAL_DELAY','$DEPARTURE_DELAY']}}}},
```

```python
    {'$project': {'_id':0,'DAY_OF_WEEK':'$_id','avgDelay' :{'$round':
 ↪['$avgDelay',2]}}},
    {'$sort':{'avgDelay':1}}]))

month_df = pd.DataFrame(collection.aggregate([
    {'$group': {'_id':'$MONTH', 'avgDelay': {'$avg':{'$add':
 ↪['$ARRIVAL_DELAY','$DEPARTURE_DELAY']}}}},
    {'$project': {'_id':0,'MONTH':'$_id','avgDelay' :{'$round':
 ↪['$avgDelay',2]}}},
    {'$sort':{'avgDelay':1}}]))

fig, axes = plt.subplots(3, 1, figsize=(10, 15), sharex=True)
sns.barplot(data=day_df, x='DAY', y='avgDelay', ax=axes[0],color='r')
axes[0].set_title('Average Delay by Day')
axes[0].set_xlabel('Day')
axes[0].set_ylabel('Average Delay')

sns.barplot(data=week_df, x='DAY_OF_WEEK', y='avgDelay', ax=axes[1],color='g')
axes[1].set_title('Average Delay by Day of Week')
axes[1].set_xlabel('Day of Week')
axes[1].set_ylabel('Average Delay')

sns.barplot(data=month_df, x='MONTH', y='avgDelay', ax=axes[2],color='b')
axes[2].set_title('Average Delay by Month')
axes[2].set_xlabel('Month')
axes[2].set_ylabel('Average Delay')

plt.show()
```

Average Delay by Day

Average Delay by Day of Week

Average Delay by Month
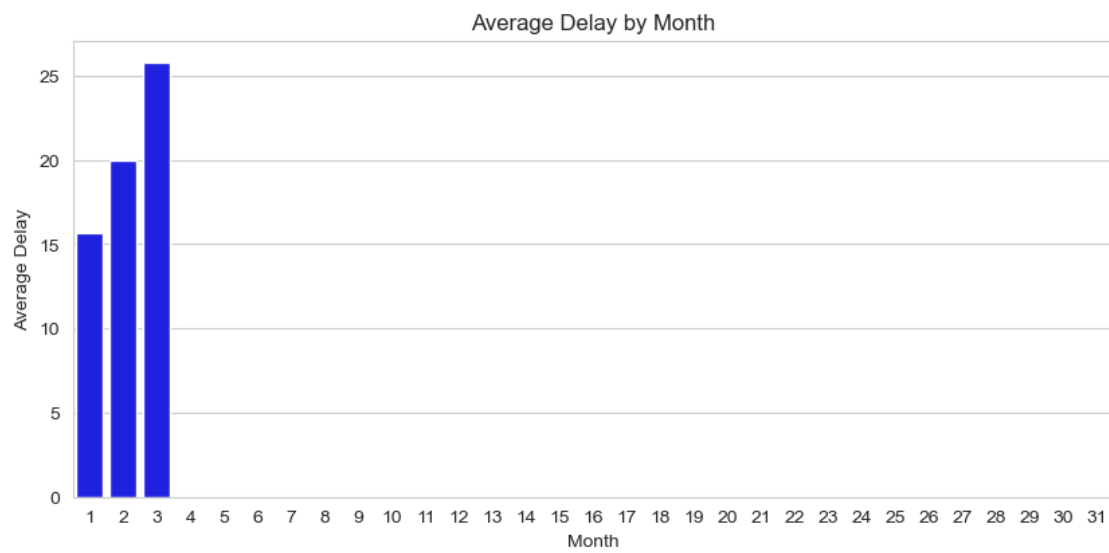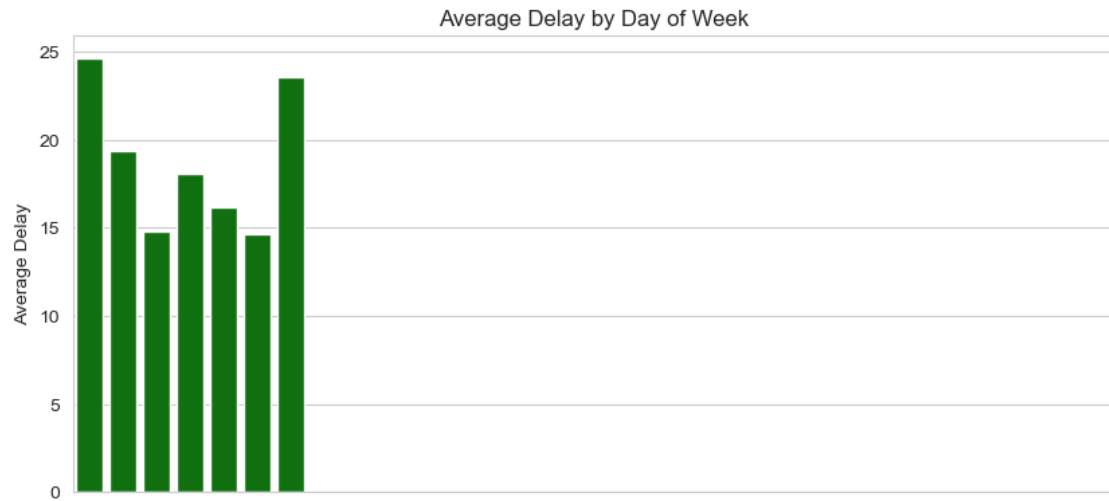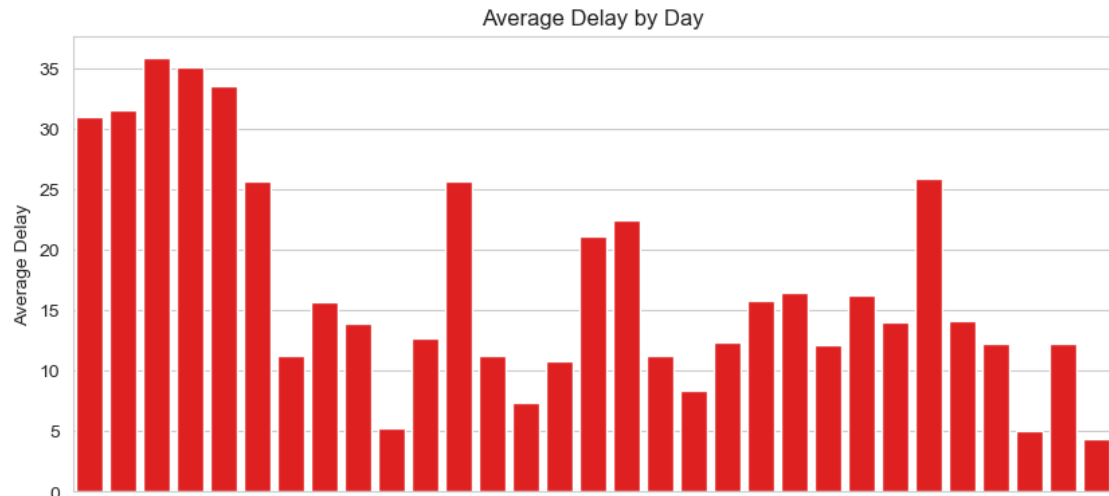
Insight : **The minimum delays will be mostly during the first month of a year or Saturdays in case of a week or 31st of every month.**

[ ]: