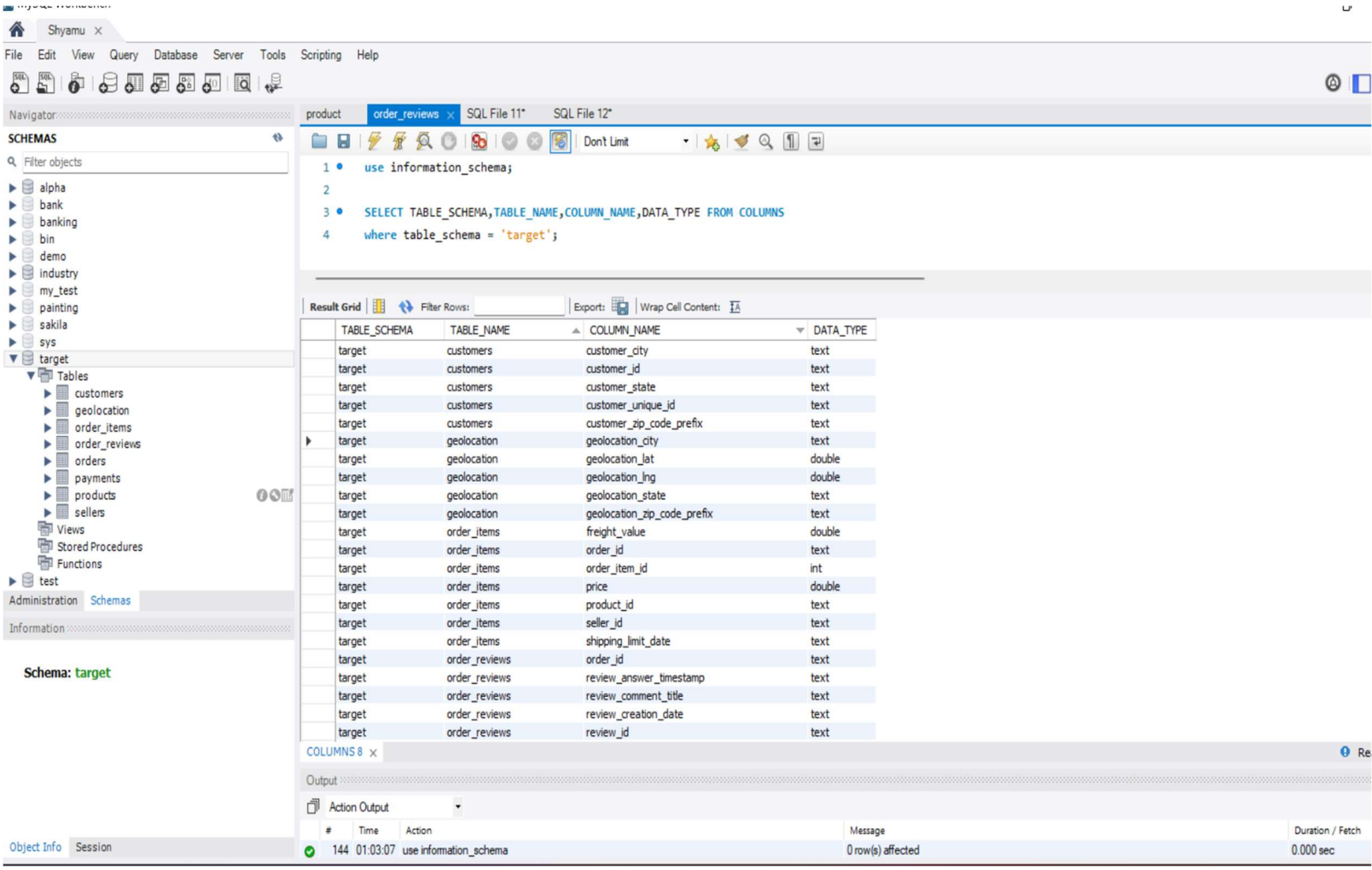
1.1 Data Types of columns in a table

```
Use information_schema;
SELECT TABLE_SCHEMA, TABLE_NAME, COLUMN_NAME, DATA_TYPE
FROM COLUMNS
WHERE TABLE_SCHEMA = 'target'
```

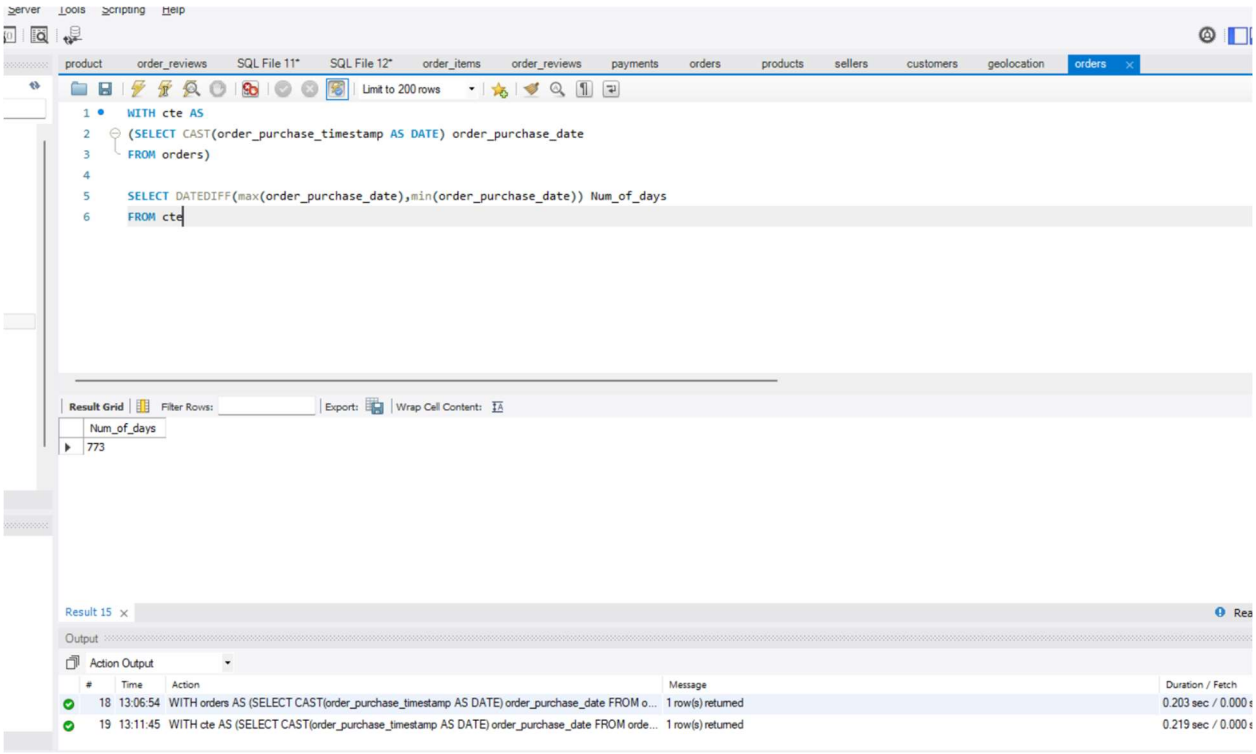
NOTE: target is name of the database where all the files are stored



1.2 Time period for which the data is given

```
WITH cte AS
```

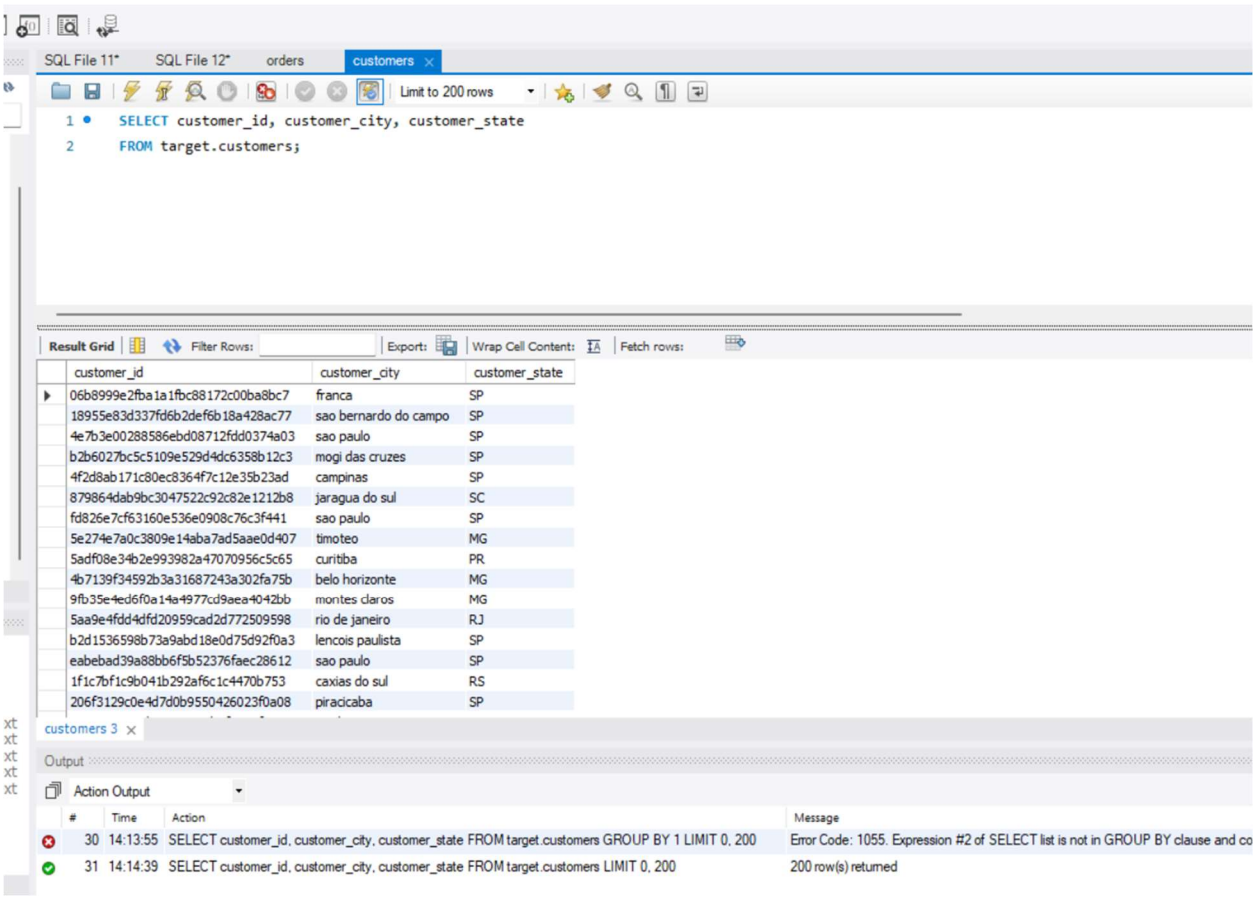
```
(SELECT CAST(order_purchase_timestamp AS DATE) order_purchase_date
FROM orders)


SELECT DATEDIFF(max(order_purchase_date),min(order_purchase_date))
Num_of_days
FROM cte
```



Finding:- From above results we can see that the data is given of nearly more than 2 years. Or more precisely of 773 days.

