Project 1: Database Management and Retrieval

Project Brief

Key Tasks

In this project, you will implement several SQL commands, and practice data manipulation operations and information retrieval to answer several business questions for your client. Your submission will include **all required SQL commands with the command execution output** and a brief write-up **in a single Word document.**

For Project 1, complete the following key tasks:

1. Run the Airline_DB.sql Download Airline_DB.sqlscript to create the database tables.

- Define and execute SQL queries that show the content of each table.

2. Define and execute SQL queries to display data for one or more columns:

- Write a query that displays Flight Number, Depart DateTime, Arrival DateTime for all scheduled flights. What business question do you think this SQL query answers?
- Write a query that displays all aircraft with a fuel capacity between 7000 and 24000 gallons. Additionally, displays the number of passengers these flights can carry. What business question do you think this SQL query answers?

3. Define and execute SQL queries to sort retrieved data:

- Write a query that displays information for all scheduled flights sorted by Depart DateTime in descending order. What business question do you think this SQL query answers?
- Write an SQL query to display information for all aircrafts sorted by passenger capacity in descending order. What business question do you think this SQL query answers?

4. Define and execute SQL queries to generate data:

- Write a query that displays each AirplaneID, purchase date, and how many years the airplane has been in service since purchased.
- What business question do you think this SQL query answers?

5. Use functions to complete the following, and specify what business question you think each SQL query answers:

- Write a query that filters and displays all rows from the Airplane table such that the following parameters are true:
    - The aircraftTypeID start with 'BOE'
    - The purchaseDate is in the year 2015
    - Fuel capacity is less than 63000
- Write a query to find the average of the aircrafts seating capacity.
- Write a query to find how many times flights on the route with flight number ‘5063’ were delayed.

6. Define and execute SQL commands to insert, update, and delete table records:

You need to complete the following:

- Define and execute a SQL command to insert a new state entry for Michigan with the state abbreviation 'MI'. Create a new city named 'Detroit' in Michigan and add an airport named 'Detroit Airport (DTW)' to this city. Lastly, insert a flight with the flight number '3851' originating from DTW and arriving at SFO, covering 2079 miles. Display each updated table in your output.
- Define and execute a SQL command to update the status of scheduled flights with flight number ‘3310’ to ‘D’ (Delayed)
- Define and execute a SQL command to delete all the cancelled flights with a departure date less than ‘16-OCT-2021’.
- Commit the changes.

What is the importance of these SQL commands? Why would the business apply these SQL commands?

7. Joining data from tables:

- Define and execute a SQL query to display all flights which were canceled or delayed. You need to display the flight Aircraft Type ID, Aircraft purchase date, flight depart DateTime, and statusID. What business question do you think this SQL query answers?

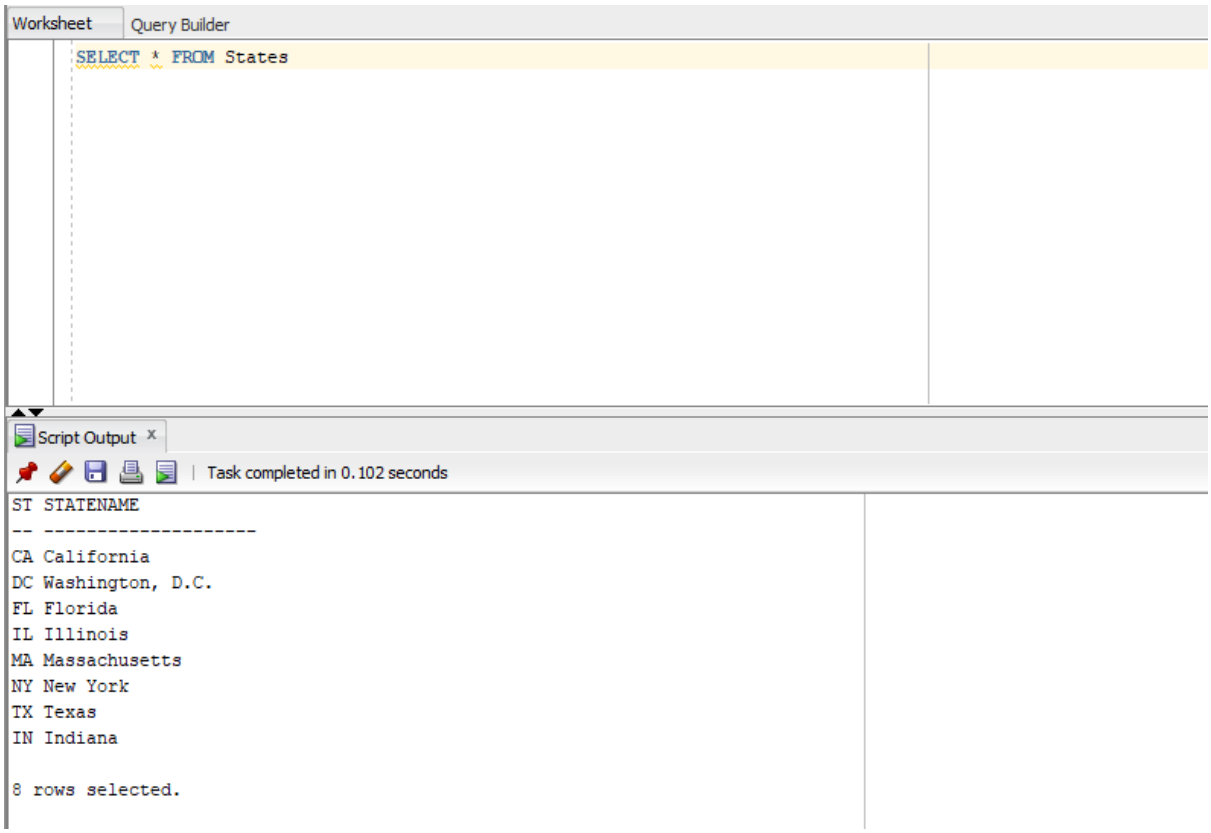
- Define and execute a SQL query to display all flights that are delayed leaving from Boston. You need to display the flight number, departure airport, arrival airport and flight depart Date/Time.

  What business question do you think this SQL query answers?

Project 1: Database Management and Retrieval

- Define and execute SQL queries that show the content of each table.

States Table



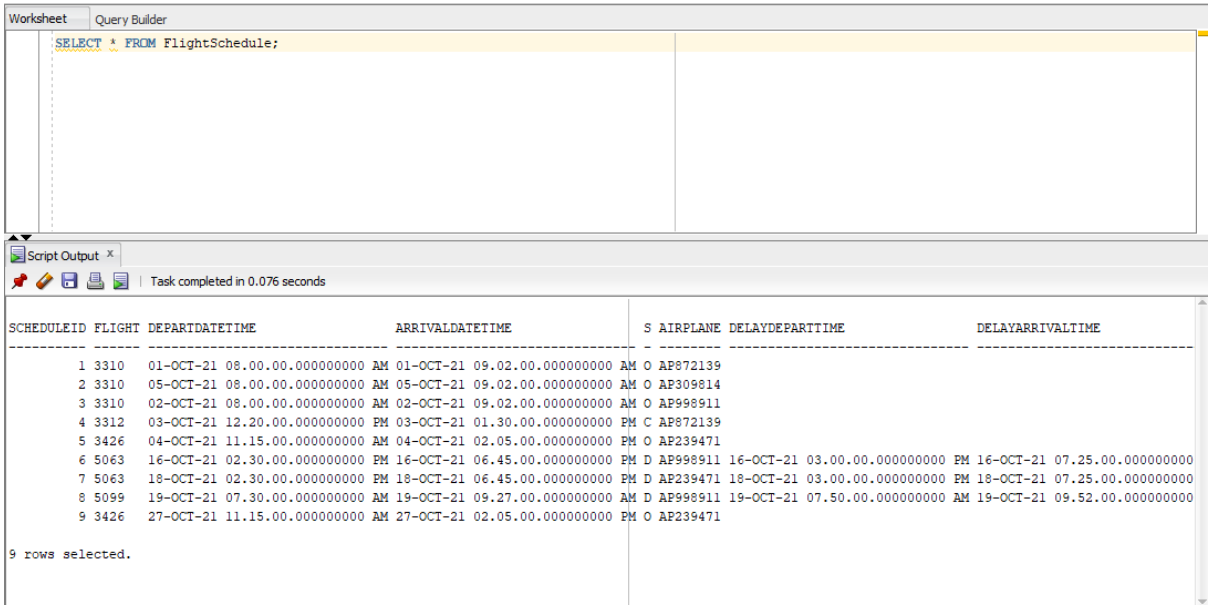
Worksheet | Query Builder

```
SELECT * FROM States
```

Script Output | Task completed in 0.102 seconds

```
ST STATENAME
-- --------------------
CA California
DC Washington, D.C.
FL Florida
IL Illinois
MA Massachusetts
NY New York
TX Texas
IN Indiana

8 rows selected.
```

