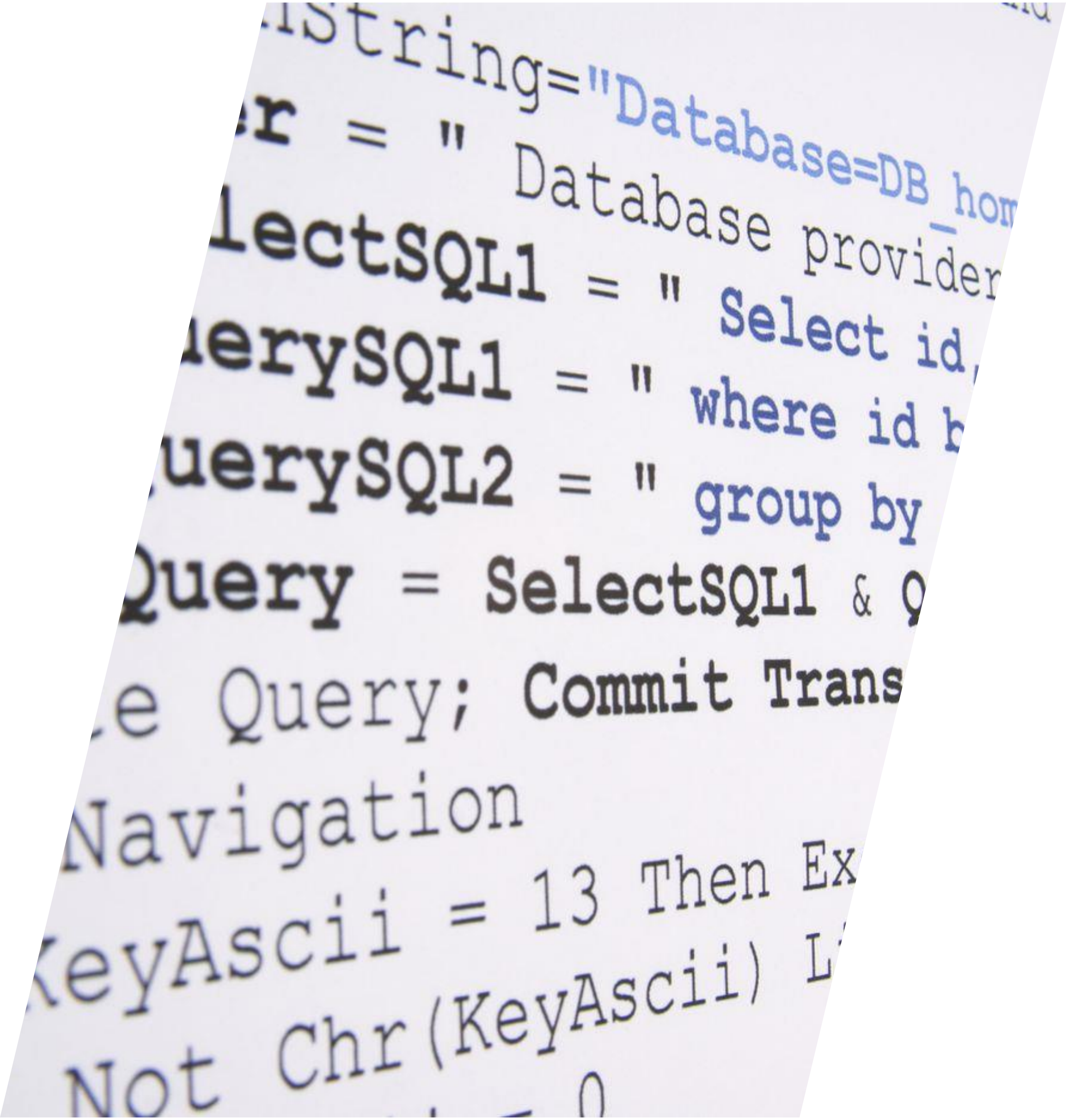
ELECTRIC VEHICLE SALES: AN SQL CASE STUDY

-SOURAV PATTANAYAK



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uerySQL1 = " where id b
uerySQL2 = " group by
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INTRODUCTION

WHAT ARE ELECTRIC VEHICLES?
WHY SQL?

