

**DTI 5126: Fundamentals for Applied Data Science Summer 2023**

**Assignment 1**

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## Part A: SQL using PostgreSQL Server

- a- Provide the key summary statistics of the data contained in the table by retrieving the number of distinct aircrafts, total number of flights as well as a few statistics about flights departure delays (e.g., min, max & avg departure delays)

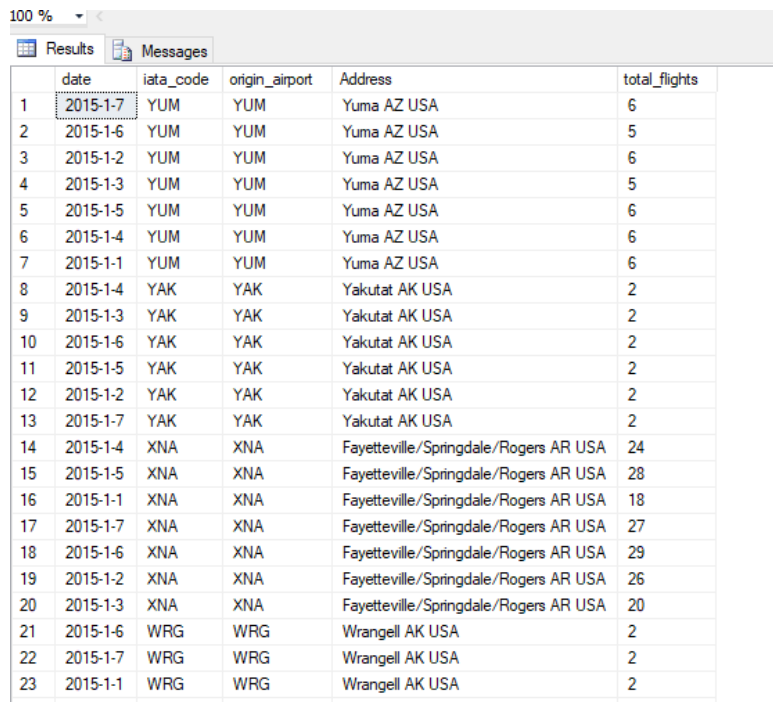


The screenshot shows a PostgreSQL query result window with a table containing summary statistics. The table has five columns: distinct\_aircraft\_count, total\_flights, min\_departure\_delay, max\_departure\_delay, and Avg\_departure\_delay. The first row shows the results for a single query.

|   | distinct_aircraft_count | total_flights | min_departure_delay | max_departure_delay | Avg_departure_delay |
|---|-------------------------|---------------|---------------------|---------------------|---------------------|
| 1 | 4402                    | 478000        | -48                 | 1988                | 9                   |

Query executed successfully.

- b- Create a view called FlightSummaryView to display the date (e.g., 2015-01-01), iata\_code, origin\_airport, concatenated city, state and country renamed as Address, and the total number of flights departing from each airport for the first week of 2015. Use the JOIN ON syntax and order by the iata\_code in descending order (Make sure to add space between the address if required).



The screenshot shows a PostgreSQL query result window with a table displaying flight summary data for the first week of 2015. The table has six columns: date, iata\_code, origin\_airport, Address, and total\_flights. The data is ordered by iata\_code in descending order.