Flight schedule Table



Worksheet | Query Builder

```
SELECT * FROM FlightSchedule;
```

Script Output | Task completed in 0.076 seconds

```
SCHEDULEID FLIGHT DEPARTDATETIME                 ARRIVALDATETIME                  S AIRPLANE DELAYDEPARTTIME                DELAYARRIVALTIME
---------- ------ ------------------------------ ------------------------------ - -------- ------------------------------ ------------------------------
         1 3310   01-OCT-21 08.00.00.000000000 AM 01-OCT-21 09.02.00.000000000 AM O AP872139
         2 3310   05-OCT-21 08.00.00.000000000 AM 05-OCT-21 09.02.00.000000000 AM O AP309814
         3 3310   02-OCT-21 08.00.00.000000000 AM 02-OCT-21 09.02.00.000000000 AM O AP998911
         4 3312   03-OCT-21 12.20.00.000000000 PM 03-OCT-21 01.30.00.000000000 PM C AP872139
         5 3426   04-OCT-21 11.15.00.000000000 AM 04-OCT-21 02.05.00.000000000 PM O AP239471
         6 5063   16-OCT-21 02.30.00.000000000 PM 16-OCT-21 06.45.00.000000000 PM D AP998911 16-OCT-21 03.00.00.000000000 PM 16-OCT-21 07.25.00.000000000
         7 5063   18-OCT-21 02.30.00.000000000 PM 18-OCT-21 06.45.00.000000000 PM D AP239471 18-OCT-21 03.00.00.000000000 PM 18-OCT-21 07.25.00.000000000
         8 5099   19-OCT-21 07.30.00.000000000 AM 19-OCT-21 09.27.00.000000000 AM D AP998911 19-OCT-21 07.50.00.000000000 AM 19-OCT-21 09.52.00.000000000
         9 3426   27-OCT-21 11.15.00.000000000 AM 27-OCT-21 02.05.00.000000000 PM O AP239471

9 rows selected.
```

Flight route Table

Worksheet | Query Builder

```
SELECT * FROM FlightRoute
```

Script Output | Task completed in 0.048 seconds

```
FLIGHT DEP ARR   DISTANCE
------ --- --- ----------
3310   SYR JFK        209
3312   JFK SYR        209
3426   LAX ORD       1745
5063   BOS MCO       1121
5099   BOS ORD        867
```

Airport Table

Worksheet | Query Builder

```
SELECT * FROM Airport;
```

Script Output | Task completed in 0.042 seconds

```
MCO Orlando International Airport                C005
MDW Chicago Midway International Airport         C006
MIA Miami International Airport                  C004
ORD Chicago OHare International Airport          C006
SFO San Francisco International Airport          C002

AIR AIRPORTNAME                                  CITYID
--- -------------------------------------------- --------
SYR Syracuse Hancock International Airport       C009
IND Indianapolis International Airport           C010

13 rows selected.
```

City Table

Worksheet | Query Builder

```
SELECT * FROM City;
```

Script Output | Task completed in 0.055 seconds

```
C001    Los Angeles             CA
C002    San Francisco           CA
C003    Washington, D.C.        DC
C004    Miami                   FL
C005    Orlando                 FL
C006    Chicago                 IL
C007    Boston                  MA
C008    New York                NY
C009    Syracuse                NY
C010    Indianapolis            IN

10 rows selected.
```

Airplane Table

Worksheet | Query Builder

```
SELECT * FROM Airplane;
```

Script Output | Task completed in 0.064 seconds

```
AIRPLANE AIRCRAFT PURCHASED
-------- -------- ---------
AP098640 AIR2     01-MAR-13
AP239471 AIR1     10-JUN-15
AP309814 BOE2     15-MAY-15
AP629342 BOE1     20-OCT-13
AP872139 BOE3     02-SEP-18
AP998911 BOE2     01-OCT-09
AP998981 BOE4     01-NOV-15

7 rows selected.
```

Flight Status Table

Worksheet | Query Builder

```
SELECT * FROM FlightStatus
```

Script Output | Task completed in 0.041 seconds

```
S DESCRIPTION
- --------------------
C Cancelled
D Delay
O On Time
```

Aircraft Specs Table

Worksheet | Query Builder

```
SELECT * FROM AircraftSpecs;
```

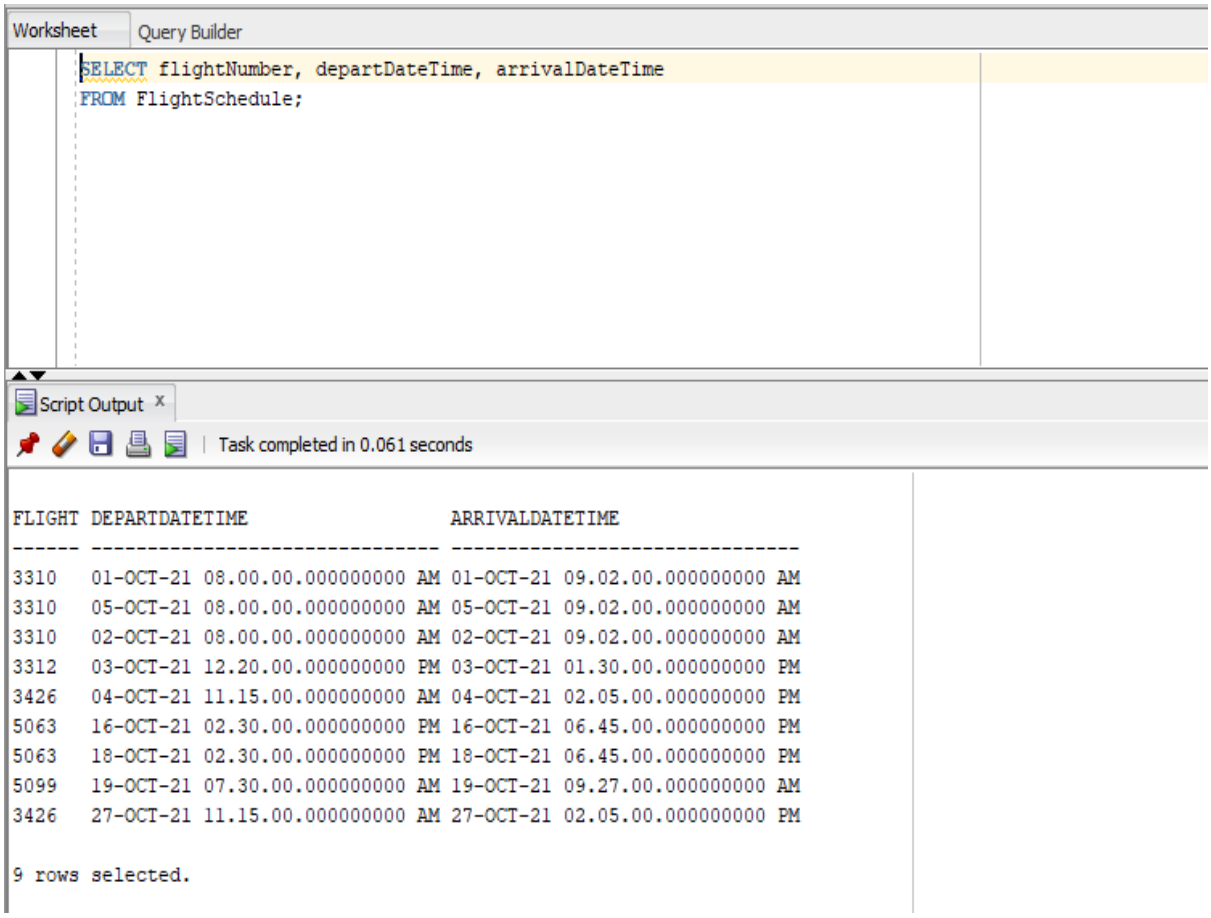
Script Output | Task completed in 0.053 seconds

```
AIRCRAFT AIRCRAFTVE CABINNUMOFSEATS FUELCAPACITY
-------- ---------- --------------- ------------
AIR1     321-200                220         7930
AIR2     737-600                132         6875
BOE1     747-400                416        63705
BOE2     767-300                350        23980
BOE3     737-600                132         6875
BOE4     737-900                167        10707

6 rows selected.
```

- Write a query that displays Flight Number, Depart Date Time, Arrival Date Time for all scheduled flights. What business question do you think this SQL query answers?

