Project: Target-SQL Business Case

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

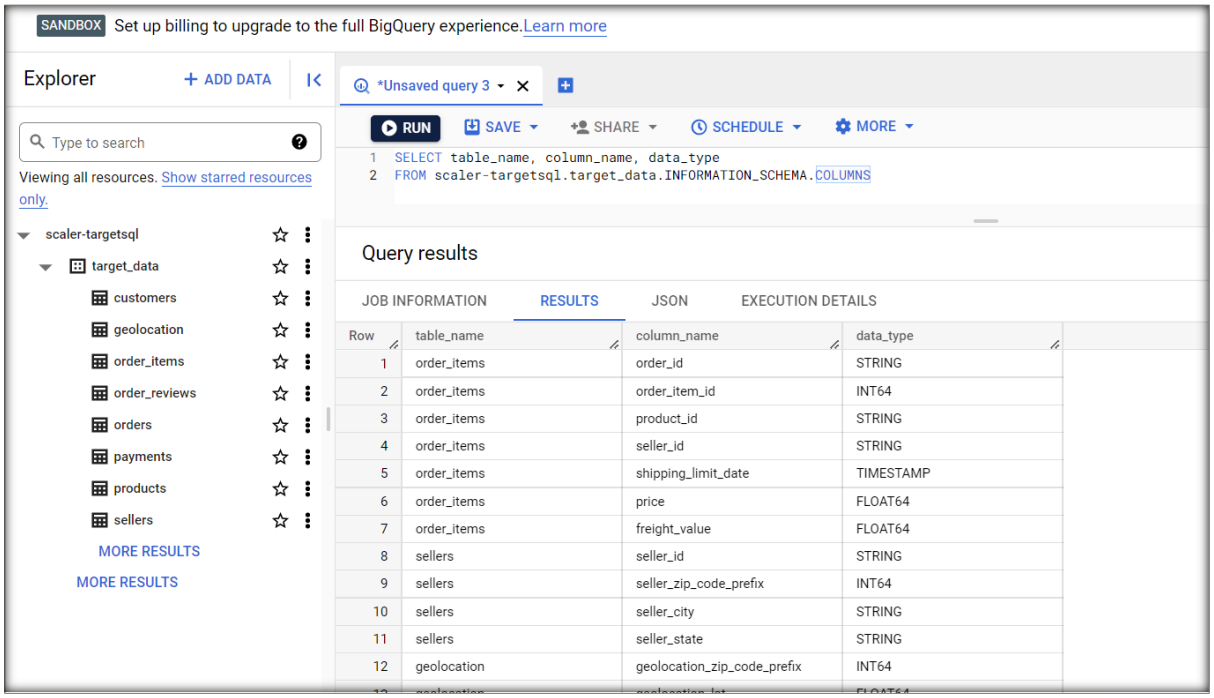
1) Data type of columns in a table
2) Time period for which the data is given
3) Cities and States covered in the dataset

Ans:

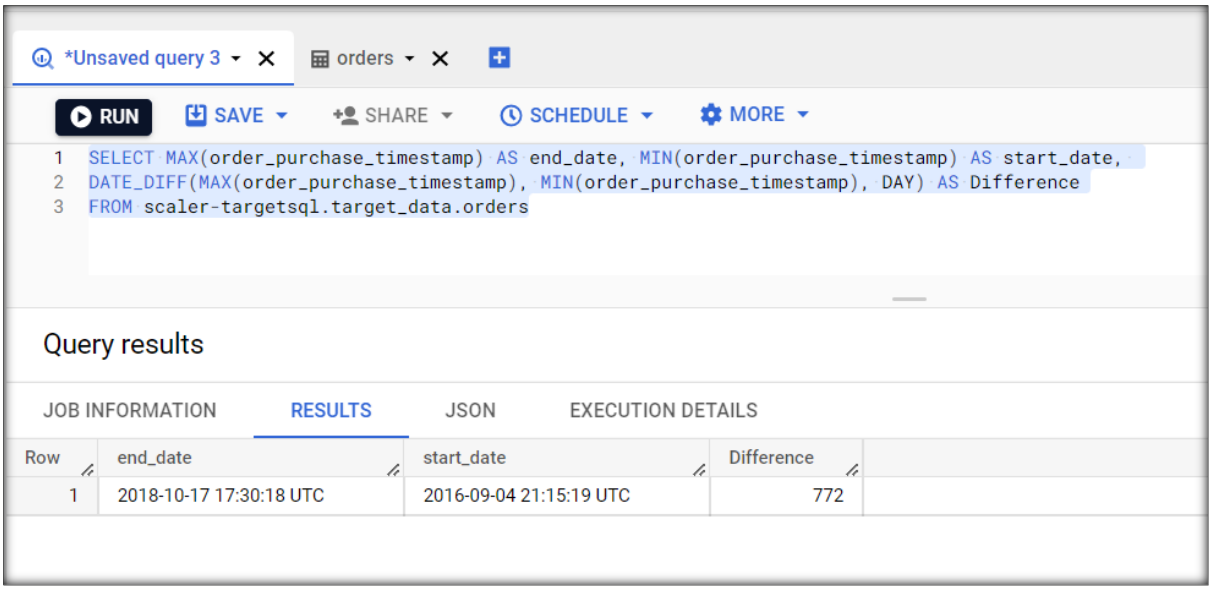
1)
```
SELECT table_name, column_name, data_type
FROM scaler-targetsql.target_data.INFORMATION_SCHEMA.COLUMNS
```

To get specific table:

```
SELECT table_name, column_name, data_type
FROM scaler-targetsql.target_data.INFORMATION_SCHEMA.COLUMNS
WHERE table_name = "orders"
```



2)
```
SELECT MAX(order_purchase_timestamp) AS end_date, MIN(order_purchase_timestamp) AS start_date,
DATE_DIFF(MAX(order_purchase_timestamp), MIN(order_purchase_timestamp), DAY) AS Difference
FROM scaler-targetsql.target_data.orders
```



3) SELECT DISTINCT geolocation_city AS city, geolocation_state AS state, FROM scaler-targetsql.target_data.geolocation

<u>To get count of cities within each state:</u>

```
SELECT geolocation_state AS state, COUNT(DISTINCT(geolocation_
city)) AS city_count,
FROM scaler-targetsql.target_data.geolocation
GROUP BY geolocation_state
```

<u>To get total count of cities and states</u>

```
SELECT
COUNT(DISTINCT geolocation_city) AS city_count,
COUNT(DISTINCT geolocation_state) AS state_count,
FROM scaler-targetsql.target_data.geolocation
```

Explorer + ADD DATA

Type to search

Viewing all resources. Show starred resources only.