|    | date     | iata_code | origin_airport | Address                               | total_flights |
|----|----------|-----------|----------------|---------------------------------------|---------------|
| 1  | 2015-1-7 | YUM       | YUM            | Yuma AZ USA                           | 6             |
| 2  | 2015-1-6 | YUM       | YUM            | Yuma AZ USA                           | 5             |
| 3  | 2015-1-2 | YUM       | YUM            | Yuma AZ USA                           | 6             |
| 4  | 2015-1-3 | YUM       | YUM            | Yuma AZ USA                           | 5             |
| 5  | 2015-1-5 | YUM       | YUM            | Yuma AZ USA                           | 6             |
| 6  | 2015-1-4 | YUM       | YUM            | Yuma AZ USA                           | 6             |
| 7  | 2015-1-1 | YUM       | YUM            | Yuma AZ USA                           | 6             |
| 8  | 2015-1-4 | YAK       | YAK            | Yakutat AK USA                        | 2             |
| 9  | 2015-1-3 | YAK       | YAK            | Yakutat AK USA                        | 2             |
| 10 | 2015-1-6 | YAK       | YAK            | Yakutat AK USA                        | 2             |
| 11 | 2015-1-5 | YAK       | YAK            | Yakutat AK USA                        | 2             |
| 12 | 2015-1-2 | YAK       | YAK            | Yakutat AK USA                        | 2             |
| 13 | 2015-1-7 | YAK       | YAK            | Yakutat AK USA                        | 2             |
| 14 | 2015-1-4 | XNA       | XNA            | Fayetteville/Springdale/Rogers AR USA | 24            |
| 15 | 2015-1-5 | XNA       | XNA            | Fayetteville/Springdale/Rogers AR USA | 28            |
| 16 | 2015-1-1 | XNA       | XNA            | Fayetteville/Springdale/Rogers AR USA | 18            |
| 17 | 2015-1-7 | XNA       | XNA            | Fayetteville/Springdale/Rogers AR USA | 27            |
| 18 | 2015-1-6 | XNA       | XNA            | Fayetteville/Springdale/Rogers AR USA | 29            |
| 19 | 2015-1-2 | XNA       | XNA            | Fayetteville/Springdale/Rogers AR USA | 26            |
| 20 | 2015-1-3 | XNA       | XNA            | Fayetteville/Springdale/Rogers AR USA | 20            |
| 21 | 2015-1-6 | WRG       | WRG            | Wrangell AK USA                       | 2             |
| 22 | 2015-1-7 | WRG       | WRG            | Wrangell AK USA                       | 2             |
| 23 | 2015-1-1 | WRG       | WRG            | Wrangell AK USA                       | 2             |

Query executed successfully.

- c- Display the origin\_airport, destination\_airport, and the rank for the top 3 routes departing from each airport.

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Results Messages

|    | origin_airport | destination_airport | rank |
|----|----------------|---------------------|------|
| 1  | ABE            | DTW                 | 1    |
| 2  | ABE            | ATL                 | 2    |
| 3  | ABE            | ORD                 | 3    |
| 4  | ABI            | DFW                 | 1    |
| 5  | ABQ            | PHX                 | 1    |
| 6  | ABQ            | LAX                 | 2    |
| 7  | ABQ            | DAL                 | 3    |
| 8  | ABR            | MSP                 | 1    |
| 9  | ABY            | ATL                 | 1    |
| 10 | ACT            | DFW                 | 1    |
| 11 | ACV            | SFO                 | 1    |
| 12 | ACY            | FLL                 | 1    |
| 13 | ACY            | MCO                 | 2    |
| 14 | ACY            | RSW                 | 3    |
| 15 | ADK            | ANC                 | 1    |
| 16 | ADQ            | ANC                 | 1    |
| 17 | AEX            | ATL                 | 1    |
| 18 | AEX            | DFW                 | 2    |
| 19 | AEX            | IAH                 | 3    |
| 20 | AGS            | ATL                 | 1    |
| 21 | ALB            | BWI                 | 1    |
| 22 | ALB            | MCO                 | 2    |
| 23 | ALB            | ATL                 | 3    |

Query executed successfully.

- d- Display the airport iata\_code, airport name, airline iata\_code, airline name, flight\_number, tail\_number, origin\_airport, destination\_airport, departure\_time, and arrival\_time for all flights that fly on weekends (Saturdays and Sundays) and landed between 4 and 5 am

