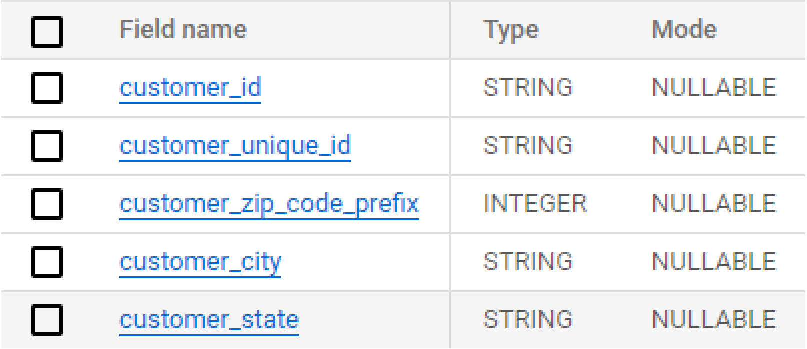
Target Business Case - SQL

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

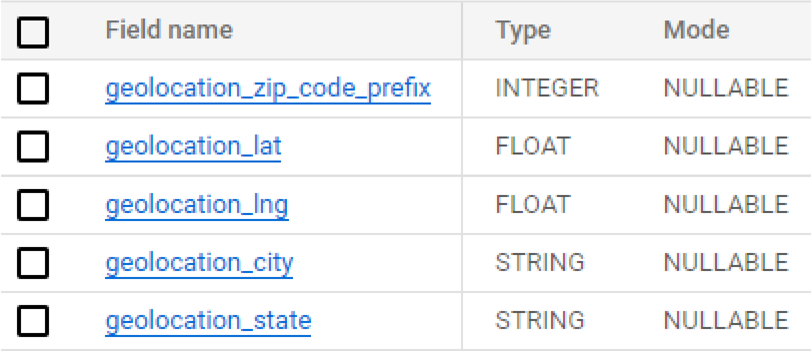
a. Data type of columns in a table
– We Used This query(SELECT COLUMN_NAME, DATA_TYPE
FROM Business.INFORMATION_SCHEMA.COLUMNS
WHERE TABLE_NAME = ‘customers’)

Customers:



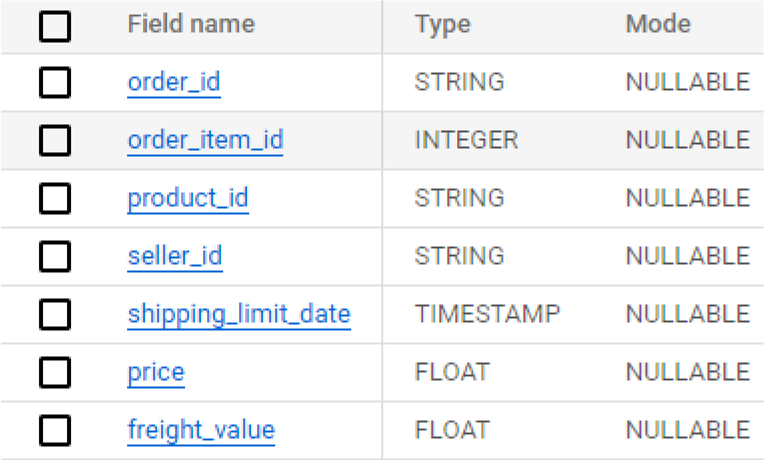
□	Field name	Type	Mode
□	customer_id	STRING	NULLABLE
□	customer_unique_id	STRING	NULLABLE
□	customer_zip_code_prefix	INTEGER	NULLABLE
□	customer_city	STRING	NULLABLE
□	customer_state	STRING	NULLABLE

Geolocation:



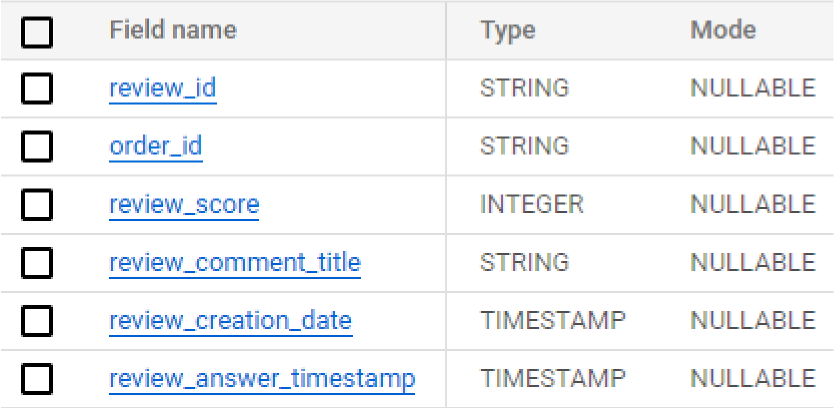
□	Field name	Type	Mode
□	geolocation_zip_code_prefix	INTEGER	NULLABLE
□	geolocation_lat	FLOAT	NULLABLE
□	geolocation_lng	FLOAT	NULLABLE
□	geolocation_city	STRING	NULLABLE
□	geolocation_state	STRING	NULLABLE

Order_items:



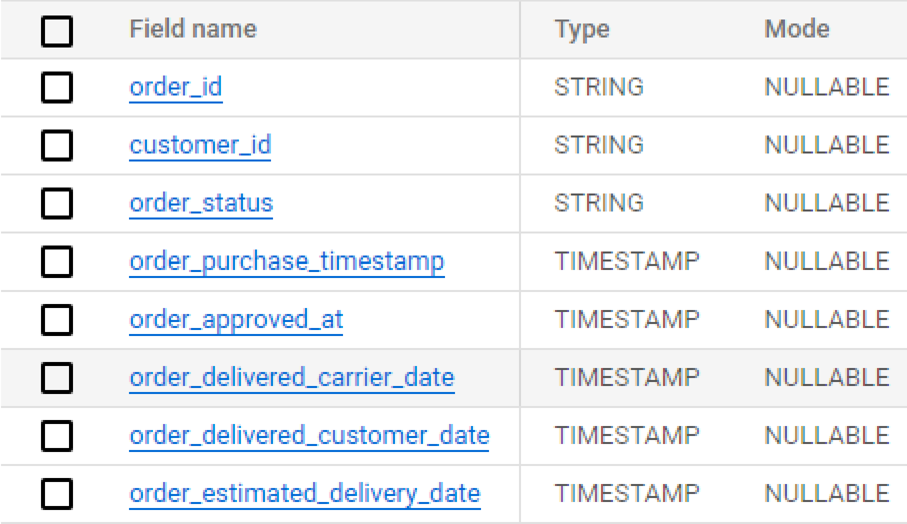
□	Field name	Type	Mode
□	order_id	STRING	NULLABLE
□	order_item_id	INTEGER	NULLABLE
□	product_id	STRING	NULLABLE
□	seller_id	STRING	NULLABLE
□	shipping_limit_date	TIMESTAMP	NULLABLE
□	price	FLOAT	NULLABLE
□	freight_value	FLOAT	NULLABLE

Order_reviews:



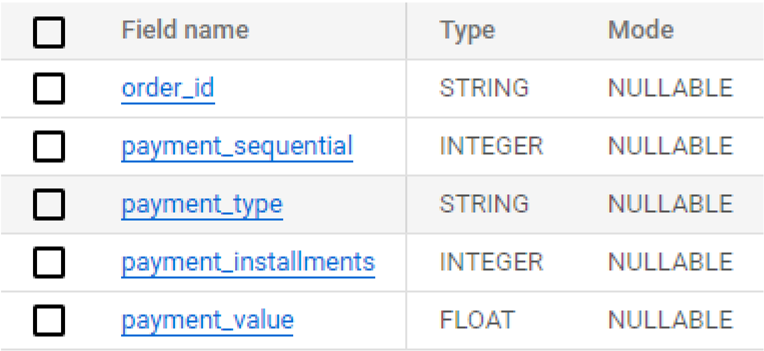
□	Field name	Type	Mode
□	review_id	STRING	NULLABLE
□	order_id	STRING	NULLABLE
□	review_score	INTEGER	NULLABLE
□	review_comment_title	STRING	NULLABLE
□	review_creation_date	TIMESTAMP	NULLABLE
□	review_answer_timestamp	TIMESTAMP	NULLABLE

Orders:



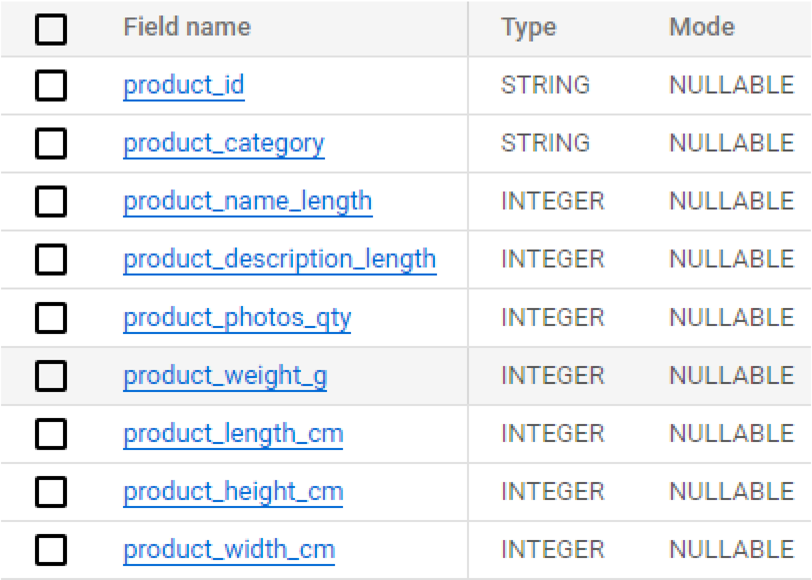
□	Field name	Type	Mode
□	order_id	STRING	NULLABLE
□	customer_id	STRING	NULLABLE
□	order_status	STRING	NULLABLE
□	order_purchase_timestamp	TIMESTAMP	NULLABLE
□	order_approved_at	TIMESTAMP	NULLABLE
□	order_delivered_carrier_date	TIMESTAMP	NULLABLE
□	order_delivered_customer_date	TIMESTAMP	NULLABLE
□	order_estimated_delivery_date	TIMESTAMP	NULLABLE

Payments:



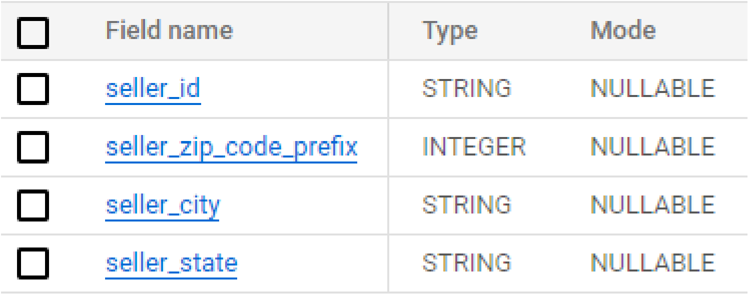
□	Field name	Type	Mode
□	order_id	STRING	NULLABLE
□	payment_sequential	INTEGER	NULLABLE
□	payment_type	STRING	NULLABLE
□	payment_installments	INTEGER	NULLABLE
□	payment_value	FLOAT	NULLABLE

Products:



□	Field name	Type	Mode
□	product_id	STRING	NULLABLE
□	product_category	STRING	NULLABLE
□	product_name_length	INTEGER	NULLABLE
□	product_description_length	INTEGER	NULLABLE
□	product_photos_qty	INTEGER	NULLABLE
□	product_weight_g	INTEGER	NULLABLE
□	product_length_cm	INTEGER	NULLABLE
□	product_height_cm	INTEGER	NULLABLE
□	product_width_cm	INTEGER	NULLABLE

Seller:



□	Field name	Type	Mode
□	seller_id	STRING	NULLABLE
□	seller_zip_code_prefix	INTEGER	NULLABLE
□	seller_city	STRING	NULLABLE
□	seller_state	STRING	NULLABLE

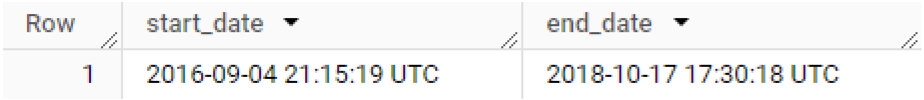
Insights:

- The database schema for different tables here tells about the relation between different tables and what all are the possible primary key and foreign keys.

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

```
SELECT
```

```
MIN(order_purchase_timestamp) AS start_date,
MAX(order_purchase_timestamp) AS end_date
FROM `target-410421.Target_dataset.orders`
```



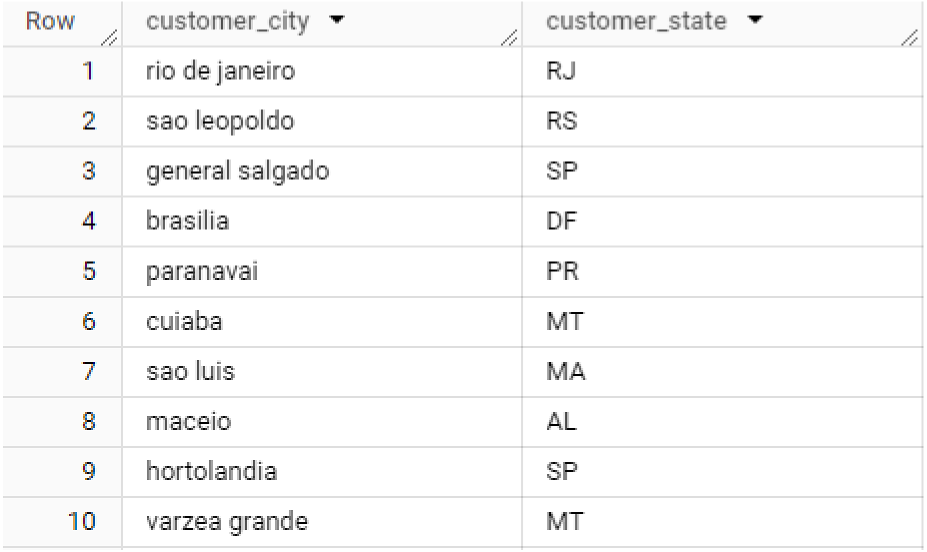
Row	start_date	end_date
1	2016-09-04 21:15:19 UTC	2018-10-17 17:30:18 UTC

Insights:

- If we take the difference between the end date and the start date we get the total time or period between them.

3. Count the Cities and states of customers who ordered during the given period.

```
SELECT DISTINCT
customer_city,customer_state
FROM`target-410421.Target_dataset.customers` AS c
JOIN`target-410421.Target_dataset.orders` AS o
ON c.customer_id=o.customer_id
```



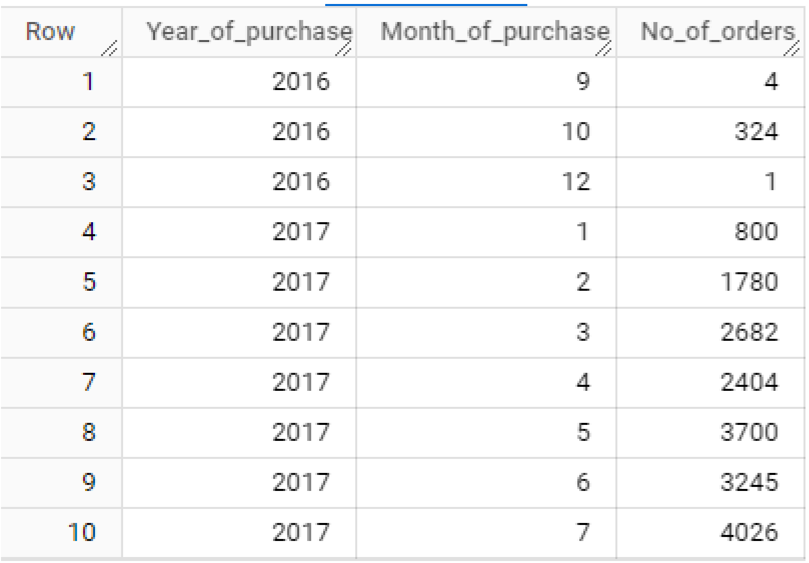
Row	customer_city	customer_state
1	rio de janeiro	RJ
2	sao leopoldo	RS
3	general salgado	SP
4	brasilia	DF
5	paranavai	PR
6	cuiaba	MT
7	sao luis	MA
8	maceio	AL
9	hortolandia	SP
10	varzea grande	MT

Q2) In-depth exploration:

2.1)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?

```
SELECT
```

```
EXTRACT(YEAR FROM order_purchase_timestamp) as Year_of_purchase,
EXTRACT(MONTH FROM order_purchase_timestamp) as
Month_of_purchase,
COUNT(order_id) as No_of_orders,
FROM `target-410421.Target_dataset.orders`
Group by 1,2
Order by 1,2
```



Row	Year_of_purchase	Month_of_purchase	No_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
9	2017	6	3245
10	2017	7	4026

Year trend:

```
SELECT
EXTRACT(YEAR FROM order_purchase_timestamp) as Year_of_purchase,
COUNT(order_id) as No_of_orders
FROM `target-410421.Target_dataset.orders`
Group by 1
Order by 1
Monthly trend:
SELECT
EXTRACT(MONTH FROM order_purchase_timestamp) as
Month_of_purchase,
COUNT(order_id) as No_of_orders
FROM `target-410421.Target_dataset.orders`
Group by 1
Order by 1
```

Insights:

Yearly trend: Over the years from 2016 to 2018 we can observe a significant increase in the number of orders, which shows a positive sign that people are ordering more from the e-commerce sites and it is rapidly gaining some popularity.

