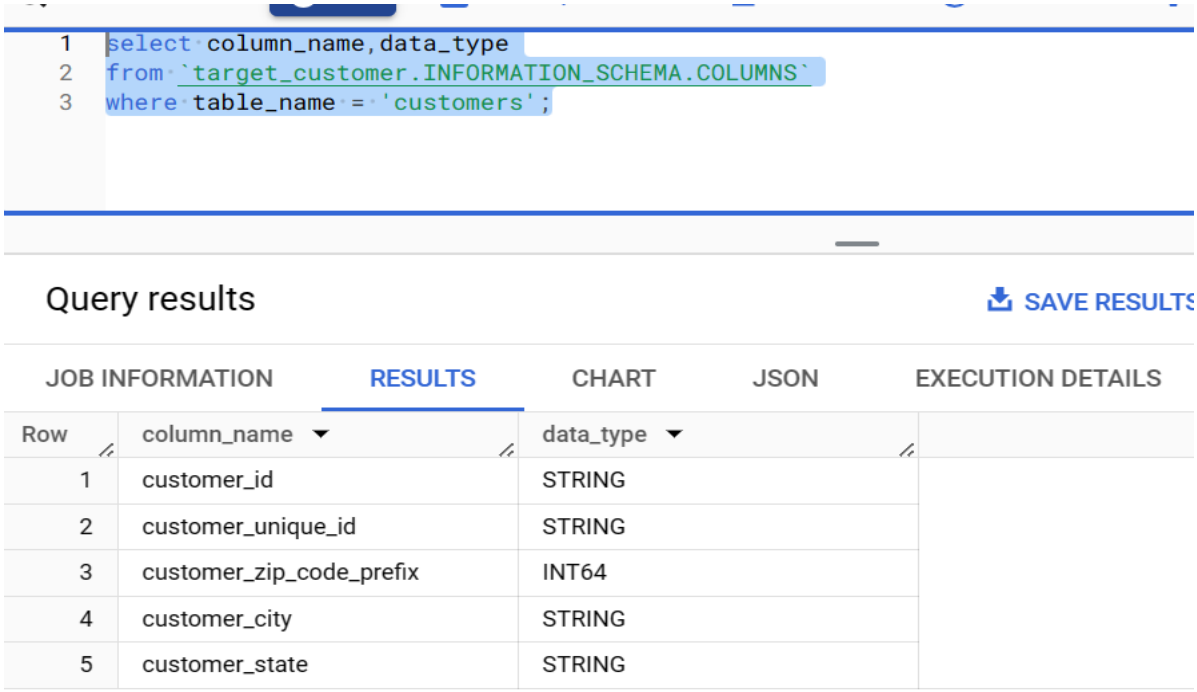
Target Business case study – submitted by Omprakash S

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

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

1.1) Answer – Query

```
select column_name,data_type
from `target_customer.INFORMATION_SCHEMA.COLUMNS`
where table_name = 'customers';
```



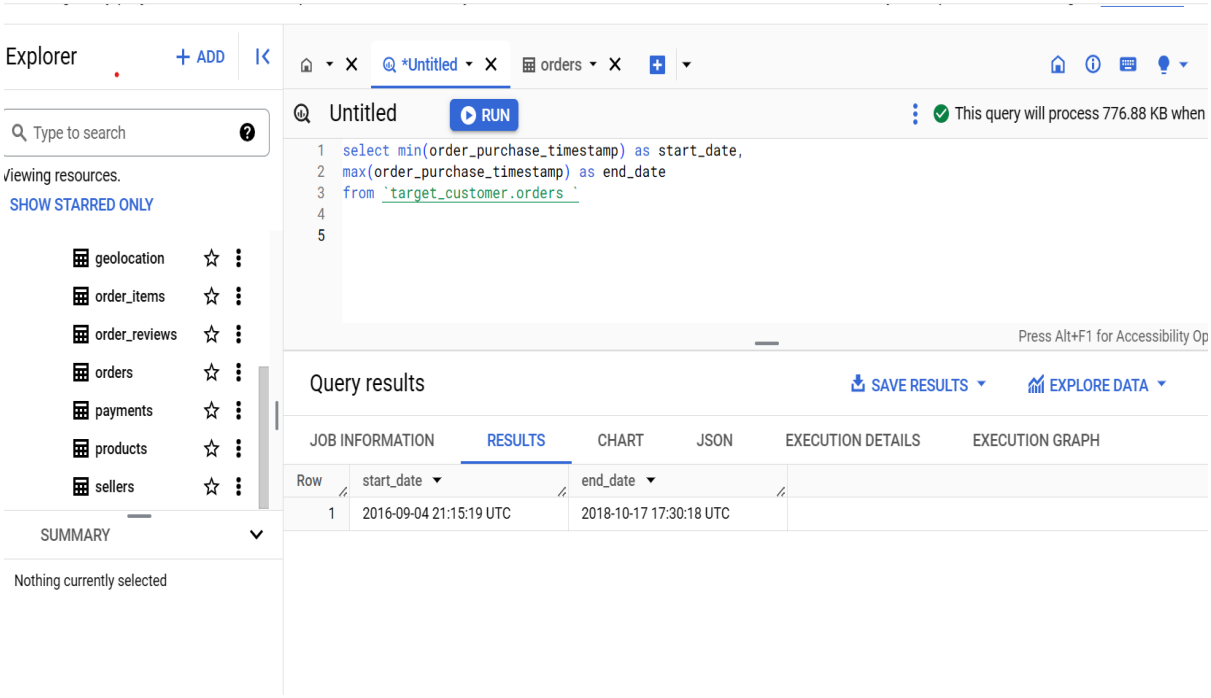
Insights : I observer the data type of the customer's table. By the same way we can find the data type of the necessary tables and this will help us to find the relationship between the tables and get the ER diagram of the entire data sets and to know the data structure.

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

1.2) Answer **Query :**

```
select min(order_purchase_timestamp) as start_date,
max(order_purchase_timestamp) as end_date
from `target_customer.orders `
```

Result :



Insight : I found that the sales of orders started at 4th Sep 2016 and ended at 17th oct 2018. This helps to know the customers order frequency between the time period.

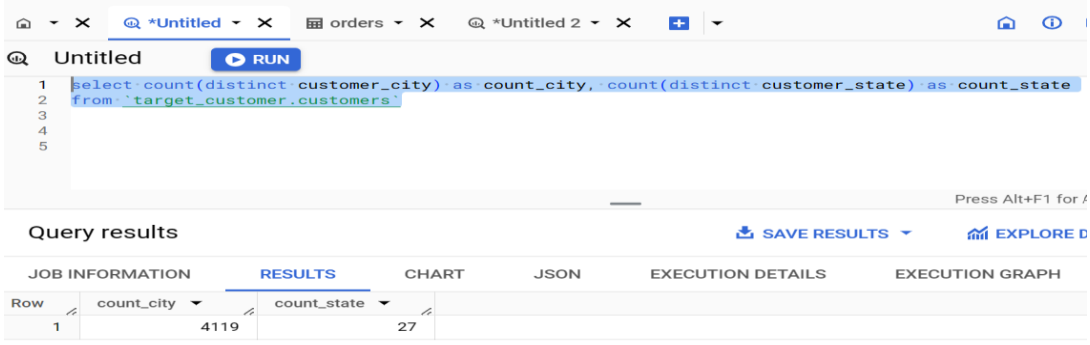
3. Count the Cities & States of customers who ordered during the given period.