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Results Messages

|    | IATA_CODE | AIRPORT   | IATA_CODE | AIRLINE                | FLIGHT_NUMBER | TAIL_NUMBER | ORIGIN_AIRPORT | DESTINATION_AIRPORT | DEPARTURE_TIME | ARRIVAL_TIME |
|----|-----------|---|-----------|------------------------|---------------|-------------|----------------|---------------------|----------------|--------------|
| 1  | LAX       | Los Angeles International Airport                   | AA        | American Airlines Inc. | 2400          | N5DKAA      | LAX            | DFW                 | 0005           | 0459         |
| 2  | ANC       | Ted Stevens Anchorage International Airport         | DL        | Delta Air Lines Inc.   | 1560          | N375DA      | ANC            | SEA                 | 0038           | 0437         |
| 3  | ANC       | Ted Stevens Anchorage International Airport         | AS        | Alaska Airlines Inc.   | 122           | N457AS      | ANC            | PDX                 | 0046           | 0451         |
| 4  | PHX       | Phoenix Sky Harbor International Airport            | US        | US Airways Inc.        | 1780          | N819AW      | PHX            | STL                 | 0112           | 0456         |
| 5  | SJU       | Luis Muñoz Marín International Airport              | B6        | JetBlue Airways        | 304           | N597JB      | SJU            | JFK                 | 0203           | 0450         |
| 6  | IAG       | Niagara Falls International Airport                 | NK        | Spirit Air Lines       | 647           | N620NK      | IAG            | FLL                 | 0147           | 0442         |
| 7  | DEN       | Denver International Airport                        | F9        | Frontier Airlines Inc. | 432           | N905FR      | DEN            | OMA                 | 0137           | 0402         |
| 8  | LIH       | Lihue Airport                                       | UA        | United Air Lines Inc.  | 825           | N549UA      | LIH            | LAX                 | 2126           | 0426         |
| 9  | KOA       | Kona International Airport at Keahole               | UA        | United Air Lines Inc.  | 1639          | N11206      | KOA            | LAX                 | 2148           | 0439         |
| 10 | HNL       | Honolulu International Airport                      | UA        | United Air Lines Inc.  | 534           | N213UA      | HNL            | LAX                 | 2156           | 0459         |
| 11 | IAD       | Washington Dulles International Airport             | UA        | United Air Lines Inc.  | 1529          | N37470      | IAD            | SJU                 | 0017           | 0456         |
| 12 | SAN       | San Diego International Airport (Lindbergh Field)   | UA        | United Air Lines Inc.  | 1608          | N67827      | SAN            | ORD                 | 2252           | 0439         |
| 13 | PHX       | Phoenix Sky Harbor International Airport            | US        | US Airways Inc.        | 1809          | N805AW      | PHX            | EWR                 | 2239           | 0459         |
| 14 | SEA       | Seattle-Tacoma International Airport                | UA        | United Air Lines Inc.  | 1742          | N68802      | SEA            | ORD                 | 2324           | 0458         |
| 15 | PHX       | Phoenix Sky Harbor International Airport            | US        | US Airways Inc.        | 576           | N555AY      | PHX            | MCO                 | 2241           | 0444         |
| 16 | LAX       | Los Angeles International Airport                   | UA        | United Air Lines Inc.  | 1674          | N16217      | LAX            | IAH                 | 2306           | 0410         |
| 17 | SMF       | Sacramento International Airport                    | UA        | United Air Lines Inc.  | 1575          | N66828      | SMF            | ORD                 | 2300           | 0450         |
| 18 | LAX       | Los Angeles International Airport                   | UA        | United Air Lines Inc.  | 411           | N844UA      | LAX            | IAH                 | 2336           | 0444         |
| 19 | JFK       | John F. Kennedy International Airport (New York ... | B6        | JetBlue Airways        | 745           | N789JB      | JFK            | PSE                 | 0015           | 0447         |
| 20 | JFK       | John F. Kennedy International Airport (New York ... | B6        | JetBlue Airways        | 1503          | N768JB      | JFK            | SJU                 | 2353           | 0431         |
| 21 | LAX       | Los Angeles International Airport                   | AA        | American Airlines Inc. | 2400          | N630AA      | LAX            | DFW                 | 0002           | 0453         |
| 22 | ANC       | Ted Stevens Anchorage International Airport         | AS        | Alaska Airlines Inc.   | 98            | N317AS      | ANC            | SEA                 | 0041           | 0449         |
| 23 | CLT       | Charlotte Douglas International Airport             | US        | US Airways Inc.        | 1838          | N174US      | CLT            | RDU                 | 0344           | 0425         |

Query executed successfully.

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- e- All New York flights originate in one of 3 airports: 'JFK' (Kennedy), 'LGA' (La Guardia), and 'EWR' (Newark in New Jersey). Count how many flights originate at 'JFK.' Then show how many flights originate at 'JFK' as a percentage of all flights. (hint: use a WITH clause or a FROM subquery).