1.3 Cities and States of customers ordered during the given period

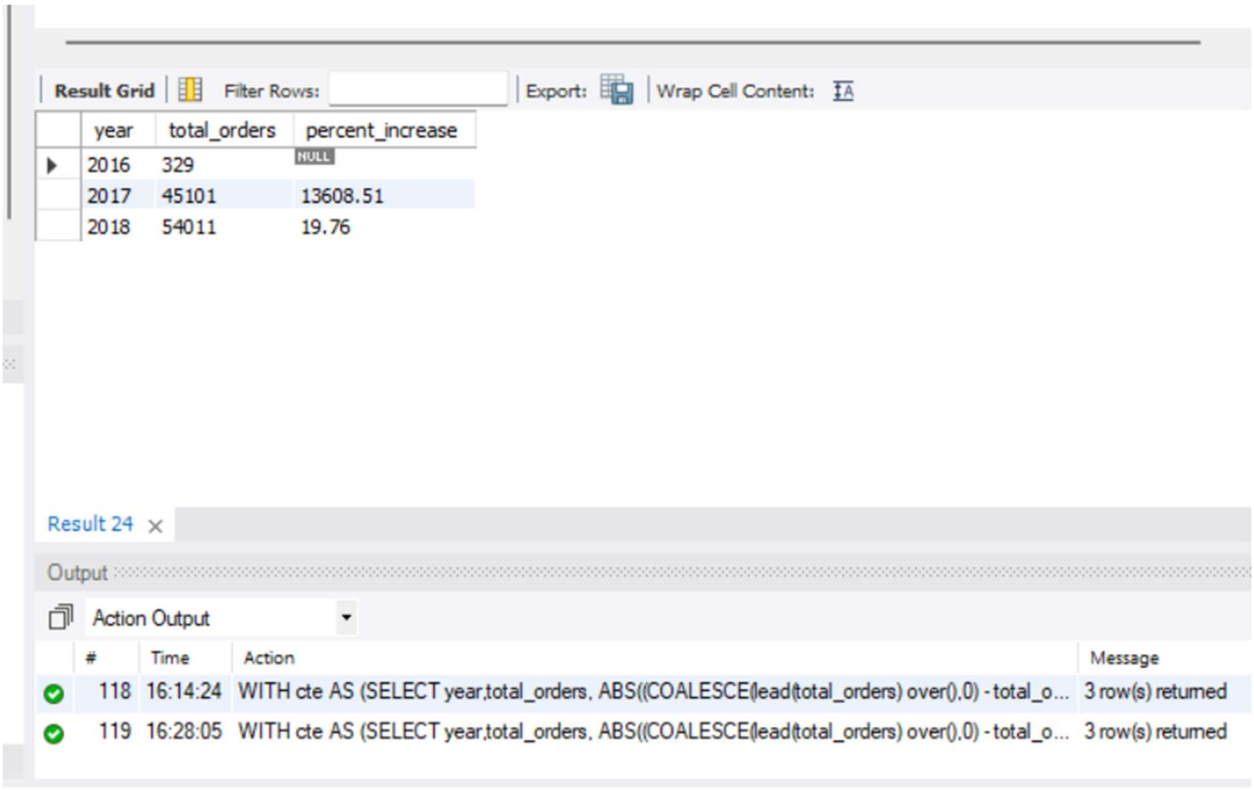
```
SELECT customer_id, customer_city, customer_state
 FROM target.customers;
```



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?

```
WITH cte AS

(SELECT year,total_orders, ABS((COALESCE(lead(total_orders) over(),0) - total_orders))
        YoY_Change

 FROM

(SELECT EXTRACT(year FROM order_purchase_timestamp) as year, COUNT(*) total_orders

FROM orders

GROUP BY 1

order BY 2) order_table)
```

```
SELECT year, total_orders, ROUND(lag(( YoY_Change/total_orders)*100)  over(),2) AS
        percent_increase

FROM cte
```



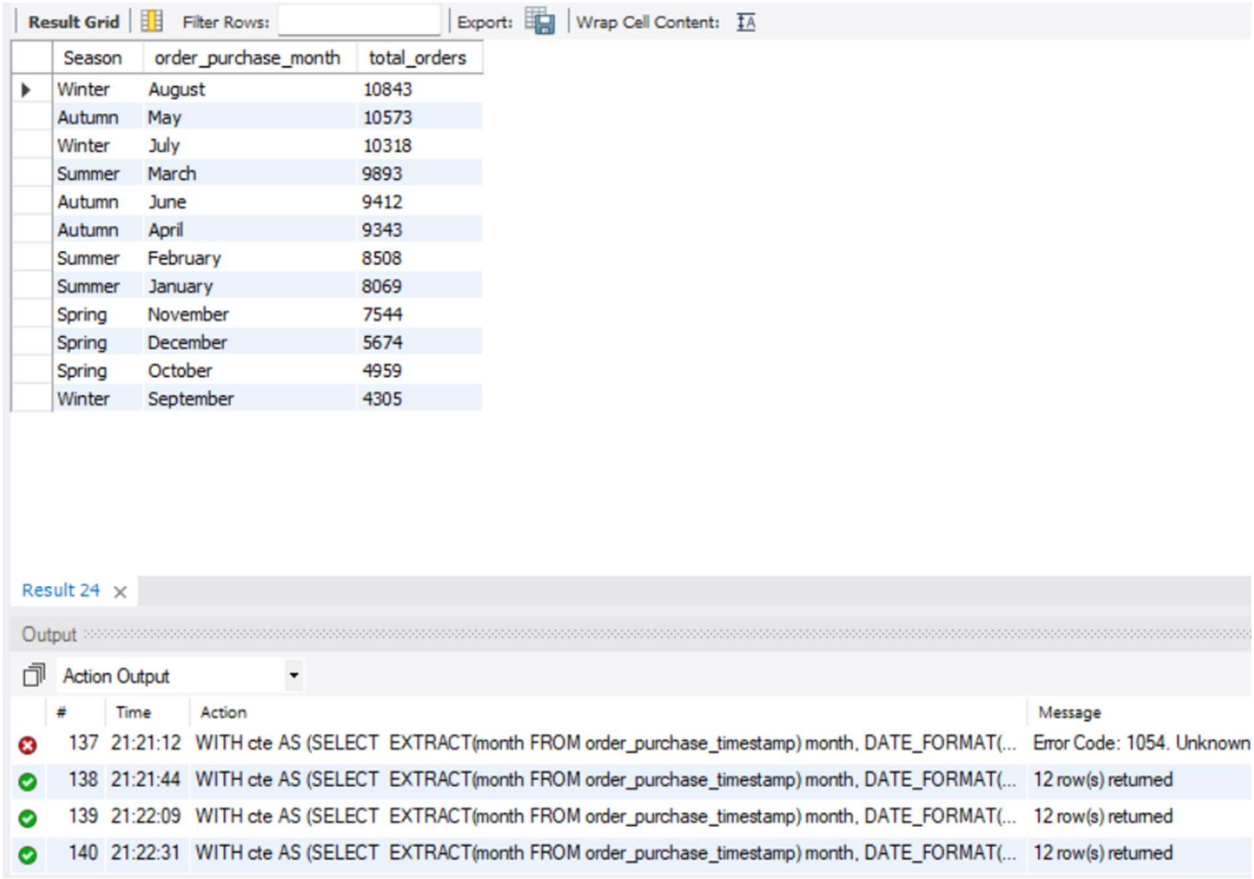
Findings :-

- From the above picture we can infer that there is nearly 13608 percent of increment from 2016 to 2017. This huge increase is due to insufficient data from 2016 as data of only 3 months is available.
- There is 19.76 percent increment from 2017 to 2018 which show numbers of orders are increasing at quite high rate indicating the positive sign in e-commerce activities.

Part 2

```
WITH cte AS

(SELECT  EXTRACT(month FROM order_purchase_timestamp) month,
DATE_FORMAT(order_purchase_timestamp, '%M') as order_purchase_month,
order_id

FROM orders
```

```
)
SELECT CASE
 WHEN month IN (1,2,3) THEN 'Summer'
 WHEN month IN (4,5,6) THEN 'Autumn'
 WHEN month IN (7,8,9) THEN 'Winter'
 WHEN month IN (10,11,12) THEN 'Spring'
 END Season, order_purchase_month, COUNT(order_id) total_orders
 FROM cte
 GROUP BY 1,2
```



Result Grid | Filter Rows: | Export: | Wrap Cell Content:

Season	order_purchase_month	total_orders
Winter	August	10843
Autumn	May	10573
Winter	July	10318
Summer	March	9893
Autumn	June	9412
Autumn	April	9343
Summer	February	8508
Summer	January	8069
Spring	November	7544
Spring	December	5674
Spring	October	4959
Winter	September	4305

