Target SQL Case Study

Q1 :- Import the dataset and do usual exploratory analysis steps like checking the structure & characteristics of the dataset:

Q1.1 Data type of all columns in the "customers" table.

Query:-

```
SELECT column_name, data_type
FROM `target.INFORMATION_SCHEMA.COLUMNS`
WHERE table_name = 'customers';
```

Screenshot:-

```
1 SELECT column_name, data_type
2 FROM `target.INFORMATION_SCHEMA.COLUMNS`
3 WHERE table_name = 'customers'
```

Query results

JOB INFORMATION | RESULTS | JSON | EXECUTION DETAILS

Row	column_name	data_type
1	customer_id	STRING
2	customer_unique_id	STRING
3	customer_zip_code_prefix	INT64
4	customer_city	STRING
5	customer_state	STRING

Q1.2 Get the time range between which the orders were placed

Query:-

```
SELECT
MIN(order_purchase_timestamp) AS first_purchase_timestamp,
MAX(order_purchase_timestamp) AS last_purchase_timestamp
FROM `target.orders`;
```

Screenshot:-

```
1 SELECT MIN(order_purchase_timestamp) AS first_purchase_timestamp,
2        MAX(order_purchase_timestamp) AS last_purchase_timestamp
3 FROM `target.orders`
```

Query results

JOB INFORMATION | RESULTS | JSON | EXECUTION DETAILS | EXECUTION GRAPH

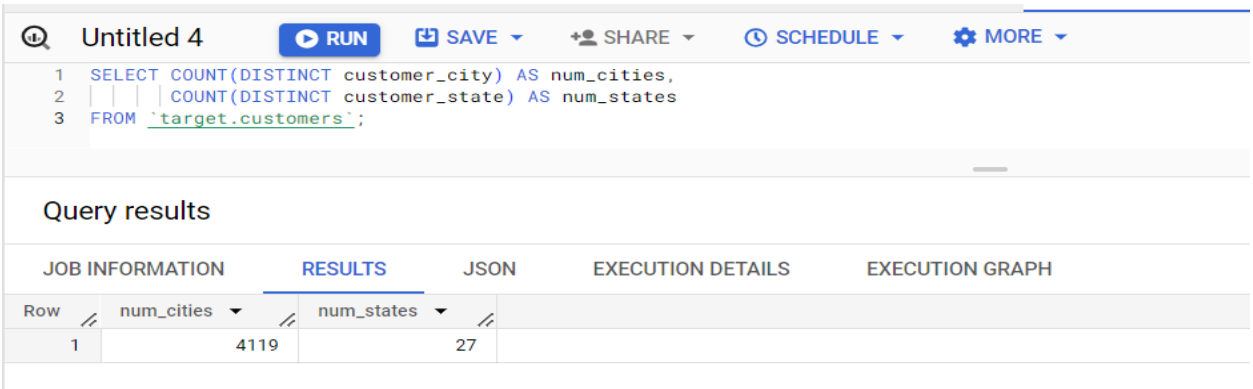
Row	first_purchase_timestamp	last_purchase_timestamp
1	2016-09-04 21:15:19 UTC	2018-10-17 17:30:18 UTC

Q1.3 Count the number of Cities and States in our dataset

Query:-

```
SELECT
COUNT(DISTINCT customer_city) AS num_cities,
COUNT(DISTINCT customer_state) AS num_states
FROM `target.customers`;
```

Screenshot:-



Row	num_cities	num_states
1	4119	27

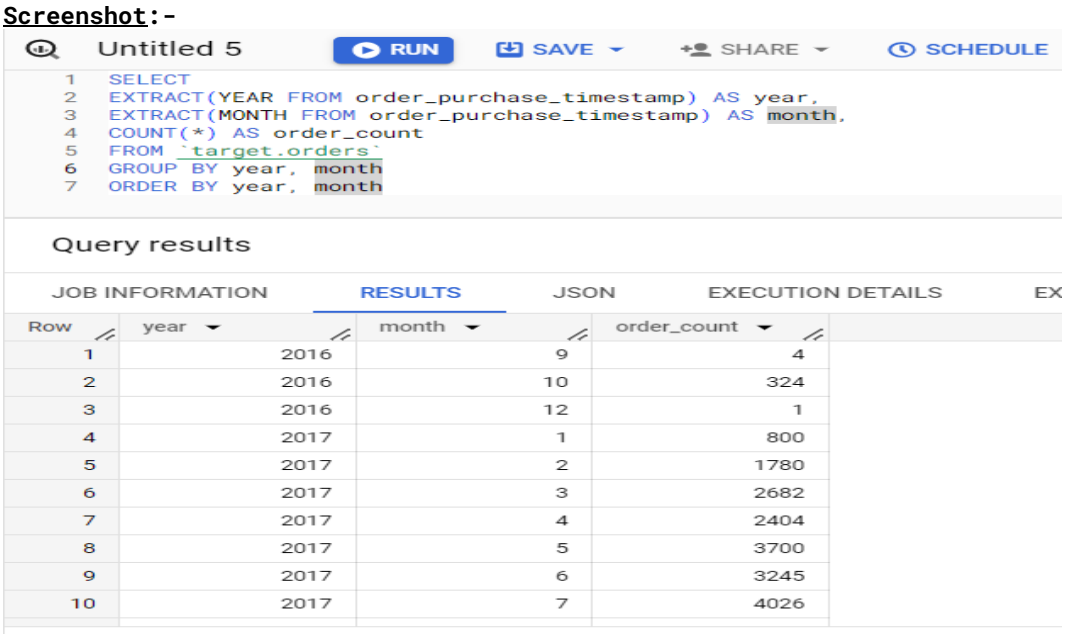
Q2:- In-depth Exploration:

Q2.1 :- Is there a growing trend in the no. of orders placed over the past years?

Query:-

```
SELECT
EXTRACT(YEAR FROM order_purchase_timestamp) AS year,
EXTRACT(MONTH FROM order_purchase_timestamp) AS month,
COUNT(*) AS order_count
FROM `target.orders`
GROUP BY year, month
ORDER BY year, month
```

Screenshot:-



Row	year	month	order_count
1	2016	9	4
2	2016	10	324
3	2016	12	1
4	2017	1	800
5	2017	2	1780
6	2017	3	2682
7	2017	4	2404
8	2017	5	3700
9	2017	6	3245
10	2017	7	4026