- scaler-targetsql
  - target_data
    - customers
    - geolocation
    - order_items
    - order_reviews
    - orders
    - payments
    - products
    - sellers

MORE RESULTS

MORE RESULTS

*Unsaved query 3 | geolocation

RUN | SAVE | SHARE | SCHEDULE | MORE

```
WITH cte1 AS (
  SELECT
    DISTINCT geolocation_city AS city, geolocation_state AS state,
  FROM scaler-targetsql.target_data.geolocation
),

```

Query results

JOB INFORMATION | RESULTS | JSON | EXECUTION DETAILS

Row	city	state
1	aracaju	SE
2	riachuelo	SE
3	nossa senhora do socorro	SE
4	barra dos coqueiros	SE
5	itaporanga d'ajuda	SE
6	sao cristovao	SE
7	são cristóvão	SE
8	santo amaro das brotas	SE
9	pirambu	SE
10	laranjeiras	SE
11	umbauba	SE

PERSONAL HISTORY | PROJECT HISTORY

Explorer + ADD DATA

Type to search

Viewing all resources. Show starred resources only.

- scaler-targetsql
  - target_data
    - customers
    - geolocation
    - order_items
    - order_reviews
    - orders
    - payments
    - products
    - sellers

MORE RESULTS

MORE RESULTS

*Unsaved query 3 | geolocation

RUN | SAVE | SHARE | SCHEDULE | MORE

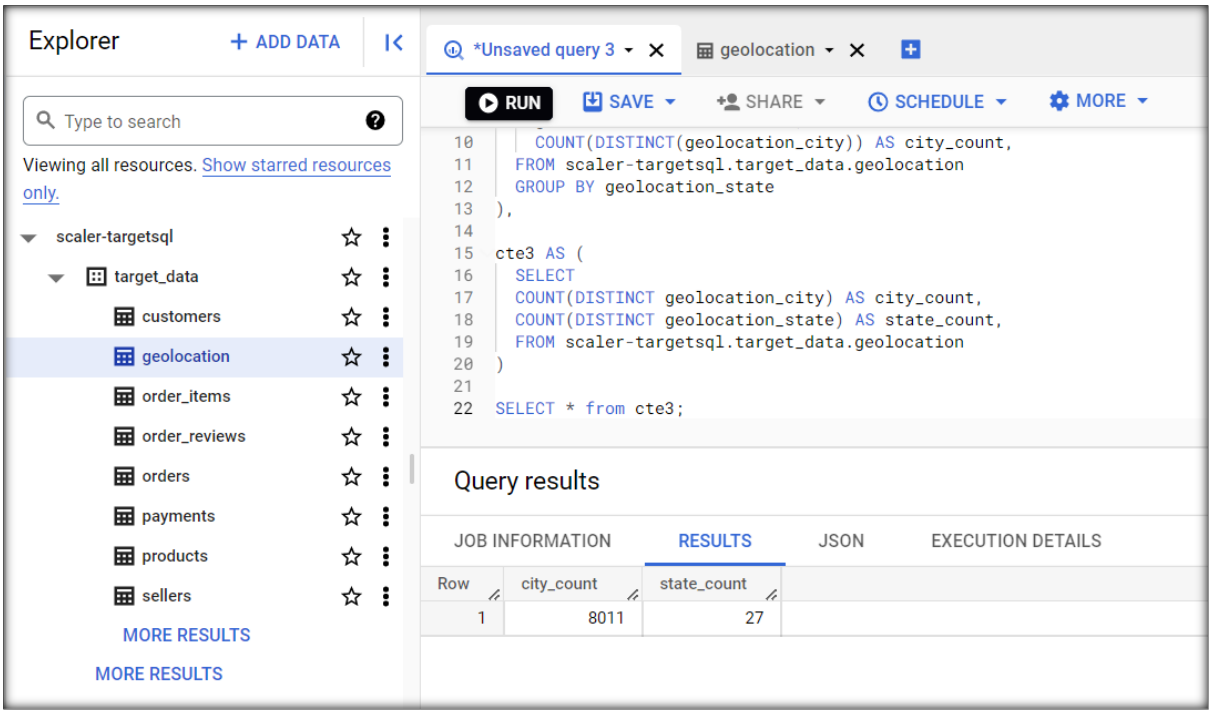
```
  SELECT
    geolocation_state AS state,
    COUNT(DISTINCT(geolocation_city)) AS city_count,
  FROM scaler-targetsql.target_data.geolocation
  GROUP BY geolocation_state
```

Query results

JOB INFORMATION | RESULTS | JSON | EXECUTION DETAILS

Row	state	city_count
1	SE	96
2	AL	130
3	PI	278
4	AP	17
5	AM	74
6	RR	14
7	AC	34
8	RO	83
9	TO	173
10	BA	652
11	CE	260

PERSONAL HISTORY | PROJECT HISTORY



Q2. In-depth Exploration:

1. Is there a growing trend on e-commerce in Brazil? How can we describe a complete scenario? Can we see some seasonality with peaks at specific months?
2. What time do Brazilian customers tend to buy (Dawn, Morning, Afternoon or Night)?

Ans:

1)
```
SELECT
DISTINCT EXTRACT(MONTH FROM order_purchase_timestamp) AS month
s,
COUNT(orders.order_id) OVER (PARTITION BY EXTRACT(MONTH FROM o
rder_purchase_timestamp)) AS order_count,
ROUND(SUM(payments.payment_value) OVER (PARTITION BY EXTRACT(M
ONTH FROM order_purchase_timestamp)) , 2) AS total_purchase_va
lue

FROM scaler-targetsql.target_data.orders AS orders
LEFT JOIN scaler-targetsql.target_data.payments AS payments
ON orders.order_id = payments.order_id
ORDER BY order_count DESC, total_purchase_value DESC

// This query checks seasonality based on order count and
total purchase value of good. As we can clearly see from the
output(in screenshot). In the winter months (Sept → Feb) the
sales are low as compared to the summer months(March → August)
```

RUN SAVE SHARE SCHEDULE MORE Query completed

```
SELECT
  DISTINCT EXTRACT(MONTH FROM order_purchase_timestamp) AS months,
  COUNT(orders.order_id) OVER (PARTITION BY EXTRACT(MONTH FROM order_purchase_timestamp)) AS order_count,
  ROUND(SUM(payments.payment_value) OVER (PARTITION BY EXTRACT(MONTH FROM order_purchase_timestamp)) , 2) AS total_purchase_value
FROM scaler-targetsql.target_data.orders AS orders
LEFT JOIN scaler-targetsql.target_data.payments AS payments
ON orders.order_id = payments.order_id
ORDER BY order_count DESC, total_purchase_value DESC
```

Press Alt+F1 for accessibility option

Query results SAVE RESULTS EXPLORE DATA

JOB INFORMATION RESULTS JSON EXECUTION DETAILS

Row	months	order_count	total_purcha...
1	8	11248	1696821.64
2	5	11079	1746900.97
3	7	10824	1658923.67
4	3	10349	1609515.72
5	6	9855	1535156.88
6	4	9780	1578573.51
7	2	8838	1284371.35
8	1	8413	1253492.22
9	11	7863	1194882.8
10	12	5896	878421.1
11	10	5206	839358.03

Results per page: 50 1 – 12 of 12

PERSONAL HISTORY PROJECT HISTORY REFRESH

<u>To see yearly trend:</u>

```
SELECT
EXTRACT(YEAR FROM order_purchase_timestamp) AS years,
COUNT(orders.order_id) AS total_orders,
SUM(price) AS total_price
FROM `target_data.orders` AS orders
INNER JOIN `target_data.order_items` AS order_items
ON orders.order_id = order_items.order_id
GROUP BY years
ORDER BY years
```