Electric Vehicles (EVs) are eco-friendly, powered by electricity, and emit zero tailpipe emissions. They use electric motors and batteries for propulsion, reducing pollution. Available in various forms like cars and scooters, EVs have gained popularity for their environmental benefits. and energy efficiency.

Vehicle companies like Zoom Electric (ZE) rely on Data analysts using languages like SQL to make data-driven decisions, optimizing sales, customer insights, and marketing.

PROJECT DESCRIPTION

WHAT ARE THE TARGETS?

WHAT'S MY ROLE?

In this project, I am working as a Data Analyst for Zoom Electric (ZE), a unique electric vehicle company known for regularly introducing new scooter models. Our project focuses on analyzing electric vehicle sales data. We aim to uncover valuable insights into our sales performance, customer behavior, and the effectiveness of our marketing efforts. By understanding these key aspects, we'll be better equipped to make informed decisions and enhance our business strategies for future growth.

PROJECT OBJECTIVE

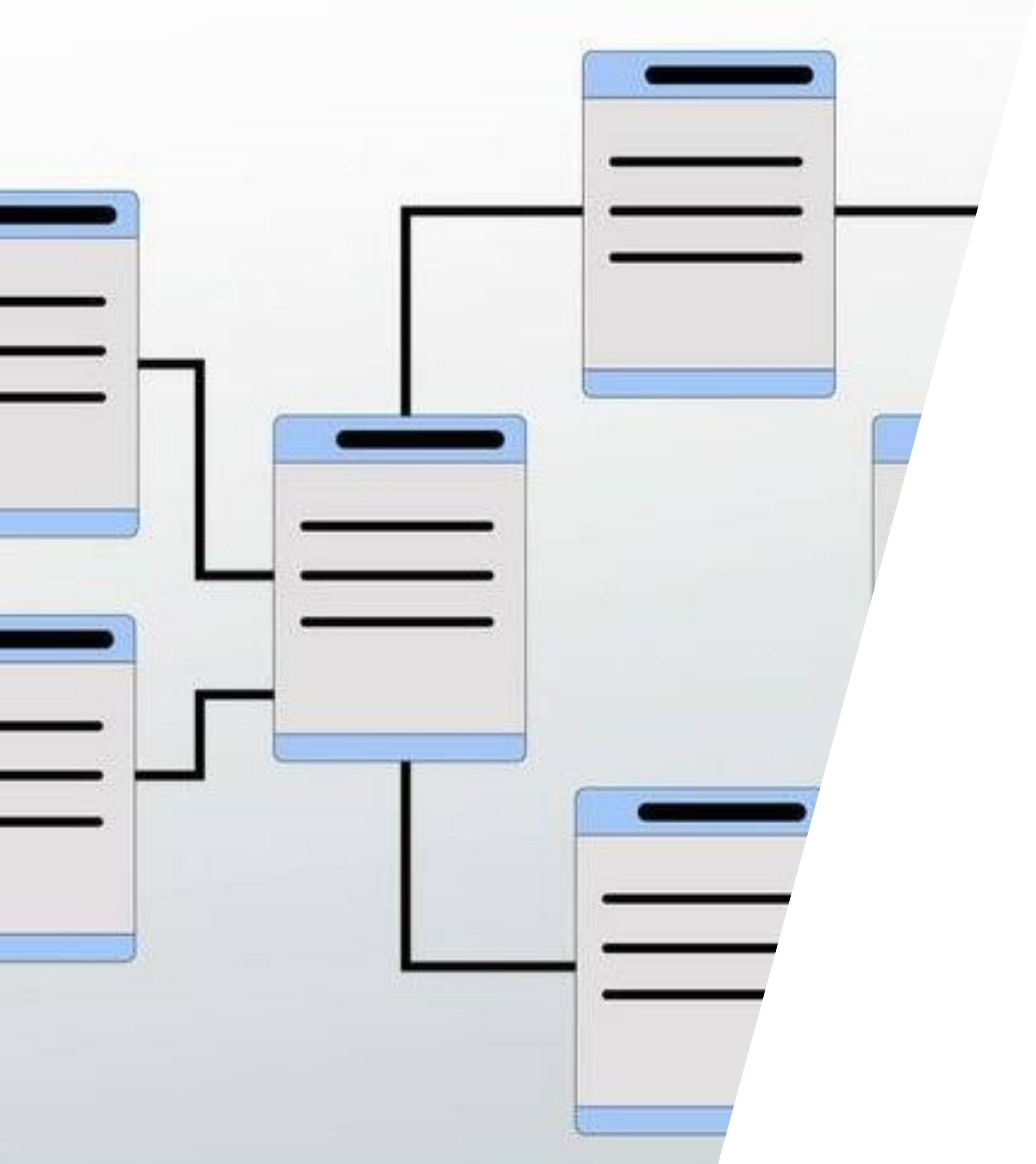
WHAT DO I HAVE?