Analysis:-

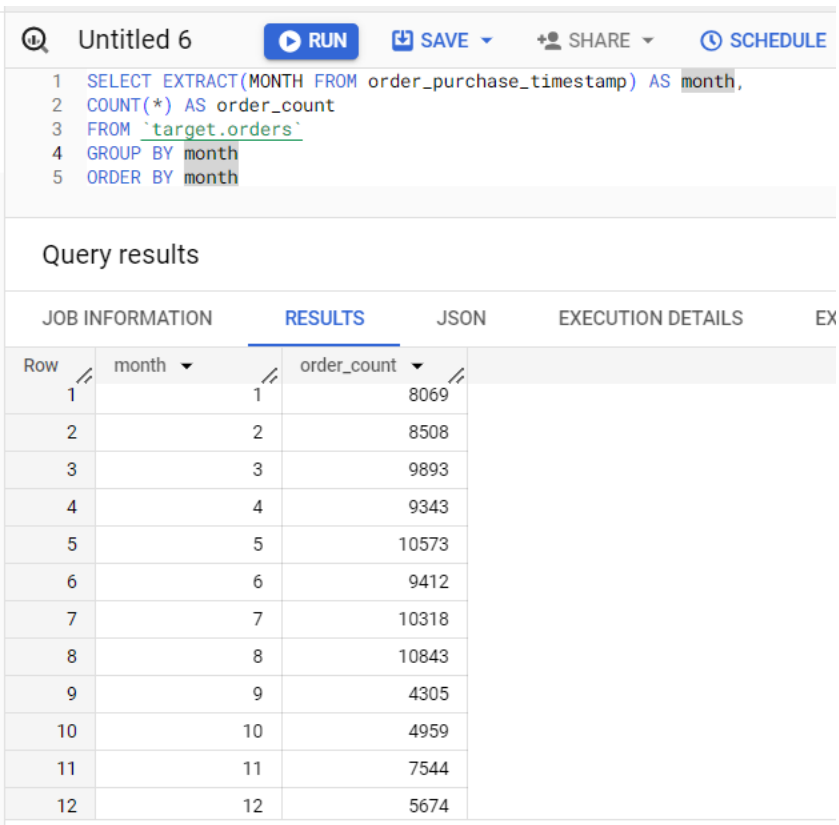
1. Max order placed in November 2017 i.e., 7544 orders.
2. Total order in
   2016 = 329 , 2017 = 45101 , 2018 = 54011
3. We can conclude from the above data that no. of orders is increasing year over year

Q2.2 Can we see some kind of monthly seasonality in terms of the no. of orders being placed?

Query :-

```
SELECT EXTRACT(MONTH FROM order_purchase_timestamp) AS month,
COUNT(*) AS order_count
FROM `target.orders`
GROUP BY month
ORDER BY month
```

Screenshot:-



Row	month	order_count
1	1	8069
2	2	8508
3	3	9893
4	4	9343
5	5	10573
6	6	9412
7	7	10318
8	8	10843
9	9	4305
10	10	4959
11	11	7544
12	12	5674

Analysis :-

1. Max order placed in August
2. From the above data we can conclude that the number of orders increases as we reach near the year mid (May, June, July, August), then we can see a decline in the orders during the year end.
3. The above data forms a bell curve having peak in mid year

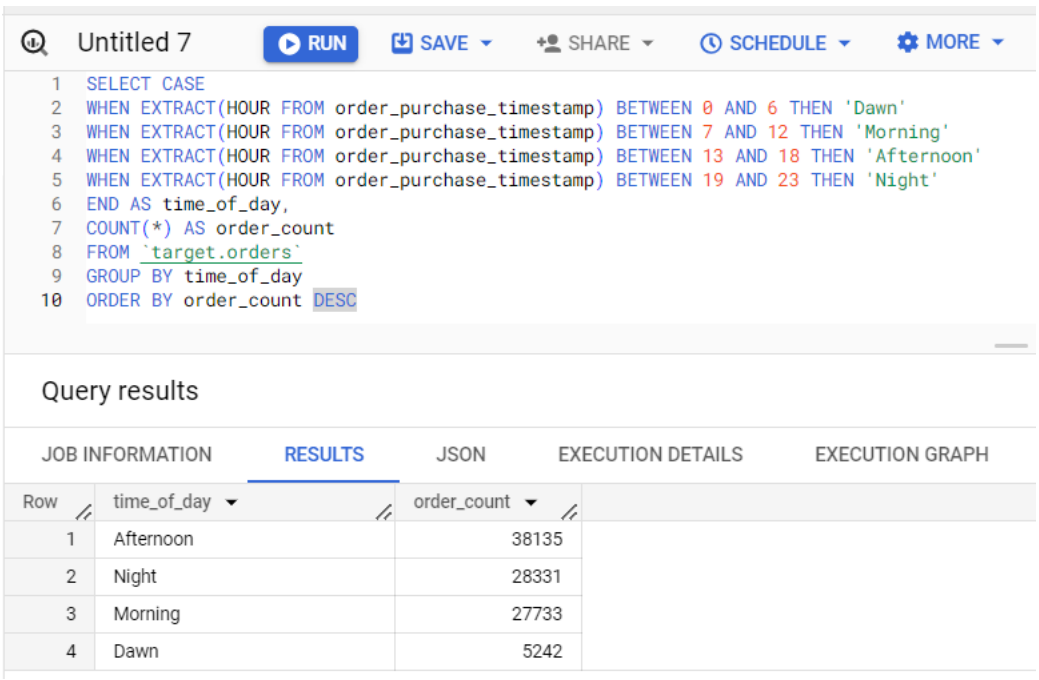
Q2.3 During what time of the day, do the Brazilian customers mostly place their orders? (Dawn, Morning, Afternoon or Night)

- **0-6 hrs : Dawn**
- **7-12 hrs : Mornings**
- **13-18 hrs : Afternoon**
- **19-23 hrs : Night**

Query :-

```
SELECT CASE
WHEN EXTRACT(HOUR FROM order_purchase_timestamp) BETWEEN 0 AND 6 THEN 'Dawn'
WHEN EXTRACT(HOUR FROM order_purchase_timestamp) BETWEEN 7 AND 12 THEN 'Morning'
WHEN EXTRACT(HOUR FROM order_purchase_timestamp) BETWEEN 13 AND 18 THEN 'Afternoon'
WHEN EXTRACT(HOUR FROM order_purchase_timestamp) BETWEEN 19 AND 23 THEN 'Night'
END AS time_of_day,
COUNT(*) AS order_count
FROM `target.orders`
GROUP BY time_of_day
ORDER BY order_count DESC
```

Screenshot :-



Row	time_of_day	order_count
1	Afternoon	38135
2	Night	28331
3	Morning	27733
4	Dawn	5242

Analysis :-

1. From the above results we can conclude the Maximum orders are places in Afternoon
2. Followed by Night and Morning with a marginal difference of 1k orders
3. Least orders are placed in Dawn

Note:- Time zone of the given data set is not converted and used as it is. Incase we have to convert the time zone result may differ.