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Results Messages

|   | total_flight | total_flight_from_JFK | total_flight_for_New_York | percentage_for_total | percentage_for_ALL_newk_flight |
|---|--------------|-----------------------|---------------------------|----------------------|--------------------------------|
| 1 | 478000       | 8600                  | 27090                     | 1.79916317991632     | 31.7460317460317               |

- f- Retrieve the flight information for all flights going into New York City, flying through any of its two airports (JFK and LGA) or into neighboring city's airport New Jersey (Newark, EWR), where the elapsed time is greater than 500 mins. Suppose we are told these flights are cancelled. Use this information directly in SQL to update their cancelled status from 0 to 1.

100 %

Results Messages

|    | _record_number | YEAR | MONTH | DAY | DAY_OF_WEEK | AIRLINE | FLIGHT_NUMBER | TAIL_NUMBER | ORIGIN_AIRPORT | DESTINATION_AIRPORT | SCHEDULED_DEPARTURE | DEPARTURE_TIME | DEPARTURE_DELAY | TAXI_OUT | WT |
|----|----------------|------|-------|-----|-------------|---------|---------------|-------------|----------------|---------------------|---------------------|----------------|-----------------|----------|----|
| 1  | 9395           | 2015 | 1     | 1   | 4           | HA      | 50            | N390HA      | HNL            | JFK                 | 1625                | 1632           | 7               | 11       | 16 |
| 2  | 10135          | 2015 | 1     | 1   | 4           | DL      | 1059          | N178DN      | HNL            | JFK                 | 1715                | 1705           | -10             | 18       | 17 |
| 3  | 13358          | 2015 | 1     | 1   | 4           | UA      | 14            | N67052      | HNL            | EWR                 | 2125                | 2149           | 24              | 20       | 22 |
| 4  | 25299          | 2015 | 1     | 2   | 5           | HA      | 50            | N383HA      | HNL            | JFK                 | 1625                | 1635           | 10              | 19       | 16 |
| 5  | 26114          | 2015 | 1     | 2   | 5           | DL      | 1059          | N1602       | HNL            | JFK                 | 1715                | 1739           | 24              | 20       | 17 |
| 6  | 41192          | 2015 | 1     | 3   | 6           | HA      | 50            | N396HA      | HNL            | JFK                 | 1625                | 1629           | 4               | 23       | 16 |
| 7  | 41967          | 2015 | 1     | 3   | 6           | DL      | 1059          | N827MH      | HNL            | JFK                 | 1715                | 1746           | 31              | 24       | 18 |
| 8  | 45416          | 2015 | 1     | 3   | 6           | UA      | 14            | N77066      | HNL            | EWR                 | 2125                | 2152           | 27              | 30       | 22 |
| 9  | 57097          | 2015 | 1     | 4   | 7           | HA      | 50            | N385HA      | HNL            | JFK                 | 1625                | 1623           | -2              | 20       | 16 |
| 10 | 57919          | 2015 | 1     | 4   | 7           | DL      | 1059          | N841MH      | HNL            | JFK                 | 1715                | 1717           | 2               | 19       | 17 |
| 11 | 61693          | 2015 | 1     | 4   | 7           | UA      | 14            | N76064      | HNL            | EWR                 | 2125                | 2131           | 6               | 15       | 21 |
| 12 | 73806          | 2015 | 1     | 5   | 1           | HA      | 50            | N395HA      | HNL            | JFK                 | 1625                | 1623           | -2              | 17       | 16 |
| 13 | 74625          | 2015 | 1     | 5   | 1           | DL      | 1059          | N190DN      | HNL            | JFK                 | 1715                | 1711           | -4              | 17       | 17 |
| 14 | 78311          | 2015 | 1     | 5   | 1           | UA      | 14            | N67058      | HNL            | EWR                 | 2125                | 2122           | -3              | 14       | 21 |
| 15 | 89779          | 2015 | 1     | 6   | 2           | HA      | 50            | N390HA      | HNL            | JFK                 | 1625                | 1619           | -6              | 15       | 16 |
| 16 | 90573          | 2015 | 1     | 6   | 2           | DL      | 1059          | N195DN      | HNL            | JFK                 | 1715                | 1714           | -1              | 18       | 17 |
| 17 | 93884          | 2015 | 1     | 6   | 2           | UA      | 14            | N76055      | HNL            | EWR                 | 2125                | 2124           | -1              | 15       | 21 |
| 18 | 105128         | 2015 | 1     | 7   | 3           | HA      | 50            | N380HA      | HNL            | JFK                 | 1625                | 1630           | 5               | 13       | 16 |
| 19 | 105965         | 2015 | 1     | 7   | 3           | DL      | 1059          | N197DN      | HNL            | JFK                 | 1715                | 1713           | -2              | 15       | 17 |
| 20 | 109405         | 2015 | 1     | 7   | 3           | UA      | 14            | N66057      | HNL            | EWR                 | 2125                | 2122           | -3              | 22       | 21 |