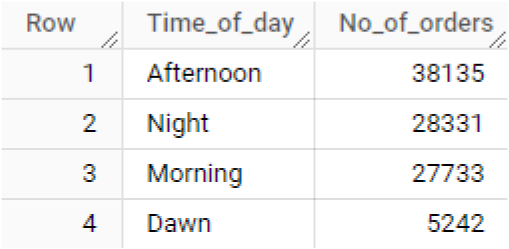
Monthly Trend: From the query mentioned above we observe that from March to August we have a relatively higher number of orders compared to the rest of the months. The highest number of orders Is in August which can be due to the seasonal pattern.

Here in this month (August - autumn and winter) people from prefer to shop from online rather than physically visit. And other reasons can we in this month we have high discounts and sales in online platform due to holiday, festivals. etc.

In months from September to January e-commerce activity is low due to seasonal patterns.

2. 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

```
SELECT
CASE
WHEN EXTRACT(hour FROM timestamp(order_purchase_timestamp)) BETWEEN 0 AND 6 THEN
'Dawn'
WHEN EXTRACT(hour FROM timestamp(order_purchase_timestamp)) BETWEEN 7 AND 12 THEN
'Morning'
WHEN EXTRACT(hour FROM timestamp(order_purchase_timestamp)) BETWEEN 13 AND 18 THEN
'Afternoon'
WHEN EXTRACT(hour FROM timestamp(order_purchase_timestamp)) BETWEEN 19 AND 23 THEN
'Night'
END AS Time_of_day,
COUNT(DISTINCT order_id) AS No_of_orders
 FROM `target-410421.Target_dataset.orders`
 GROUP BY 1
 ORDER BY 2 DESC;
```



Row	Time_of_day	No_of_orders
1	Afternoon	38135
2	Night	28331
3	Morning	27733
4	Dawn	5242

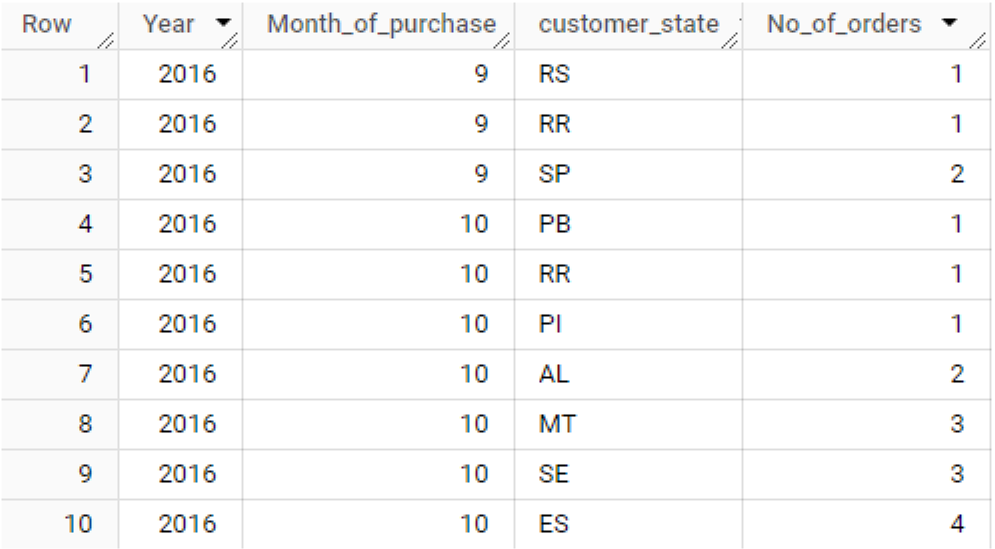
Insights :

- From the above table, it is evident that the customers is mainly active in the afternoon and at night that corresponds to work hours, and free time after work hours.
- Thus, the company should focus on these hours because it is the peak time when customers are keen to buy something.

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

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

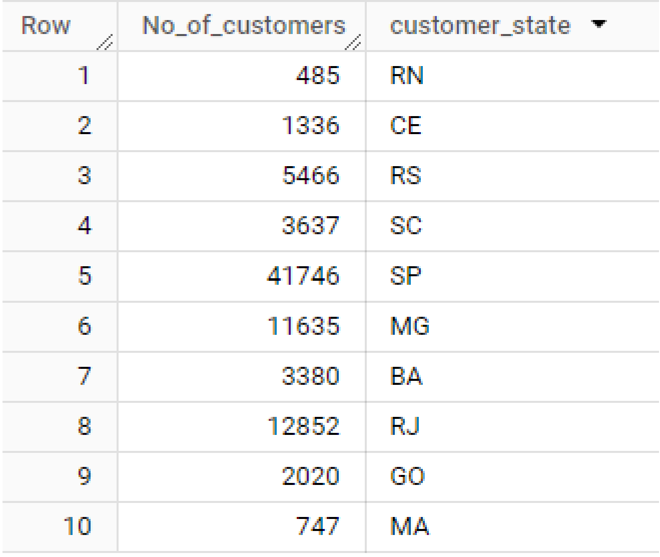
```
SELECT EXTRACT (YEAR from (o.order_purchase_timestamp)) as Year,
EXTRACT (MONTH from ( o.order_purchase_timestamp)) as Month_of_purchase,
c.customer_state,
COUNT(o.order_id) as No_of_orders
FROM `target-410421.Target_dataset.orders` o
JOIN `target-410421.Target_dataset.customers` c
ON o.customer_id = c.customer_id
Group by customer_state, Month_of_purchase, Year
Order by Year, Month_of_purchase, No_of_orders
LIMIT 10;
```