RUN SAVE SHARE SCHEDULE MORE

```
SELECT
EXTRACT(YEAR FROM order_purchase_timestamp) AS years,
COUNT(orders.order_id) AS total_orders,
SUM(price) AS total_price
FROM `target_data.orders` AS orders
INNER JOIN `target_data.order_items` AS order_items
ON orders.order_id = order_items.order_id
GROUP BY years
ORDER BY years
```

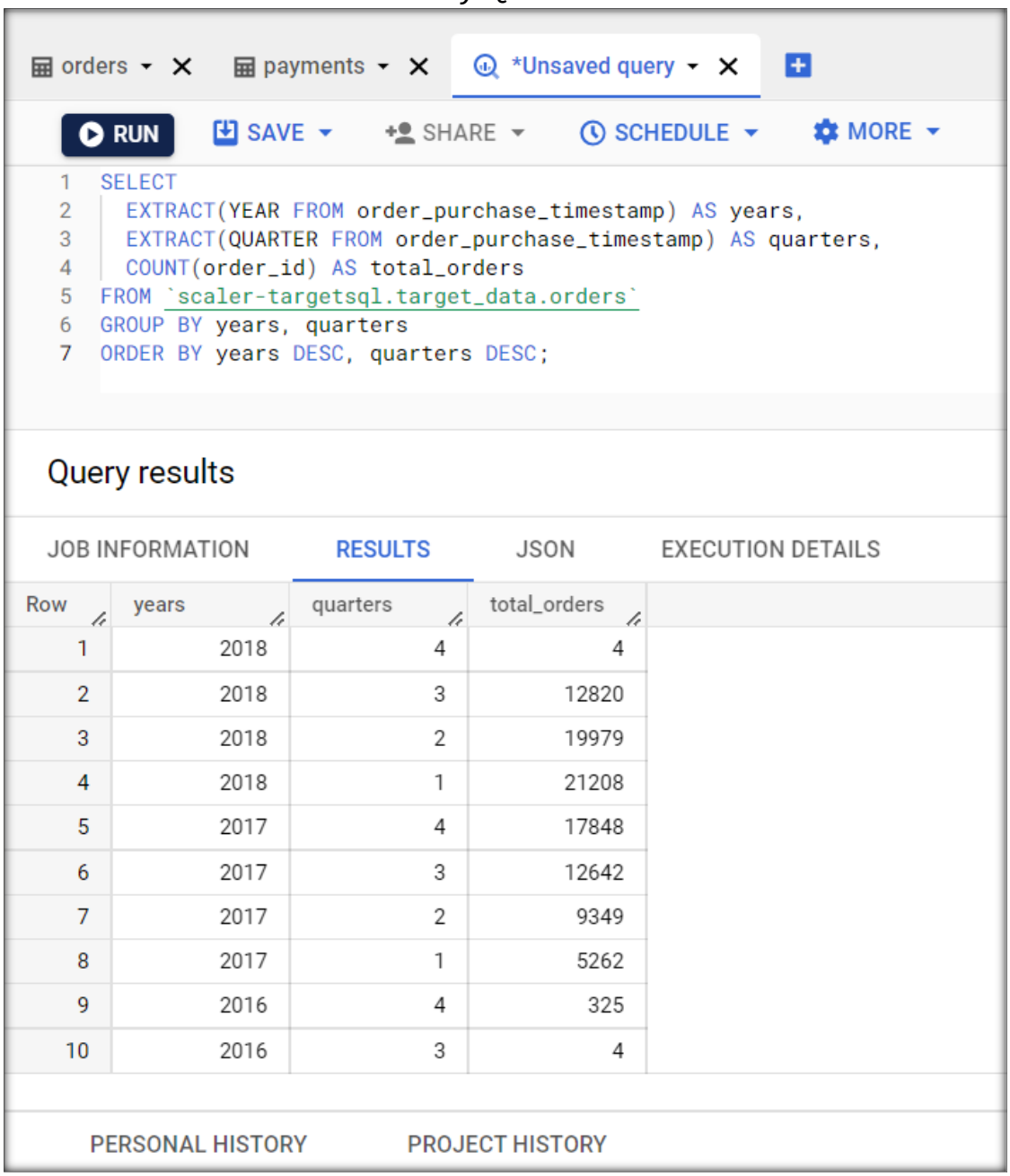
Query results

JOB INFORMATION RESULTS JSON EXECUTION DETAILS

Row	years	total_orders	total_price
1	2016	370	49785.9200...
2	2017	50864	6155806.98...
3	2018	61416	7386050.80...

To see quarterly trend:

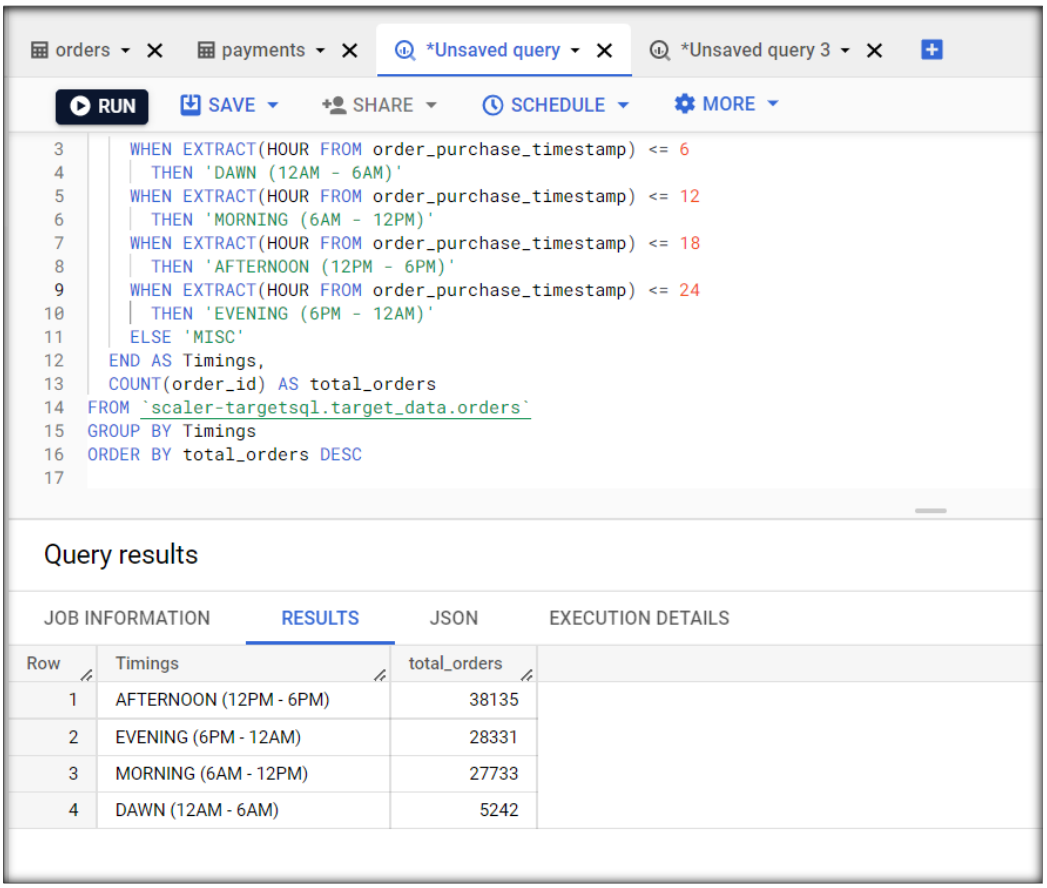
```
SELECT
EXTRACT(YEAR FROM order_purchase_timestamp) AS years,
EXTRACT(QUARTER FROM order_purchase_timestamp) AS quarters,
COUNT(order_id) AS total_orders
FROM `scaler-targetsql.target_data.orders`
GROUP BY years, quarters
ORDER BY years DESC, quarters DESC;

// As we can see, in Q3 and Q4 of 2016, there were very few
sales as compared to Q3 and Q4 of 2017. And there has been an
increase in sales in all the quarters from 2017 to 2018. So,
the market for e-commerce increased very quickly from 2016 →
2017 but it has slowed down by Q3 of 2018
```