Query executed successfully. DESKTOP-MNF19FE (11.0 SP3) DESKTOP-MNF19FE\Ahmed ... Flight\_System 00:00:00 68 rows

100 %

Results Messages

|    | TIME | DISTANCE | WHEELS_ON | TAXI_IN | SCHEDULED_ARRIVAL | ARRIVAL_TIME | ARRIVAL_DELAY | DIVERTED | CANCELLED | CANCELLATION_REASON | AIR_SYSTEM_DELAY | SECURITY_DELAY | AIRLINE_DELAY | LATE_AIRCRAFT |
|----|------|----------|-----------|---------|-------------------|--------------|---------------|----------|-----------|---------------------|------------------|----------------|---------------|---------------|
| 1  | 3    | 4983     | 0646      | 12      | 0655              | 0658         | 3             | 0        | 1         | NULL                | NULL             | NULL           | NULL          | NULL          |
| 2  | 6    | 4983     | 0729      | 11      | 0800              | 0740         | -20           | 0        | 1         | NULL                | NULL             | NULL           | NULL          | NULL          |
| 3  | 5    | 4962     | 1214      | 10      | 1201              | 1224         | 23            | 0        | 1         | NULL                | 0                | 0              | 23            | 0             |
| 4  | 3    | 4983     | 0647      | 23      | 0655              | 0710         | 15            | 0        | 1         | NULL                | 0                | 0              | 15            | 0             |
| 5  | 0    | 4983     | 0749      | 9       | 0800              | 0758         | -2            | 0        | 1         | NULL                | NULL             | NULL           | NULL          | NULL          |
| 6  | 1    | 4983     | 0703      | 11      | 0655              | 0714         | 19            | 0        | 1         | NULL                | 0                | 0              | 19            | 0             |
| 7  | 0    | 4983     | 0810      | 8       | 0800              | 0818         | 18            | 0        | 1         | NULL                | 0                | 0              | 18            | 0             |
| 8  | 9    | 4962     | 1221      | 7       | 1201              | 1228         | 27            | 0        | 1         | NULL                | 27               | 0              | 0             | 0             |
| 9  | 1    | 4983     | 0634      | 10      | 0655              | 0644         | -11           | 0        | 1         | NULL                | NULL             | NULL           | NULL          | NULL          |
| 10 | 4    | 4983     | 0720      | 38      | 0800              | 0758         | -2            | 0        | 1         | NULL                | NULL             | NULL           | NULL          | NULL          |
| 11 | 4    | 4962     | 1140      | 10      | 1201              | 1150         | -11           | 0        | 1         | NULL                | NULL             | NULL           | NULL          | NULL          |
| 12 | 4    | 4983     | 0624      | 11      | 0655              | 0635         | -20           | 0        | 1         | NULL                | NULL             | NULL           | NULL          | NULL          |
| 13 | 3    | 4983     | 0711      | 35      | 0800              | 0746         | -14           | 0        | 1         | NULL                | NULL             | NULL           | NULL          | NULL          |
| 14 | 8    | 4962     | 1114      | 20      | 1201              | 1134         | -27           | 0        | 1         | NULL                | NULL             | NULL           | NULL          | NULL          |
| 15 | 2    | 4983     | 0646      | 13      | 0655              | 0659         | 4             | 0        | 1         | NULL                | NULL             | NULL           | NULL          | NULL          |
| 16 | 6    | 4983     | 0718      | 12      | 0800              | 0730         | -30           | 0        | 1         | NULL                | NULL             | NULL           | NULL          | NULL          |
| 17 | 7    | 4962     | 1136      | 13      | 1204              | 1149         | -15           | 0        | 1         | NULL                | NULL             | NULL           | NULL          | NULL          |
| 18 | 0    | 4983     | 0633      | 14      | 0655              | 0647         | -8            | 0        | 1         | NULL                | NULL             | NULL           | NULL          | NULL          |
| 19 | 4    | 4983     | 0722      | 10      | 0800              | 0732         | -28           | 0        | 1         | NULL                | NULL             | NULL           | NULL          | NULL          |
| 20 | 9    | 4962     | 1143      | 13      | 1204              | 1156         | -8            | 0        | 1         | NULL                | NULL             | NULL           | NULL          | NULL          |