Row	Year	Month_of_purchase	customer_state	No_of_orders
1	2016	9	RS	1
2	2016	9	RR	1
3	2016	9	SP	2
4	2016	10	PB	1
5	2016	10	RR	1
6	2016	10	PI	1
7	2016	10	AL	2
8	2016	10	MT	3
9	2016	10	SE	3
10	2016	10	ES	4

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

```
SELECT
COUNT (customer_unique_id) AS No_of_customers,
customer_state
FROM `Target_dataset.customers`
GROUP BY 2
LIMIT 10;
```



Row	No_of_customers	customer_state
1	485	RN
2	1336	CE
3	5466	RS
4	3637	SC
5	41746	SP
6	11635	MG
7	3380	BA
8	12852	RJ
9	2020	GO
10	747	MA

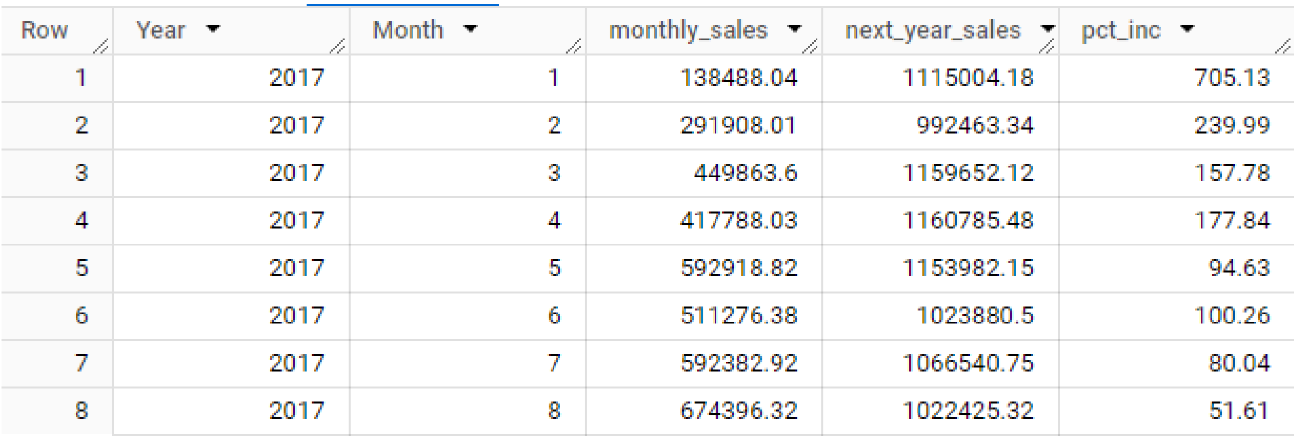
Insights:

- Some States like SP, RJ, and MG have the highest number of customers as the e-commerce presence is quite strong in these areas.
- The states of AC, AP, and RR have the lowest count and the people are not so confident in e-commerce shopping.
  -

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.

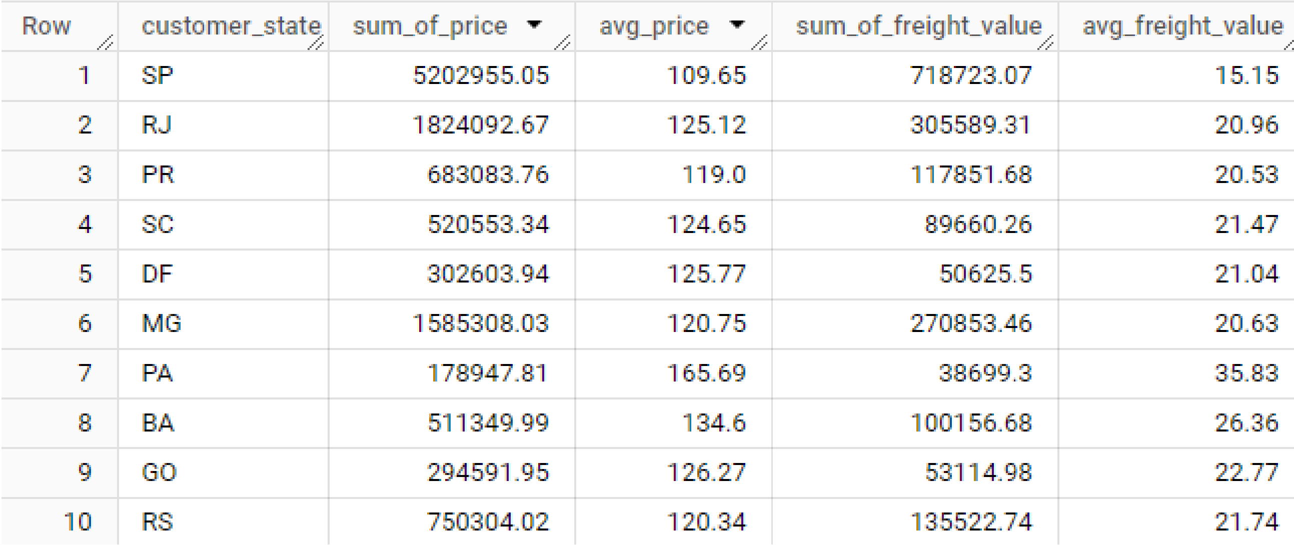
```
with cte as (
SELECT DISTINCT
EXTRACT (year from (o.order_purchase_timestamp)) as Year,
EXTRACT (month from (o.order_purchase_timestamp)) as Month,
round(SUM(p.payment_value),2) AS monthly_sales,
FROM `Target_dataset.payments` p
join `Target_dataset.orders` o on p.order_id = o.order_id
WHERE EXTRACT (year from (o.order_purchase_timestamp)) between 2017 and 2018
and EXTRACT (month from (o.order_purchase_timestamp)) between 1 and 8
group by Year, Month
order by Year, Month)
SELECT *,
LEAD (monthly_sales,8) OVER (ORDER BY cte.year, cte.Month asc) as next_year_sales,
round((LEAD (monthly_sales,8) OVER (ORDER BY cte.year, cte.Month asc) - monthly_sales)/monthly_sales*100, 2) as pct_inc
from cte
order by cte.year, cte.Month;
```