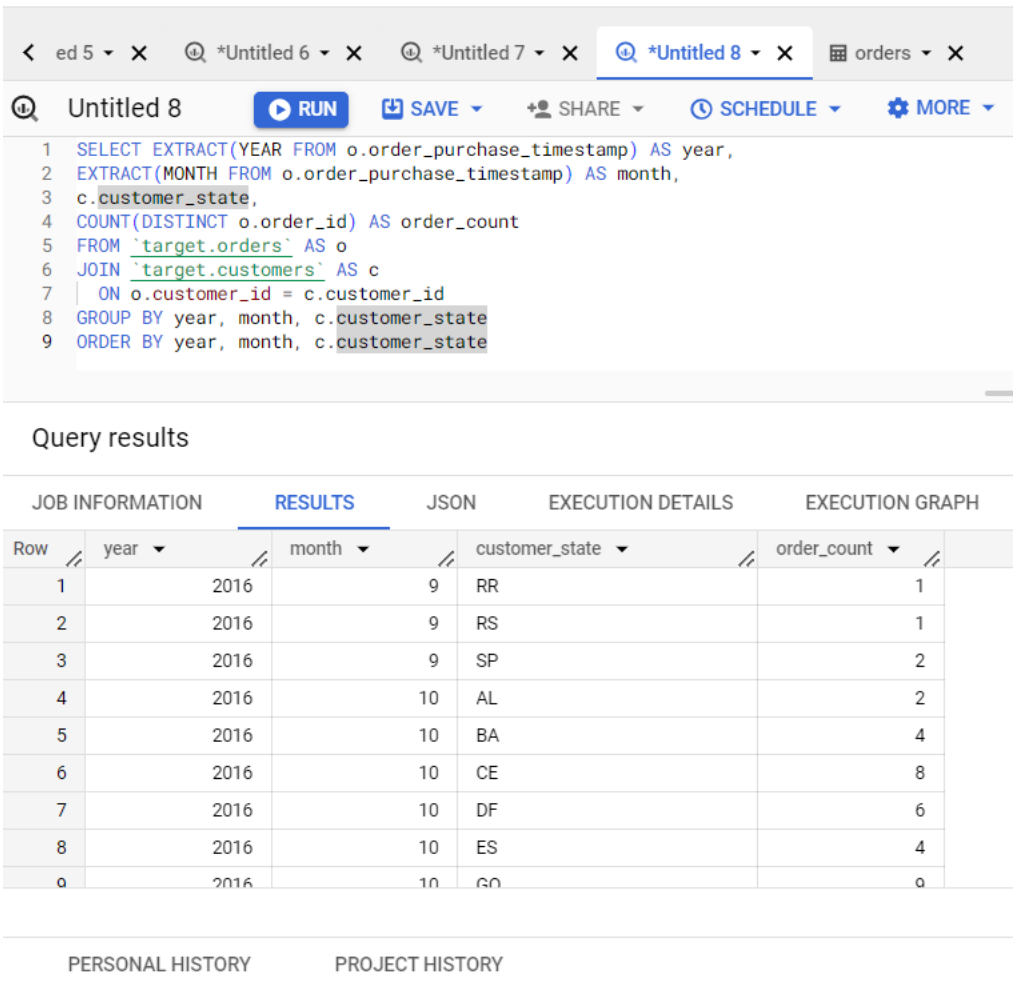
Q3. Evolution of E-commerce orders in the Brazil region:

Q3.1 Get the month on month no. of orders placed in each state.

Query :-

```
SELECT EXTRACT(YEAR FROM o.order_purchase_timestamp) AS year,
EXTRACT(MONTH FROM o.order_purchase_timestamp) AS month,
c.customer_state,
COUNT(DISTINCT o.order_id) AS order_count
FROM `target.orders` AS o
JOIN `target.customers` AS c
ON o.customer_id = c.customer_id
GROUP BY year, month, c.customer_state
ORDER BY year, month, c.customer_state
```

Screenshot:-



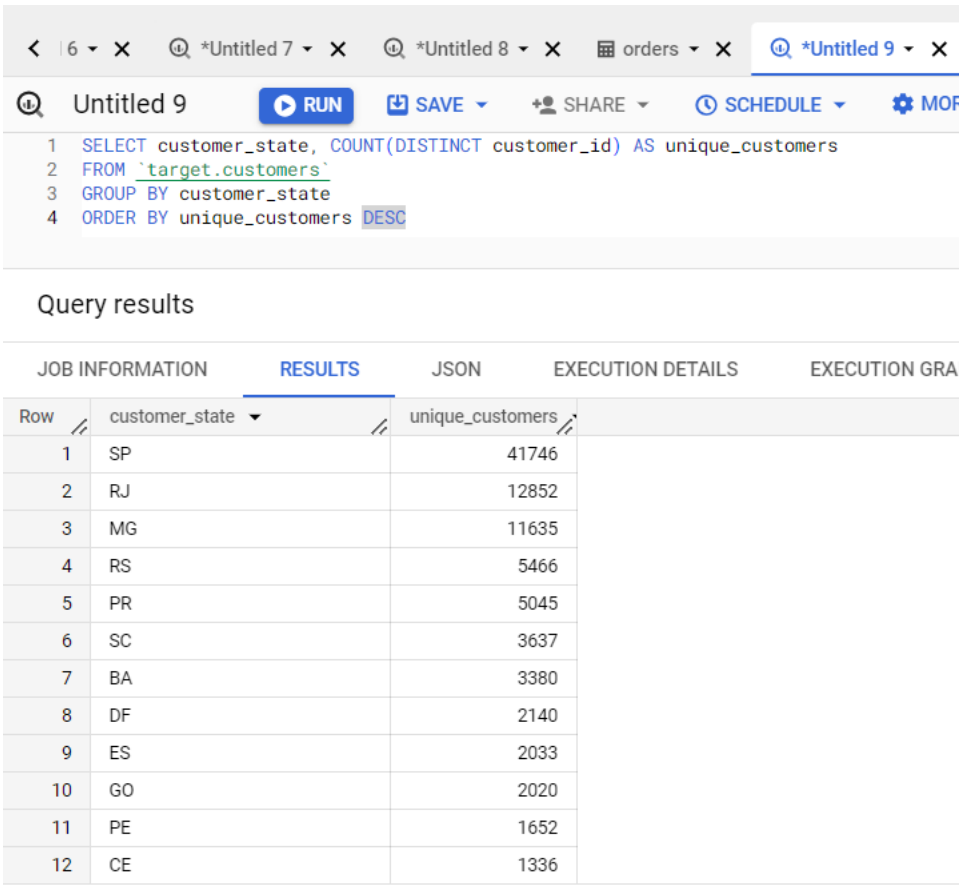
Row	year	month	customer_state	order_count
1	2016	9	RR	1
2	2016	9	RS	1
3	2016	9	SP	2
4	2016	10	AL	2
5	2016	10	BA	4
6	2016	10	CE	8
7	2016	10	DF	6
8	2016	10	ES	4
9	2016	10	GO	9

Q3.2 How are the customers distributed across all the states?

Query:-

```
SELECT customer_state, COUNT(DISTINCT customer_id) AS unique_customers
FROM `target.customers`
GROUP BY customer_state
ORDER BY unique_customers DESC
```

Screenshot:-



Row	customer_state	unique_customers
1	SP	41746
2	RJ	12852
3	MG	11635
4	RS	5466
5	PR	5045
6	SC	3637
7	BA	3380
8	DF	2140
9	ES	2033
10	GO	2020
11	PE	1652
12	CE	1336