  Business question:

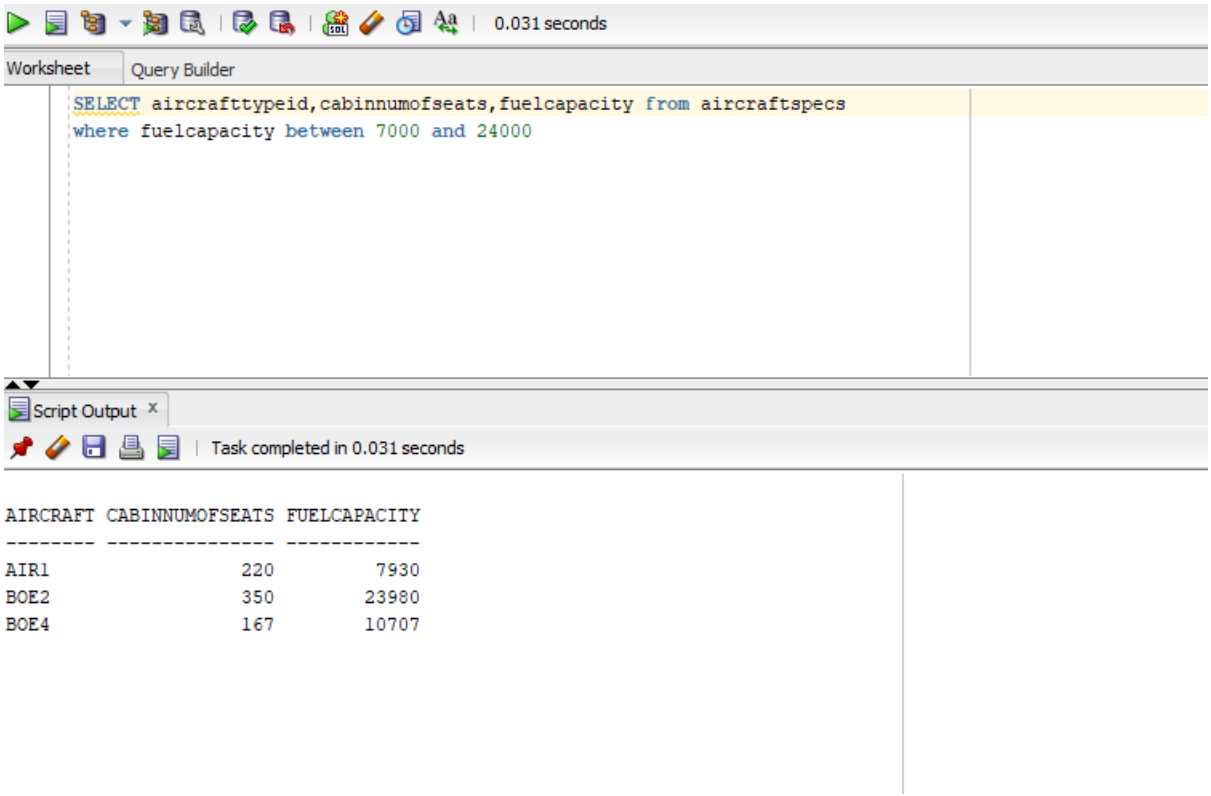
  - What is the complete schedule of all flights, including their Flight Number, Depart Date Time, and Arrival Date Time?
  - What are the flight details, including the flight number, departure time, and arrival time, for all the scheduled flights?



- Write a query that displays all aircraft with a fuel capacity between 7000 and 24000 gallons. Additionally, displays the number of passengers these flights can carry. What business question do you think this SQL query answers?

Business question:

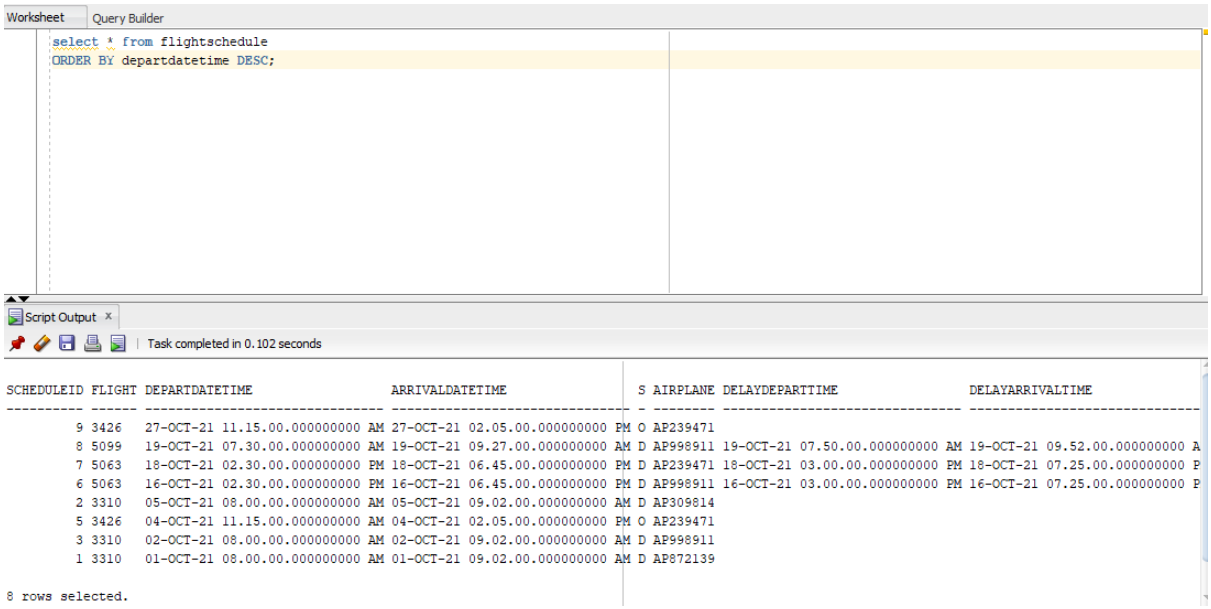
- Which aircraft have a fuel capacity between 7000 and 24000 gallons, and how many passengers can these aircraft carry?
- What are the flight details, including the flight number, departure time, and arrival time, for all the scheduled flights?
- Can you provide a list of all the flights along with their respective departure and arrival timings?



- Write a query that displays information for all scheduled flights sorted by Depart Date Time in descending order. What business question do you think this SQL query answers?

<u>Business question:</u>

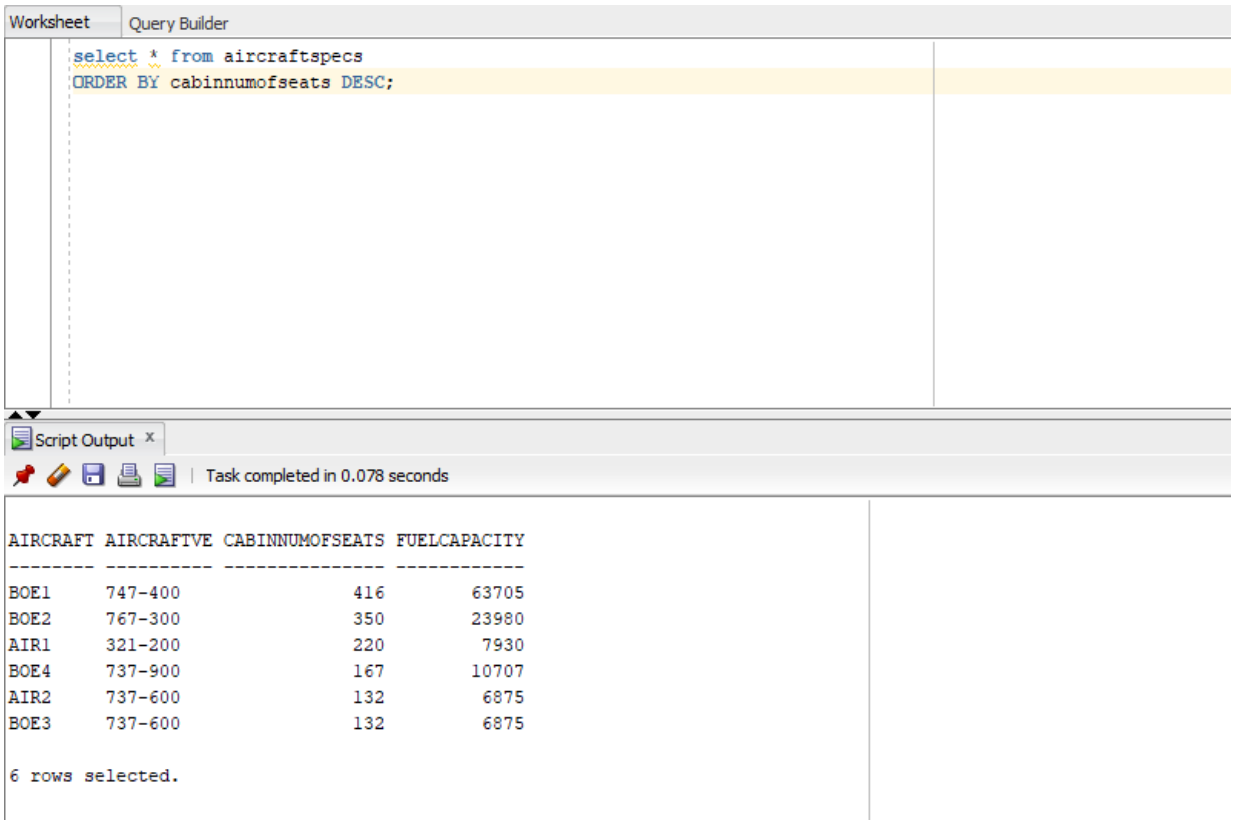
- What is the complete schedule of all scheduled flights, sorted by Depart DateTime in descending order?
- What is the chronological order of all the scheduled flights, based on their departure date and time?