Result 24

Output

Action Output

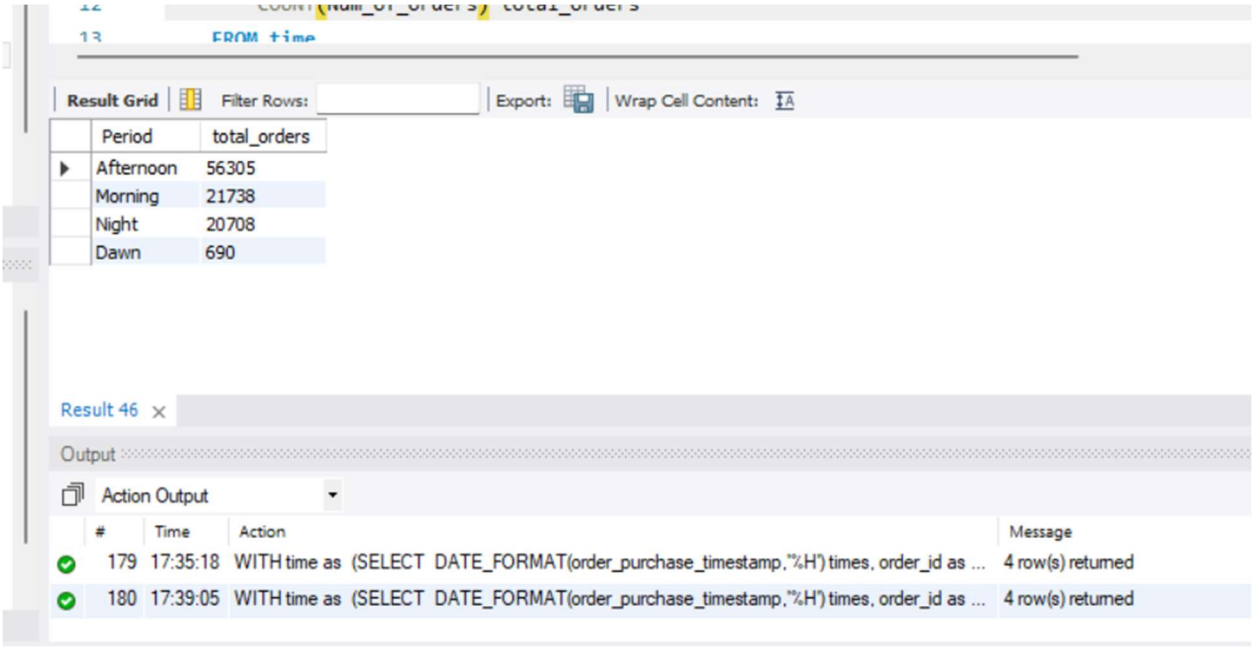
#	Time	Action	Message
137	21:21:12	WITH cte AS (SELECT EXTRACT(month FROM order_purchase_timestamp) month, DATE_FORMAT(...	Error Code: 1054. Unknown
138	21:21:44	WITH cte AS (SELECT EXTRACT(month FROM order_purchase_timestamp) month, DATE_FORMAT(...	12 row(s) returned
139	21:22:09	WITH cte AS (SELECT EXTRACT(month FROM order_purchase_timestamp) month, DATE_FORMAT(...	12 row(s) returned
140	21:22:31	WITH cte AS (SELECT EXTRACT(month FROM order_purchase_timestamp) month, DATE_FORMAT(...	12 row(s) returned

Findings :-

- The number of orders placed in Winter and Autumn is greater than any other seasons in Brazil. August month shows the peak of the orders.

2.2 What time do Brazilian customers tend to buy (Dawn, Morning, Afternoon or Night)?

```
WITH time as
(SELECT  DATE_FORMAT(order_purchase_timestamp,'%H') times, order_id as Num_of_orders
 FROM orders
 )
  SELECT CASE
                    WHEN times between 5 and 6 THEN 'Dawn'
       WHEN times between 7 and 11 THEN 'Morning'
       WHEN times between 12 and 20 THEN 'Afternoon'
       ELSE 'Night'
       END as Period,
       COUNT(Num_of_orders) total_orders
           FROM time
    GROUP BY 1
    ORDER BY 2 DESC
```



Note :- In the above case to find the time period, we categorized the hours of a day in certain periods as follows

1) Dawn :- Between 5 and 6
2) Morning :- Between 7 and 11
3) Afternoon:- Between 12 and 20
4) Night:- Remaining left hours are considered as night.

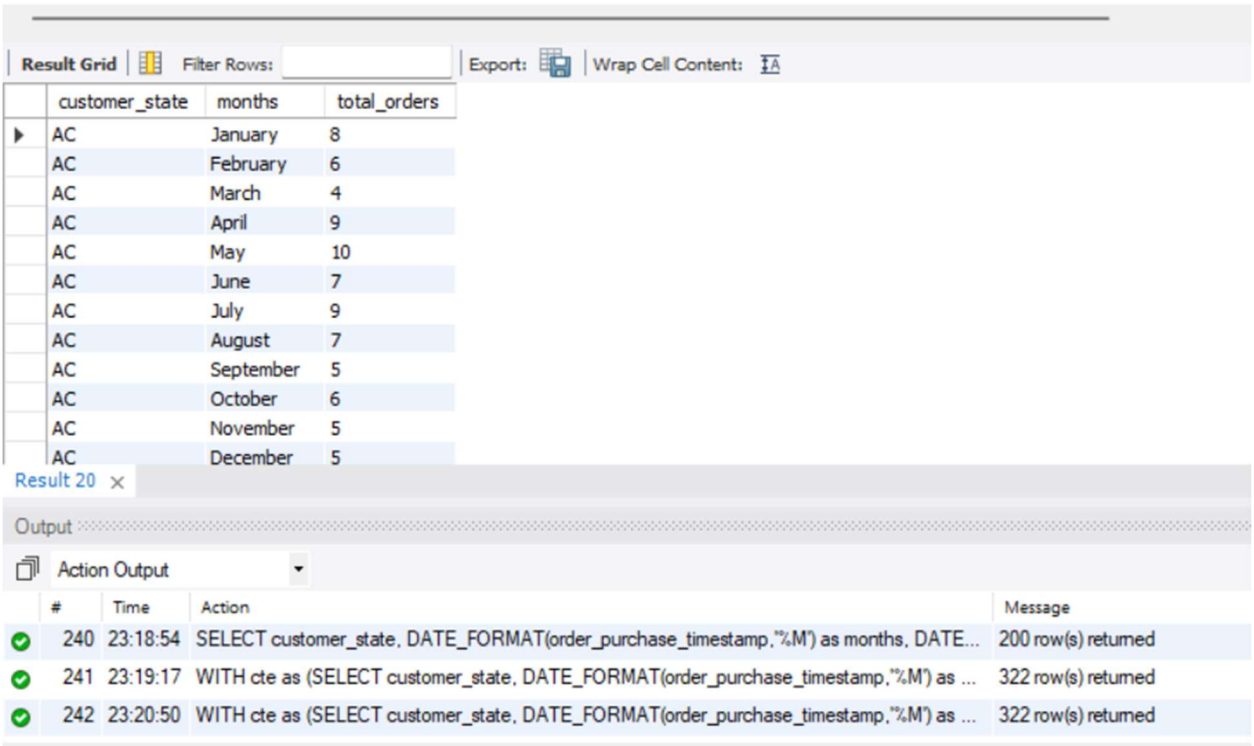
Findings:-

- From above result we can see that the tendency of Brazilians to buy during Afternoon is significantly more than other time

3.1 Get month on month orders by states

```
WITH cte as

(SELECT customer_state, DATE_FORMAT(order_purchase_timestamp,'%M') as months,
DATE_FORMAT(order_purchase_timestamp,'%m') m_num, count(*) total_orders

FROM orders o
```

```
JOIN customers c

ON o.customer_id = c.customer_id

GROUP BY 1,2,3

ORDER BY 1,3)

SELECT customer_state, months, total_orders

FROM cte
```



Result Grid | Filter Rows: | Export: | Wrap Cell Content:

customer_state	months	total_orders
AC	January	8
AC	February	6
AC	March	4
AC	April	9
AC	May	10
AC	June	7
AC	July	9
AC	August	7
AC	September	5
AC	October	6
AC	November	5
AC	December	5

Result 20

Output

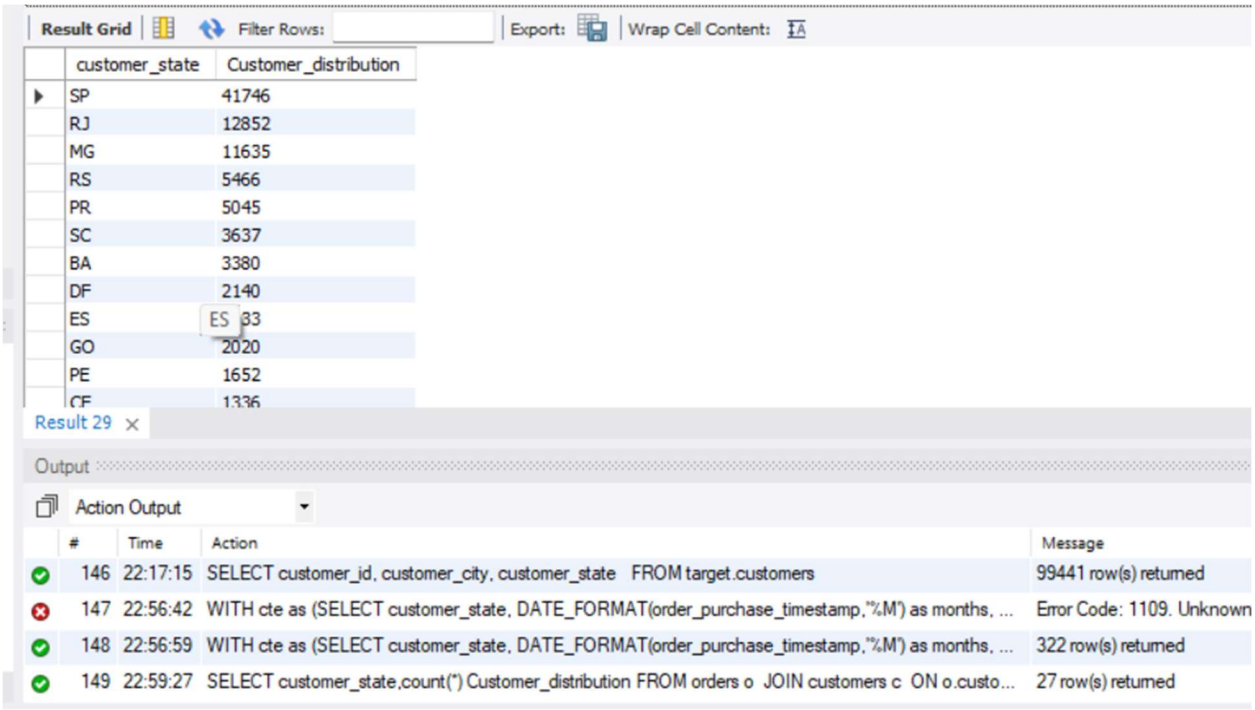
Action Output

#	Time	Action	Message
240	23:18:54	SELECT customer_state, DATE_FORMAT(order_purchase_timestamp,'%M') as months, DATE...	200 row(s) returned
241	23:19:17	WITH cte as (SELECT customer_state, DATE_FORMAT(order_purchase_timestamp,'%M') as ...	322 row(s) returned
242	23:20:50	WITH cte as (SELECT customer_state, DATE_FORMAT(order_purchase_timestamp,'%M') as ...	322 row(s) returned