1.3) Answer

Query :

```
select count(distinct customer_city) as count_city, count(distinct
customer_state) as count_state
from `target_customer.customers`
```

Result :



Insight : It is observed that customers are from 4119 cities and from 27 different states of Brazil.

Recommendation : This data helps us to focus on the deep into city from which more orders are received, so we can stock the more products near to the location. This will help in to focus the cost to company for warehouses, staff workers and delivery partners in the near by cities and states.

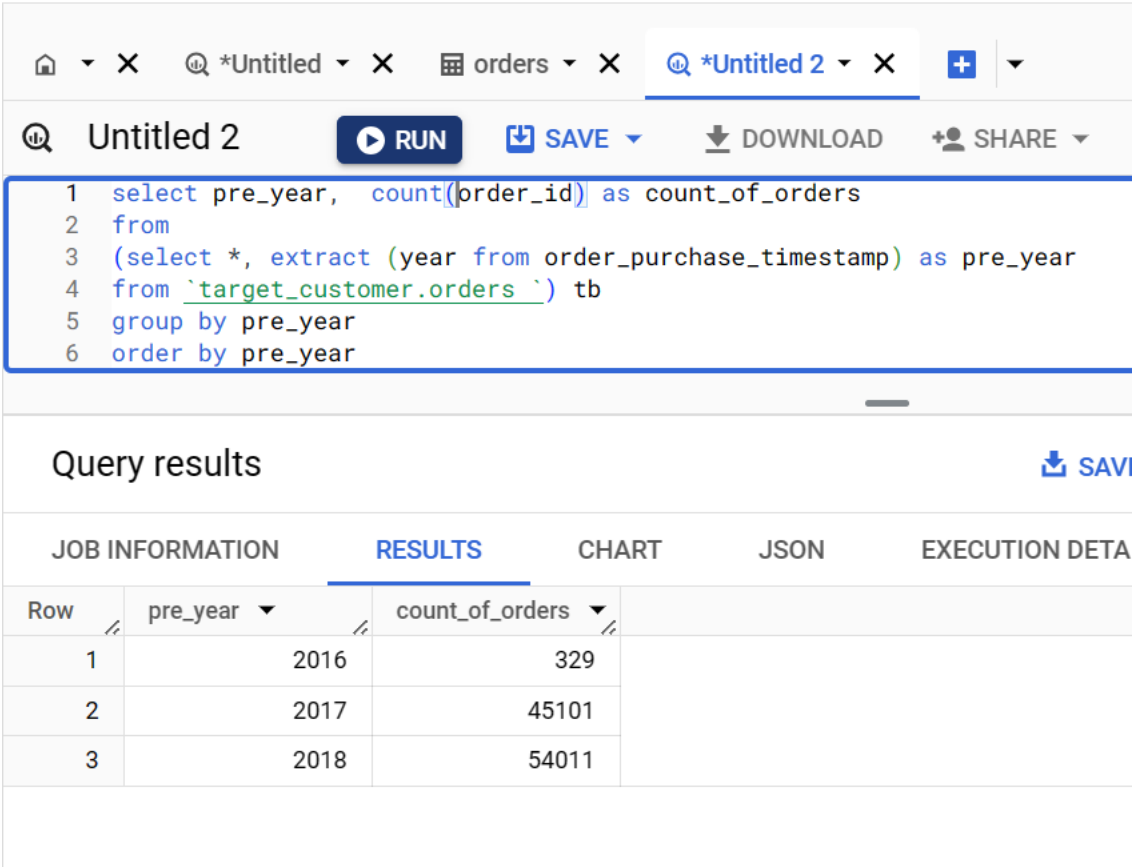
2.In-depth Exploration:

2.1) Is there a growing trend in the no. of orders placed over the past years?

2.1) Answer

Query :
```
select pre_year, count(order_id) as count_of_orders
from
(select *, extract (year from order_purchase_timestamp) as pre_year
from `target_customer.orders `) tb
group by pre_year
```

Result :



Insights :

1.We can understand that there is steep increase between the year 2016 – 2017 with 44,772 no of orders. But between the year 2017-2018, there is a decrease in no of orders with only 8,910 no of orders when compared to previous year

2. This provides us with the number of orders by the customers.

Recommendations :

To increase the count, we need to focus more on the customer needs from his end like focusing on the products image with high resolution or a small video of the products, User interface design, enable more filter options, enable best customer support.

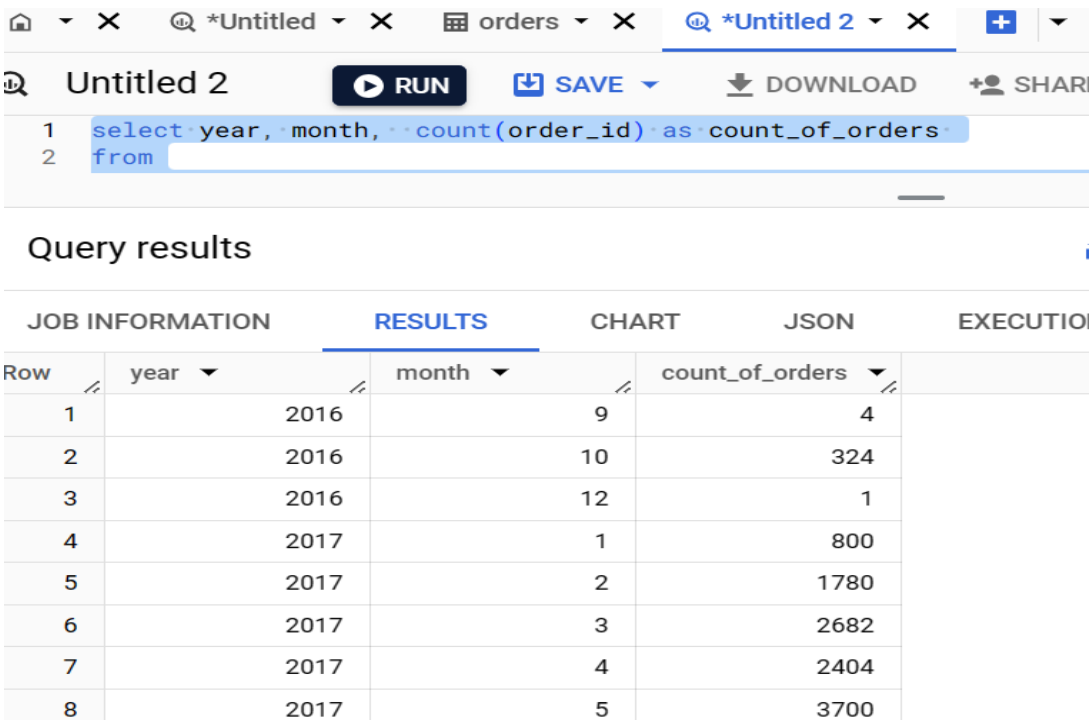
2.2) Can we see some kind of monthly seasonality in terms of the no. of orders being placed?