Query executed successfully. DESKTOP-MNF19FE (11.0 SP3) DESKTOP-MNF19FE\Ahmed ... Flight\_System 00:00:00 68 rows

- g- Build a single temporary table called `Departure_Delays` that capture the categories of the departure\_delays of flights based on how many are 'big,' 'medium,' and 'small' delays. Provide the `iata_code`, airline, departure delay category, and determine the total number of delays in each category. Order the result based on the total number of delays in descending order

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Results

Messages

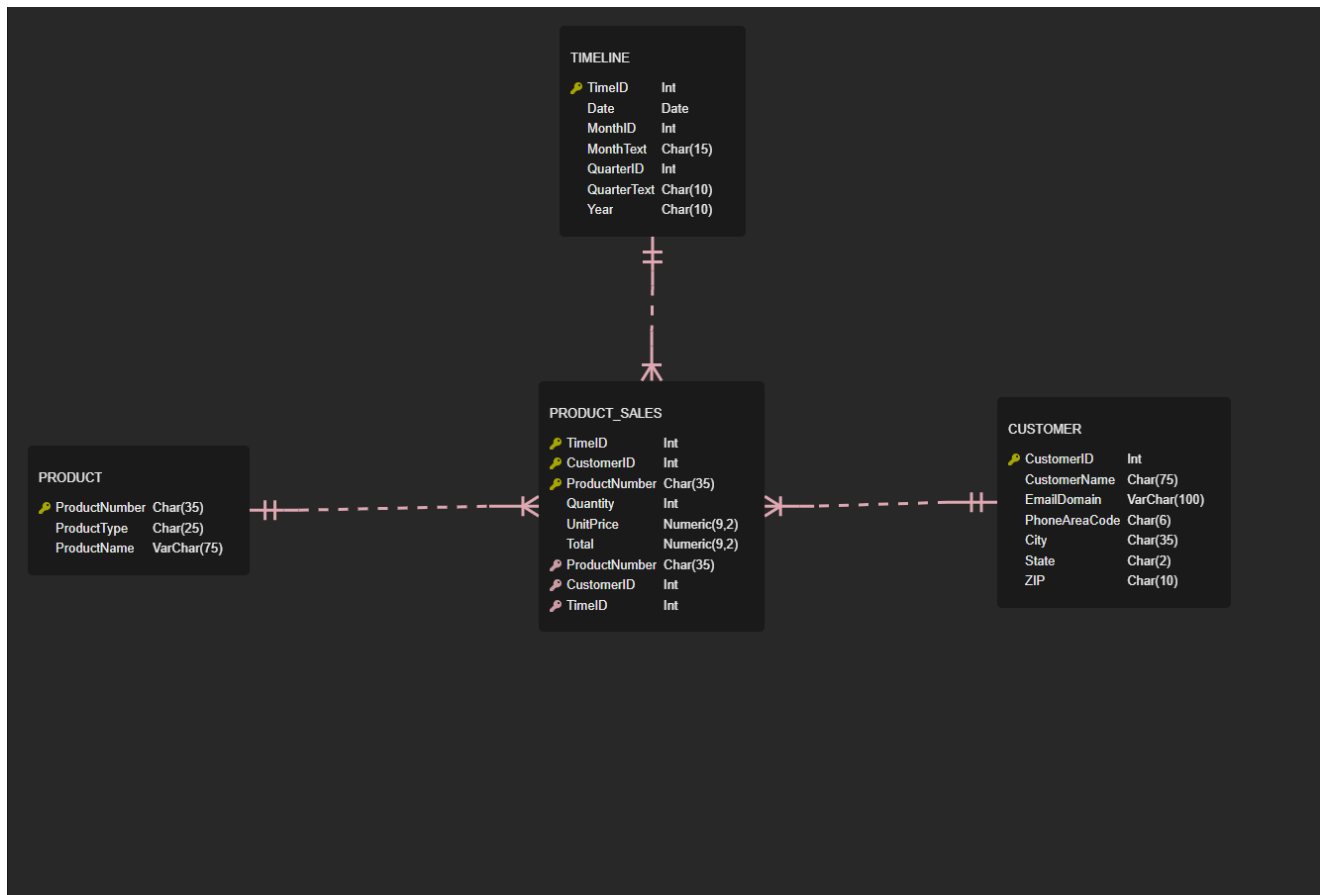
|    | iata_code | airline | delay_category | total_num_of_delays |
|----|-----------|---------|----------------|---------------------|
| 1  | ATL       | DL      | small          | 4593                |
| 2  | DFW       | AA      | small          | 3552                |
| 3  | MDW       | WN      | small          | 2188                |
| 4  | IAH       | UA      | small          | 2097                |
| 5  | LAS       | WN      | small          | 2009                |
| 6  | CLT       | US      | small          | 1942                |
| 7  | PHX       | WN      | small          | 1888                |
| 8  | BWI       | WN      | small          | 1803                |
| 9  | DFW       | MQ      | small          | 1723                |
| 10 | DEN       | WN      | small          | 1723                |
| 11 | DEN       | UA      | small          | 1713                |
| 12 | DAL       | WN      | small          | 1605                |
| 13 | DFW       | AA      | big            | 1577                |
| 14 | ORD       | UA      | small          | 1577                |
| 15 | EWR       | UA      | small          | 1526                |
| 16 | ORD       | MQ      | big            | 1277                |
| 17 | HOU       | WN      | small          | 1270                |
| 18 | SFO       | UA      | small          | 1214                |
| 19 | ORD       | MQ      | small          | 1211                |
| 20 | LAX       | WN      | small          | 1180                |