Analysis:-

1. Top three state in terms of customers SP, RJ and MG
2. Bottom three state in terms of customers are RR, AP and AC

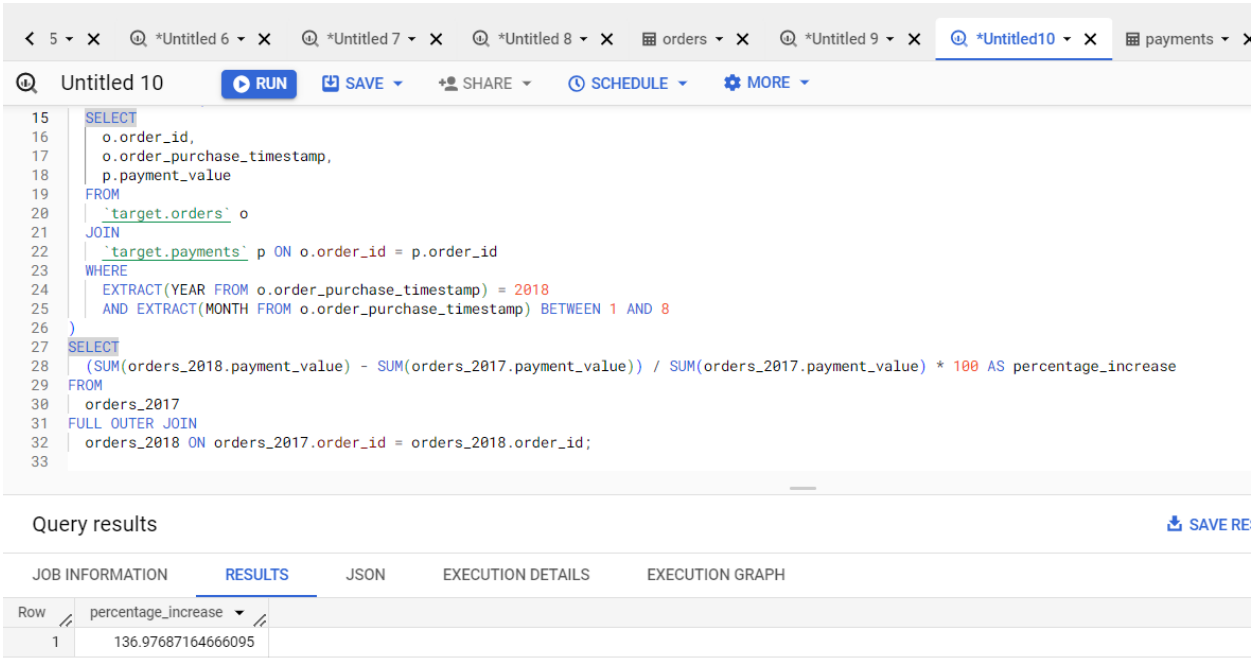
Q4. **Impact on Economy: Analyze the money movement by e-commerce by looking at order prices, freight and others.**

Q4.1 Get the % increase in the cost of orders from year 2017 to 2018 (include months between Jan to Aug only).
Query :-

```
WITH orders_2017 AS (
SELECT
    o.order_id,
    o.order_purchase_timestamp,    p.payment_value
FROM `target.orders` o
JOIN `target.payments` p ON o.order_id = p.order_id
WHERE
EXTRACT(YEAR FROM o.order_purchase_timestamp) = 2017
AND EXTRACT(MONTH FROM o.order_purchase_timestamp) BETWEEN 1 AND 8),

orders_2018 AS (
SELECT
    o.order_id,
    o.order_purchase_timestamp,
    p.payment_value
FROM `target.orders` o
JOIN `target.payments` p ON o.order_id = p.order_id
WHERE
EXTRACT(YEAR FROM o.order_purchase_timestamp) = 2018
AND EXTRACT(MONTH FROM o.order_purchase_timestamp) BETWEEN 1 AND 8 )
SELECT
  (SUM(orders_2018.payment_value) - SUM(orders_2017.payment_value)) /
SUM(orders_2017.payment_value) * 100 AS percentage_increase
FROM orders_2017
FULL OUTER JOIN
orders_2018 ON orders_2017.order_id = orders_2018.order_id;
```

screenshot

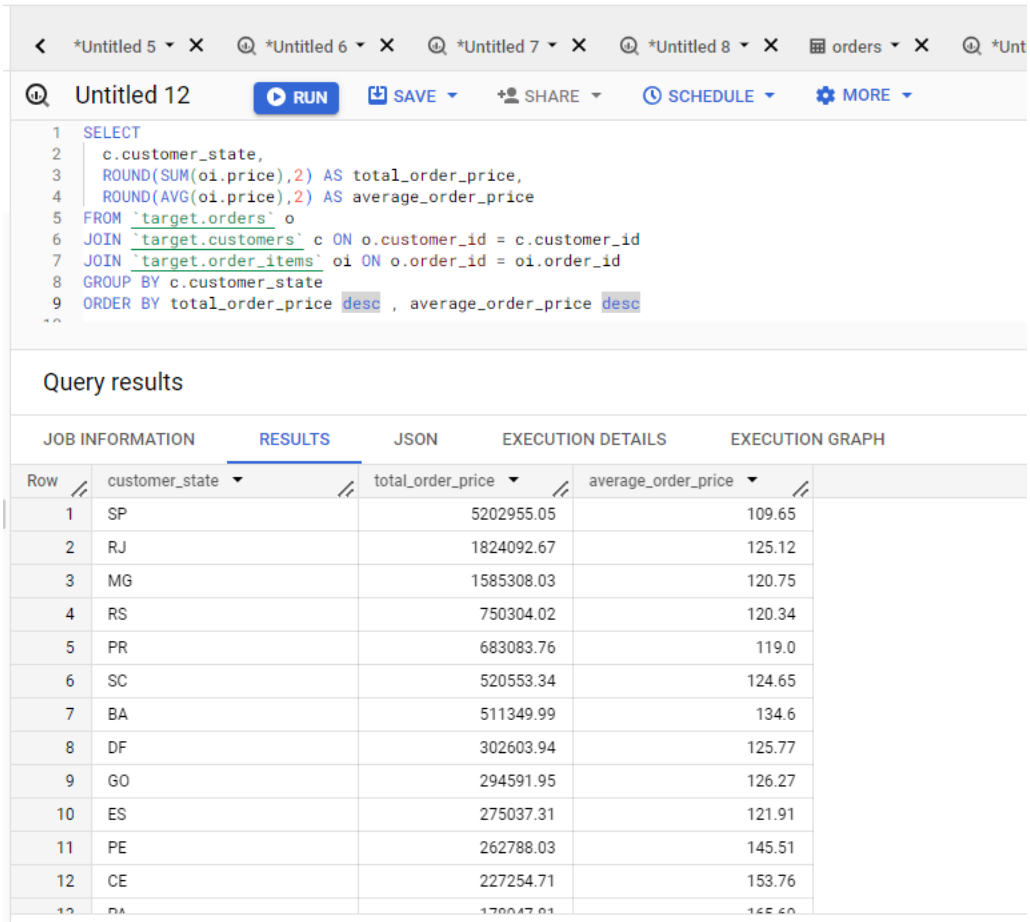


Q4.2. Calculate the Total & Average value of order price for each state.