2.2) Answer

Query :

```
select year, month,  count(order_id) as count_of_orders
from
(select *, extract (year from order_purchase_timestamp) as
year,extract(month from order_purchase_timestamp ) as month
from `target_customer.orders `) tb
group by year,month
order by year,month
```

Result :



Row	year	month	count_of_orders
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

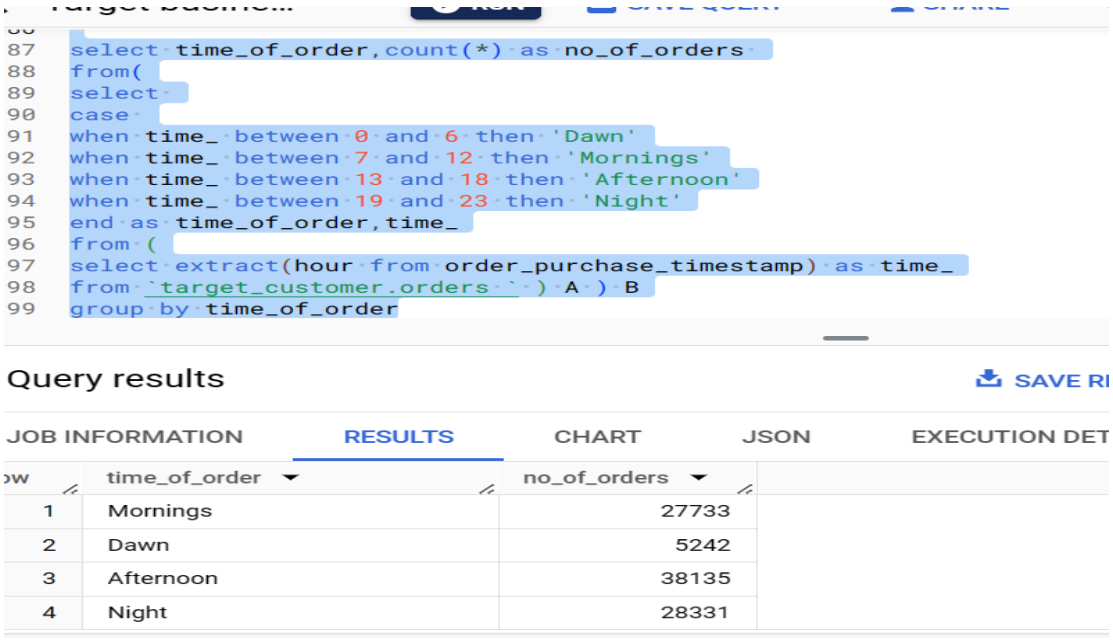
Insights: This can help to find the minimum order placed and maximum orders placed in a month and also the increase in the no of orders placed by the customers, also how many new customers are joined the e-commerce to order products.

Recommendations: Create awareness programmes like advertisements, local sponsorship, digital ads for new customer to login and purchase products.

Providing discount for first purchase for new customers and on board a greater number of vendors to sell their products on company's e-commerce website.

2.3) 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
2.3) Answer
Query :

```
select time_of_order,count(*) as no_of_orders
from(
select
case
when time_ between 0 and 6 then 'Dawn'
when time_ between 7 and 12 then 'Mornings'
when time_ between 13 and 18 then 'Afternoon'
when time_ between 19 and 23 then 'Night'
end as time_of_order,time_
from (
select extract(hour from order_purchase_timestamp) as time_
from `target_customer.orders ` ) A ) B
group by time_of_order
```



Row	time_of_order	no_of_orders
1	Mornings	27733
2	Dawn	5242
3	Afternoon	38135
4	Night	28331

Insights: The result shows that the people of Brazil purchase during afternoon followed by Night, Mornings and Dawn. So, it helps us to focus on availability, scalability of the website and to access it with out any interruptions and down time. Most of the customers are free during afternoon and night so delivery of products should be around this time period.

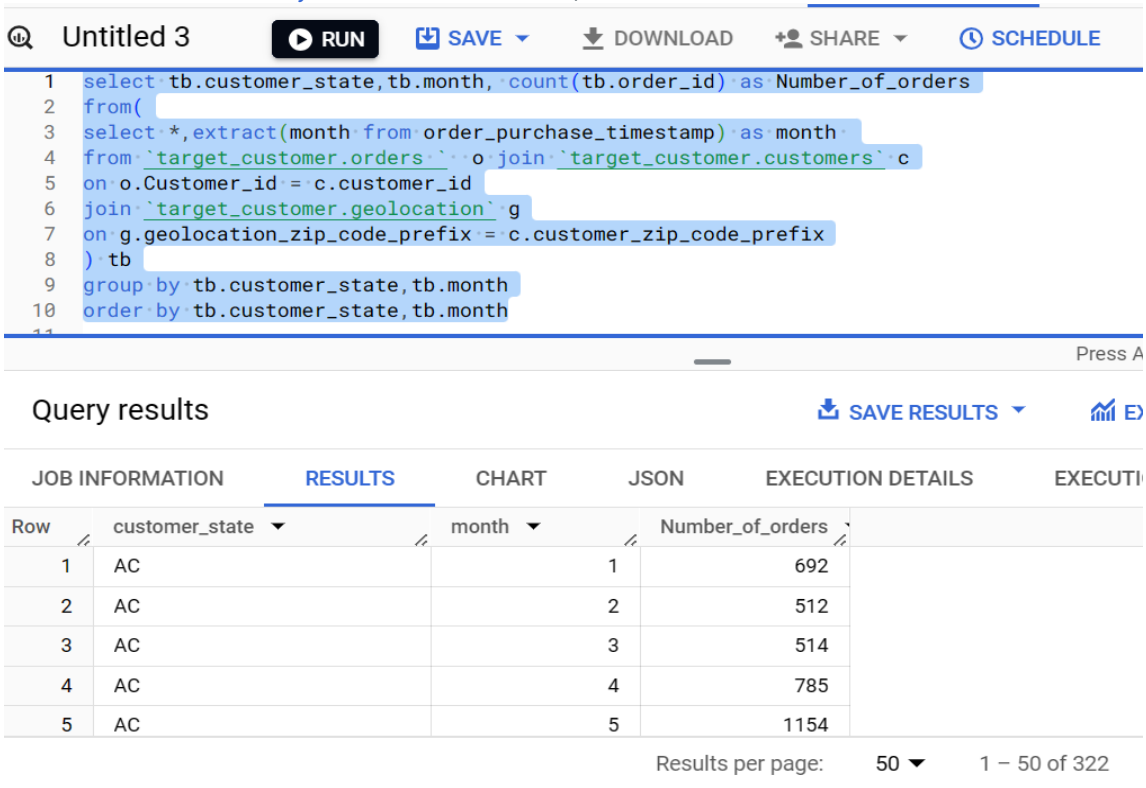
Recommendations: To increase the sales, offer can be announced during afternoon to mid night.
SMS related messages can be sent to customer during this time period for any announcements.