Row	years	quarters	total_orders
1	2018	4	4
2	2018	3	12820
3	2018	2	19979
4	2018	1	21208
5	2017	4	17848
6	2017	3	12642
7	2017	2	9349
8	2017	1	5262
9	2016	4	325
10	2016	3	4

2)
```sql
SELECT
CASE
      WHEN EXTRACT(HOUR FROM order_purchase_timestamp) <= 6
            THEN 'DAWN (12AM - 6AM)'
      WHEN EXTRACT(HOUR FROM order_purchase_timestamp) <= 12
            THEN 'MORNING (6AM - 12PM)'
      WHEN EXTRACT(HOUR FROM order_purchase_timestamp) <= 18
            THEN 'AFTERNOON (12PM - 6PM)'
      WHEN EXTRACT(HOUR FROM order_purchase_timestamp) <= 24
            THEN 'EVENING (6PM - 12AM)'
      ELSE 'MISC'
END AS Timings,
COUNT(order_id) AS total_orders
FROM `scaler-targetsql.target_data.orders`
GROUP BY Timings
ORDER BY total_orders DESC
```

// Most customers shop during the afternoon hours in Brazil followed by the morning and night hours (equal). The dawn/mid-night hours are the least shopped. So, in-case we need to do server maintenance we can do it during midnight time. And our servers need to be able to handle most load during the day (6am → 12am) timings



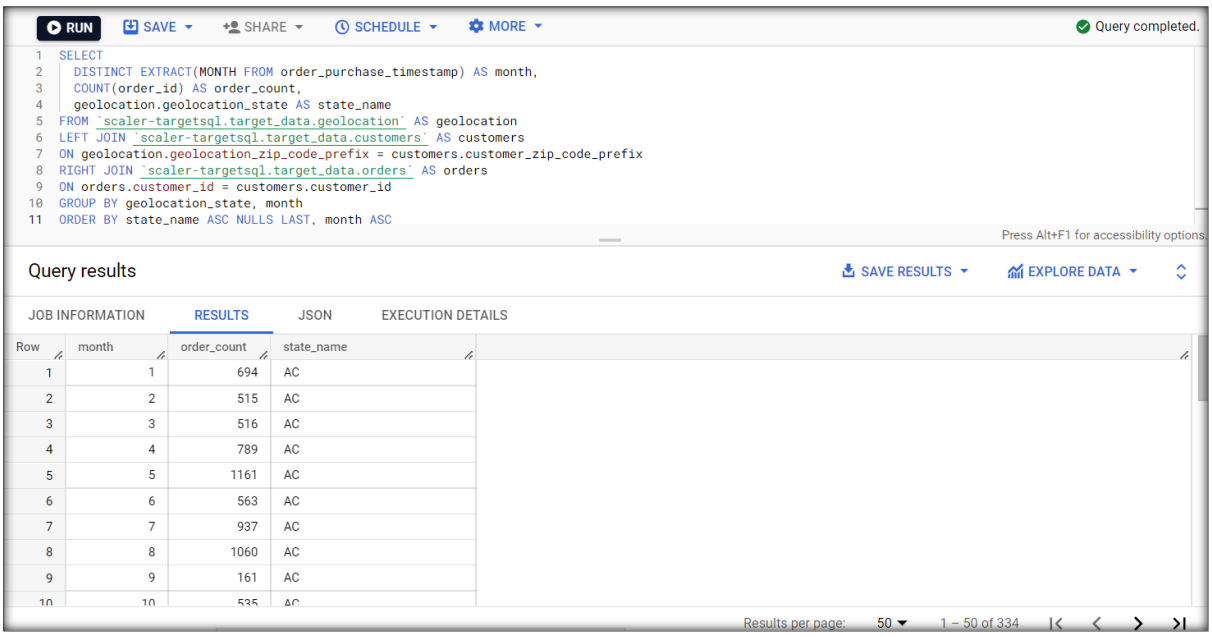
Row	Timings	total_orders
1	AFTERNOON (12PM - 6PM)	38135
2	EVENING (6PM - 12AM)	28331
3	MORNING (6AM - 12PM)	27733
4	DAWN (12AM - 6AM)	5242

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

1. Get month on month orders by region, states
2. How are customers distributed in Brazil

Ans:

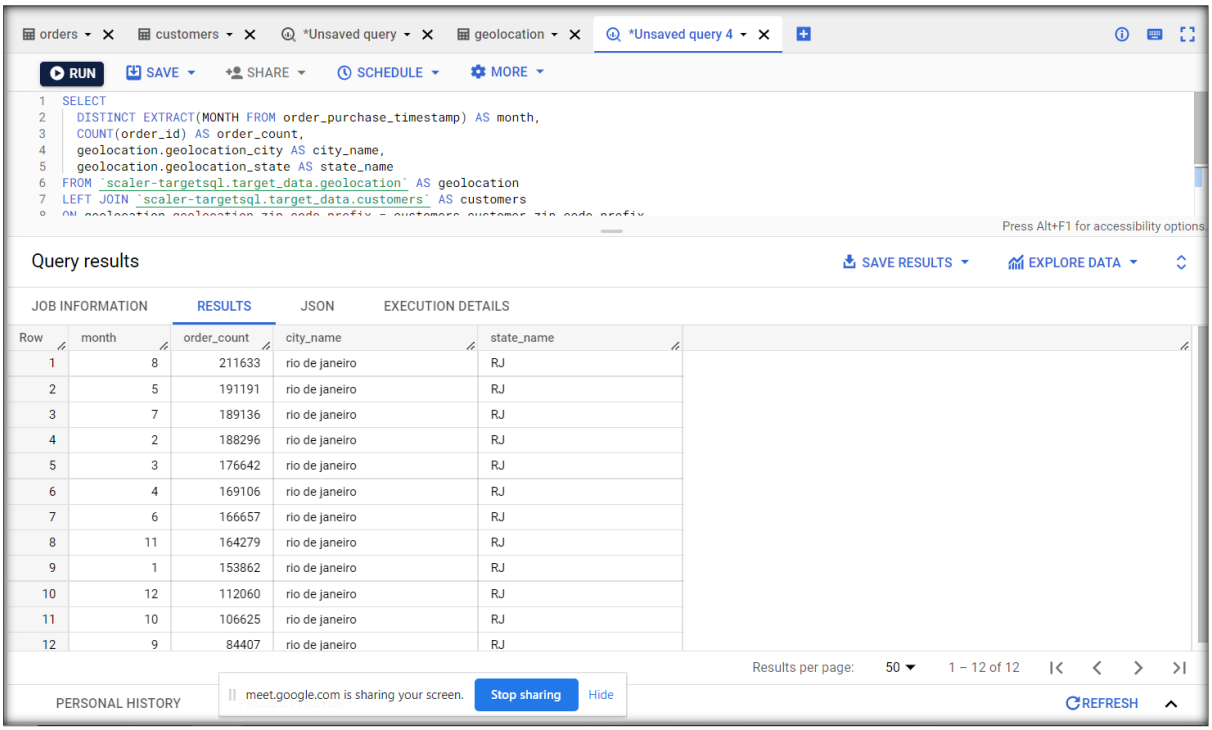
1)
```
SELECT
DISTINCT EXTRACT(MONTH FROM order_purchase_timestamp) AS month
COUNT(order_id) AS order_count,
geolocation.geolocation_state AS state_name
FROM `scaler-targetsql.target_data.geolocation` AS geolocation
LEFT JOIN `scaler-
targetsql.target_data.customers` AS customers
ON geolocation.geolocation_zip_code_prefix = customers.custome
r_zip_code_prefix
RIGHT JOIN `scaler-targetsql.target_data.orders` AS orders
ON orders.customer_id = customers.customer_id
GROUP BY geolocation_state, month
ORDER BY state_name ASC NULLS LAST, month ASC

// This query gets total orders by month, to get total orders
by city we can replace geolocation_state in GROUP BY with
geolocation_city. There is nothing such as “regions” within
the database, so we can’t get details by region
```



<u>To get count of orders by a specific city/state:</u>

```
SELECT DISTINCT EXTRACT(MONTH FROM order_purchase_timestamp) A
S month,
COUNT(order_id) AS order_count,
```

```
geolocation.geolocation_city AS city_name,
geolocation.geolocation_state AS state_name
FROM `scaler-targetsql.target_data.geolocation` AS geolocation
LEFT JOIN `scaler-
targetsql.target_data.customers` AS customers
ON geolocation.geolocation_zip_code_prefix = customers.custome
r_zip_code_prefix
RIGHT JOIN `scaler-targetsql.target_data.orders` AS orders
ON orders.customer_id = customers.customer_id
GROUP BY geolocation_city, geolocation_state, month
HAVING geolocation_city = "rio de janeiro" AND geolocation_sta
te = "RJ"
ORDER BY order_count DESC;
```



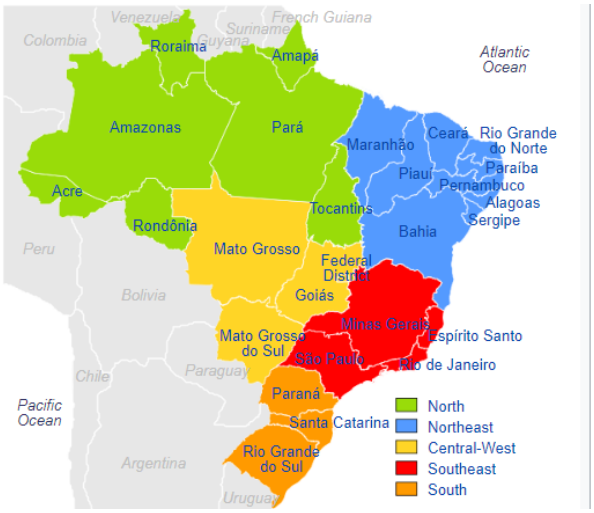
2)
```
SELECT COUNT(order_id) AS order_count,
geolocation.geolocation_state AS state_name
FROM `scaler-targetsql.target_data.geolocation` AS geolocation
LEFT JOIN `scaler-
targetsql.target_data.customers` AS customers
ON geolocation.geolocation_zip_code_prefix = customers.custome
r_zip_code_prefix
RIGHT JOIN `scaler-targetsql.target_data.orders` AS orders
ON orders.customer_id = customers.customer_id
GROUP BY geolocation_state
ORDER BY order_count DESC
```

Query results

JOB INFORMATION | RESULTS | JSON | EXECUTION DETAILS

Row	order_count	state_name
1	5620430	SP
2	3015690	RJ
3	2878728	MG
4	805370	RS
5	626021	PR
6	538638	SC
7	365875	BA
8	316654	ES
9	133146	GO
10	122395	MT

// As we can see here, most of the customers are distributed in the south-east and southern regions of Brazil. There is no “region” field in the database hence I have used an official map for this purpose

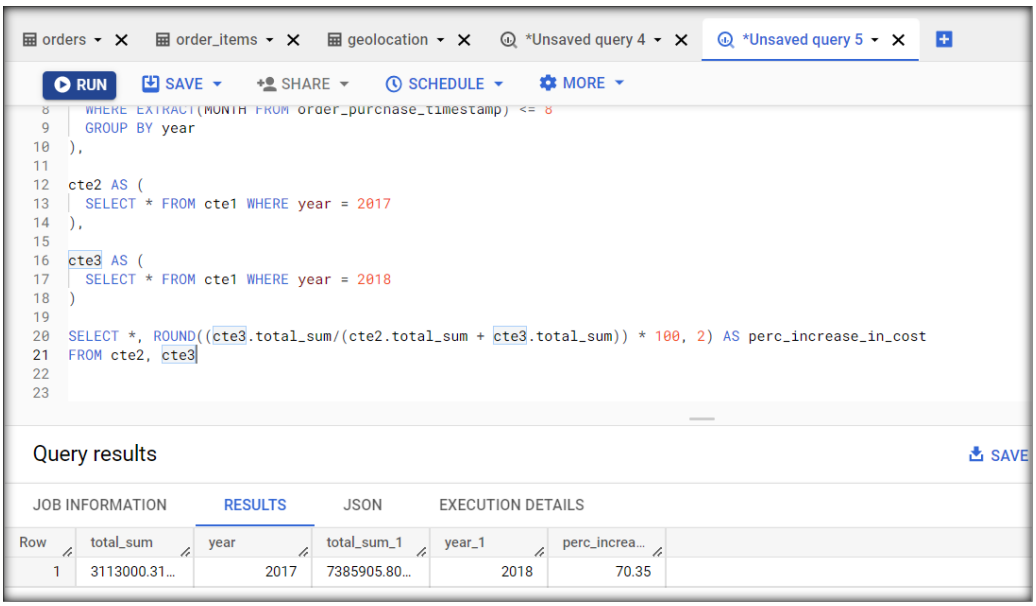


Q.4) Impact on Economy: Analyze the money movemented by e-commerce by looking at order prices, freight and others.