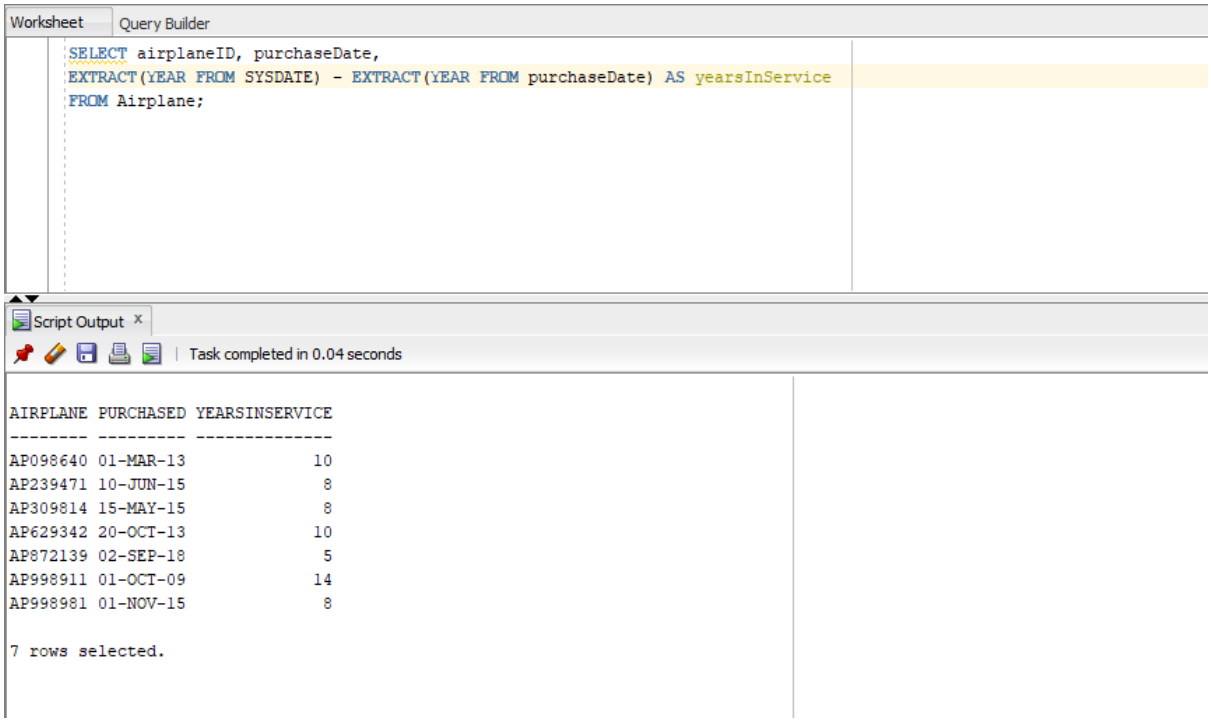
- Write an SQL query to display information for all aircrafts sorted by passenger capacity in descending order. What business question do you think this SQL query answers?

Business question:

- What is the passenger capacity of each aircraft, and how are the aircraft sorted in descending order based on their passenger capacity?
- What is the complete information for all aircraft, including their passenger capacity, sorted in descending order based on the passenger capacity?



- Write a query that displays each Airplane, purchase date, and how many years the airplane has been in service since purchased.

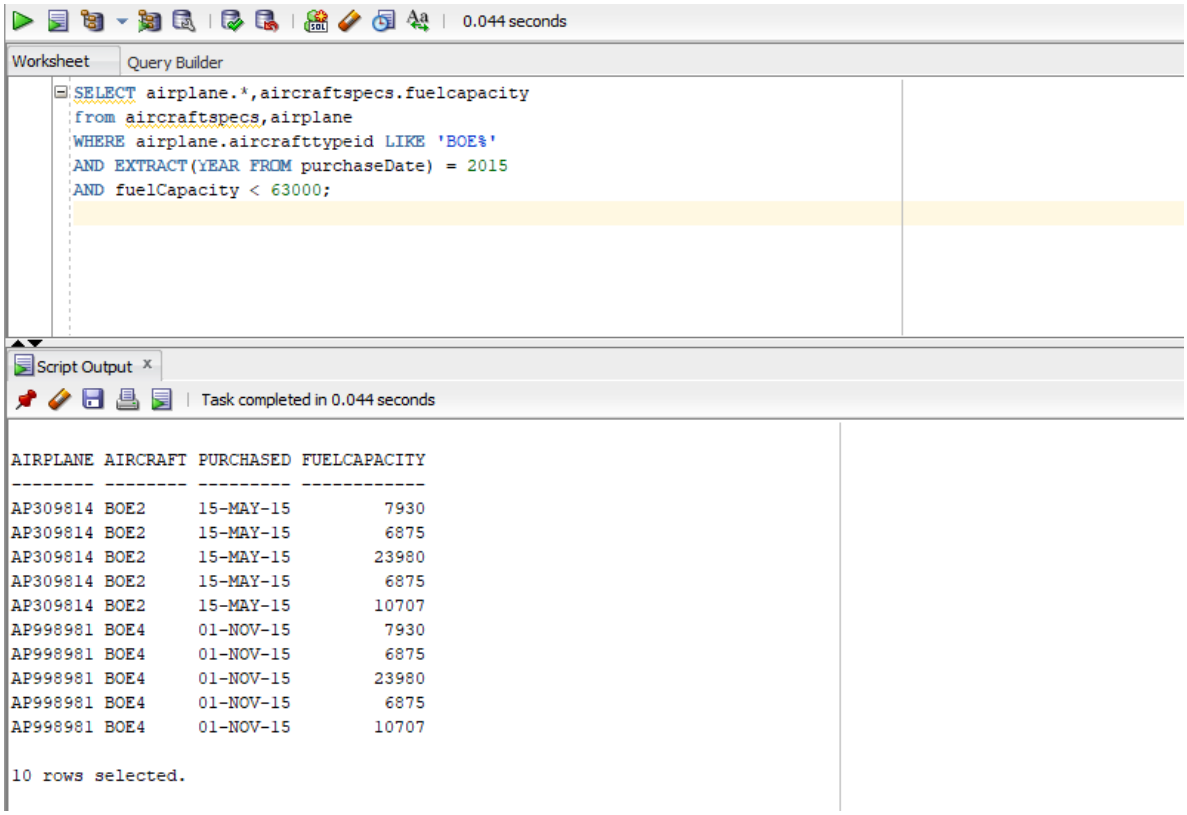


- What business question do you think this SQL query answers?

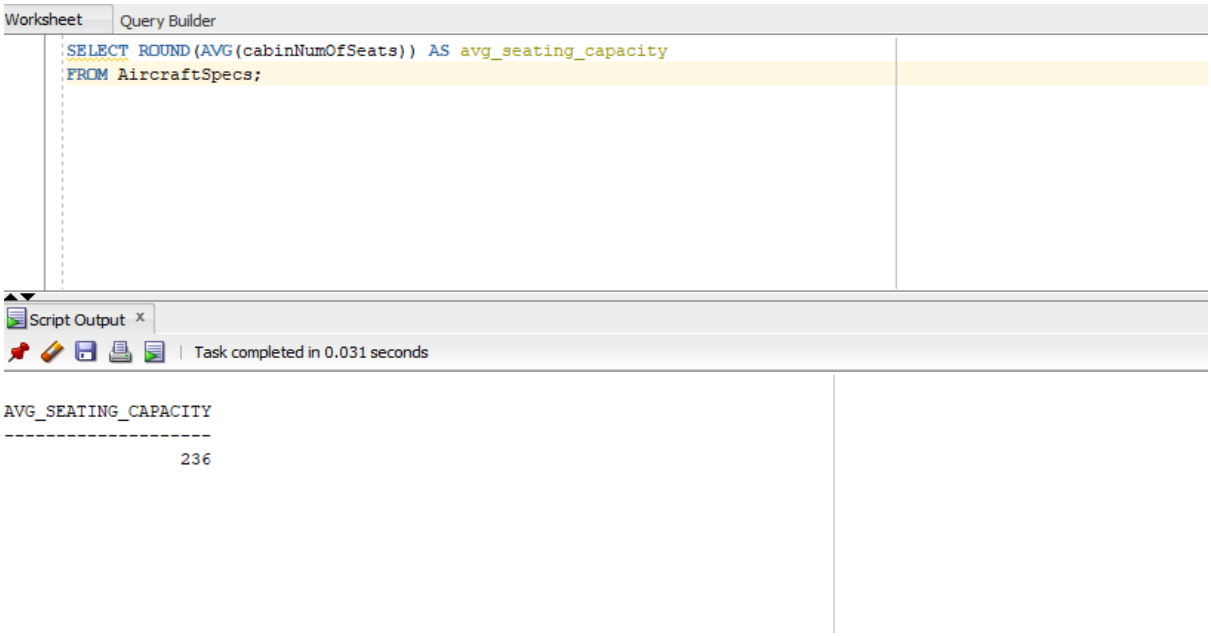
Business question:

- What is the purchase date and the number of years each airplane has been in service since its purchase?
- What is the duration in years for each airplane since its purchase, and what is the purchase date for each airplane?