Row	Year	Month	monthly_sales	next_year_sales	pct_inc
1	2017	1	138488.04	1115004.18	705.13
2	2017	2	291908.01	992463.34	239.99
3	2017	3	449863.6	1159652.12	157.78
4	2017	4	417788.03	1160785.48	177.84
5	2017	5	592918.82	1153982.15	94.63
6	2017	6	511276.38	1023880.5	100.26
7	2017	7	592382.92	1066540.75	80.04
8	2017	8	674396.32	1022425.32	51.61

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

```
SELECT
customer_state,
ROUND(SUM(price),2) as sum_of_price,
ROUND(AVG(price),2) as avg_price,
ROUND(SUM(freight_value),2) as sum_of_freight_value,
ROUND(AVG(freight_value),2) as avg_freight_value
FROM `Target_dataset.order_items`oi
JOIN`Target_dataset.orders` o
ON oi.order_id = o.order_id
JOIN `Target_dataset.customers` c
ON o.customer_id = c.customer_id
group by customer_state
LIMIT 10;
```



Row	customer_state	sum_of_price	avg_price	sum_of_freight_value	avg_freight_value
1	SP	5202955.05	109.65	718723.07	15.15
2	RJ	1824092.67	125.12	305589.31	20.96
3	PR	683083.76	119.0	117851.68	20.53
4	SC	520553.34	124.65	89660.26	21.47
5	DF	302603.94	125.77	50625.5	21.04
6	MG	1585308.03	120.75	270853.46	20.63
7	PA	178947.81	165.69	38699.3	35.83
8	BA	511349.99	134.6	100156.68	26.36
9	GO	294591.95	126.27	53114.98	22.77
10	RS	750304.02	120.34	135522.74	21.74

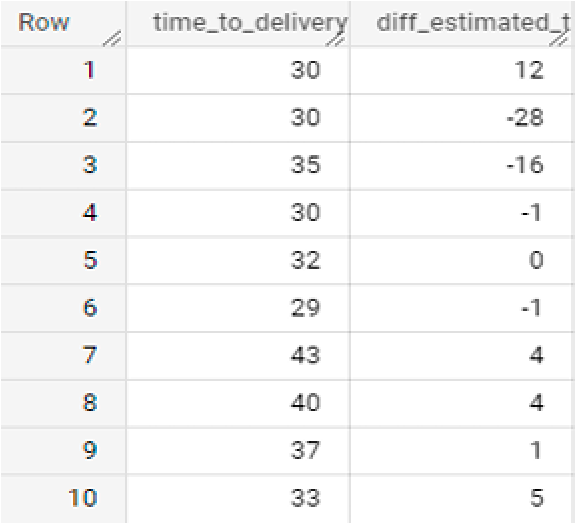
5. Analysis based on sales, freight, and delivery time.

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

```
SELECT order_id,
customer_id,
DATE_DIFF(order_estimated_delivery_date,order_purchase_timestamp, Day) AS  Estimated,
DATE_DIFF(order_delivered_customer_date, order_purchase_timestamp, Day) AS  Purchasing,
DATE_DIFF(order_estimated_delivery_date, order_delivered_customer_date, Day) AS  Delivery
FROM`Target_dataset.orders`
```

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

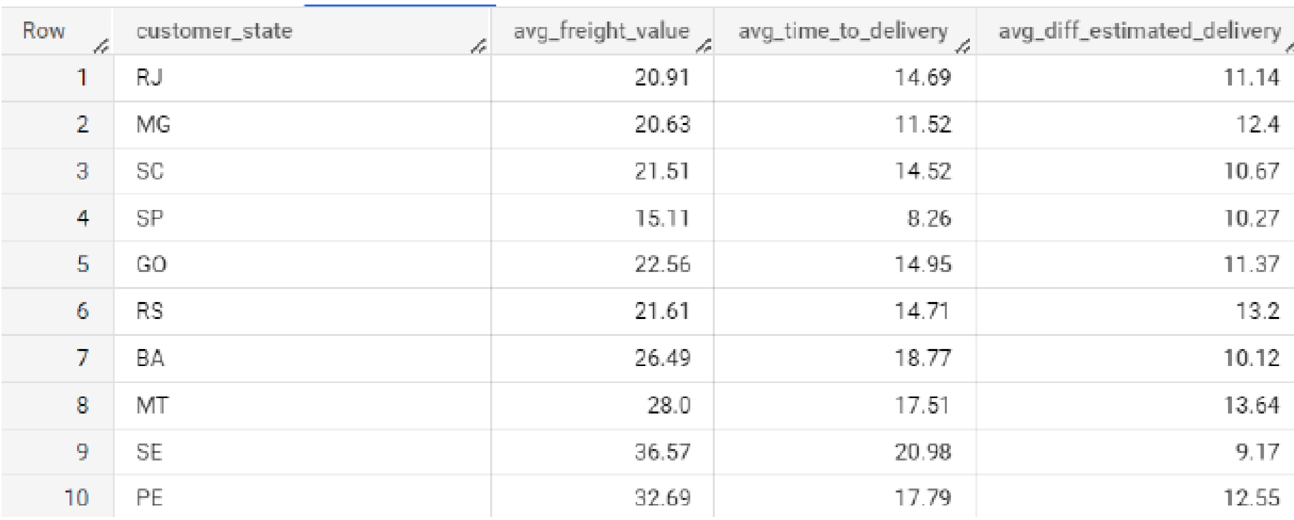
```
SELECT
date_diff(order_delivered_customer_date,order_purchase_timestamp,day) AStime_to_delivery,
date_diff(order_delivered_customer_date,order_estimated_delivery_date,day) ASdiff_estimated_time
FROM`Target_dataset.orders`
```