3.2 Distribution of customers across the states in Brazil

```
SELECT customer_state,count(*) Customer_distribution

FROM orders o

JOIN customers c
```

```
ON o.customer_id = c.customer_id

GROUP BY 1

ORDER BY 2 DESC;
```



Result Grid | Filter Rows: | Export: | Wrap Cell Content:

customer_state	Customer_distribution
SP	41746
RJ	12852
MG	11635
RS	5466
PR	5045
SC	3637
BA	3380
DF	2140
ES	33
GO	2020
PE	1652
CE	1336

Result 29

Output

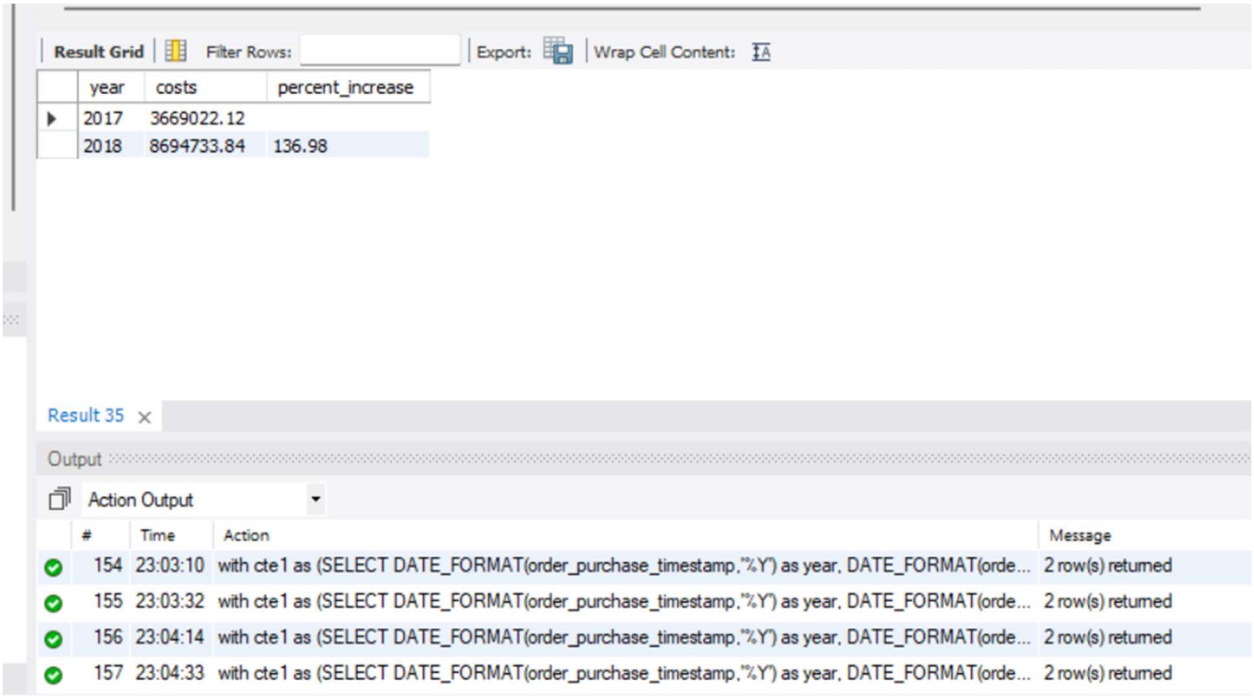
Action Output

#	Time	Action	Message
146	22:17:15	SELECT customer_id, customer_city, customer_state FROM target.customers	99441 row(s) returned
147	22:56:42	WITH cte as (SELECT customer_state, DATE_FORMAT(order_purchase_timestamp,'%M') as months, ...	Error Code: 1109. Unknown
148	22:56:59	WITH cte as (SELECT customer_state, DATE_FORMAT(order_purchase_timestamp,'%M') as months, ...	322 row(s) returned
149	22:59:27	SELECT customer_state,count(*) Customer_distribution FROM orders o JOIN customers c ON o.custo...	27 row(s) returned

4.1 Get % increase in cost of orders from 2017 to 2018 (include months between Jan to Aug only) - You can use "payment_value" column in payments table

```
        with cte1 as

(SELECT DATE_FORMAT(order_purchase_timestamp,'%Y') as year,
DATE_FORMAT(order_purchase_timestamp,'%m') as date1, SUM(payment_value) value

FROM orders o

JOIN payments p using(order_id)

GROUP BY 1,2),

 cte2 as
```

```
(SELECT year, sum(value) cost, lead(sum(value)) over(order by year)-sum(value)
c_increment FROM cte1

WHERE date1 between 1 and 8 and year <> 2016

group by 1)

SELECT year, ROUND(cost,2) costs, COALESCE(lag(ROUND((c_increment/cost)*100,2))
over(),'') as percent_increase

FROM cte2
```

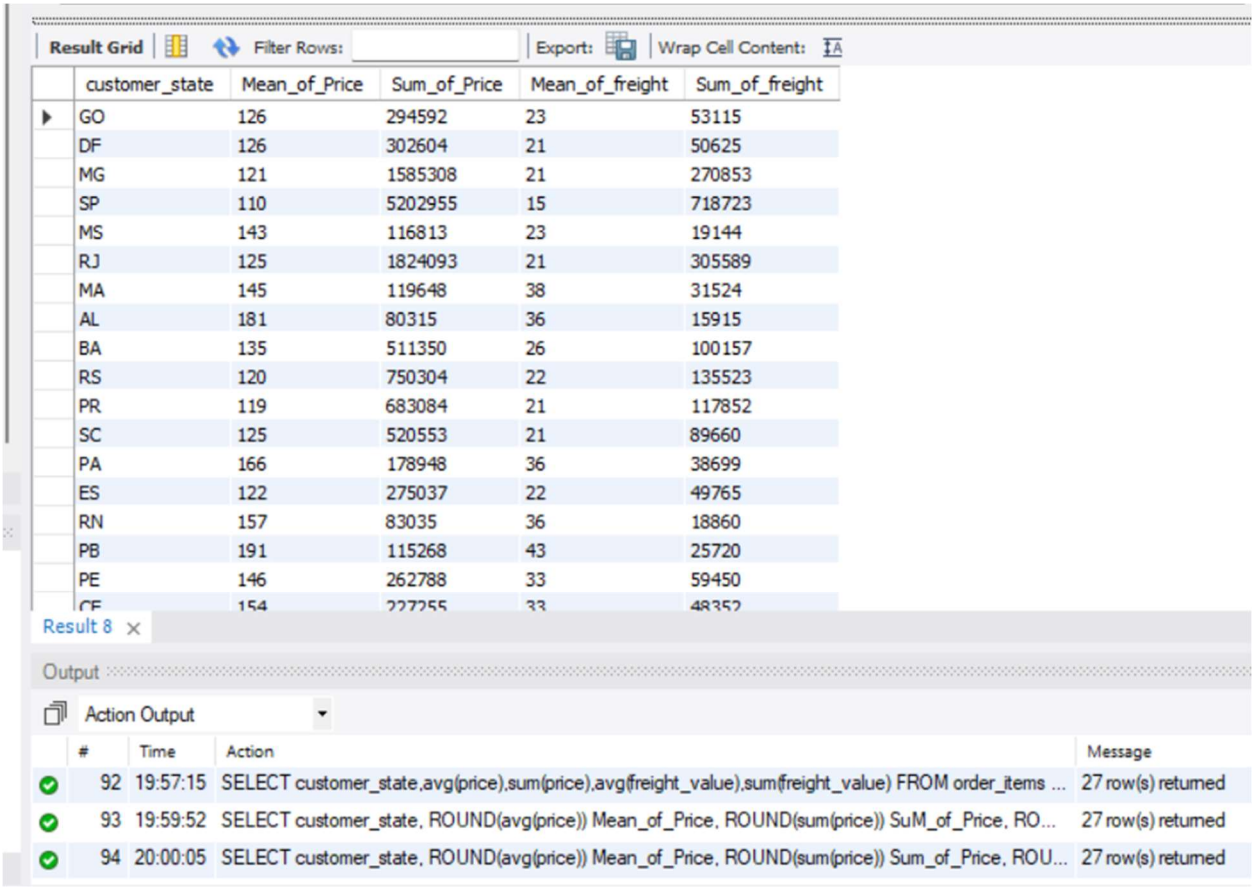


Findings:-

There is more than 135 % increase in cost of orders from 2017 to 2018, indicating tremendous growth in terms of cost of orders

4.2 Mean & Sum of price and freight value by customer state

```
SELECT customer_state, ROUND(avg(price)) Mean_of_Price, ROUND(sum(price)) Sum_of_Price,

ROUND(avg(freight_value)) Mean_of_freight, ROUND(sum(freight_value)) Sum_of_freight

FROM order_items oi

JOIN orders o

using(order_id)

JOIN customers c

using(customer_id)

GROUP BY 1
```



Result Grid | Filter Rows: | Export: | Wrap Cell Content:

customer_state	Mean_of_Price	Sum_of_Price	Mean_of_freight	Sum_of_freight
GO	126	294592	23	53115
DF	126	302604	21	50625
MG	121	1585308	21	270853
SP	110	5202955	15	718723
MS	143	116813	23	19144
RJ	125	1824093	21	305589
MA	145	119648	38	31524
AL	181	80315	36	15915
BA	135	511350	26	100157
RS	120	750304	22	135523
PR	119	683084	21	117852
SC	125	520553	21	89660
PA	166	178948	36	38699
ES	122	275037	22	49765
RN	157	83035	36	18860
PB	191	115268	43	25720
PE	146	262788	33	59450
CE	154	227255	33	48352