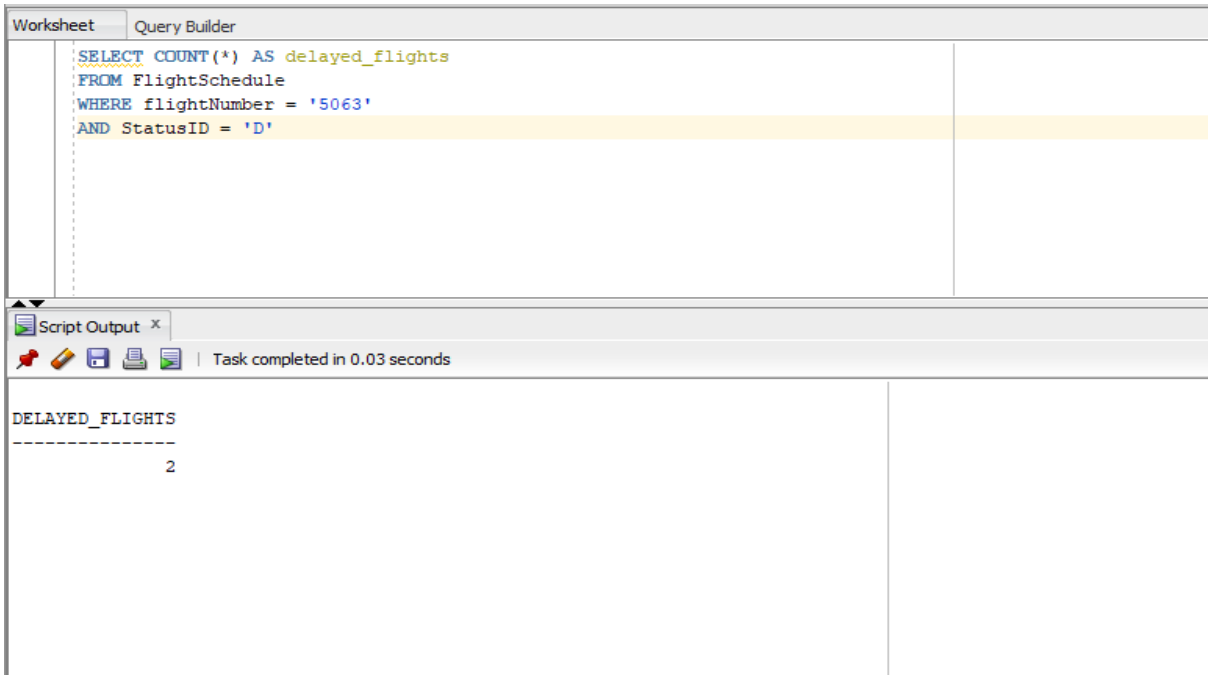
- Write a query that filters and displays all rows from the Airplane table such that the following parameters are true:
  - The aircraftTypeID start with 'BOE'
  - The purchaseDate is in the year 2015
  - Fuel capacity is less than 63000



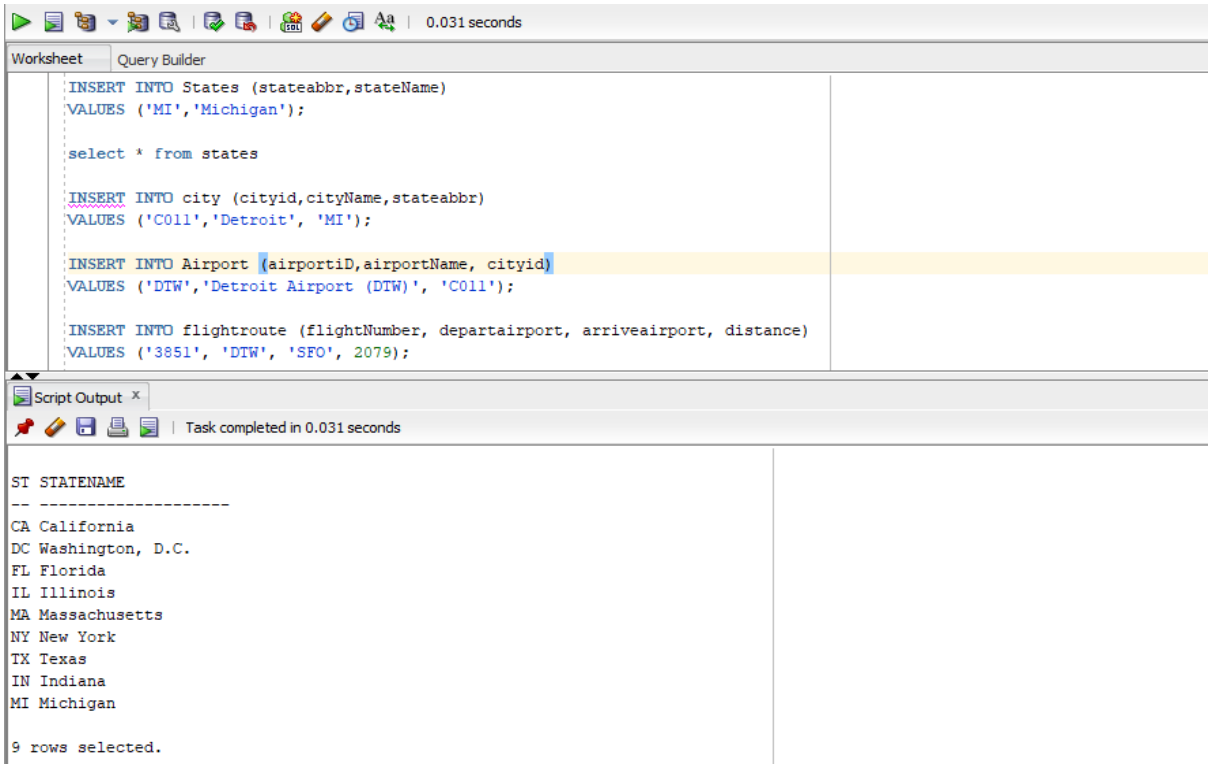
- Write a query to find the average of the aircrafts seating capacity.



- Write a query to find how many times flights on the route with flight number ‘5063’ were delayed.



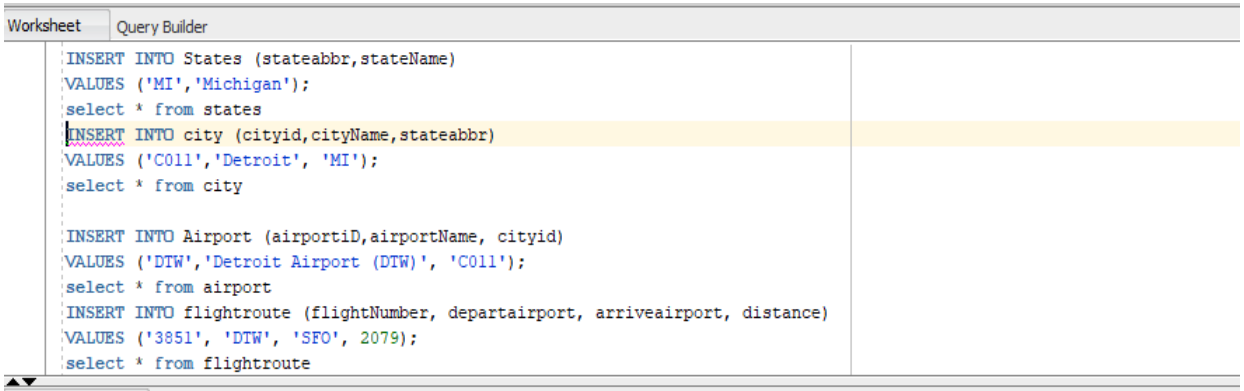
- Define and execute a SQL command to insert a new state entry for Michigan with the state abbreviation 'MI'. Create a new city named 'Detroit' in Michigan and add an airport named 'Detroit Airport (DTW)' to this city. Lastly, insert a flight with the flight number '3851' originating from DTW and arriving at SFO, covering 2079 miles. Display each updated table in your output.



```
INSERT INTO States (stateabbr,stateName)
VALUES ('MI','Michigan');

select * from states

INSERT INTO city (cityid,cityName,stateabbr)
VALUES ('C011','Detroit', 'MI');

INSERT INTO Airport (airportiD,airportName, cityid)
VALUES ('DTW','Detroit Airport (DTW)', 'C011');

INSERT INTO flightroute (flightNumber, departairport, arriveairport, distance)
VALUES ('3851', 'DTW', 'SFO', 2079);
```