Row	time_to_delivery	diff_estimated_t
1	30	12
2	30	-28
3	35	-16
4	30	-1
5	32	0
6	29	-1
7	43	4
8	40	4
9	37	1
10	33	5

3. Group data by state, take mean of freight_value, time_to_delivery, Diff_estimated_delivery

```
SELECT
c.customer_state,
ROUND(AVG(oi.freight_value),2) AS avg_freight_value,
ROUND(AVG(Timestamp_diff(o.order_delivered_customer_date,o.order_p
urchase_timestamp, day)),2) AS avg_time_to_delivery,
round(avg(Timestamp_diff(o.order_estimated_delivery_date,
o.order_delivered_customer_date, day)),2) AS
avg_diff_estimated_delivery
FROM`Target_dataset.orders` o
JOIN `Target_dataset.customers` c
ON o.customer_id = c.customer_id
JOIN`Target_dataset.order_items` oi
ON o.order_id=oi.order_id
WHERE order_purchase_timestamp is not null
AND order_delivered_customer_date is not null
AND order_estimated_delivery_date is not null
GROUP BY customer_state
LIMIT10;
```

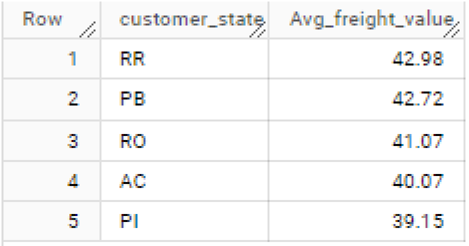


Row	customer_state	avg_freight_value	avg_time_to_delivery	avg_diff_estimated_delivery
1	RJ	20.91	14.69	11.14
2	MG	20.63	11.52	12.4
3	SC	21.51	14.52	10.67
4	SP	15.11	8.26	10.27
5	GO	22.56	14.95	11.37
6	RS	21.61	14.71	13.2
7	BA	26.49	18.77	10.12
8	MT	28.0	17.51	13.64
9	SE	36.57	20.98	9.17
10	PE	32.69	17.79	12.55

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

HIGHEST:

```
SELECT c.customer_state,
ROUND(AVG(oi.freight_value),2) AS Avg_freight_value
FROM `Target_dataset.order_items` oi
JOIN `Target_dataset.orders` o ON oi.order_id = o.order_id
JOIN `Target_dataset.customers` c ON o.customer_id = c.customer_id
GROUP BY c.customer_state
ORDER BY AVG(freight_value) DESC
LIMIT 5;
```

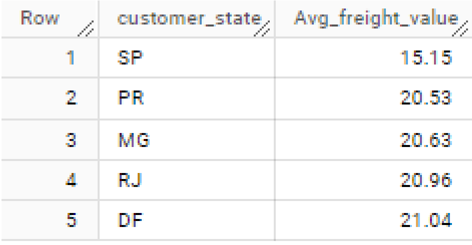


Row	customer_state	Avg_freight_value
1	RR	42.98
2	PB	42.72
3	RO	41.07
4	AC	40.07
5	PI	39.15

LOWEST:

```
SELECT c.customer_state,
ROUND(AVG(oi.freight_value),2) AS Avg_freight_value
FROM `Target_dataset.order_items` oi
JOIN `Target_dataset.orders` o ON oi.order_id = o.order_id
JOIN `Target_dataset.customers` c ON o.customer_id = c.customer_id
```

```
GROUP BY c.customer_state
ORDER BY AVG(freight_value) ASC
LIMIT 5;
```

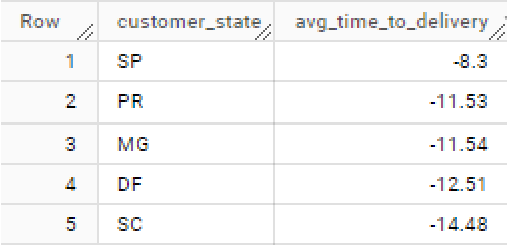


Row	customer_state	Avg_freight_value
1	SP	15.15
2	PR	20.53
3	MG	20.63
4	RJ	20.96
5	DF	21.04

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

HIGHEST:

```
SELECT
c.customer_state,
ROUND(AVG(Timestamp_diff(o.order_purchase_timestamp,o.order_delivered_customer_date, day)),2) AS avg_time_to_delivery
FROM `Target_dataset.orders` o
JOIN `Target_dataset.customers` c
ON o.customer_id = c.customer_id
GROUP  BY customer_state
ORDER BY avg_time_to_delivery DESC
LIMIT 5;
```

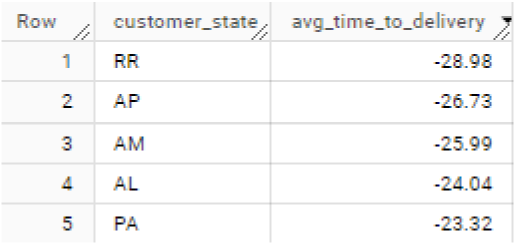


Row	customer_state	avg_time_to_delivery
1	SP	-8.3
2	PR	-11.53
3	MG	-11.54
4	DF	-12.51
5	SC	-14.48