WHAT DOES MY MANAGER WANT?

I was provided with four tables, email_subject, emails, products, and sales.

- email_subject: Contains datewise and activity-wise details on customer interaction with advertisements.
- emails: contains information on email_subject and subject_id.
- products: Contains product information.
- sales: Contains sales data of the company.

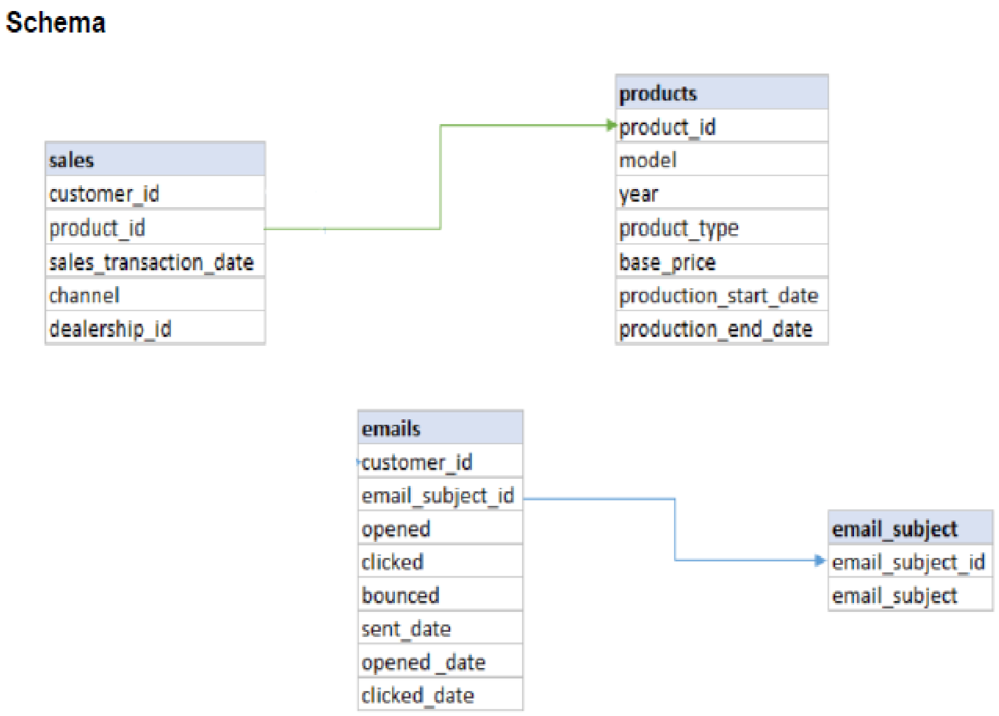
Objective: To gain actionable insights from electric vehicle sales data for Zoom Electric.