Query:-

```
SELECT
  c.customer_state,
  ROUND(SUM(oi.price),2) AS total_order_price,
  ROUND(AVG(oi.price),2) AS average_order_price
FROM `target.orders` o
JOIN `target.customers` c ON o.customer_id = c.customer_id
JOIN `target.order_items` oi ON o.order_id = oi.order_id
GROUP BY c.customer_state
ORDER BY total_order_price desc , average_order_price desc
```

Screenshot:-



Row	customer_state	total_order_price	average_order_price
1	SP	5202955.05	109.65
2	RJ	1824092.67	125.12
3	MG	1585308.03	120.75
4	RS	750304.02	120.34
5	PR	683083.76	119.0
6	SC	520553.34	124.65
7	BA	511349.99	134.6
8	DF	302603.94	125.77
9	GO	294591.95	126.27
10	ES	275037.31	121.91
11	PE	262788.03	145.51
12	CE	227254.71	153.76

Analysis :-

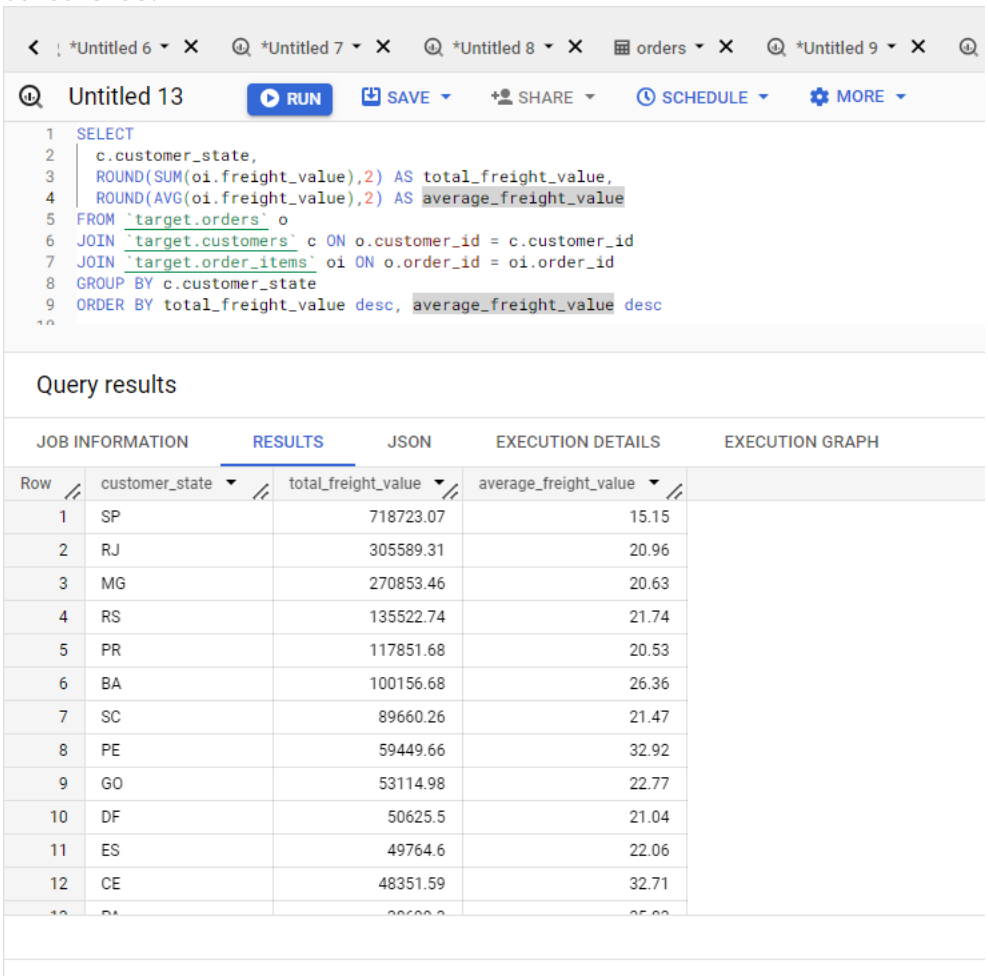
1. Top three state in terms of max total order price are SP, RJ, MG
2. Top three state in terms of avg order price are PB, AL, AC
3. Bottom three state in terms of total order price are RR, AP, AC
4. Bottom three state in terms of avg order price are SP, PR, RS

Q4.3 Calculate the Total & Average value of order freight for each state

Query :-

```
SELECT
  c.customer_state,
  ROUND(SUM(oi.freight_value),2) AS total_freight_value,
  ROUND(AVG(oi.freight_value),2) AS average_freight_value
FROM `target.orders` o
JOIN `target.customers` c ON o.customer_id = c.customer_id
JOIN `target.order_items` oi ON o.order_id = oi.order_id
GROUP BY c.customer_state
ORDER BY total_freight_value desc, average_freight_value desc
```

Screenshot:-



Row	customer_state	total_freight_value	average_freight_value
1	SP	718723.07	15.15
2	RJ	305589.31	20.96
3	MG	270853.46	20.63
4	RS	135522.74	21.74
5	PR	117851.68	20.53
6	BA	100156.68	26.36
7	SC	89660.26	21.47
8	PE	59449.66	32.92
9	GO	53114.98	22.77
10	DF	50625.5	21.04
11	ES	49764.6	22.06
12	CE	48351.59	32.71

Analysis :-

1. Top three state in terms of max total freight value are SP, RJ, MG
2. Top three state in terms of avg freight value are RR, PB, RO
3. Bottom three state in terms of total freight value are RR, AP, AC
4. Bottom three state in terms of avg freight value are SP, PR, MG

Q5. **Analysis based on sales, freight and delivery time.**

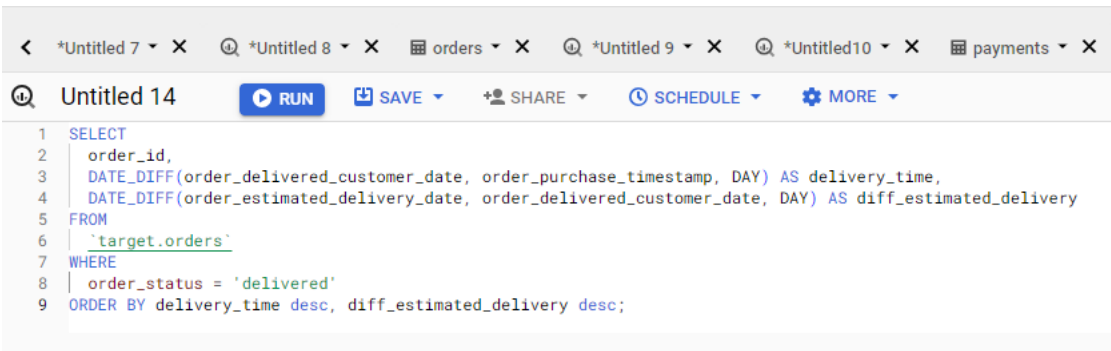
Q5.1 Find the no. of days taken to deliver each order from the order's purchase date as delivery time.

Also, calculate the difference (in days) between the estimated & actual delivery date of an order.