Result 8

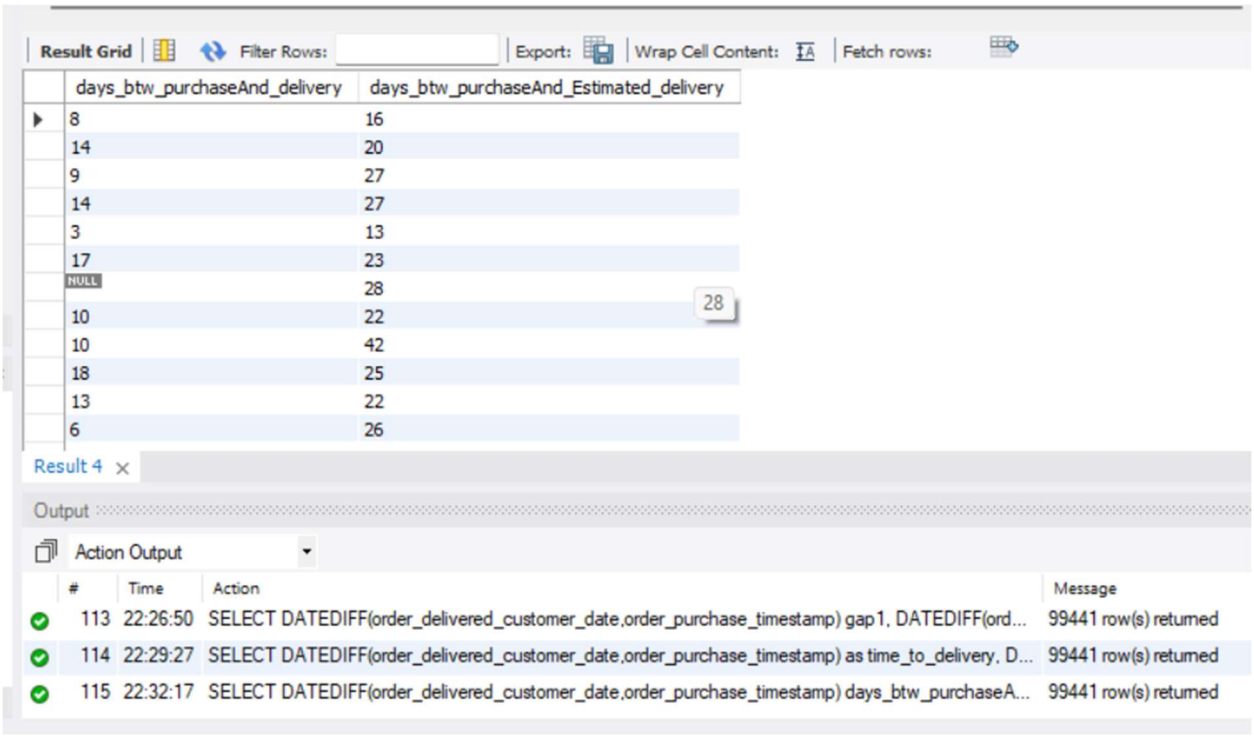
Output

Action Output

#	Time	Action	Message
92	19:57:15	SELECT customer_state,avg(price),sum(price),avg(freight_value),sum(freight_value) FROM order_items ...	27 row(s) returned
93	19:59:52	SELECT customer_state, ROUND(avg(price)) Mean_of_Price, ROUND(sum(price)) SuM_of_Price, RO...	27 row(s) returned
94	20:00:05	SELECT customer_state, ROUND(avg(price)) Mean_of_Price, ROUND(sum(price)) Sum_of_Price, ROU...	27 row(s) returned

5.1 Calculate days between purchasing, delivering and estimated delivery

```
SELECT
DATEDIFF(order_delivered_customer_date,order_purchase_timestamp)
days_btw_purchaseAnd_delivery,

 DATEDIFF(order_estimated_delivery_date,order_purchase_timestamp)
days_btw_purchaseAnd_Estimated_delivery

FROM orders
```

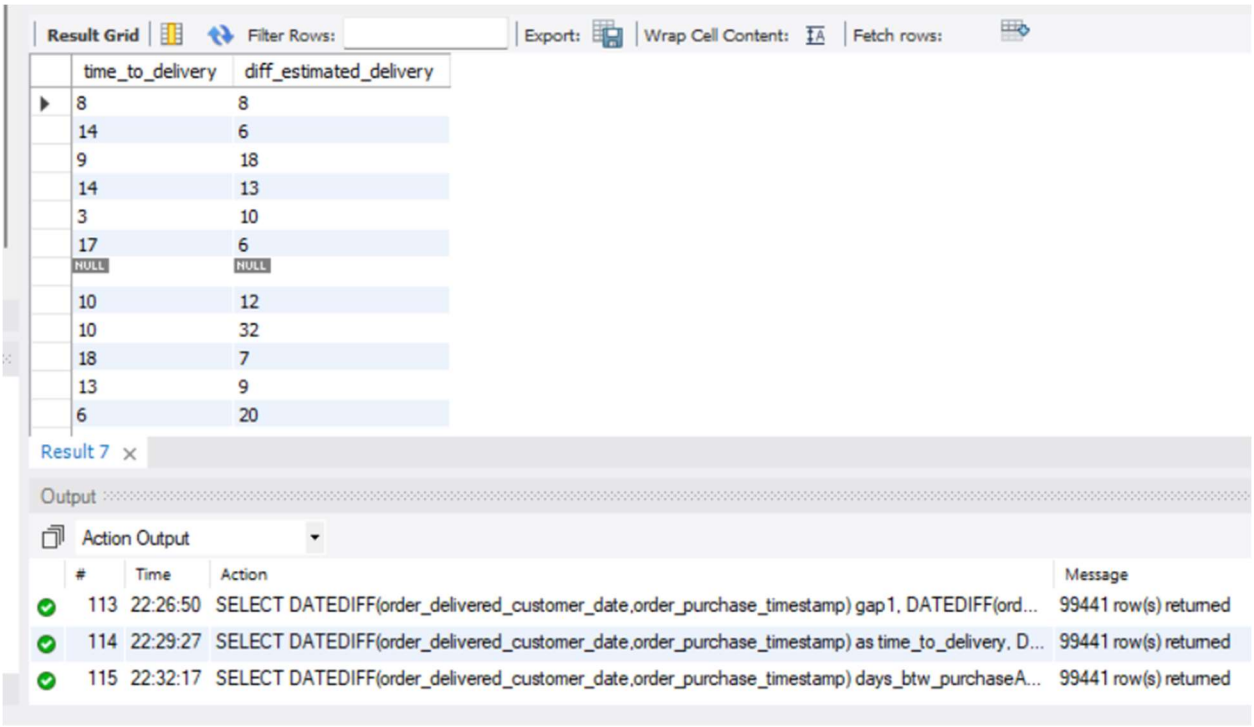


5.2 Find time_to_delivery & diff_estimated_delivery. Formula for the same given below:

- **time_to_delivery = order_purchase_timestamp-order_delivered_customer_date**
- **diff_estimated_delivery = order_estimated_delivery_date-order_delivered_customer_date**

```
SELECT DATEDIFF(order_delivered_customer_date,order_purchase_timestamp) as
time_to_delivery,

DATEDIFF(order_estimated_delivery_date,order_delivered_customer_date) as
diff_estimated_delivery
```

FROM orders



5.3 Group data by state, take mean of freight_value, time_to_delivery, diff_estimated_delivery

WITH cte AS

(SELECT DATEDIFF(order_delivered_customer_date,order_purchase_timestamp) as time_to_delivery,

DATEDIFF(order_estimated_delivery_date,order_delivered_customer_date) as diff_estimated_delivery, customer_id, order_id

FROM orders)

SELECT customer_state, ROUND(avg(freight_value),2) as freight_value_mean, ROUND(avg(time_to_delivery),2) time_to_delivery_mean,

ROUND(avg(diff_estimated_delivery),2) diff_estimated_delivery_mean

FROM customers c

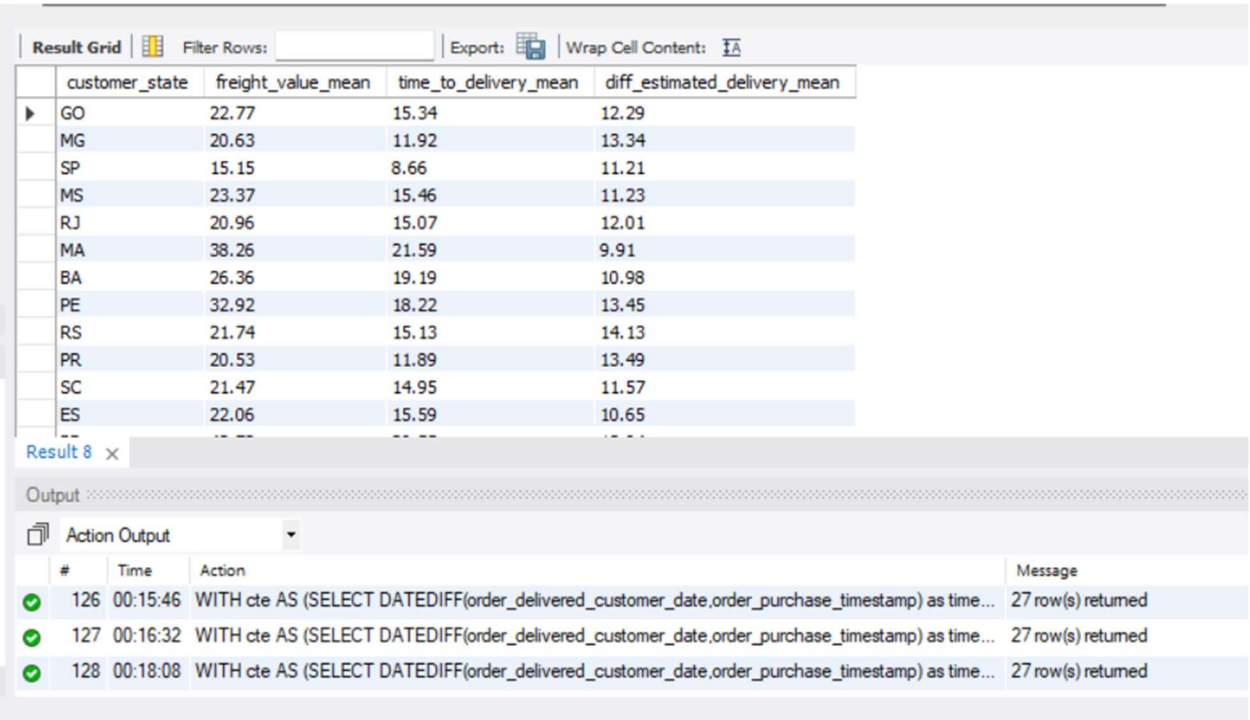
JOIN cte ct

using (customer_id)