LOWEST:

```
SELECT
c.customer_state,
ROUND(AVG(Timestamp_diff(o.order_purchase_timestamp,o.order_delivered_customer_date, day)),2) AS avg_time_to_delivery
FROM `Target_dataset.orders` o
JOIN `Target_dataset.customers` c
```

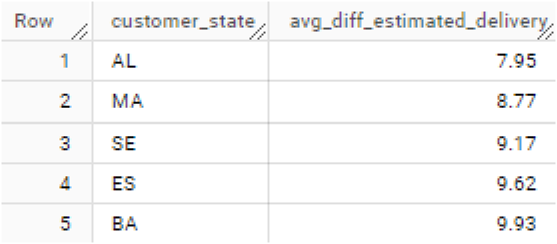
```
ON o.customer_id = c.customer_id
GROUP  BY customer_state
ORDER BY avg_time_to_delivery ASC
```



Row	customer_state	avg_time_to_delivery
1	RR	-28.98
2	AP	-26.73
3	AM	-25.99
4	AL	-24.04
5	PA	-23.32

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

```
SELECT c.customer_state,
ROUND(avg(Timestamp_diff(o.order_estimated_delivery_date,
o.order_delivered_customer_date, day)),2) as
avg_diff_estimated_delivery
FROM `Target_dataset.orders` o
JOIN`Target_dataset.customers` c
ON o.customer_id = c.customer_id
GROUP BY customer_state
ORDER BY avg_diff_estimated_delivery asc
LIMIT 5;
```

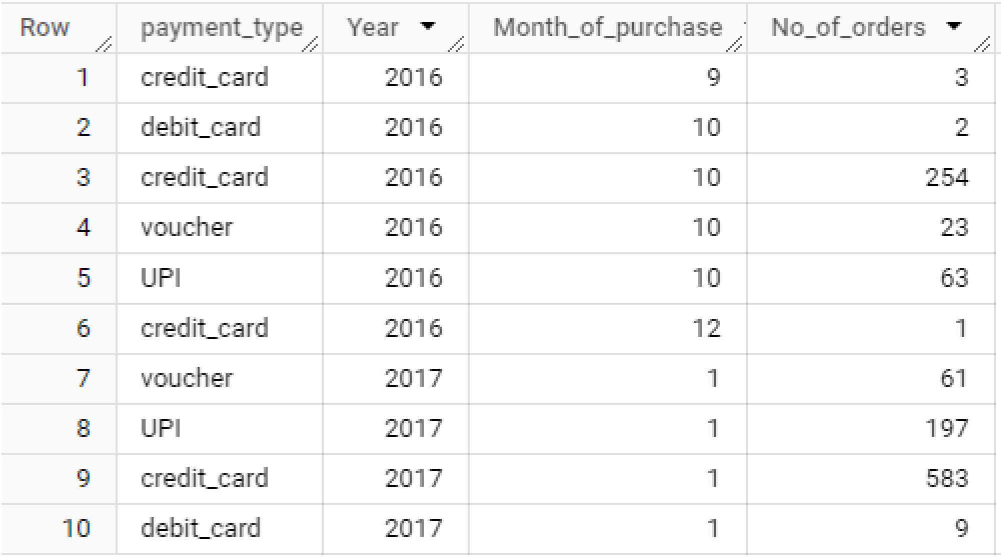


Row	customer_state	avg_diff_estimated_delivery
1	AL	7.95
2	MA	8.77
3	SE	9.17
4	ES	9.62
5	BA	9.93

6. Analysis based on the payments:

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

```
SELECT
p.payment_type,
EXTRACT (year FROM (o.order_purchase_timestamp)) as Year,
EXTRACT (month FROM (o.order_purchase_timestamp)) as Month_of_purchase,
COUNT(o.order_id) as No_of_orders
FROM `Target_dataset.payments` p
JOIN `Target_dataset.orders` o
ON p.order_id = o.order_id
group by Month_of_purchase, payment_type, Year
order by Year, Month_of_purchase
LIMIT 10;
```



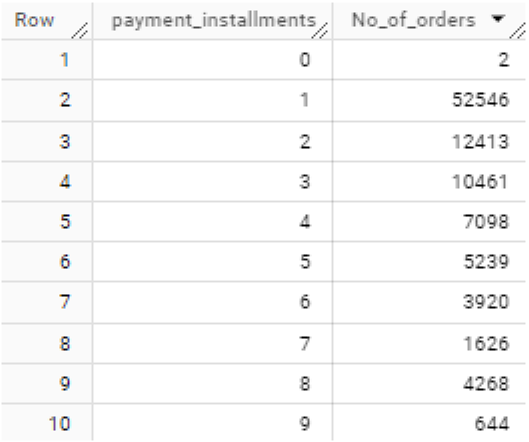
Row	payment_type	Year	Month_of_purchase	No_of_orders
1	credit_card	2016	9	3
2	debit_card	2016	10	2
3	credit_card	2016	10	254
4	voucher	2016	10	23
5	UPI	2016	10	63
6	credit_card	2016	12	1
7	voucher	2017	1	61
8	UPI	2017	1	197
9	credit_card	2017	1	583
10	debit_card	2017	1	9

Insights:

- We can observe that year by year credit card payments are increasing followed by UPI payments as it is easy and can be used for faster transactions.
- Debit card payments are not very popular as there is a very low probability that customers will use a debit card. Vouchers are increasingly used by people more and more.

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

```
SELECT
payment_installments,
COUNT(order_id) as No_of_orders
FROM `Target_dataset.payments`
GROUP BY payment_installments;
```



Row	payment_installments	No_of_orders
1	0	2
2	1	52546
3	2	12413
4	3	10461
5	4	7098
6	5	5239
7	6	3920
8	7	1626
9	8	4268
10	9	644

Insights :

- The majority share is taken by one-time payments followed by 2 installments and 3 installment payments.
- Installments 4 to 8 are considerably less as people don’t want long-term Emi.