Query :-

```
SELECT order_id,
DATE_DIFF(order_delivered_customer_date, order_purchase_timestamp, DAY) AS
delivery_time,
DATE_DIFF(order_estimated_delivery_date, order_delivered_customer_date, DAY) AS
diff_estimated_delivery
FROM `target.orders`
WHERE order_status = 'delivered'
ORDER BY delivery_time desc, diff_estimated_delivery desc;
```

Screenshot :-



Query results

JOB INFORMATION | RESULTS | JSON | EXECUTION DETAILS | EXECUTION GRAPH

Row	order_id	delivery_time	diff_estimated_deliv
1	ca07593549f1816d26a572e06...	209	-181
2	1b3190b2dfa9d789e1f14c05b...	208	-188
3	440d0d17af552815d15a9e41a...	195	-165
4	2fb597c2f772eca01b1f5c561b...	194	-155
5	0f4519c5f1c541ddec9f21b3bd...	194	-161
6	285ab9426d6982034523a855f...	194	-166
7	47b40429ed8cce3aee9199792...	191	-175
8	2fe324febf907e3ea3f2aa9650...	189	-167
9	2d7561026d542c8dbd8f0daea...	188	-159
10	437222e3fd1b07396f1d9ba8c...	187	-144
11	c27815f7e3dd0b926b5855262...	187	-162
12	dfe5f68118c2576143240b8d7...	186	-153

Analysis :-

1. Maximum delivery time = 209 days
2. Minimum delivery time = 0 days
3. Maximum diff estimated delivery = 146 days
4. Minimum diff estimated delivery = -188 days (delivered before time)

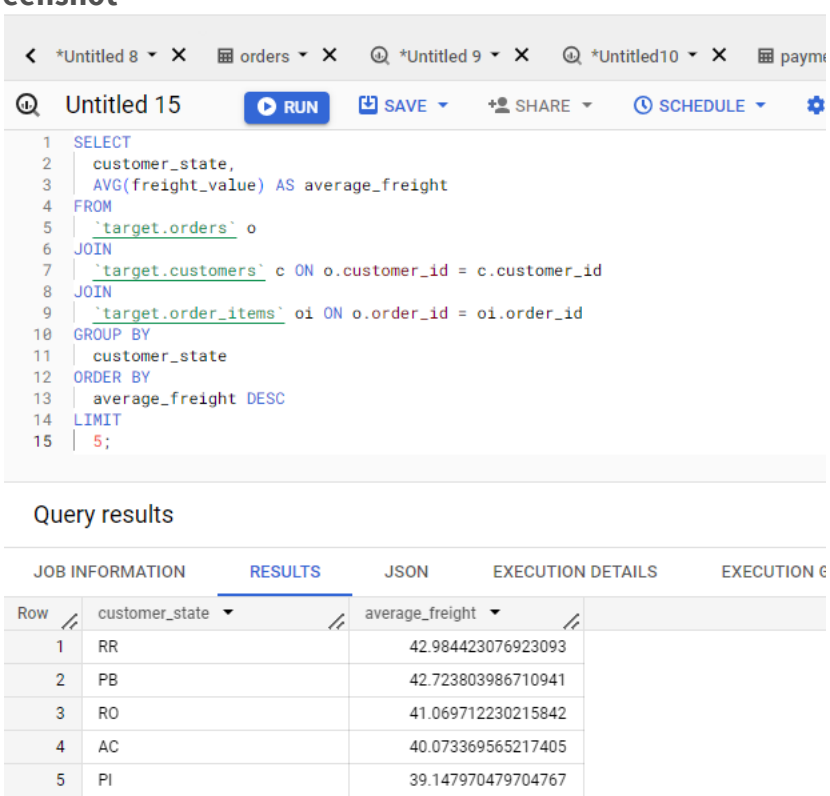
Q5.2 Find out the top 5 states with the highest & lowest average freight value.

A. Highest

Query

```
SELECT
  customer_state,
  AVG(freight_value) AS average_freight
FROM
  `target.orders` o
JOIN
  `target.customers` c ON o.customer_id = c.customer_id
JOIN
  `target.order_items` oi ON o.order_id = oi.order_id
GROUP BY
  customer_state
ORDER BY
  average_freight DESC
LIMIT
  5;
```

Screenshot



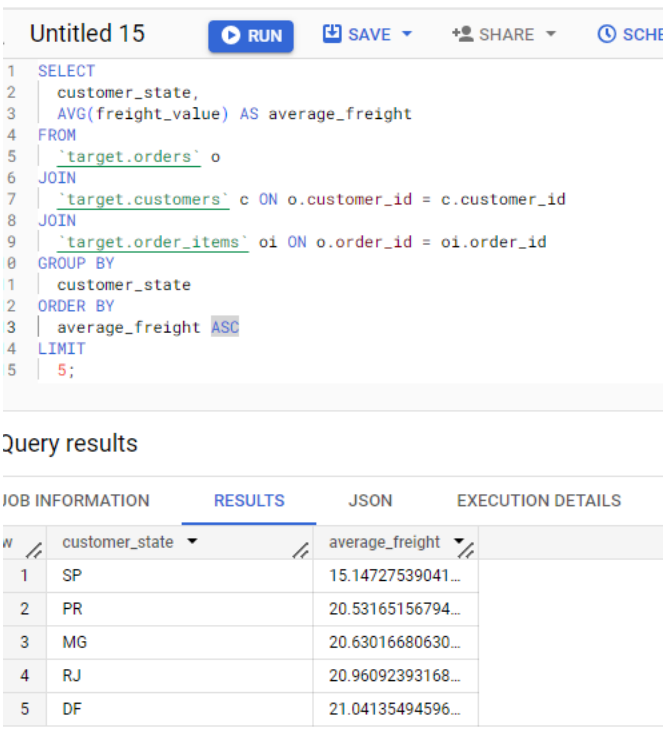
Row	customer_state	average_freight
1	RR	42.984423076923093
2	PB	42.723803986710941
3	RO	41.069712230215842
4	AC	40.073369565217405
5	PI	39.147970479704767

B. Lowest

Query :-

```
SELECT
  customer_state,
  AVG(freight_value) AS average_freight
FROM
  `target.orders` o
JOIN
  `target.customers` c ON o.customer_id = c.customer_id
JOIN
  `target.order_items` oi ON o.order_id = oi.order_id
GROUP BY
  customer_state
ORDER BY
  average_freight ASC
LIMIT
  5;
```

Screenshot:-



w	customer_state	average_freight
1	SP	15.14727539041...
2	PR	20.53165156794...
3	MG	20.63016680630...
4	RJ	20.96092393168...
5	DF	21.04135494596...

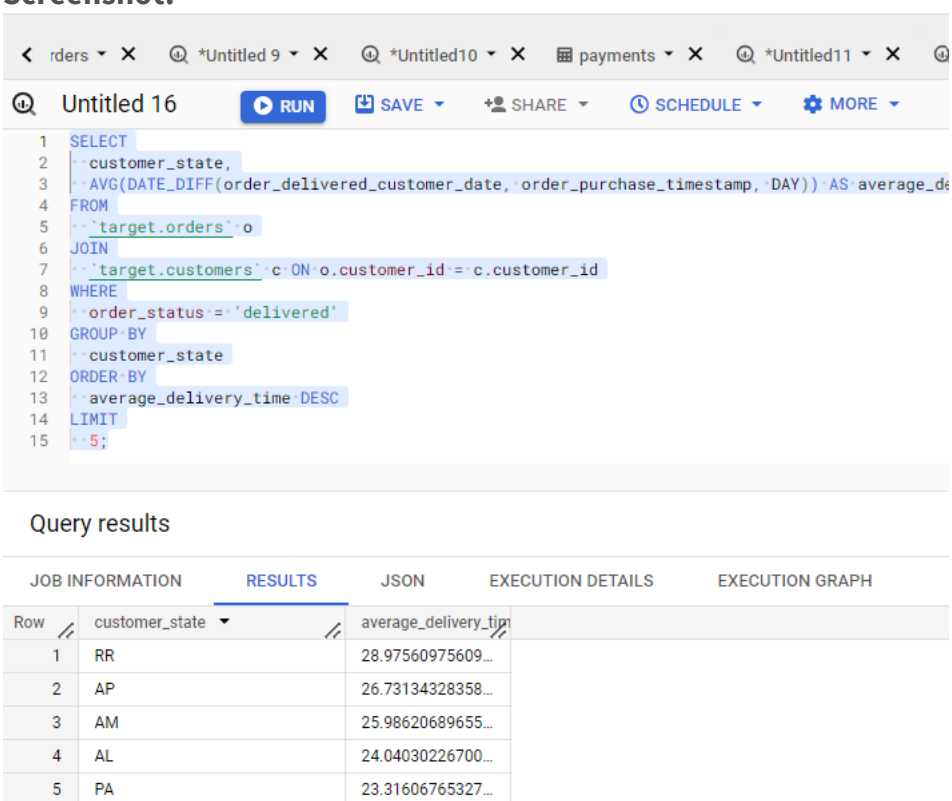
Q 5.3 Find out the top 5 states with the highest & lowest average delivery time.