DATABASE SCHEMA

WHAT ARE THE TABLE RELATIONSHIPS?

Here is the database schema of the tables:



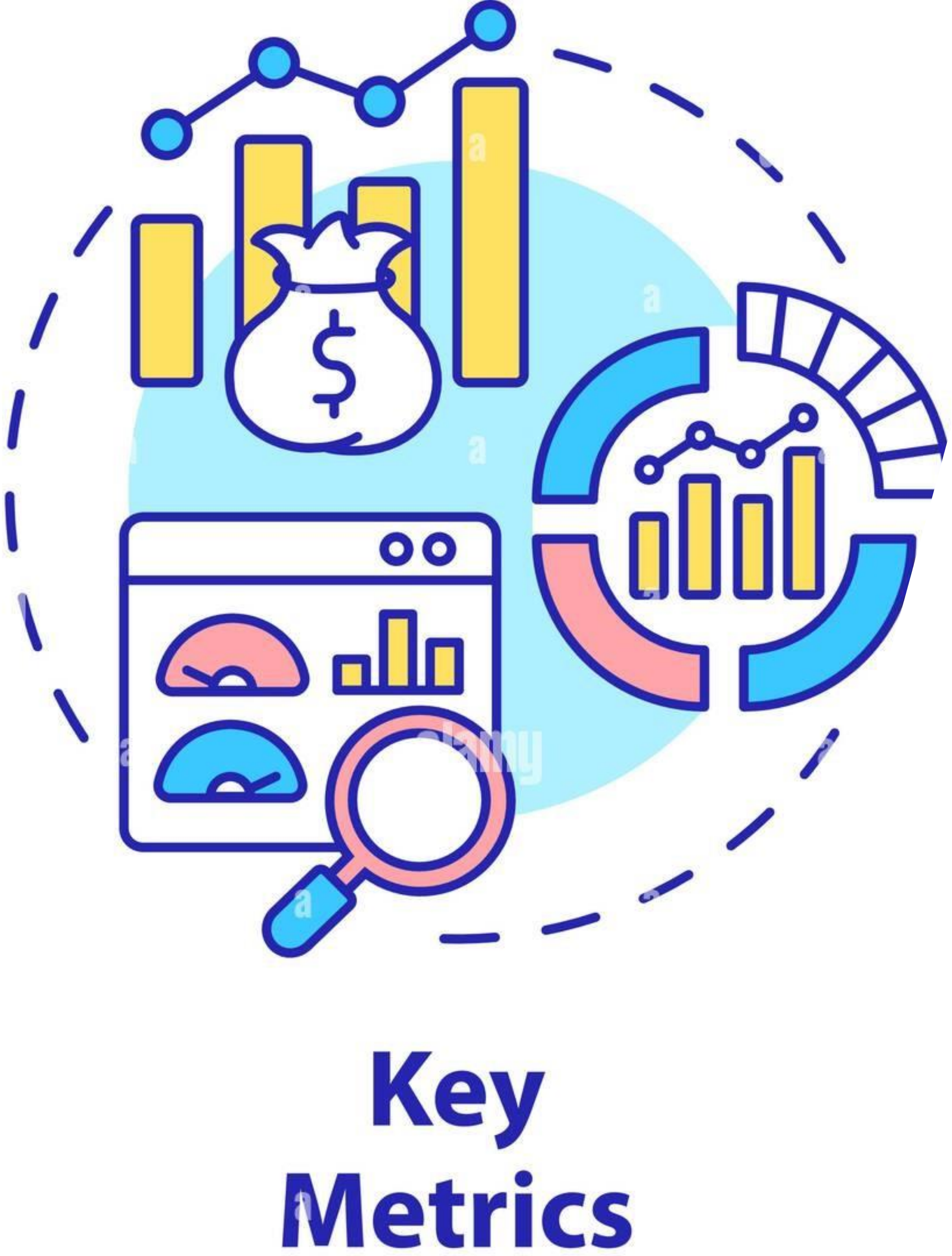
Schema

sales
customer_id
product_id
sales_transaction_date
channel
dealership_id

products
product_id
model
year
product_type
base_price
production_start_date
production_end_date

emails
customer_id
email_subject_id
opened
clicked
bounced
sent_date
opened _date
clicked_date

email_subject
email_subject_id
email_subject



KEY METRICS USED

WHAT ARE THE KEY METRICS?