JOIN order_items o

using (order_id)

GROUP BY customer_state



Result Grid | Filter Rows: | Export: | Wrap Cell Content:

customer_state	freight_value_mean	time_to_delivery_mean	diff_estimated_delivery_mean
GO	22.77	15.34	12.29
MG	20.63	11.92	13.34
SP	15.15	8.66	11.21
MS	23.37	15.46	11.23
RJ	20.96	15.07	12.01
MA	38.26	21.59	9.91
BA	26.36	19.19	10.98
PE	32.92	18.22	13.45
RS	21.74	15.13	14.13
PR	20.53	11.89	13.49
SC	21.47	14.95	11.57
ES	22.06	15.59	10.65

Result 8

Output

Action Output

#	Time	Action	Message
126	00:15:46	WITH cte AS (SELECT DATEDIFF(order_delivered_customer_date,order_purchase_timestamp) as time...	27 row(s) returned
127	00:16:32	WITH cte AS (SELECT DATEDIFF(order_delivered_customer_date,order_purchase_timestamp) as time...	27 row(s) returned
128	00:18:08	WITH cte AS (SELECT DATEDIFF(order_delivered_customer_date,order_purchase_timestamp) as time...	27 row(s) returned

5.4 Sort the data to get the following:

5.5 Top 5 states with highest/lowest average freight value - sort in desc/asc limit 5

Part 1

WITH cte AS

(SELECT DATEDIFF(order_delivered_customer_date,order_purchase_timestamp) as time_to_delivery,

DATEDIFF(order_estimated_delivery_date,order_delivered_customer_date) as diff_estimated_delivery, customer_id, order_id

FROM orders)

SELECT customer_state, ROUND(avg(freight_value),2) as freight_value_mean

FROM customers c

JOIN cte ct

using (customer_id)

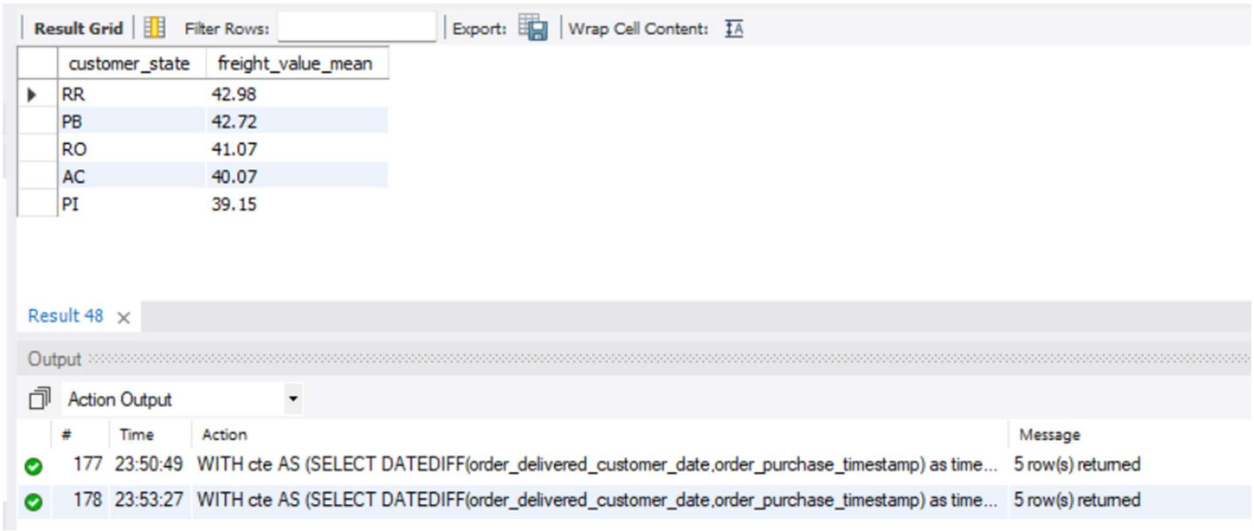
JOIN order_items o

using (order_id)

GROUP BY customer_state

ORDER BY 2 DESC

LIMIT 5



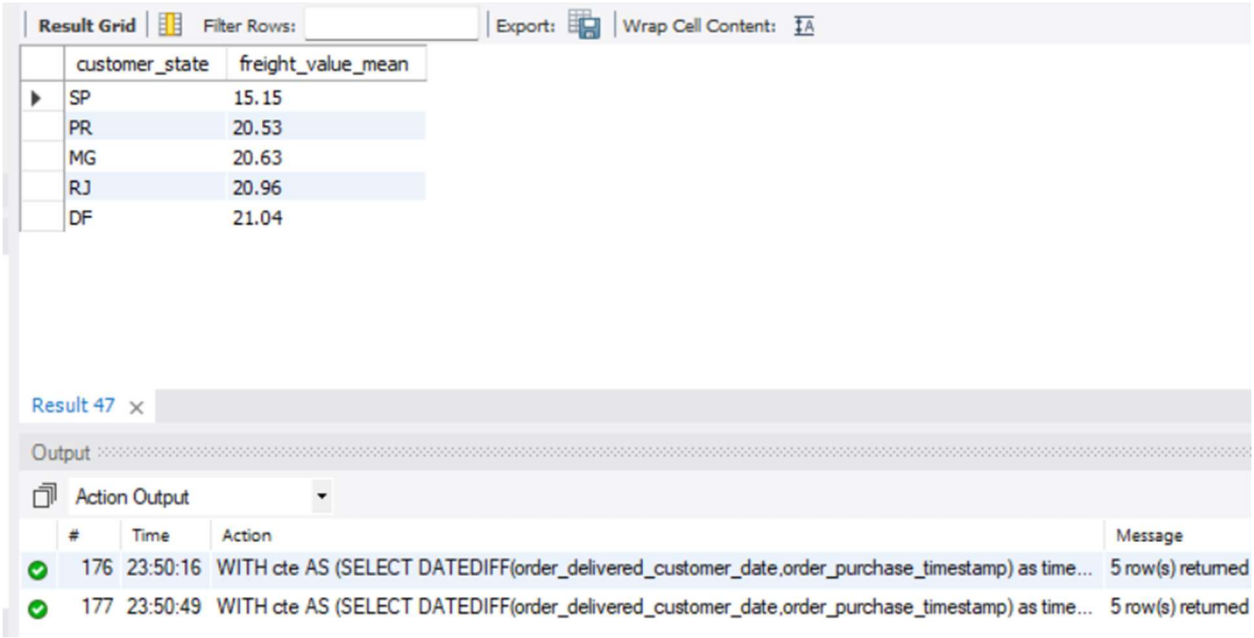
Findings:- The above query gives the top 5 states having most freight_value_mean

Part 2

WITH cte AS

(SELECT DATEDIFF(order_delivered_customer_date,order_purchase_timestamp) as time_to_delivery,

```
DATEDIFF(order_estimated_delivery_date,order_delivered_customer_date) as
diff_estimated_delivery, customer_id, order_id

FROM orders)

SELECT customer_state, ROUND(avg(freight_value),2) as freight_value_mean,

FROM customers c

JOIN cte ct

using (customer_id)

JOIN order_items o

using (order_id)

GROUP BY customer_state

ORDER BY 2

LIMIT 5
```