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Query executed successfully.

## Part B: Data Warehousing & OLAP

- 1- Sketch a representative Star schema for the data warehouse (specifying the relations, the attributes, the primary keys, and the foreign keys)



2. Suppose that we want to examine the data of HSD\_DW, write SQL queries to answer the following questions

- a. Which customer(s) made an order in the past 90 days from May 31, 2018? Provide the CustomerName and CustomerID, Quantity and Total amounts of the orders.

110 %

Results Messages

|   | CustomerID | CustomerName   | sum_Quantity | sum_Total_orders |
|---|------------|----------------|--------------|------------------|
| 1 | 1          | Jacobs, Nancy  | 3            | 47.89            |
| 2 | 3          | Able, Ralph    | 1            | 24.95            |
| 3 | 4          | Baker, Susan   | 3            | 64.85            |
| 4 | 5          | Eagleton, Sam  | 3            | 47.89            |
| 5 | 6          | Foxtrot, Kathy | 5            | 94.79            |
| 6 | 7          | George, Sally  | 4            | 94.80            |
| 7 | 8          | Hullett, Shawn | 3            | 54.89            |
| 8 | 9          | Pearson, Bobbi | 5            | 70.83            |
| 9 | 11         | Tyler, Jenny   | 6            | 109.78           |

- b. Which customer had an average order greater than the average order of all customers?

110 %

Results Messages

|   | CustomerID | CustomerName  | total_arv |
|---|------------|---------------|-----------|
| 1 | 7          | George, Sally | 23.950000 |
| 2 | 11         | Tyler, Jenny  | 31.132000 |

c. For each customer, determine the time between the sale of products as Days\_between\_Product\_Sales. Display the Customer ID, Customer Name, Product Number, Product Name, Date, End Date, Days\_between\_Product\_Sales. Consider using the lag function and order the result by the CustomerID.