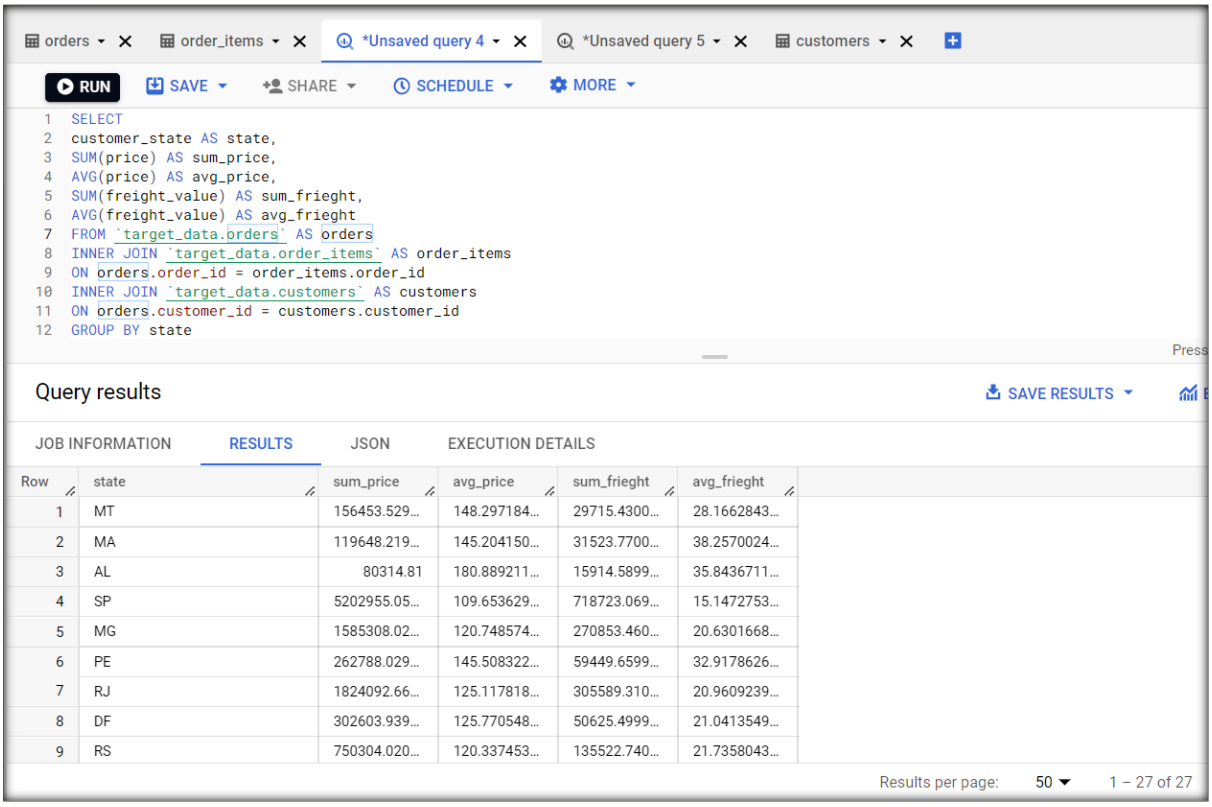
1. Get % increase in cost of orders from 2017 to 2018 (include months between Jan to Aug only)
2. Mean & Sum of price and freight value by customer state

Ans:

```
1) WITH cte1 AS (
     SELECT
     SUM(price) AS total_sum,
     EXTRACT(YEAR FROM order_purchase_timestamp) AS year
     FROM `target_data.order_items` AS order_items
     INNER JOIN `target_data.orders` AS orders
     ON orders.order_id = order_items.order_id
     WHERE EXTRACT(MONTH FROM order_purchase_timestamp) <= 8
     GROUP BY year
   ),

   cte2 AS (
     SELECT * FROM cte1 WHERE year = 2017
   ),

   cte3 AS (
     SELECT * FROM cte1 WHERE year = 2018
   )

   SELECT *, ROUND((cte3.total_sum/(cte2.total_sum + cte3.total_s
   um)) * 100, 2) AS perc_increase_in_cost
   FROM cte2, cte3
```



2)
```
SELECT
customer_state AS state,
SUM(price) AS sum_price,
AVG(price) AS avg_price,
SUM(freight_value) AS sum_frieght,
AVG(freight_value) AS avg_frieght
FROM `target_data.orders` AS orders
INNER JOIN `target_data.order_items` AS order_items
ON orders.order_id = order_items.order_id
INNER JOIN `target_data.customers` AS customers
ON orders.customer_id = customers.customer_id
GROUP BY state
```



Row	state	sum_price	avg_price	sum_frieght	avg_frieght
1	MT	156453.529...	148.297184...	29715.4300...	28.1662843...
2	MA	119648.219...	145.204150...	31523.7700...	38.2570024...
3	AL	80314.81	180.889211...	15914.5899...	35.8436711...
4	SP	5202955.05...	109.653629...	718723.069...	15.1472753...
5	MG	1585308.02...	120.748574...	270853.460...	20.6301668...
6	PE	262788.029...	145.508322...	59449.6599...	32.9178626...
7	RJ	1824092.66...	125.117818...	305589.310...	20.9609239...
8	DF	302603.939...	125.770548...	50625.4999...	21.0413549...
9	RS	750304.020...	120.337453...	135522.740...	21.7358043...

Q.5) Analysis on sales, freight and delivery time

1. Calculate days between purchasing, delivering and estimated delivery. Create columns:
   a. time_to_delivery = order_purchase_timestamp-order_delivered_customer_date
   b. diff_estimated_delivery = order_estimated_delivery_date-order_delivered_customer_date
2. Group data by state, take mean of freight_value, time_to_delivery, diff_estimated_delivery
3. Sort the data to get the following:

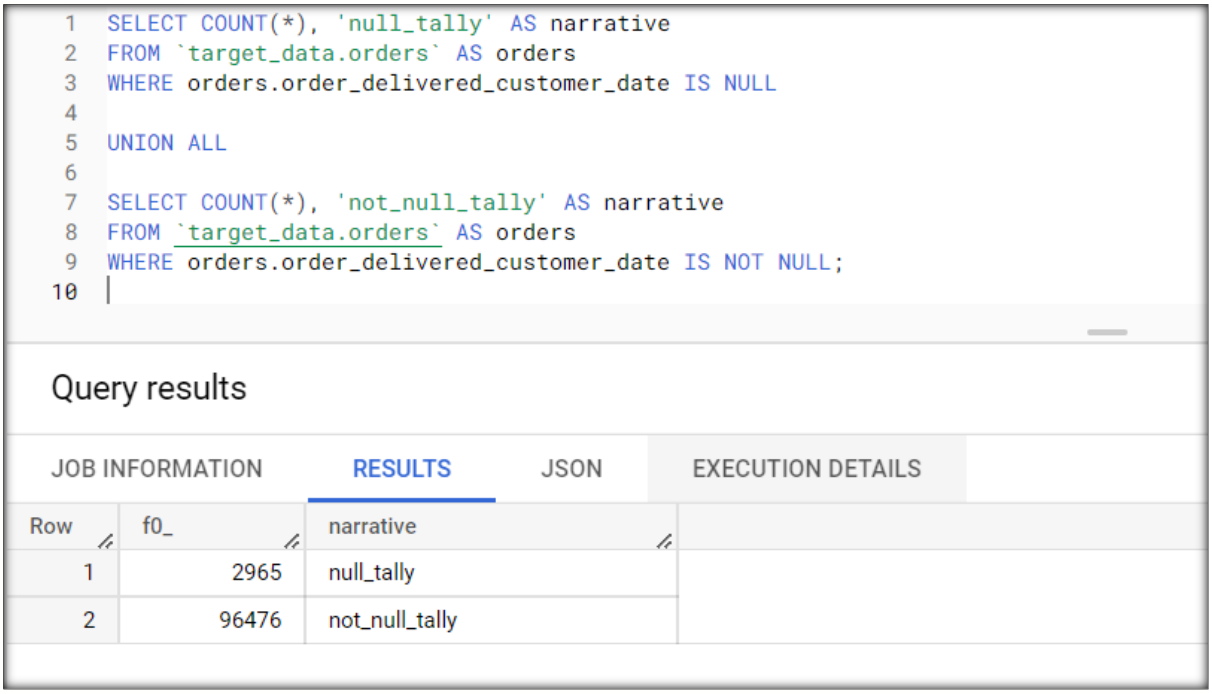
a. Top 5 states with highest/lowest average freight value - sort in desc/asc limit 5
b. Top 5 states with highest/lowest average time to delivery
c. Top 5 states where delivery is really fast/ not so fast compared to estimated date