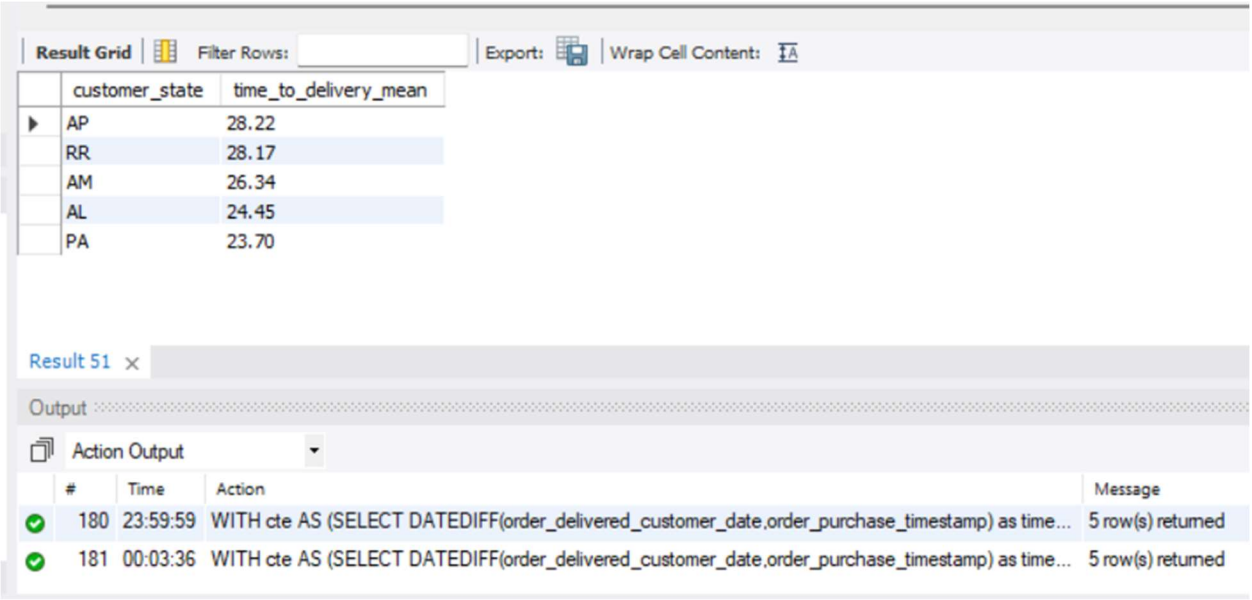


Findings:- The above query gives the 5 state with lowest freight_value_mean

5.6 Top 5 states with highest/lowest average time to delivery

Part 1

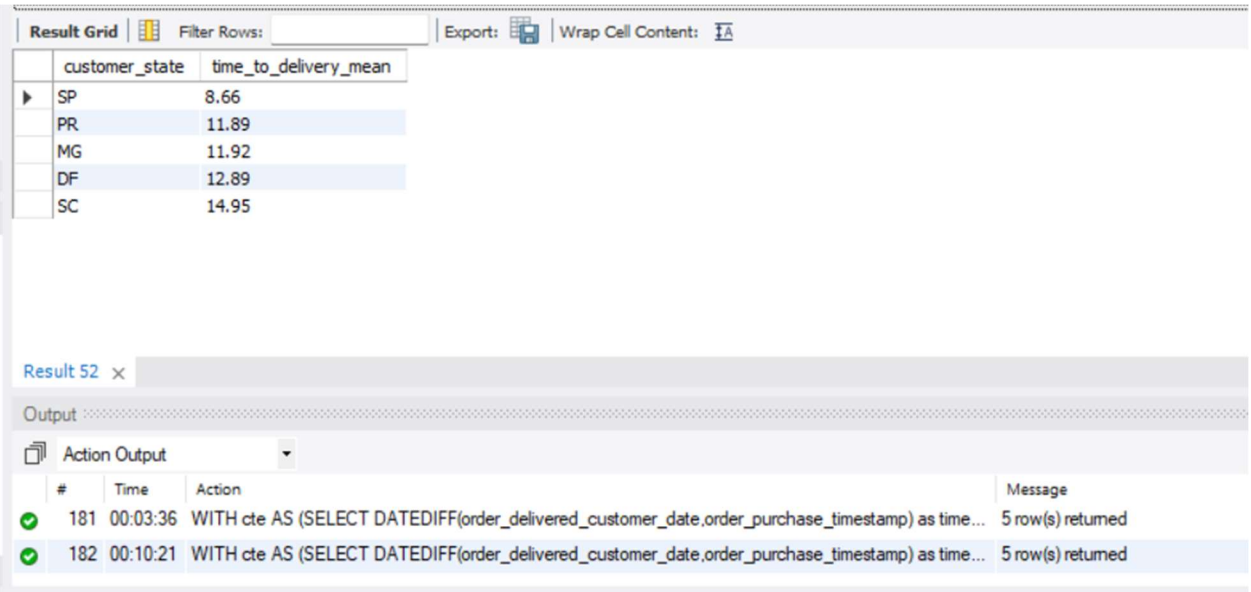
```
WITH cte AS

(SELECT DATEDIFF(order_delivered_customer_date,order_purchase_timestamp) as
time_to_delivery,

DATEDIFF(order_estimated_delivery_date,order_delivered_customer_date) as
diff_estimated_delivery, customer_id, order_id

FROM orders)

SELECT customer_state, ROUND(avg(time_to_delivery),2) time_to_delivery_mean

FROM customers c

JOIN cte ct

using (customer_id)

JOIN order_items o

using (order_id)

GROUP BY customer_state

ORDER BY 2 DESC LIMIT 5
```



Findings:- From above result, we can say that these are the 5 states where delivery is taking very long times as compared to other states.

Part 2

```
WITH cte AS
(SELECT DATEDIFF(order_delivered_customer_date,order_purchase_timestamp) as time_to_delivery,
DATEDIFF(order_estimated_delivery_date,order_delivered_customer_date) as diff_estimated_delivery,
customer_id, order_id
FROM orders)
SELECT customer_state, ROUND(avg(time_to_delivery),2) time_to_delivery_mean
FROM customers c
JOIN cte ct
using (customer_id)
JOIN order_items o
using (order_id)
GROUP BY customer_state
ORDER BY 2  LIMIT 5
```



Finding: - **From above we can infer that the delivery in above 5 states is very fast as compared to other states.**

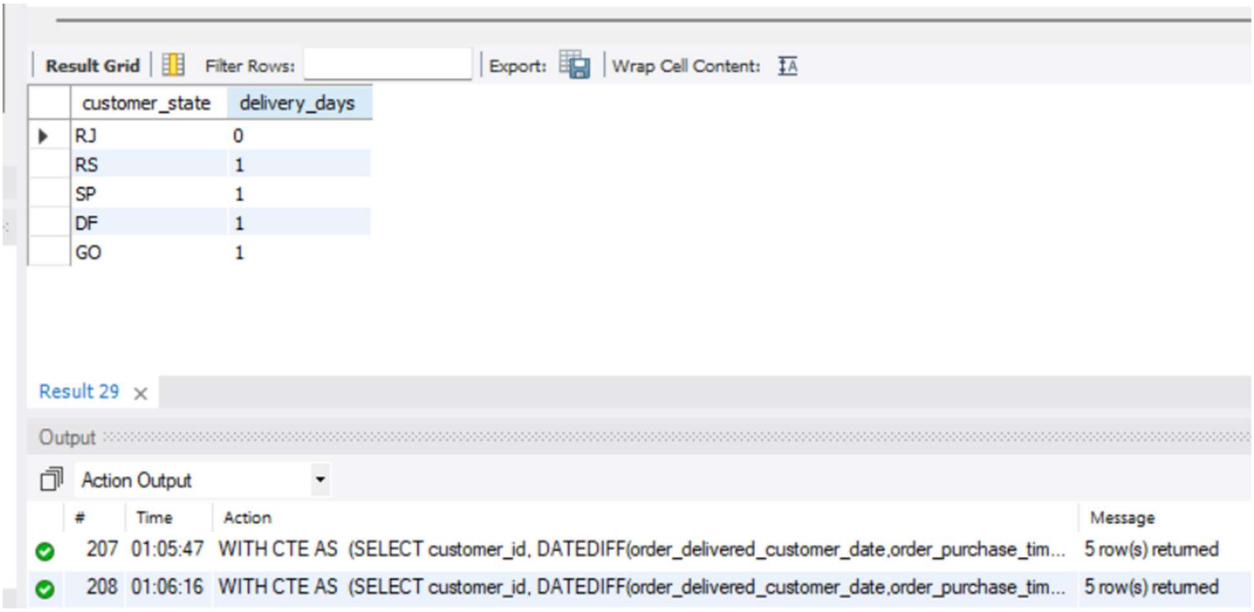
5.7 Top 5 states where delivery is really fast/ not so fast compared to estimated date

Part 1

```
WITH CTE AS

(SELECT customer_id,
        DATEDIFF(order_delivered_customer_date,order_purchase_timestamp)
        delivery_days,

 DATEDIFF(order_estimated_delivery_date,order_purchase_timestamp)
        Estimated_delivery_days

 FROM orders )

  SELECT DISTINCT customer_state, delivery_days

 FROM customers

 JOIN CTE  using(customer_id)

WHERE delivery_days is not null
```

ORDER BY 2

LIMIT 5



Part 2

WITH CTE AS

(SELECT customer_id,
DATEDIFF(order_delivered_customer_date,order_purchase_timestamp) delivery_days,

DATEDIFF(order_estimated_delivery_date,order_purchase_timestamp)
Estimated_delivery_days

FROM orders)

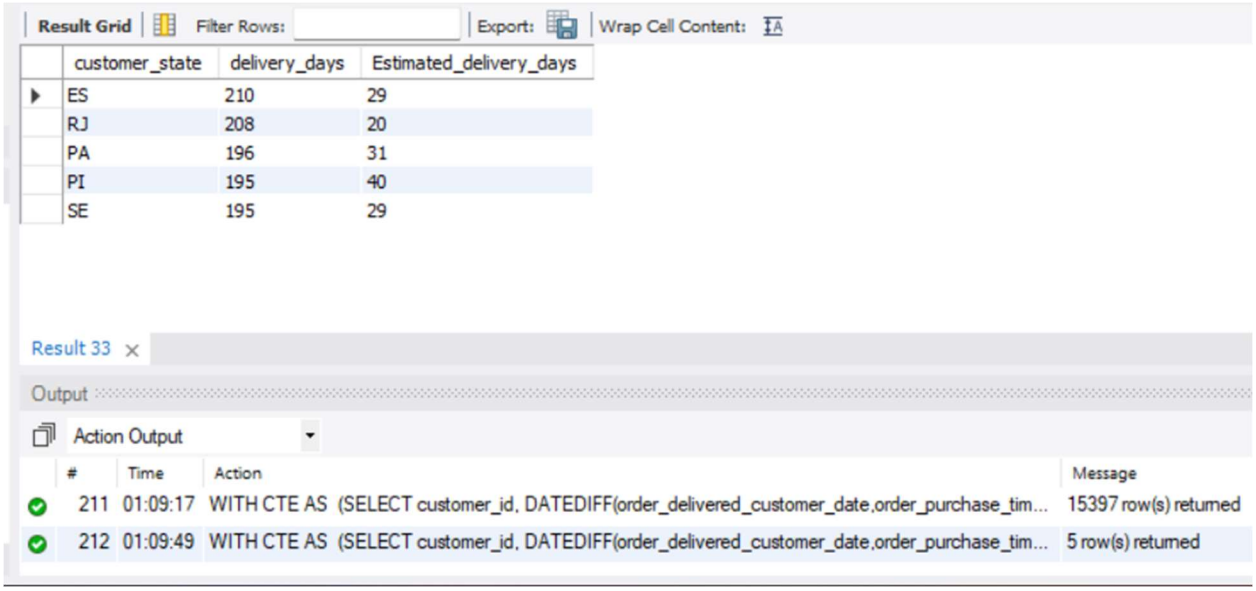
SELECT DISTINCT customer_state, delivery_days, Estimated_delivery_days

FROM customers

JOIN CTE using(customer_id)

WHERE delivery_days is not null

```
ORDER BY 2 DESC

LIMIT 5
```



Result Grid | Filter Rows: | Export: | Wrap Cell Content:

customer_state	delivery_days	Estimated_delivery_days
ES	210	29
RJ	208	20
PA	196	31
PI	195	40
SE	195	29