In this project the key metrics that were used are,

- ✓ Revenue
- ✓ average revenue per model
- ✓ sales volume
- ✓ email open rates
- ✓ bounce rates
- ✓ click-through rates(CTR)
- ✓ customer engagement.

COMMON BUSINESS TERMS

WHAT DOES IT MEAN?

The project uses several common business terms, which are also relevant in the context of this analysis, including:

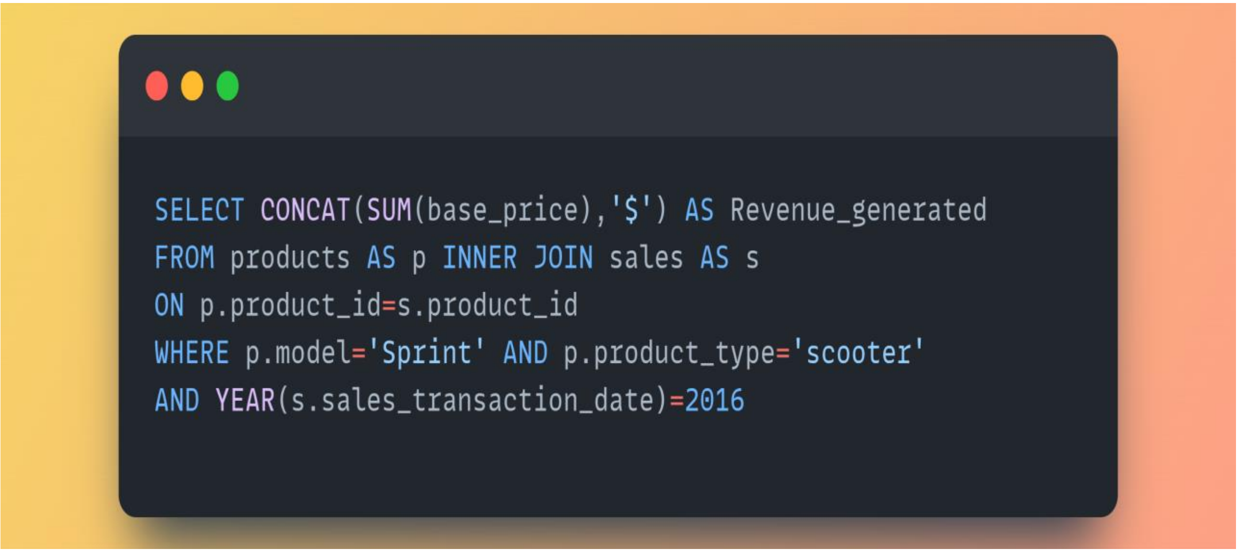
1. **Bounce Rate:** The percentage of emails that could not be delivered to the recipient's inbox.
2. **Click-Through Rate (CTR):** The percentage of email recipients who clicked on a link contained in an email.
3. **Customer Engagement:** The level of interaction and participation between customers and a brand or product.
4. **Cumulative Sales:** The total sales over a specified time period, considering previous sales.