Script Output — Task completed in 0.031 seconds

```
ST STATENAME
-- --------------------
CA California
DC Washington, D.C.
FL Florida
IL Illinois
MA Massachusetts
NY New York
TX Texas
IN Indiana
MI Michigan

9 rows selected.
```



```
INSERT INTO States (stateabbr,stateName)
VALUES ('MI','Michigan');
select * from states
INSERT INTO city (cityid,cityName,stateabbr)
VALUES ('C011','Detroit', 'MI');
select * from city

INSERT INTO Airport (airportiD,airportName, cityid)
VALUES ('DTW','Detroit Airport (DTW)', 'C011');
select * from airport
INSERT INTO flightroute (flightNumber, departairport, arriveairport, distance)
VALUES ('3851', 'DTW', 'SFO', 2079);
select * from flightroute
```

Query Result — All Rows Fetched: 11 in 0.003 seconds

	CITYID	CITYNAME	STATEABBR
1	C001	Los Angeles	CA
2	C002	San Francisco	CA
3	C003	Washington, D.C.	DC
4	C004	Miami	FL
5	C005	Orlando	FL
6	C006	Chicago	IL
7	C007	Boston	MA
8	C008	New York	NY
9	C009	Syracuse	NY
10	C010	Indianapolis	IN
11	C011	Detroit	MI

Worksheet Query Builder

```
select * from city

INSERT INTO Airport (airportiD,airportName, cityid)
VALUES ('DTW','Detroit Airport (DTW)', 'C011');
select * from airport

INSERT INTO flightroute (flightNumber, departairport, arriveairport, distance)
VALUES ('3851', 'DTW', 'SFO', 2079);
select * from flightroute
```

Query Result

SQL | All Rows Fetched: 14 in 0.004 seconds

	AIRPORTID	AIRPORTNAME	CITYID
1	BOS	Boston Logan International Airport	C007
2	DCA	Ronald Regan National Airport	C003
3	IAD	Washington Dulles International Airport	C003
4	JFK	John F. Kennedy International Airport	C008
5	LAX	Los Angeles International Airport	C001
6	LGA	LaGuardia Airport	C008
7	MCO	Orlando International Airport	C005
8	MDW	Chicago Midway International Airport	C006
9	MIA	Miami International Airport	C004
10	ORD	Chicago OHare International Airport	C006
11	SFO	San Francisco International Airport	C002
12	SYR	Syracuse Hancock International Airport	C009
13	IND	Indianapolis International Airport	C010
14	DTW	Detroit Airport (DTW)	C011

Worksheet Query Builder

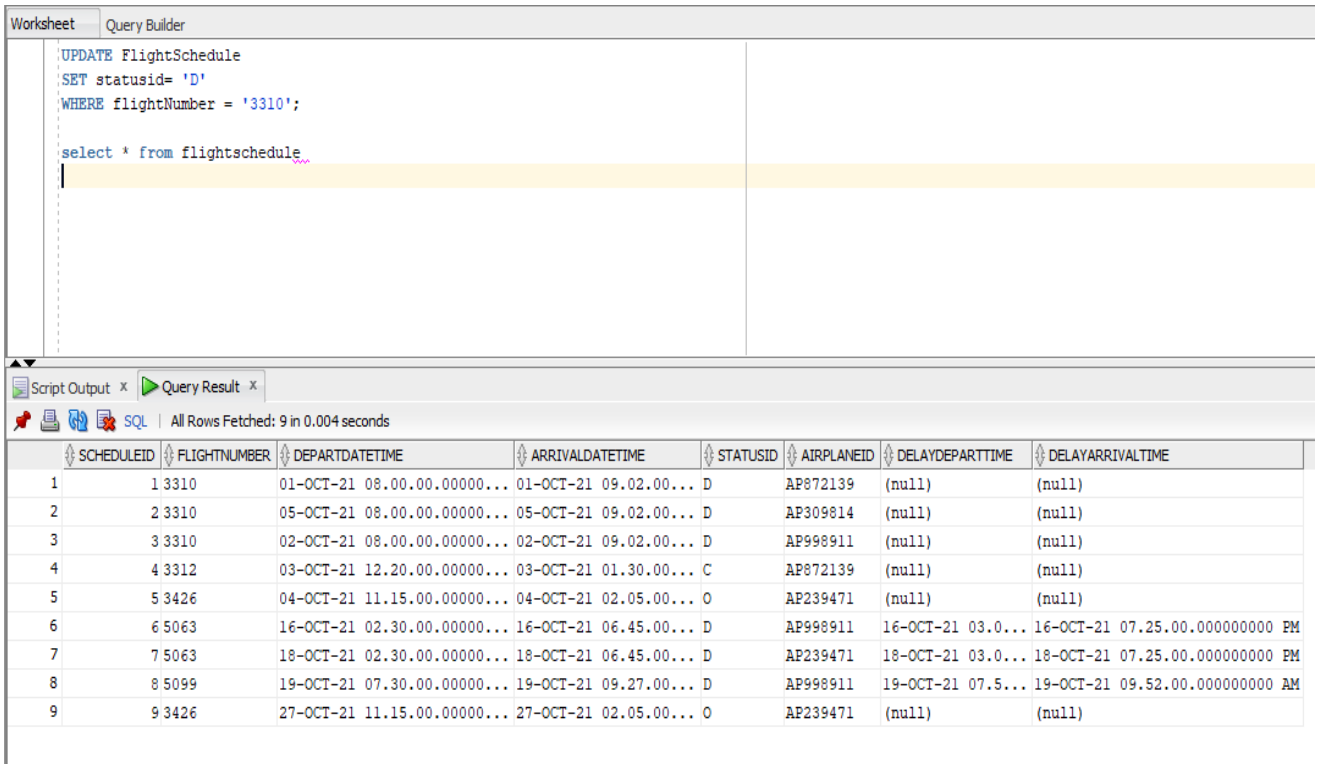
```
VALUES ('DTW','Detroit Airport (DTW)', 'C011');
select * from airport

INSERT INTO flightroute (flightNumber, departairport, arriveairport, distance)
VALUES ('3851', 'DTW', 'SFO', 2079);
select * from flightroute
```

Query Result

SQL | All Rows Fetched: 6 in 0.003 seconds

	FLIGHTNUMBER	DEPARTAIRPORT	ARRIVEAIRPORT	DISTANCE
1	3310	SYR	JFK	209
2	3312	JFK	SYR	209
3	3426	LAX	ORD	1745
4	5063	BOS	MCO	1121
5	5099	BOS	ORD	867
6	3851	DTW	SFO	2079

- Define and execute a SQL command to update the status of scheduled flights with flight number ‘3310’ to ‘D’ (Delayed)



Worksheet | Query Builder

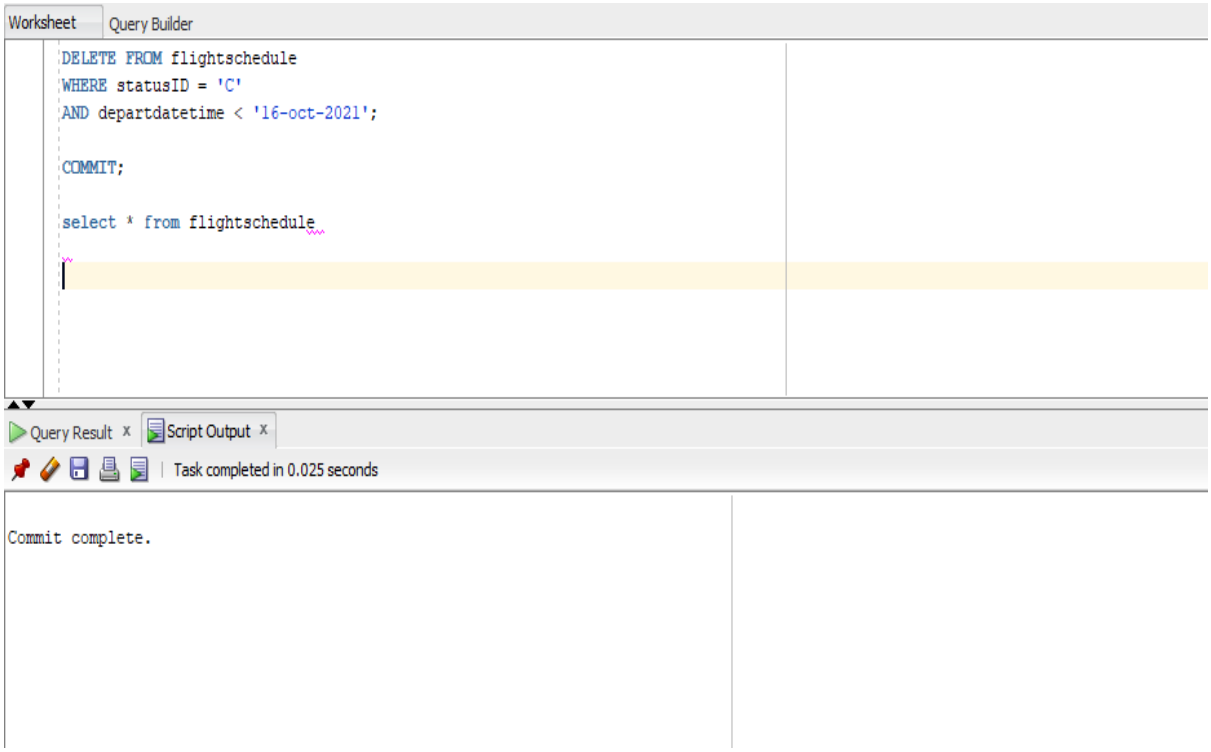
```
UPDATE FlightSchedule
SET statusid= 'D'
WHERE flightNumber = '3310';

select * from flightschedule
```