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

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

3.1) Answer Query :

```
select tb.customer_state,tb.month, count(tb.order_id) as
Number_of_orders
from(
select *,extract(month from order_purchase_timestamp) as month
from `target_customer.orders `  o join `target_customer.customers` c
on o.Customer_id = c.customer_id
join `target_customer.geolocation` g
on g.geolocation_zip_code_prefix = c.customer_zip_code_prefix
) tb
group by tb.customer_state,tb.month
order by tb.customer_state,tb.month
```



Insights : For each state, we can observe the number of orders placed by customer on monthly basis. With min aggregate function I found that only 49 orders received from AM state during October month. With max, it is found that 660765 orders received from SP state during August. This helps us to find the customer purchasing behaviour and how many new customers have ordered on monthly basis.

Recommendation : we can provide a standard additional discount for first order so it will help to encourage people to buy products from e-commerce.

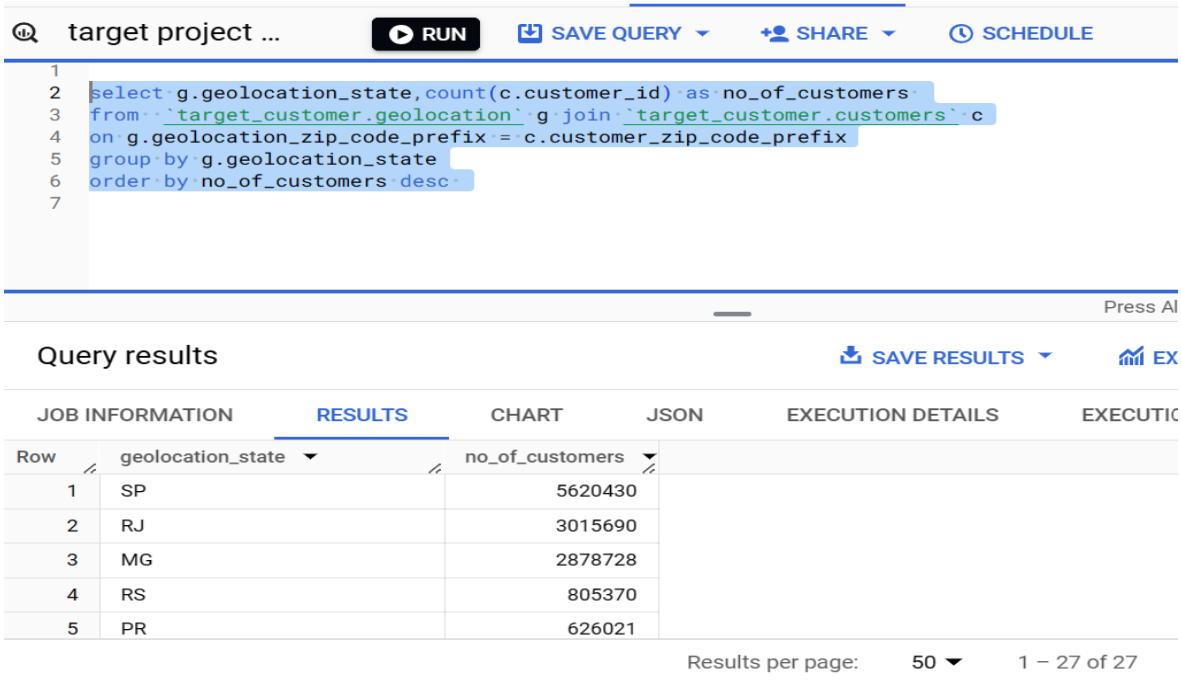
We can focus on logistics, delivery partners in the state with high orders like hiring delivery partner for fast delivery.

We can find the most ordered products so it will help us to restock the products in the location.

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

3.2) Answer
Query

```
select g.geolocation_state,count(c.customer_id) as no_of_customers
                    from  `target_customer.geolocation` g join
                    `target_customer.customers` c
                    on g.geolocation_zip_code_prefix =
                    c.customer_zip_code_prefix
                    group by g.geolocation_state
                    order by no_of_customers desc
```



Insights : The highest number of customers are from the state SP with fifty-six lakh twenty thousand four thirty. The lowest number of customers are from the state RR with two thousand eight seven.

Recommendations: For the state holding highest number of customers, we need to focus on customer retention liking better delivery experience, increase customer support to resolve issues as quickly, creating necessary infrastructure facility in the ware-house in the state.

For the state with lowest number of customers, the marketing and branding department has to take concern step to reach the customer. Getting feedback of existing customer to understand user experience and improving on it. Organise campaigns to create awareness about the company and sponsor the local events in crowded areas like malls, markets areas provide them with coupons for their first purchases. This might help to increase the customer base in the states having a smaller number of the customers.

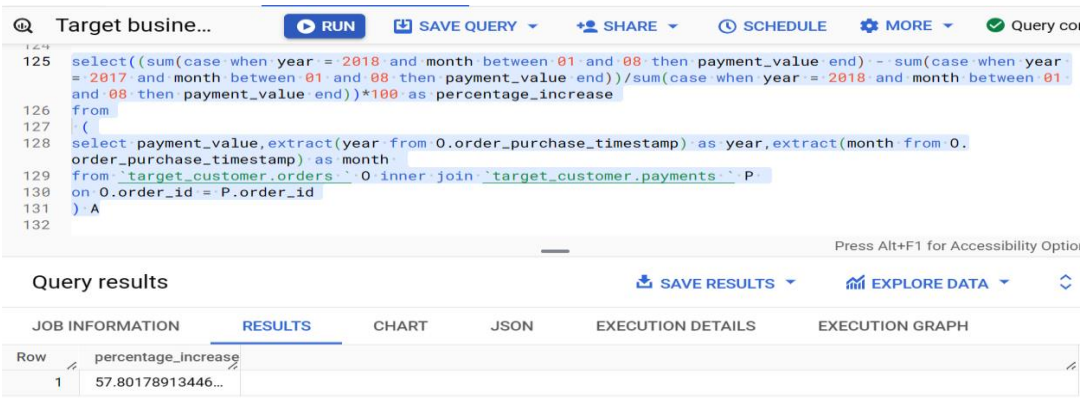
4.Impact on Economy: Analyze the money movement by e-commerce by looking at order prices, freight and others.

1. Get the % increase in the cost of orders from year 2017 to 2018 (include months between Jan to Aug only).
   You can use the "payment_value" column in the payments table to get the cost of orders.