PROBLEMS & QUERIES

PROBLEM-1

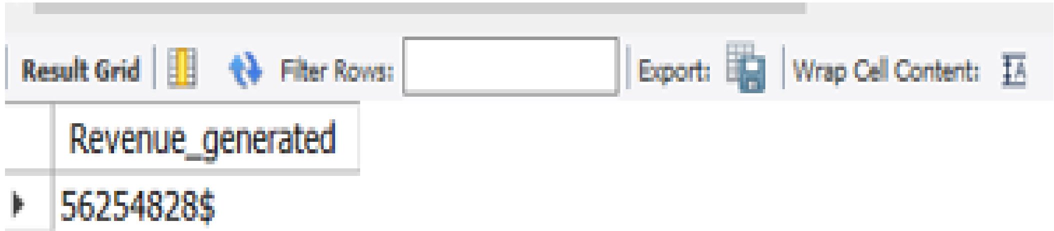
FIND THE TOTAL REVENUE GENERATED FROM SPRINT SCOOTER SALES IN THE YEAR 2016

Query-1:



```sql
SELECT CONCAT(SUM(base_price),'$') AS Revenue_generated
FROM products AS p INNER JOIN sales AS s
ON p.product_id=s.product_id
WHERE p.model='Sprint' AND p.product_type='scooter'
AND YEAR(s.sales_transaction_date)=2016
```

Output-1:



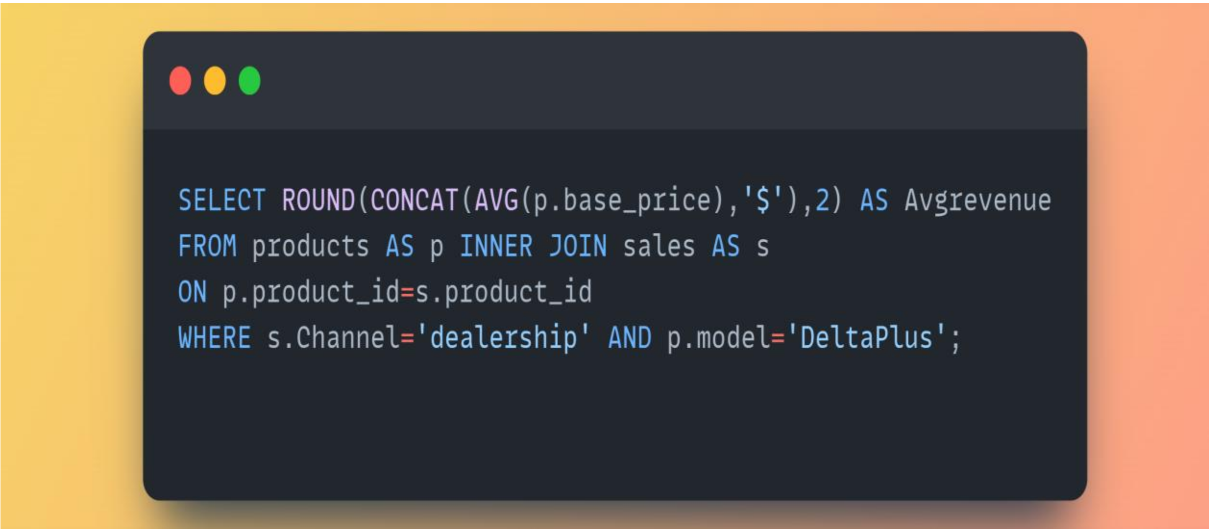
```
Revenue_generated
56254828$
```

PROBLEMS & QUERIES

PROBLEM-2

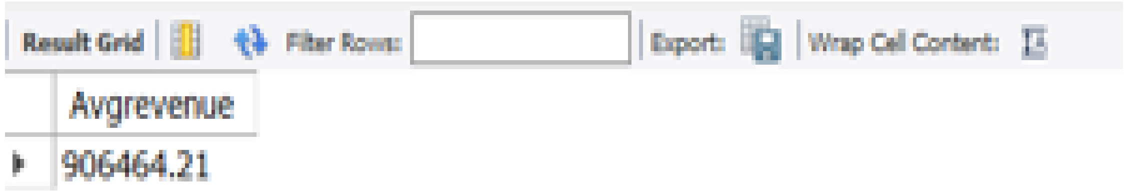
CALCULATE THE AVERAGE REVENUE GENERATED ON MODEL 'DELTAPLUS' THROUGH THE DEALERSHIP CHANNEL