A. highest

Query :-

```
SELECT
  customer_state,
  AVG(DATE_DIFF(order_delivered_customer_date, order_purchase_timestamp, DAY)) AS
average_delivery_time
FROM
  `target.orders` o
JOIN
  `target.customers` c ON o.customer_id = c.customer_id
WHERE
  order_status = 'delivered'
GROUP BY
  customer_state
ORDER BY
  average_delivery_time DESC
LIMIT
  5;
```

Screenshot:-

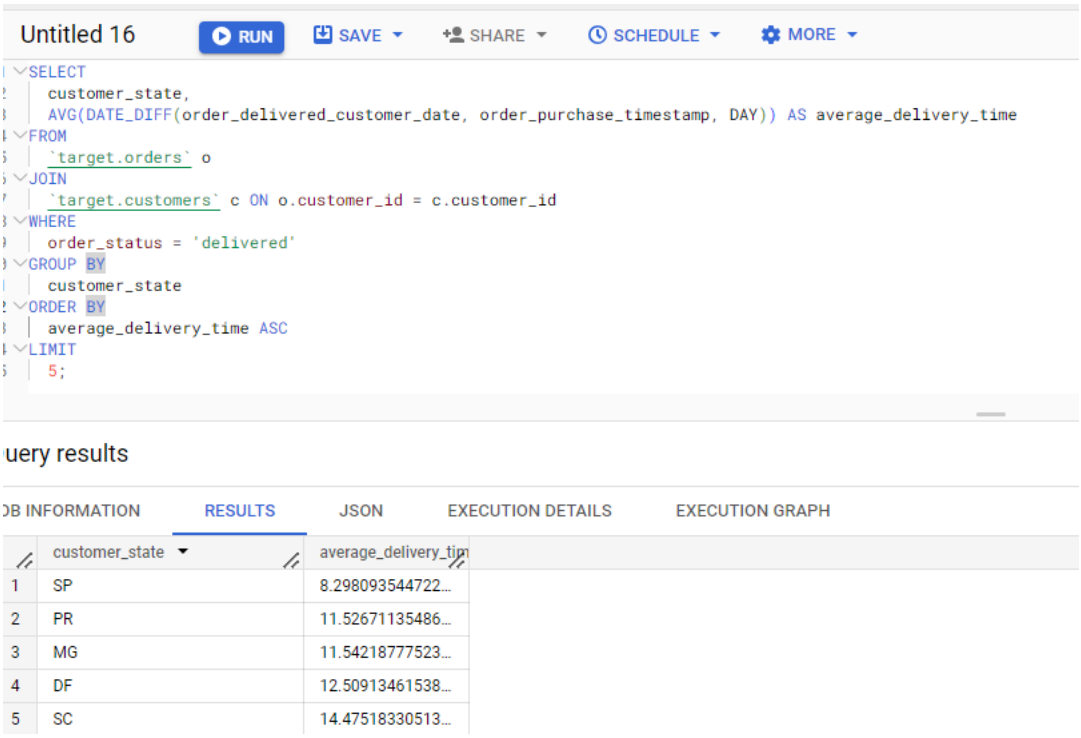


B. Lowest

Query :-

```
SELECT
  customer_state,
  AVG(DATE_DIFF(order_delivered_customer_date, order_purchase_timestamp, DAY)) AS
average_delivery_time
FROM
  `target.orders` o
JOIN
  `target.customers` c ON o.customer_id = c.customer_id
WHERE
  order_status = 'delivered'
GROUP BY
  customer_state
ORDER BY
  average_delivery_time ASC
LIMIT
  5;
```

Screenshot:-

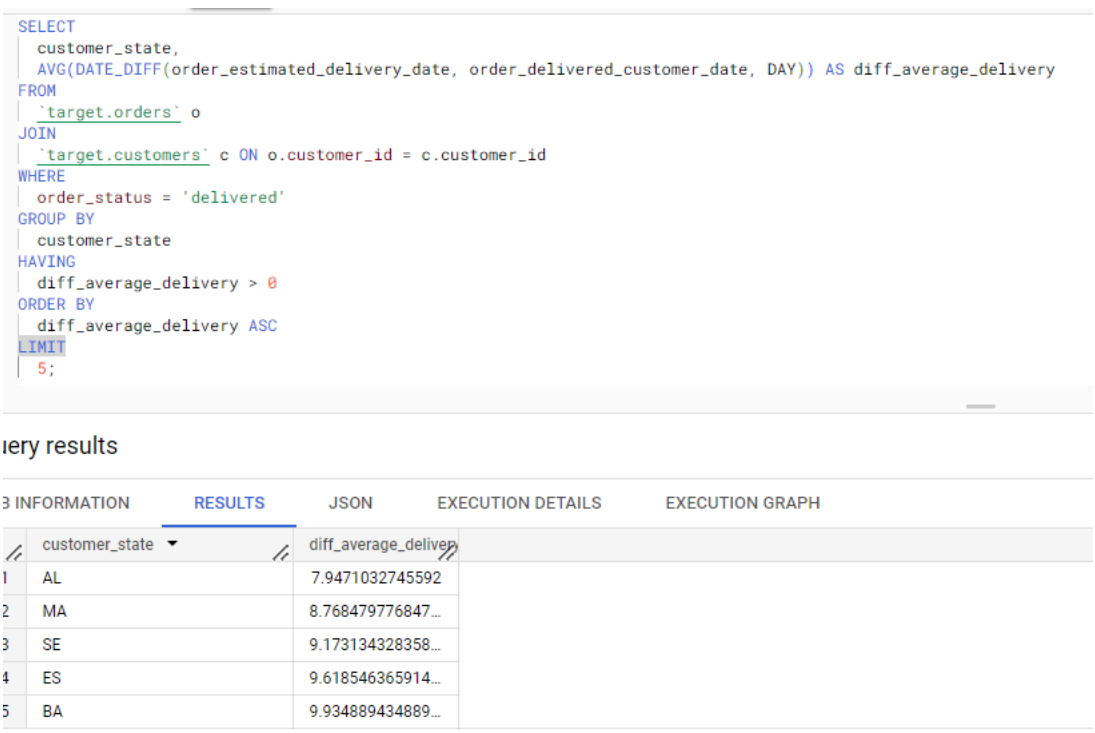


Q 5.4. Find out the top 5 states where the order delivery is really fast as compared to the estimated date of delivery.