4.1) answer

Query:
```
select((sum(case when year = 2018 and month between 01 and 08 then
payment_value end) - sum(case when year = 2017 and month between 01 and 08
then payment_value end))/sum(case when year = 2018 and month between 01 and
08 then payment_value end))*100 as percentage
from
 (
select payment_value,extract(year from O.order_purchase_timestamp) as
year,extract(month from O.order_purchase_timestamp) as month
from `target_customer.orders ` O inner join `target_customer.payments ` P
on O.order_id = P.order_id
) A
```

Result :



Insights : There is a 58-percentage increase in cost of orders which is positive development. This shows the order value placed by the customers is high in 2018 when compared to 2017(Jan to Aug)

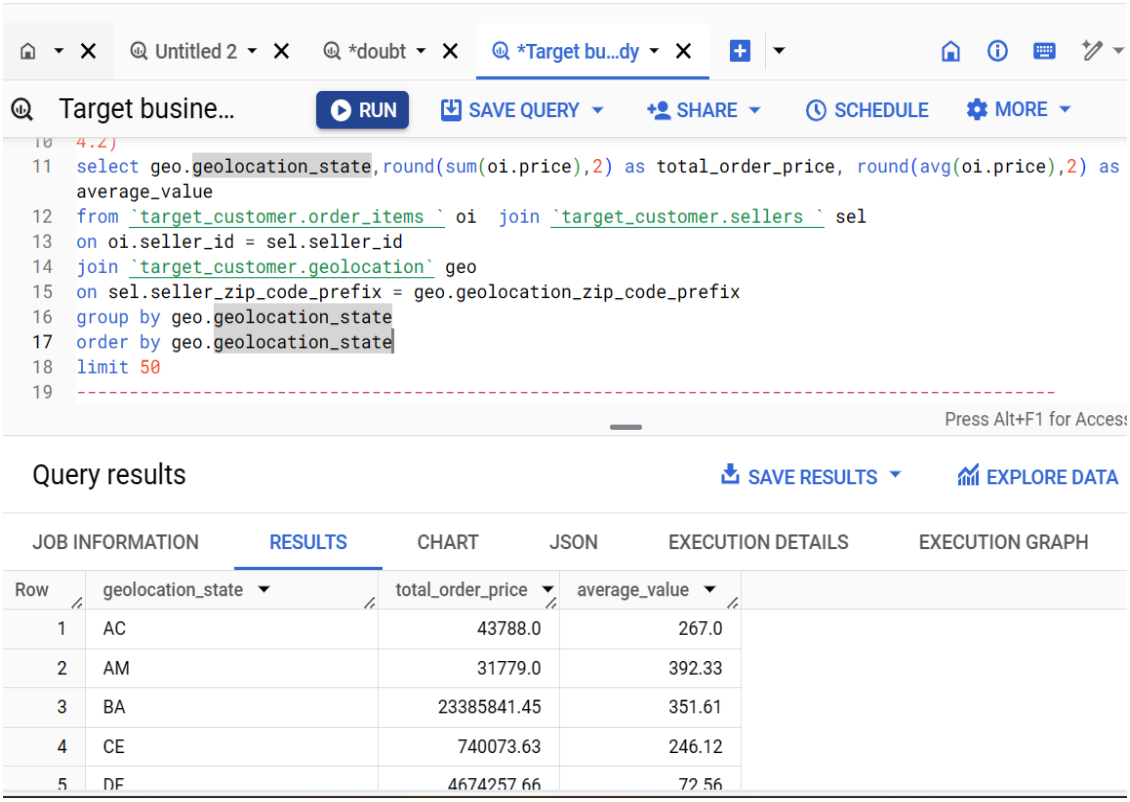
Recommendation: We can further investigate the frequent orders placed by the customer with high value so to increase the availability of the products from vendors.

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

4.2) answer

Query :

```
select geo.geolocation_state,sum(oi.price) as total_order_price,
avg(oi.price) as average_value
from `target_customer.order_items ` oi  join `target_customer.sellers ` sel
on oi.seller_id = sel.seller_id
join `target_customer.geolocation` geo
on sel.seller_zip_code_prefix = geo.geolocation_zip_code_prefix
group by geo.geolocation_state
order by geo.geolocation_state
limit 50
```



Row	geolocation_state	total_order_price	average_value
1	AC	43788.0	267.0
2	AM	31779.0	392.33
3	BA	23385841.45	351.61
4	CE	740073.63	246.12
5	DF	4674257.66	72.56

Insights : I could observer that total order price of each state give us the information about the total amount spent by customer on products by this we can get customer spending cost by each state where it will help to segregate us the high-capacity spending customers by each state. The average value column tells that at least spending of customers for any order.

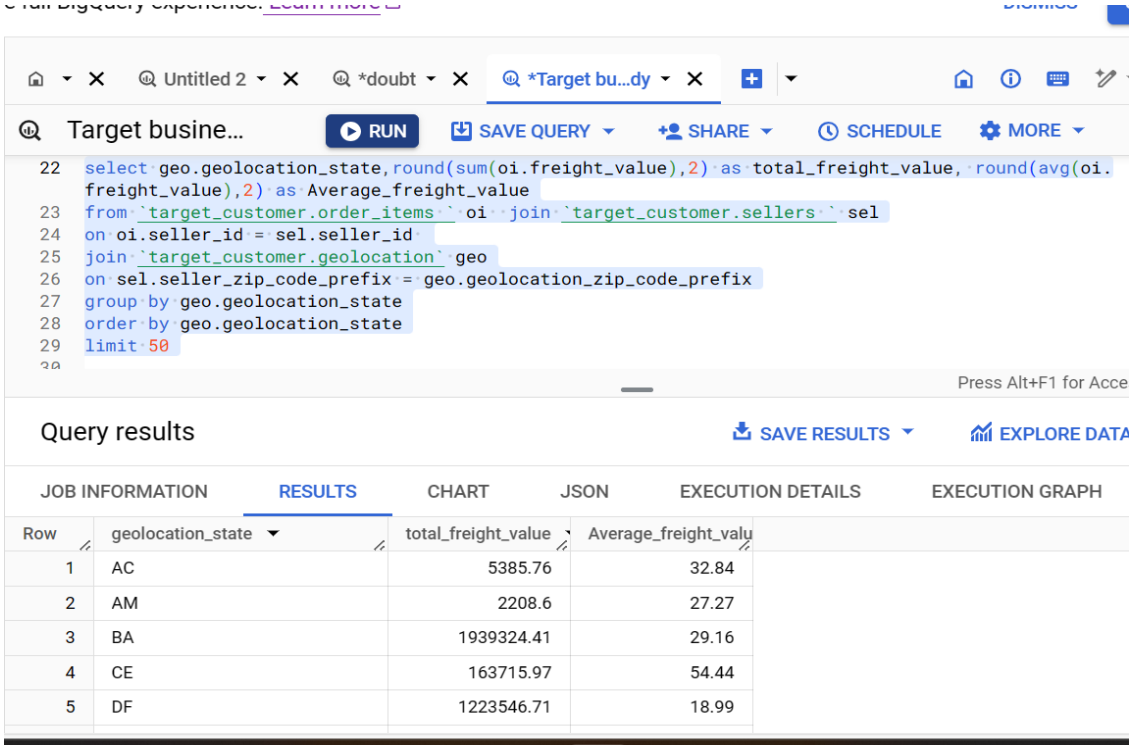
Recommendation : Based on the insights, we can detect the major sales in particular state. This helps us get the revenue information.