Ans:

1) // Before, diving all data into columns, I noticed that order_delivered customer date as some NULL values, so we will check them first and remove them in main query

NULL value check:

```
SELECT COUNT(*), 'null_tally' AS narrative
FROM `target_data.orders` AS orders
WHERE orders.order_delivered_customer_date IS NULL

UNION ALL

SELECT COUNT(*), 'not_null_tally' AS narrative
FROM `target_data.orders` AS orders
WHERE orders.order_delivered_customer_date IS NOT NULL;
```



Main Query:

```
SELECT
  EXTRACT(DATE FROM order_purchase_timestamp) AS purchasing_time,
```

```
  EXTRACT(DATE FROM order_delivered_customer_date) AS actual_d
elivery_date,
  DATE_DIFF(order_purchase_timestamp, order_delivered_customer
_date, DAY) AS time_to_delivery,
  EXTRACT(DATE FROM order_estimated_delivery_date) AS est_deli
very_date,
  DATE_DIFF(order_estimated_delivery_date, order_purchase_time
stamp, DAY) AS diff_estimated_delivery
FROM `target_data.orders` AS orders
WHERE order_delivered_customer_date IS NOT NULL
```

RUN SAVE SHARE SCHEDULE MORE

```
SELECT
  EXTRACT(DATE FROM order_purchase_timestamp) AS purchasing_time,
  EXTRACT(DATE FROM order_delivered_customer_date) AS actual_delivery_date,
  DATE_DIFF(order_purchase_timestamp, order_delivered_customer_date, DAY) AS time_to_delivery,
  EXTRACT(DATE FROM order_estimated_delivery_date) AS est_delivery_date,
  DATE_DIFF(order_estimated_delivery_date, order_purchase_timestamp, DAY) AS diff_estimated_delivery
FROM `target_data.orders` AS orders
WHERE order_delivered_customer_date IS NOT NULL
```

Query results SAVE RESULTS

JOB INFORMATION RESULTS JSON EXECUTION DETAILS

Row	purchasing_time	actual_delivery_date	time_to_delivery	est_delivery_date	diff_estimated_delivery
1	2016-10-07	2016-10-14	-7	2016-11-29	52
2	2016-10-09	2016-11-09	-30	2016-12-08	59
3	2016-10-09	2016-10-16	-7	2016-11-30	51
4	2016-10-08	2016-10-19	-10	2016-11-30	52
5	2016-10-03	2016-11-08	-35	2016-11-25	52
6	2017-03-17	2017-04-07	-20	2017-05-18	61
7	2017-03-20	2017-03-30	-10	2017-05-18	58
8	2017-03-21	2017-04-18	-28	2017-05-18	57
9	2018-08-20	2018-08-29	-9	2018-10-04	44
10	2018-08-12	2018-08-23	-10	2018-10-04	52
11	2018-08-16	2018-08-23	-6	2018-10-04	48

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2)
```
SELECT
  AVG(freight_value) AS avg_frieght,
  AVG(DATE_DIFF(order_purchase_timestamp, order_delivered_cust
omer_date, DAY)) AS avg_time_to_delivery,
  AVG(DATE_DIFF(order_estimated_delivery_date, order_purchase_
timestamp, DAY)) AS avg_diff_estimated_delivery,
  customer_state AS state
FROM `target_data.orders` AS orders
INNER JOIN `target_data.order_items` AS order_items
ON orders.order_id = order_items.order_id
INNER JOIN `target_data.customers` AS customers
ON orders.customer_id = customers.customer_id
WHERE order_delivered_customer_date IS NOT NULL
GROUP BY state
```

RUN SAVE SHARE SCHEDULE MORE

```google_sql
SELECT
  AVG(freight_value) AS avg_frieght,
  AVG(DATE_DIFF(order_purchase_timestamp, order_delivered_customer_date, DAY)) AS avg_time_to_delivery,
  AVG(DATE_DIFF(order_estimated_delivery_date, order_purchase_timestamp, DAY)) AS avg_diff_estimated_delivery,
  customer_state AS state
FROM `target_data.orders` AS orders
INNER JOIN `target_data.order_items` AS order_items
ON orders.order_id = order_items.order_id
INNER JOIN `target_data.customers` AS customers
ON orders.customer_id = customers.customer_id
WHERE order_delivered_customer_date IS NOT NULL
GROUP BY state
```

Query results

SAVE RESULTS

JOB INFORMATION | RESULTS | JSON | EXECUTION DETAILS

Row	avg_frieght	avg_time_to...	avg_diff_est...	state
1	20.9097843...	-14.689382...	26.0895659...	RJ
2	20.6258372...	-11.515522...	24.2633738...	MG
3	21.5066276...	-14.520985...	25.5229380...	SC
4	15.1149940...	-8.2596085...	18.8701634...	SP
5	22.5628678...	-14.948177...	26.6297760...	GO
6	21.6142703...	-14.708299...	28.2687102...	RS
7	26.4875563...	-18.774640...	29.1751289...	BA
8	27.9969141...	-17.508196...	31.4792671...	MT
9	36.5731733...	-20.978666...	30.4213333...	SE

Results per page: 50 1 – 27 of 27

3)

Top 5 avg_frieght ASC :

```google_sql
ORDER BY avg_frieght ASC
LIMIT 5
```

RUN SAVE SHARE SCHEDULE MORE

```google_sql
FROM `target_data.orders` AS orders
INNER JOIN `target_data.order_items` AS order_items
ON orders.order_id = order_items.order_id
INNER JOIN `target_data.customers` AS customers
ON orders.customer_id = customers.customer_id
WHERE order_delivered_customer_date IS NOT NULL
GROUP BY state
ORDER BY avg_frieght ASC
LIMIT 5
```