|    | CustomerID | CustomerName  | ProductNumber | ProductName   | Date       | End Date   | Days_between_Product_Sales |
|----|------------|---------------|---------------|---|------------|------------|----------------------------|
| 1  | 1          | Jacobs, Nancy | BK001         | Kitchen Remodeling Basics For Everyone              | 2018-04-08 | NULL       | NULL                       |
| 2  | 1          | Jacobs, Nancy | VB001         | Kitchen Remodeling Basics                           | 2018-04-08 | 2018-04-08 | 0                          |
| 3  | 1          | Jacobs, Nancy | VK001         | Kitchen Remodeling Basics                           | 2018-04-08 | 2018-04-08 | 0                          |
| 4  | 3          | Able, Ralph   | VB001         | Kitchen Remodeling Basics                           | 2017-10-15 | NULL       | NULL                       |
| 5  | 3          | Able, Ralph   | VK001         | Kitchen Remodeling Basics                           | 2017-10-15 | 2017-10-15 | 0                          |
| 6  | 3          | Able, Ralph   | BK001         | Kitchen Remodeling Basics For Everyone              | 2018-04-23 | 2017-10-15 | 190                        |
| 7  | 3          | Able, Ralph   | BK002         | Advanced Kitchen Remodeling For Everyone            | 2018-06-05 | 2018-04-23 | 43                         |
| 8  | 3          | Able, Ralph   | VB001         | Kitchen Remodeling Basics                           | 2018-06-05 | 2018-06-05 | 0                          |
| 9  | 3          | Able, Ralph   | VB002         | Advanced Kitchen Remodeling I                       | 2018-06-05 | 2018-06-05 | 0                          |
| 10 | 3          | Able, Ralph   | VK001         | Kitchen Remodeling Basics                           | 2018-06-05 | 2018-06-05 | 0                          |
| 11 | 3          | Able, Ralph   | VK002         | Advanced Kitchen Remodeling                         | 2018-06-05 | 2018-06-05 | 0                          |
| 12 | 4          | Baker, Susan  | BK001         | Kitchen Remodeling Basics For Everyone              | 2017-10-25 | NULL       | NULL                       |
| 13 | 4          | Baker, Susan  | VB001         | Kitchen Remodeling Basics                           | 2017-10-25 | 2017-10-25 | 0                          |
| 14 | 4          | Baker, Susan  | VK001         | Kitchen Remodeling Basics                           | 2017-10-25 | 2017-10-25 | 0                          |
| 15 | 4          | Baker, Susan  | BK002         | Advanced Kitchen Remodeling For Everyone            | 2018-03-25 | 2017-10-25 | 151                        |
| 16 | 4          | Baker, Susan  | VK002         | Advanced Kitchen Remodeling                         | 2018-03-25 | 2018-03-25 | 0                          |
| 17 | 4          | Baker, Susan  | VK004         | Heather Sweeney Seminar Live in Dallas on 25-OCT... | 2018-03-25 | 2018-03-25 | 0                          |
| 18 | 5          | Eagleton, Sam | BK001         | Kitchen Remodeling Basics For Everyone              | 2018-04-08 | NULL       | NULL                       |
| 19 | 5          | Eagleton, Sam | VB001         | Kitchen Remodeling Basics                           | 2018-04-08 | 2018-04-08 | 0                          |
| 20 | 5          | Eagleton, Sam | VK001         | Kitchen Remodeling Basics                           | 2018-04-08 | 2018-04-08 | 0                          |
| 21 | 6          | Frost, Kathy  | BK002         | Advanced Kitchen Remodeling For Everyone            | 2018-03-27 | NULL       | NULL                       |

Query executed successfully.

d. Write SQL query for the "Roll-Up" operation to summarise the total sales per quarter.

|   | Year | QuarterID | QuarterText | the total sales per quarter |
|---|------|-----------|-------------|-----------------------------|
| 1 | 2018 | 1         | Qtr1        | 302.33                      |
| 2 | 2018 | 2         | Qtr2        | 542.78                      |
| 3 | 2017 | 3         | Qtr3        | 95.78                       |

Query executed successfully.



3. Customer churn is a huge problem for telecoms providers. Analyze the customer\_churn dataset provided to determine ways to improve customer retention. Using Excel or R, build an OLAP cube to determine the following:

- a. The total revenue contribution from a Two Year contract for each Offer by internet type.

```
> revenue_two_year["Two Year",,]
      Internet.Type
Offer      Cable      DSL Fiber optic
None      554678.24 1235674.43 2075682.41
offer A    349750.71  720759.09 1474862.52
offer B    164188.21  362671.78  473681.65
offer C     10360.26   34148.92   80196.94
offer D       5443.22    5592.51   22464.25
offer E       1684.86    3019.54    6134.10
>
```

- b. For Offer B, what (%) of the total revenue was contributed by churned customers that accepted a Month-to-Month contract for Cable service

```
> print(paste(round(percentage, digits = 2), "%"))
[1] "0.45 %"
> |
```