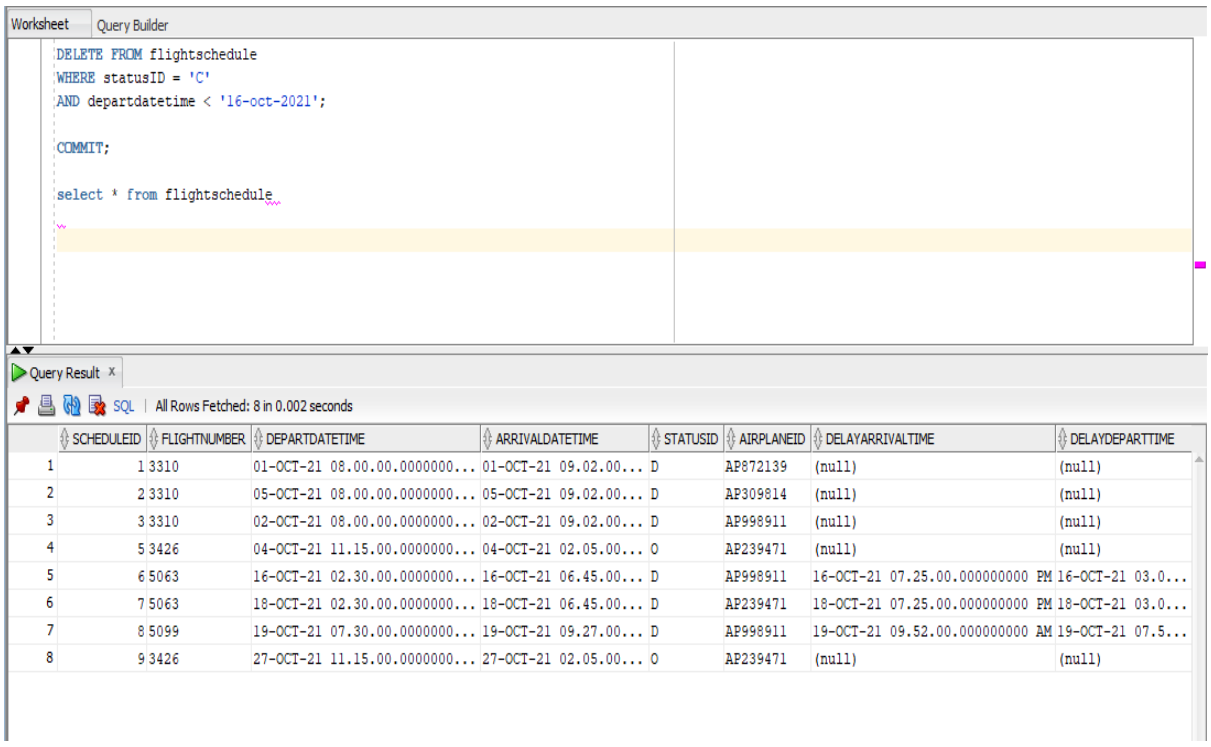
Script Output | Query Result

SQL | All Rows Fetched: 9 in 0.004 seconds

	SCHEDULEID	FLIGHTNUMBER	DEPARTDATETIME	ARRIVALDATETIME	STATUSID	AIRPLANEID	DELAYDEPARTTIME	DELAYARRIVALTIME
1	1	3310	01-OCT-21 08.00.00.00000...	01-OCT-21 09.02.00...	D	AP872139	(null)	(null)
2	2	3310	05-OCT-21 08.00.00.00000...	05-OCT-21 09.02.00...	D	AP309814	(null)	(null)
3	3	3310	02-OCT-21 08.00.00.00000...	02-OCT-21 09.02.00...	D	AP998911	(null)	(null)
4	4	3312	03-OCT-21 12.20.00.00000...	03-OCT-21 01.30.00...	C	AP872139	(null)	(null)
5	5	3426	04-OCT-21 11.15.00.00000...	04-OCT-21 02.05.00...	O	AP239471	(null)	(null)
6	6	5063	16-OCT-21 02.30.00.00000...	16-OCT-21 06.45.00...	D	AP998911	16-OCT-21 03.0...	16-OCT-21 07.25.00.000000000 PM
7	7	5063	18-OCT-21 02.30.00.00000...	18-OCT-21 06.45.00...	D	AP239471	18-OCT-21 03.0...	18-OCT-21 07.25.00.000000000 PM
8	8	5099	19-OCT-21 07.30.00.00000...	19-OCT-21 09.27.00...	D	AP998911	19-OCT-21 07.5...	19-OCT-21 09.52.00.000000000 AM
9	9	3426	27-OCT-21 11.15.00.00000...	27-OCT-21 02.05.00...	O	AP239471	(null)	(null)

- Define and execute a SQL command to delete all the cancelled flights with a departure date less than '16-OCT-2021'.
- Commit the changes.





	SCHEDULEID	FLIGHTNUMBER	DEPARTDATETIME	ARRIVALDATETIME	STATUSID	AIRPLANEID	DELAYARRIVALTIME	DELAYDEPARTTIME
1	1	3310	01-OCT-21 08.00.00.0000000...	01-OCT-21 09.02.00...	D	AP872139	(null)	(null)
2	2	3310	05-OCT-21 08.00.00.0000000...	05-OCT-21 09.02.00...	D	AP309814	(null)	(null)
3	3	3310	02-OCT-21 08.00.00.0000000...	02-OCT-21 09.02.00...	D	AP998911	(null)	(null)
4	5	3426	04-OCT-21 11.15.00.0000000...	04-OCT-21 02.05.00...	O	AP239471	(null)	(null)
5	6	5063	16-OCT-21 02.30.00.0000000...	16-OCT-21 06.45.00...	D	AP998911	16-OCT-21 07.25.00.000000000 PM	16-OCT-21 03.0...
6	7	5063	18-OCT-21 02.30.00.0000000...	18-OCT-21 06.45.00...	D	AP239471	18-OCT-21 07.25.00.000000000 PM	18-OCT-21 03.0...
7	8	5099	19-OCT-21 07.30.00.0000000...	19-OCT-21 09.27.00...	D	AP998911	19-OCT-21 09.52.00.000000000 AM	19-OCT-21 07.5...
8	9	3426	27-OCT-21 11.15.00.0000000...	27-OCT-21 02.05.00...	O	AP239471	(null)	(null)

- What is the importance of these SQL commands? Why would the business apply these SQL commands?

The SQL commands mentioned in your question are used for data manipulation and maintenance in a database. Here's the importance of each command and why a business might apply them:

- Insert command: The insert command is used to add new records to a table. In this case, it is used to insert a new state entry for Michigan, create a city named Detroit in Michigan, and add an airport named Detroit Airport (DTW) to this city. This command allows businesses to add new data to their database, keeping it up-to-date and accurate.

- Update command: The update command is used to modify existing records in a table. In this case, it is used to update the status of scheduled flights with flight number '3310' to 'D' (Delayed). This command allows businesses to reflect changes in flight status, ensuring accurate and real-time information for their customers.

- Delete command: The delete command is used to remove records from a table. In this case, it is used to delete all the cancelled flights with a departure date less than '16-OCT-2021'. This command allows businesses to remove irrelevant or outdated data from their database, keeping it clean and efficient.