Result 33

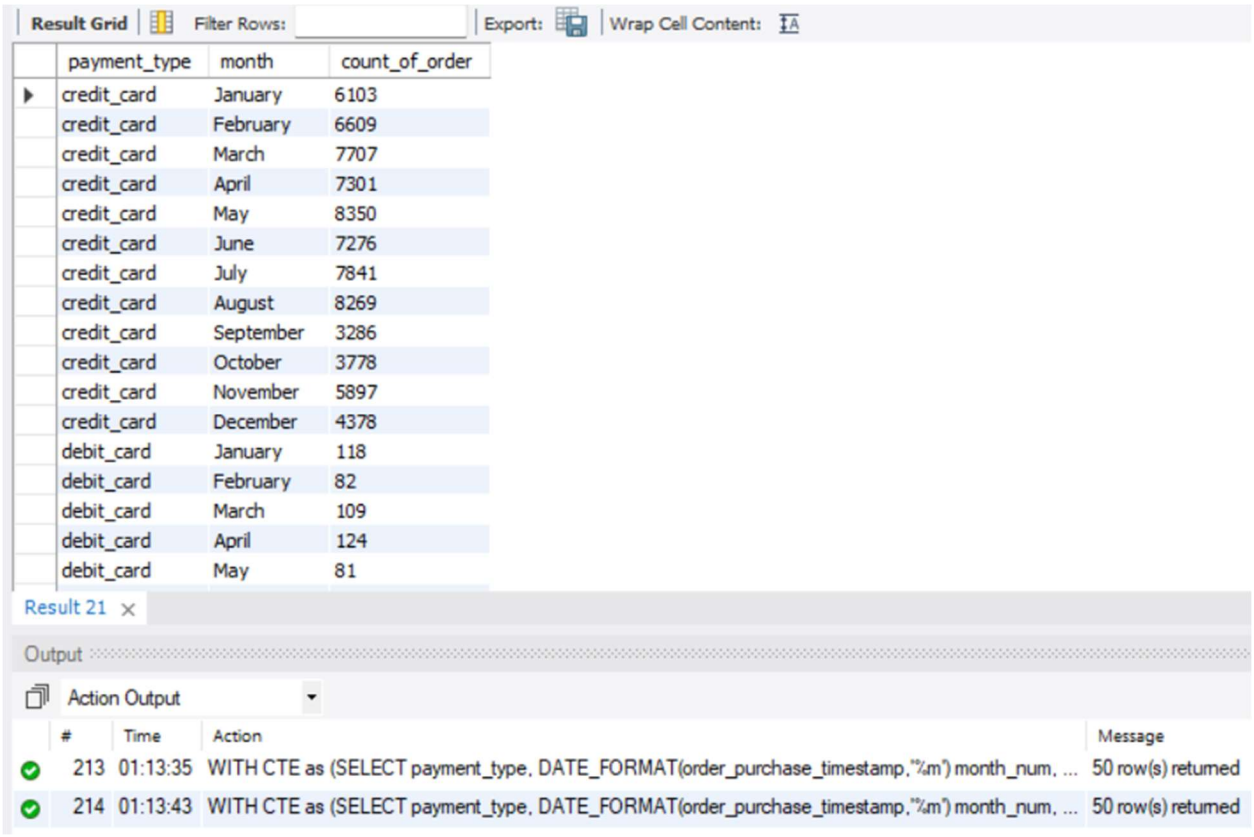
Output

Action Output

#	Time	Action	Message
211	01:09:17	WITH CTE AS (SELECT customer_id, DATEDIFF(order_delivered_customer_date,order_purchase_tim...	15397 row(s) returned
212	01:09:49	WITH CTE AS (SELECT customer_id, DATEDIFF(order_delivered_customer_date,order_purchase_tim...	5 row(s) returned

6.1 Month over Month count of orders for different payment types

```
WITH CTE as

(SELECT payment_type, DATE_FORMAT(order_purchase_timestamp,'%m') month_num,
DATE_FORMAT(order_purchase_timestamp,'%M') month, COUNT(*) count_Of_Order

FROM orders o

JOIN payments p

ON o.order_id = p.order_id

GROUP BY 1,2,3

)


SELECT payment_type, month, count_of_order

FROM cte

order by payment_type, month_num
```



Result Grid | Filter Rows: | Export: | Wrap Cell Content:

payment_type	month	count_of_order
credit_card	January	6103
credit_card	February	6609
credit_card	March	7707
credit_card	April	7301
credit_card	May	8350
credit_card	June	7276
credit_card	July	7841
credit_card	August	8269
credit_card	September	3286
credit_card	October	3778
credit_card	November	5897
credit_card	December	4378
debit_card	January	118
debit_card	February	82
debit_card	March	109
debit_card	April	124
debit_card	May	81

Result 21

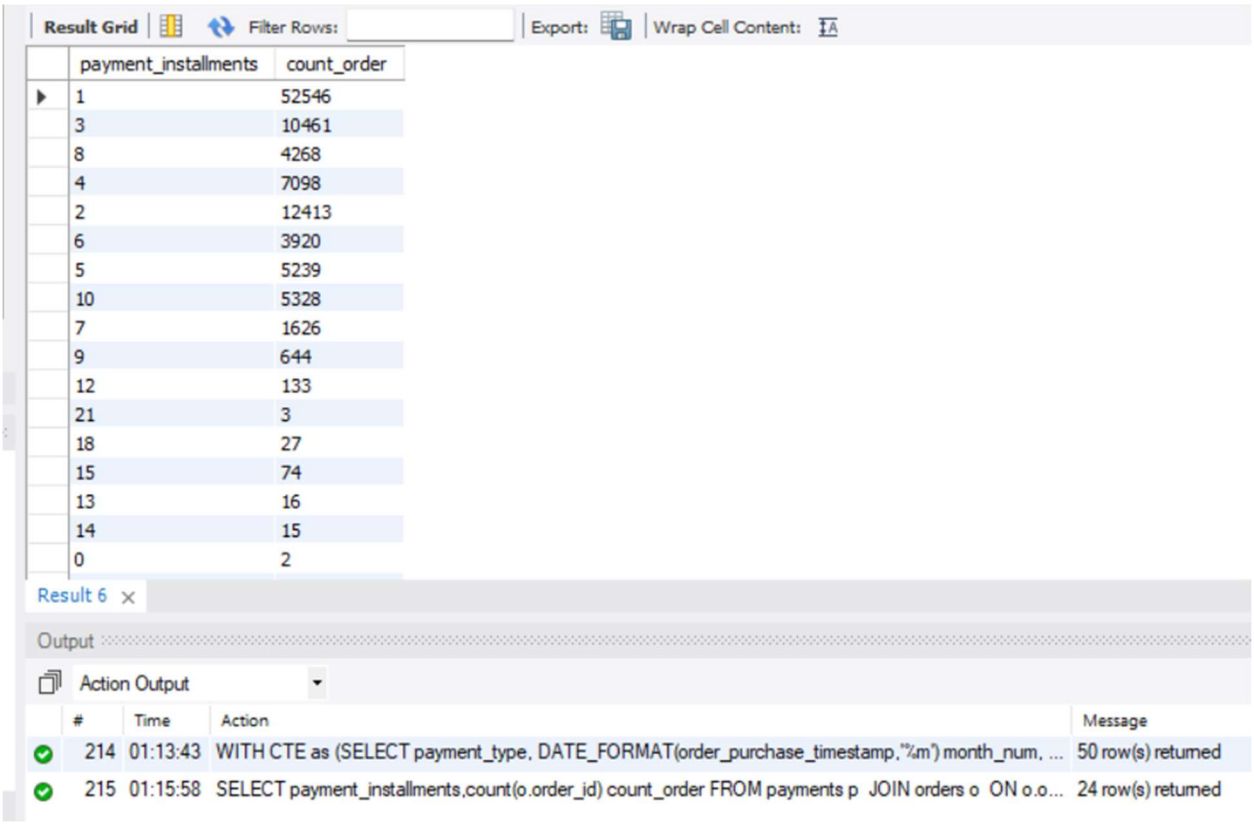
Output

Action Output

#	Time	Action	Message
213	01:13:35	WITH CTE as (SELECT payment_type, DATE_FORMAT(order_purchase_timestamp,"%m") month_num, ...	50 row(s) returned
214	01:13:43	WITH CTE as (SELECT payment_type, DATE_FORMAT(order_purchase_timestamp,"%m") month_num, ...	50 row(s) returned

6.2 Count of orders based on the no. of payment installments

```
SELECT payment_installments,count(o.order_id) count_order

FROM payments p

JOIN orders o

ON o.order_id = p.order_id

GROUP BY 1
```



Result Grid | Filter Rows: | Export: | Wrap Cell Content:

payment_installments	count_order
1	52546
3	10461
8	4268
4	7098
2	12413
6	3920
5	5239
10	5328
7	1626
9	644
12	133
21	3
18	27
15	74
13	16
14	15
0	2

Result 6

Output

Action Output

#	Time	Action	Message
214	01:13:43	WITH CTE as (SELECT payment_type, DATE_FORMAT(order_purchase_timestamp,'%m') month_num, ...	50 row(s) returned
215	01:15:58	SELECT payment_installments,count(o.order_id) count_order FROM payments p JOIN orders o ON o.o...	24 row(s) returned

Actionable Insights

1) The number of orders increased more than 19.75% from 2017 to 2018
2) Highest number of orders are placed in the winter season having August month as its peak.
3) Customers generally buy more during afternoon period as compared to others.
4) Highest number of customers are present in SP state of Brazil.
5) From 2017 to 2018, there is more than 135% YoY increase in cost of orders.
6) States like RR, PB, RO, AC and PI have average freight value more than 40.
7) States like AP, RR, AM, AL, and PA have average delivery time nearly of 25 days.

8) In States like ES, RJ, PA, PI and SE some deliveries are taking nearly 200 days to complete.
9) Highest number of orders are made using credit card.
10) Count of order is significantly higher when there are just 1 payment instalments.

Recommendations

1) Advertise in the state having low number of customers to increase the reach.
2) Reduce the average number of freight days in state where it is taking too much time.
3) Find the reason and solve the problem of states where some products are taking drastically large number of days to deliver as compared to expected date of delivery.
4) Try to give some offers on payment methods which is not used so frequently.