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

4.3) answer

Query

```
 select geo.geolocation_state,round(sum(oi.freight_value),2) as
total_freight_value, round(avg(oi.freight_value),2) as Average_freight_value
from `target_customer.order_items ` oi  join `target_customer.sellers ` sel
on oi.seller_id = sel.seller_id
join `target_customer.geolocation` geo
on sel.seller_zip_code_prefix = geo.geolocation_zip_code_prefix
group by geo.geolocation_state
order by geo.geolocation_state
limit 50
```



Row	geolocation_state	total_freight_value	Average_freight_valu
1	AC	5385.76	32.84
2	AM	2208.6	27.27
3	BA	1939324.41	29.16
4	CE	163715.97	54.44
5	DF	1223546.71	18.99

Insights : The total freight value cost indicates the total delivery cost for each which basically means that one among the expenditure cost to sell the products and average freight value gives us the at least amount incurred in the logistics

Recommendations: We can create a limit to no of orders placed eligible for free delivery to customers.

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

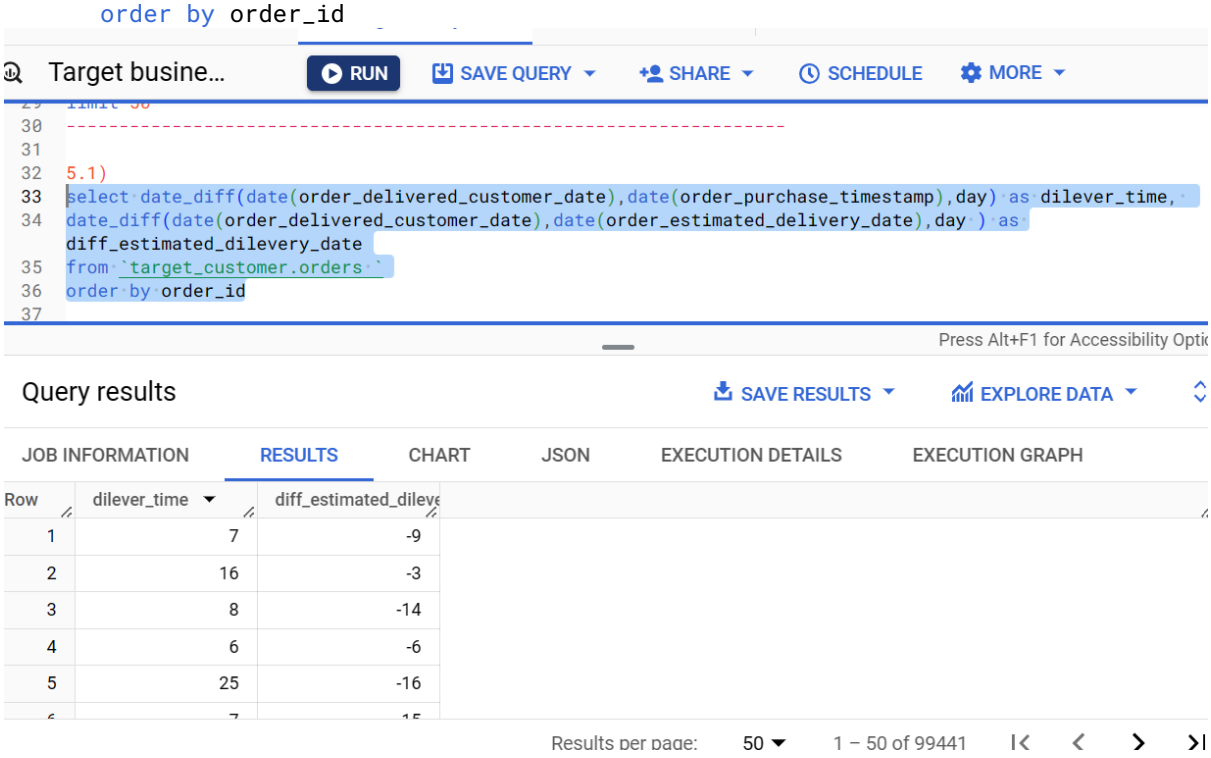
1.Find the no. of days taken to deliver each order from the order's purchase date as delivery time.
Also, calculate the difference (in days) between the estimated & actual delivery date of an order.
Do this in a single query.
You can calculate the delivery time and the difference between the estimated & actual delivery date using the given formula:

- **time_to_deliver** = order_delivered_customer_date - order_purchase_timestamp
- **diff_estimated_delivery** = order_delivered_customer_date - order_estimated_delivery_date

5.1)
Answer

Query

```
select
date_diff(date(order_delivered_customer_date),date(order_purchase_timestamp)
,day) as dilever_time,
date_diff(date(order_delivered_customer_date),date(order_estimated_delivery_
date),day ) as diff_estimated_dilevery_date
from `target_customer.orders `
order by order_id
```



Insights: The time taken to delivery a product form the date of order will help us analyse the logistics cost incurred for every order. It will help to send the correct information about the delivery of the product through SMS and email.

Recommendations : Make necessary steps to speed the delivery by hiring multiple local delivery partners of the areas.

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

5.2) Answer

Query :

```
select geo.geolocation_state,round(avg(oi.freight_value),2) as
average_freight_value
from `target_customer.order_items ` oi  join `target_customer.sellers ` sel
on oi.seller_id = sel.seller_id
join `target_customer.geolocation` geo
on sel.seller_zip_code_prefix = geo.geolocation_zip_code_prefix
group by geo.geolocation_state
order by average_freight_value  desc
limit 5
```

```
5.2)
select geo.geolocation_state,round(avg(oi.freight_value),2) as average_freight_value
from `target_customer.order_items ` oi  join `target_customer.sellers ` sel
on oi.seller_id = sel.seller_id
join `target_customer.geolocation` geo
on sel.seller_zip_code_prefix = geo.geolocation_zip_code_prefix
group by geo.geolocation_state
order by average_freight_value  desc
limit 5
```

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Query results SAVE RESULTS EX

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	geolocation_state	average_freight_valu
1	CE	54.44
2	RO	50.32
3	PI	36.94
4	PB	34.69
5	AC	32.84

5.2) answer lowest average freight value

```
select geo.geolocation_state,round(avg(oi.freight_value),2) as
lowest_average_freight_value
from `target_customer.order_items ` oi  join `target_customer.sellers ` sel
on oi.seller_id = sel.seller_id
join `target_customer.geolocation` geo
on sel.seller_zip_code_prefix = geo.geolocation_zip_code_prefix
group by geo.geolocation_state
order by lowest_average_freight_value asc
```

```
limit 5
```

```
select geo.geolocation_state,round(avg(oi.freight_value),2) as lowest_average_freight_value
from `target_customer.order_items ` oi join `target_customer.sellers ` sel
on oi.seller_id = sel.seller_id
join `target_customer.geolocation` geo
on sel.seller_zip_code_prefix = geo.geolocation_zip_code_prefix
group by geo.geolocation_state
order by lowest_average_freight_value asc
limit 5
```

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Query results

SAVE RESULTS | EXPLORE DATA

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

	geolocation_state	lowest_average_freight_value
1	RN	15.93
2	SP	18.44
3	RJ	18.93
4	DF	18.99
5	PR	22.11

Job history

Insights: The highest average freight value state is CE with 54.44 and the lowest average freight value state is RN with 15.93.