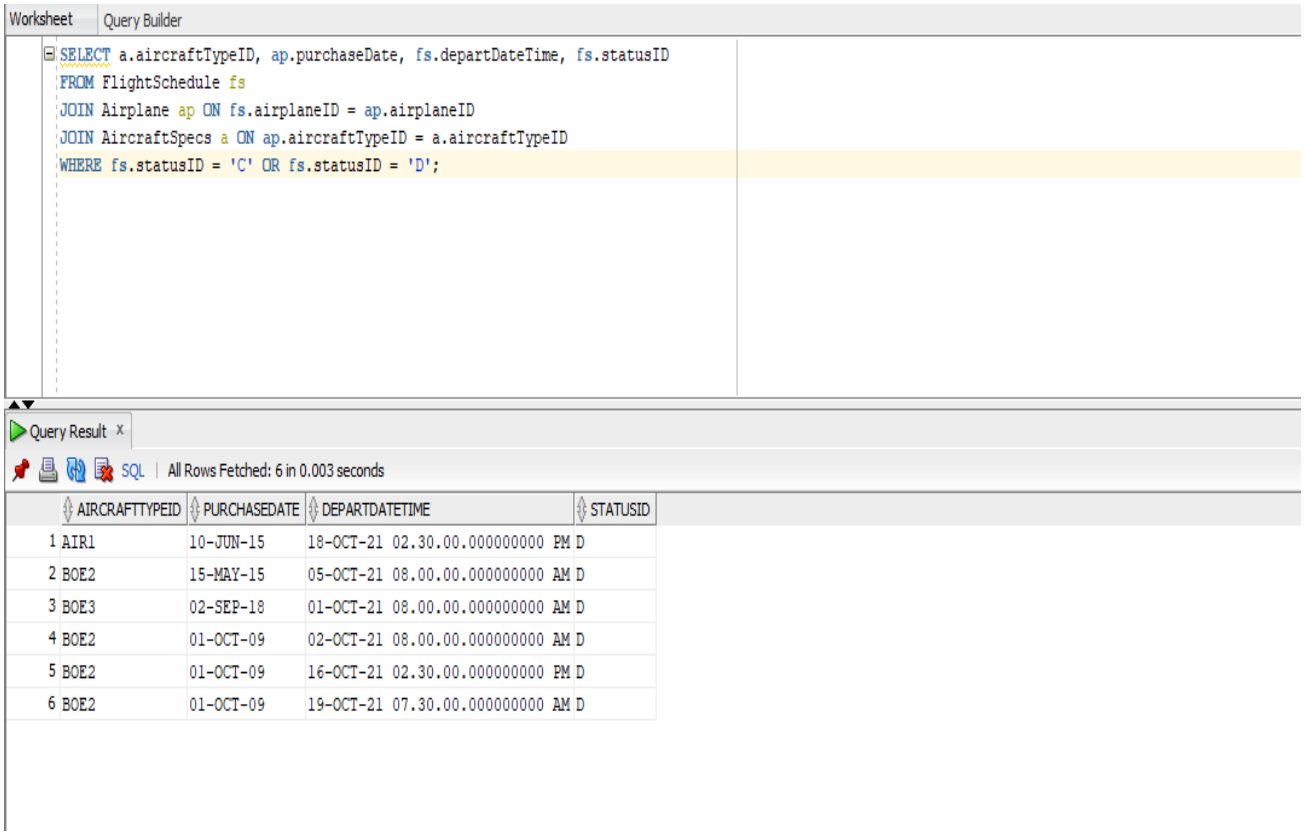
- Commit command: The commit command is used to permanently save the changes made to the database. It ensures that the changes made by the insert, update, or delete commands are saved and become a permanent part of the data. This is important for businesses to maintain data integrity and consistency.

These SQL commands are crucial for businesses as they allow them to manage and manipulate their data effectively. By inserting new records, updating existing ones, and deleting irrelevant data, businesses can ensure that their database is accurate, up-to-date, and optimized for efficient operations.

- Define and execute a SQL query to display all flights which were canceled or delayed. You need to display the flight Aircraft Type ID, Aircraft purchase date, flight depart DateTime, and statusID. What business question do you think this SQL query answers?

<u>Business question:</u>

  - Can you provide a list of all flights that experienced cancellations or delays, along with the aircraft type IDs, aircraft purchase dates, flight departure dates and times, and status IDs?
  - What is the aircraft type ID, aircraft purchase date, flight departure date and time, and status ID for each flight that was canceled or delayed?

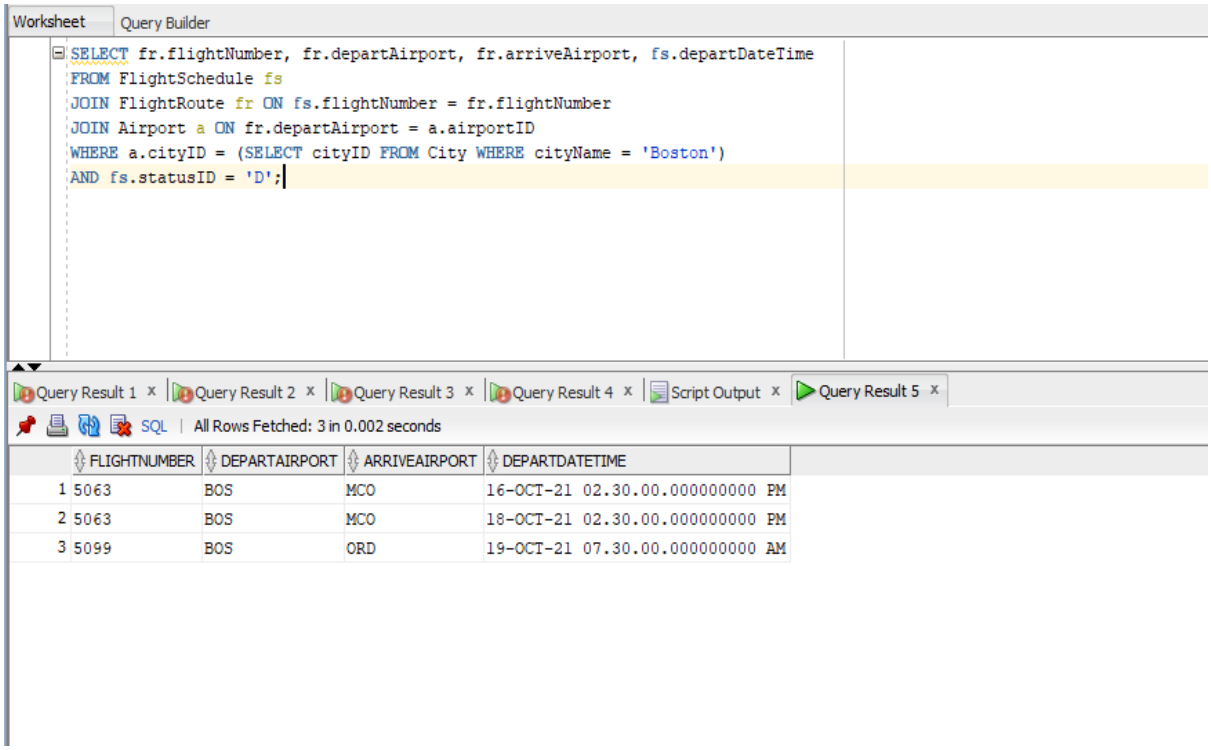


```
SELECT a.aircraftTypeID, ap.purchaseDate, fs.departDateTime, fs.statusID
FROM FlightSchedule fs
JOIN Airplane ap ON fs.airplaneID = ap.airplaneID
JOIN AircraftSpecs a ON ap.aircraftTypeID = a.aircraftTypeID
WHERE fs.statusID = 'C' OR fs.statusID = 'D';
```

Query Result — All Rows Fetched: 6 in 0.003 seconds

	AIRCRAFTTYPEID	PURCHASEDATE	DEPARTDATETIME	STATUSID
1	AIR1	10-JUN-15	18-OCT-21 02.30.00.000000000 PM	D
2	BOE2	15-MAY-15	05-OCT-21 08.00.00.000000000 AM	D
3	BOE3	02-SEP-18	01-OCT-21 08.00.00.000000000 AM	D
4	BOE2	01-OCT-09	02-OCT-21 08.00.00.000000000 AM	D
5	BOE2	01-OCT-09	16-OCT-21 02.30.00.000000000 PM	D
6	BOE2	01-OCT-09	19-OCT-21 07.30.00.000000000 AM	D

- Define and execute a SQL query to display all flights that are delayed leaving from Boston. You need to display the flight number, departure airport, arrival airport and flight depart Date/Time.



```
SELECT fr.flightNumber, fr.departAirport, fr.arriveAirport, fs.departDateTime
FROM FlightSchedule fs
JOIN FlightRoute fr ON fs.flightNumber = fr.flightNumber
JOIN Airport a ON fr.departAirport = a.airportID
WHERE a.cityID = (SELECT cityID FROM City WHERE cityName = 'Boston')
AND fs.statusID = 'D';
```

Query Result 5 — All Rows Fetched: 3 in 0.002 seconds

	FLIGHTNUMBER	DEPARTAIRPORT	ARRIVEAIRPORT	DEPARTDATETIME
1	5063	BOS	MCO	16-OCT-21 02.30.00.000000000 PM
2	5063	BOS	MCO	18-OCT-21 02.30.00.000000000 PM
3	5099	BOS	ORD	19-OCT-21 07.30.00.000000000 AM

- What business question do you think this SQL query answers?

Business question:

- What are the flight numbers, departure airports, arrival airports, and flight departure date and time for flights that are delayed and leaving from Boston?
- Can you provide a list of the delayed flights departing from Boston, including their flight numbers, departure airports, arrival airports, and flight departure date and time?
- Which flights departing from Boston are delayed, and what are their corresponding flight numbers, departure airports, arrival airports, and flight departure date and time?