Query :-

```
SELECT
  customer_state,
  AVG(DATE_DIFF(order_estimated_delivery_date, order_delivered_customer_date, DAY)) AS
diff_average_delivery
FROM
  `target.orders` o
JOIN
  `target.customers` c ON o.customer_id = c.customer_id
WHERE
  order_status = 'delivered'
GROUP BY
  customer_state
HAVING
  diff_average_delivery > 0
ORDER BY
  diff_average_delivery ASC
LIMIT
  5;
```

Screenshot:-



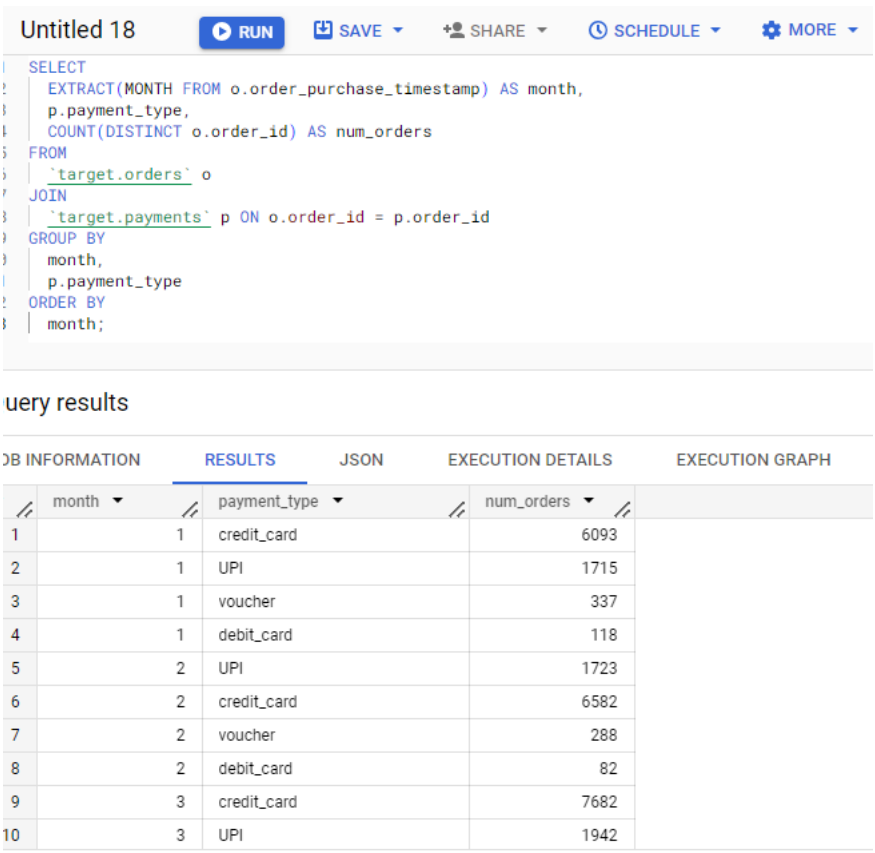
Q6. Analysis based on the payments:

Q6.1 Find the month on month no. of orders placed using different payment types.

Query:-

```
SELECT
  EXTRACT(MONTH FROM o.order_purchase_timestamp) AS month,
  p.payment_type,
  COUNT(DISTINCT o.order_id) AS num_orders
FROM
  `target.orders` o
JOIN
  `target.payments` p ON o.order_id = p.order_id
GROUP BY
  month,
  p.payment_type
ORDER BY
  month;
```

Screenshot:-



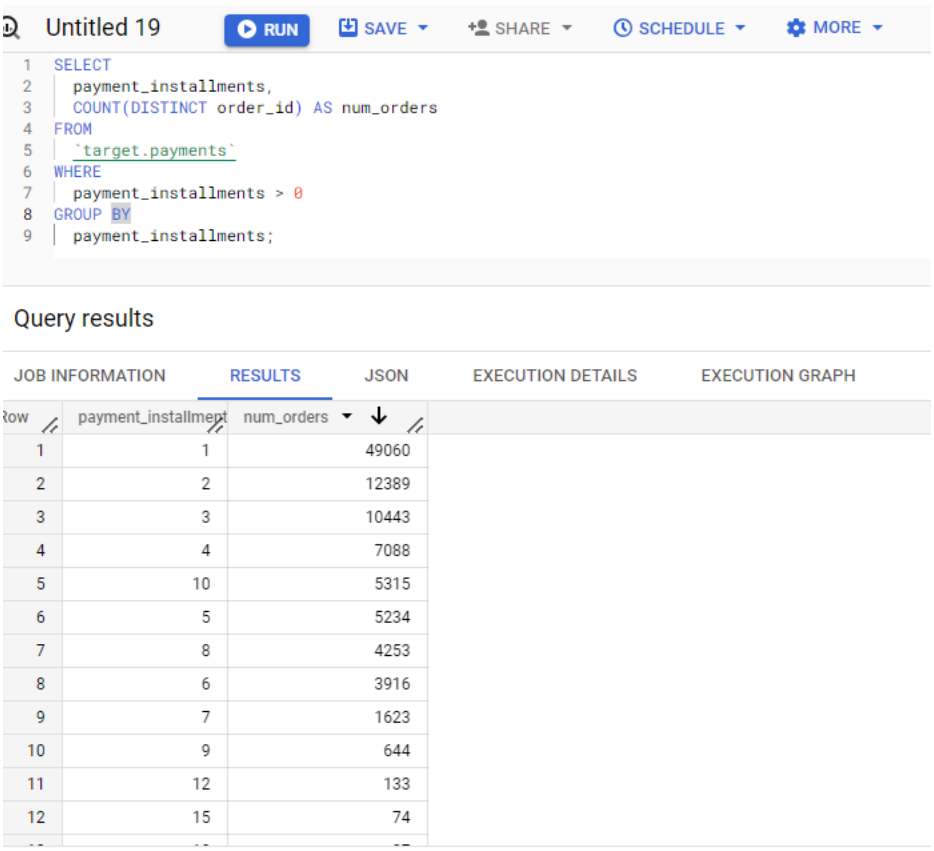
	month	payment_type	num_orders
1	1	credit_card	6093
2	1	UPI	1715
3	1	voucher	337
4	1	debit_card	118
5	2	UPI	1723
6	2	credit_card	6582
7	2	voucher	288
8	2	debit_card	82
9	3	credit_card	7682
10	3	UPI	1942

Q6.2 Find the no. of orders placed on the basis of the payment installments that have been paid.

Query:-

```
SELECT
  payment_installments,
  COUNT(DISTINCT order_id) AS num_orders
FROM
  `target.payments`
WHERE
  payment_installments > 0
GROUP BY
  payment_installments;
```

Screenshot :-



Row	payment_installment	num_orders
1	1	49060
2	2	12389
3	3	10443
4	4	7088
5	10	5315
6	5	5234
7	8	4253
8	6	3916
9	7	1623
10	9	644
11	12	133
12	15	74

Analysis :-

1. Maximum order places with single instalment i.e., full payment
2. Minimum orders are placed with 22 and 23 instalments (single order each)