Recommendation: Carefully analyse the high freight value customers and create subscription model to avail it to reduce the transportation cost entirely on the company .Keep a minimum order value to reduce the cost of the delivery from the company side.

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

Query:

```
select
C.customer_state,avg(date_diff(date(order_delivered_customer_date),date(orde
r_purchase_timestamp),day)) as average_deliver_time
from `target_customer.orders ` o inner join `target_customer.customers`
C
on o.customer_id = C.customer_id
group by C.customer_state
order by average_deliver_time desc
limit 5
```

```
5.3)
select C.customer_state,avg(date_diff(date(order_delivered_customer_date),date(order_purchase_timestamp),
day)) as average_deliver_time
from `target_customer.orders ` o inner join `target_customer.customers` C
on o.customer_id = C.customer_id
group by C.customer_state
order by average_deliver_time desc
limit 5
```

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ery results

SAVE RESULTS | EXPLORE DATA

INFORMATION | RESULTS | CHART | JSON | EXECUTION DETAILS | EXECUTION GRAPH

customer_state	average_deliver_time
RR	29.34146341463...
AP	27.17910447761...
AM	26.35862068965...
AL	24.50125944584...
PA	23.72515856236...

```
select
C.customer_state,round(avg(date_diff(date(order_delivered_customer_date),date(order
_purchase_timestamp),day)),2) as average_deliver_time
from `target_customer.orders ` o inner join `target_customer.customers` C
on o.customer_id = C.customer_id
group by C.customer_state
order by average_deliver_time asc
limit 5
```

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```
8
9  5.3) lowest_average_time
0  select C.customer_state,round(avg(date_diff(date(order_delivered_customer_date),date
   (order_purchase_timestamp),day)),2) as average_deliver_time
1  from `target_customer.orders ` o inner join `target_customer.customers` C
2  on o.customer_id = C.customer_id
3  group by C.customer_state
4  order by average_deliver_time asc
5  limit 5
6
```

Press

uery results

SAVE RESULTS

OB INFORMATION | RESULTS | CHART | JSON | EXECUTION DETAILS | EXECU

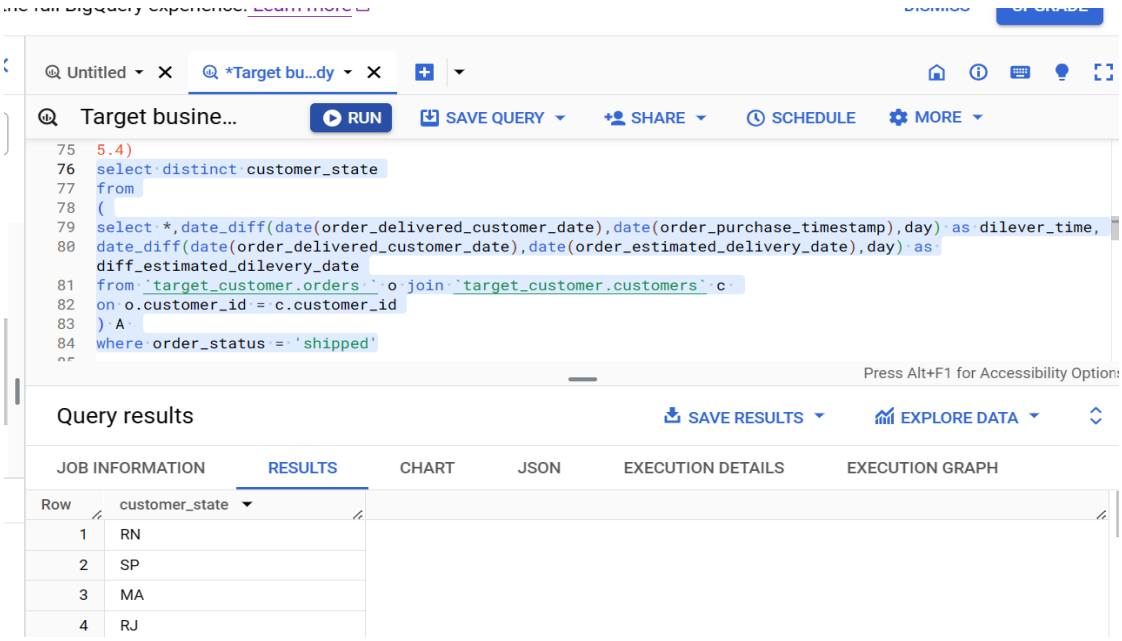
	customer_state	average_deliver_time
1	SP	8.7
2	PR	11.94
3	MG	11.95
4	DF	12.9
5	SC	14.91

Insights : The highest deliver time of the state gives us the no of days taken to deliver the product. We could focus on the measures to increase reduce the delivery time. Since delivery includes various factors so we need to discuss with the delivery vendor to improve the delivery. RR state has highest average delivery time taken and SP state has lowest average delivery time taken.
Recommendations: To engage the customer, regular updates of the order can be sent to increase the customer delivery experience**.**

5.4) Find out the top 5 states where the order delivery is really fast as compared to the estimated date of delivery.
You can use the difference between the averages of actual & estimated delivery date to figure out how fast the delivery was for each state.

5.4) Answer
Query :