Query results

JOB INFORMATION | RESULTS | JSON | EXECUTION DETAILS

Row	avg_frieght	avg_time_to...	avg_diff_est...	state
1	15.1149940...	-8.2596085...	18.8701634...	SP
2	20.4718162...	-11.480793...	24.3793591...	PR
3	20.6258372...	-11.515522...	24.2633738...	MG
4	20.9097843...	-14.689382...	26.0895659...	RJ
5	21.0721613...	-12.501486...	24.0942675...	DF

Top 5 avg_delivery_time ASC :

```
ORDER BY avg_time_to_delivery DESC
LIMIT 5

// Descending order because values are negative, higher
negative value (more towards 0) = less delivery time
```

```
INNER JOIN `target_data.order_items` AS order_items
ON orders.order_id = order_items.order_id
INNER JOIN `target_data.customers` AS customers
ON orders.customer_id = customers.customer_id
WHERE order_delivered_customer_date IS NOT NULL
GROUP BY state
ORDER BY avg_time_to_delivery DESC
LIMIT 5
```

Query results

JOB INFORMATION | RESULTS | JSON | EXECUTION DETAILS

Row	avg_frieght	avg_time_to...	avg_diff_est...	state
1	15.1149940...	-8.2596085...	18.8701634...	SP
2	20.4718162...	-11.480793...	24.3793591...	PR
3	20.6258372...	-11.515522...	24.2633738...	MG
4	21.0721613...	-12.501486...	24.0942675...	DF
5	21.5066276...	-14.520985...	25.5229380...	SC

Top 5 states where Avg. Difference between expected and actual time is least:

```
ORDER BY avg_diff_estimated_delivery ASC
LIMIT 5
```

RUN | SAVE | SHARE | SCHEDULE | MORE

```
INNER JOIN `target_data.order_items` AS order_items
ON orders.order_id = order_items.order_id
INNER JOIN `target_data.customers` AS customers
ON orders.customer_id = customers.customer_id
WHERE order_delivered_customer_date IS NOT NULL
GROUP BY state
ORDER BY avg_diff_estimated_delivery ASC
LIMIT 5
```

Query results

JOB INFORMATION | RESULTS | JSON | EXECUTION DETAILS

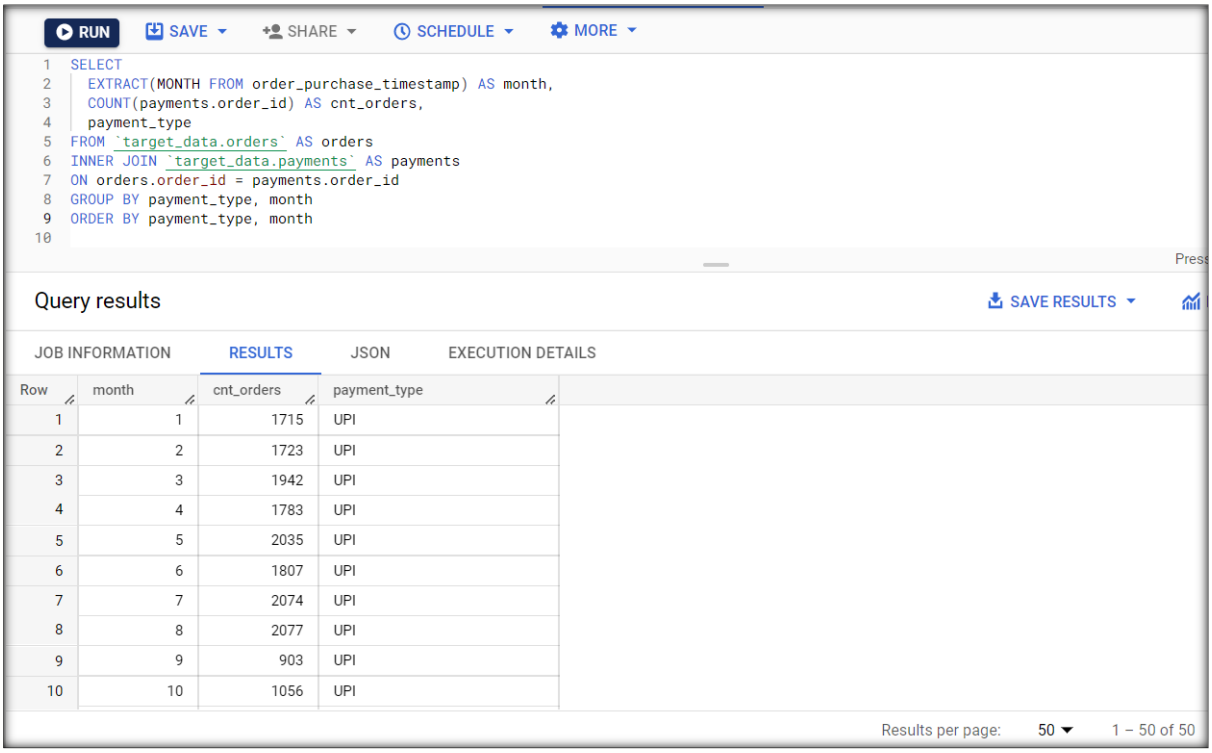
Row	avg_frieght	avg_time_to...	avg_diff_est...	state
1	15.1149940...	-8.2596085...	18.8701634...	SP
2	21.0721613...	-12.501486...	24.0942675...	DF
3	20.6258372...	-11.515522...	24.2633738...	MG
4	20.4718162...	-11.480793...	24.3793591...	PR
5	22.0289797...	-15.192808...	25.2337078...	ES

Q.6) Payment type analysis:

1. Month over Month count of orders for different payment types
2. Distribution of payment instalments and count of orders

Ans:

```
1) SELECT
        EXTRACT(MONTH FROM order_purchase_timestamp) AS month,
        COUNT(payments.order_id) AS cnt_orders,
        payment_type
   FROM `target_data.orders` AS orders
   INNER JOIN `target_data.payments` AS payments
   ON orders.order_id = payments.order_id
   GROUP BY payment_type, month
   ORDER BY payment_type, month
```



Row	month	cnt_orders	payment_type
1	1	1715	UPI
2	2	1723	UPI
3	3	1942	UPI
4	4	1783	UPI
5	5	2035	UPI
6	6	1807	UPI
7	7	2074	UPI
8	8	2077	UPI
9	9	903	UPI
10	10	1056	UPI

```
2) SELECT
        COUNT(payments.order_id) AS cnt_orders,
        payment_installments
   FROM `target_data.payments` AS payments
   GROUP BY payment_installments
   ORDER BY cnt_orders DESC
```

RUN SAVE SHARE SCHEDULE MORE

```sql
SELECT
  COUNT(payments.order_id) AS cnt_orders,
  payment_installments
FROM `target_data.payments` AS payments
GROUP BY payment_installments
ORDER BY cnt_orders DESC
```

Query results

JOB INFORMATION | RESULTS | JSON | EXECUTION DETAILS

Row	cnt_orders	payment_in...
1	52546	1
2	12413	2
3	10461	3
4	7098	4
5	5328	10
6	5239	5
7	4268	8
8	3920	6
9	1626	7
10	644	9