```
select distinct customer_state
from
(
select
*,date_diff(date(order_delivered_customer_date),date(order_purchase_timestam
p),day) as dilever_time,
date_diff(date(order_delivered_customer_date),date(order_estimated_delivery_
date),day) as diff_estimated_dilevery_date
from `target_customer.orders ` o join `target_customer.customers` c
on o.customer_id = c.customer_id
) A
where order_status = 'shipped'
```

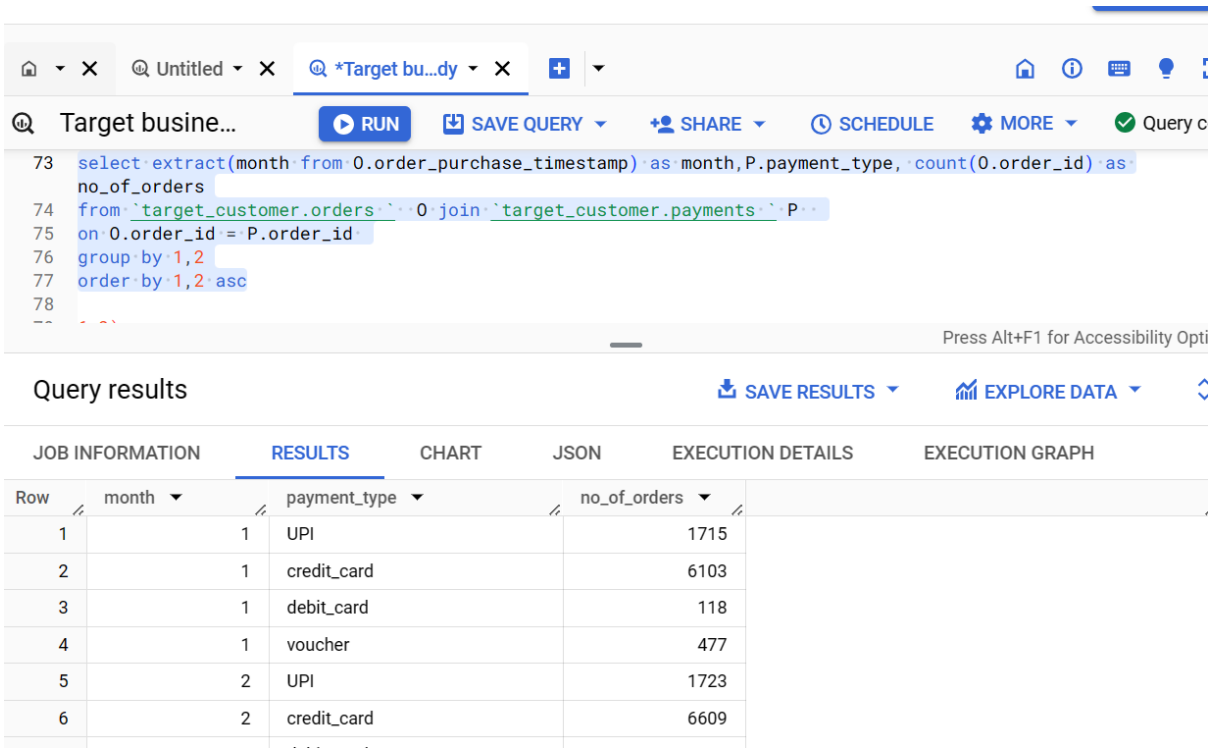


Insights : The top five state with fastest delivery than estimated delivery are RN,SP,MA,RJ.BA. The fast delivery than estimated delivery shows that the availability of the products in the near by ware house are high.

6.Analysis based on the payments:

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

```
select extract(month from O.order_purchase_timestamp) as month,P.payment_type,
count(O.order_id) as no_of_orders
from `target_customer.orders `  O join `target_customer.payments ` P
on O.order_id = P.order_id
group by 1,2
order by 1,2 asc
```



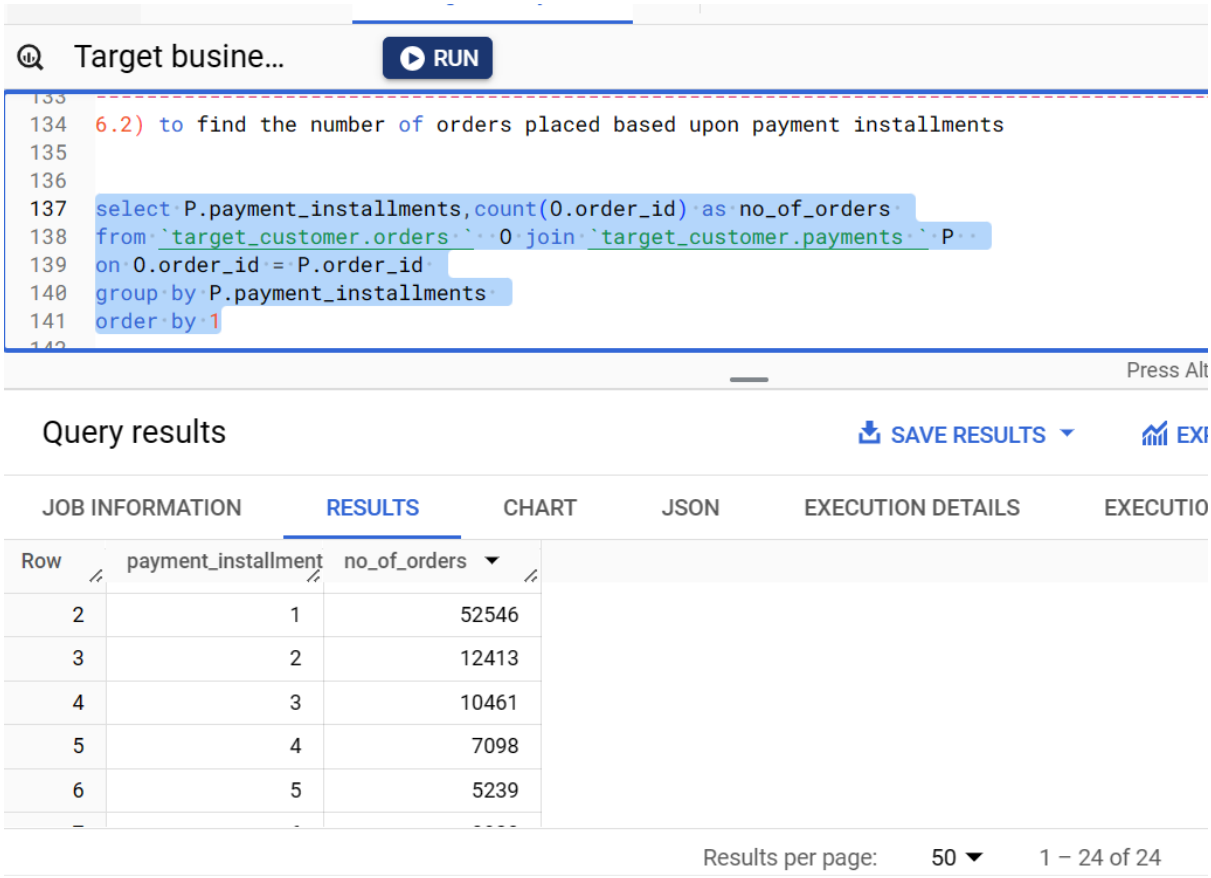
Insights : From the result, we can infer that more no of orders are placed using credit cards and there is a considerable transaction in UPI . we can understand the different payment type used by the customers and most of them are prepaid.

Recommendations:

1) Tie up with the banks to issue of credit card and offer some discount for the customer to encourage easy purchase.
2) To maintain the proper transaction history to help return the refund to the customers in case of return.
3) Since it is financial data, high data security must be required and follow regulations set by financial institution.

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

```
select P.payment_installments,count(O.order_id) as no_of_orders
from `target_customer.orders `  O join `target_customer.payments ` P
on O.order_id = P.order_id
group by P.payment_installments
order by 1
```



Insights: No of orders placed purchased by the customers using EMI options. Most of the product value are paid within three months of purchase. Since monthly instalments are carried out, we must follow SOP adherence to banks.

Recommendations: Since customers use various banks, we need to have multiple banks onboard to provide necessary financial services to the customers.
Access management and Authentication should be strict to avoid any discrepancy.