Query-2:



```
SELECT ROUND(CONCAT(AVG(p.base_price),'$'),2) AS Avgrevenue
FROM products AS p INNER JOIN sales AS s
ON p.product_id=s.product_id
WHERE s.Channel='dealership' AND p.model='DeltaPlus';
```

Output-2:



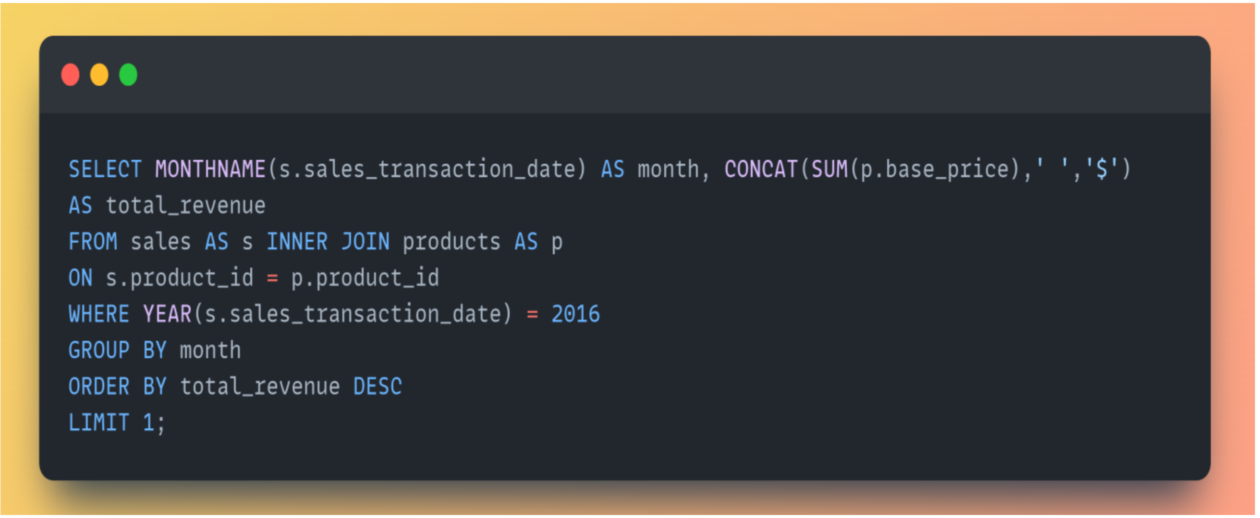
Avgrevenue
906464.21

PROBLEMS & QUERIES

PROBLEM-3

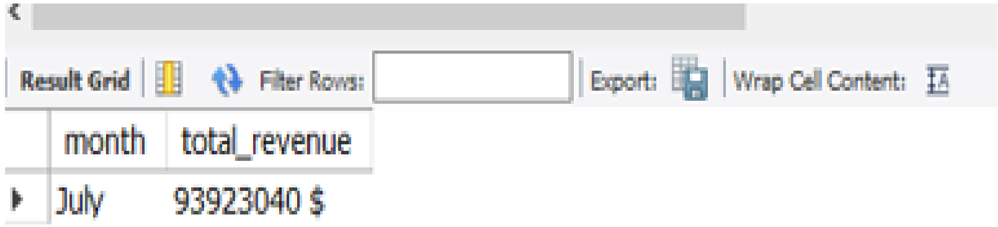
DETERMINE THE MONTH WITH THE HIGHEST TOTAL SALES REVENUE IN 2016.

Query-3:



```sql
SELECT MONTHNAME(s.sales_transaction_date) AS month, CONCAT(SUM(p.base_price),' ','$')
AS total_revenue
FROM sales AS s INNER JOIN products AS p
ON s.product_id = p.product_id
WHERE YEAR(s.sales_transaction_date) = 2016
GROUP BY month
ORDER BY total_revenue DESC
LIMIT 1;
```

Output-3:



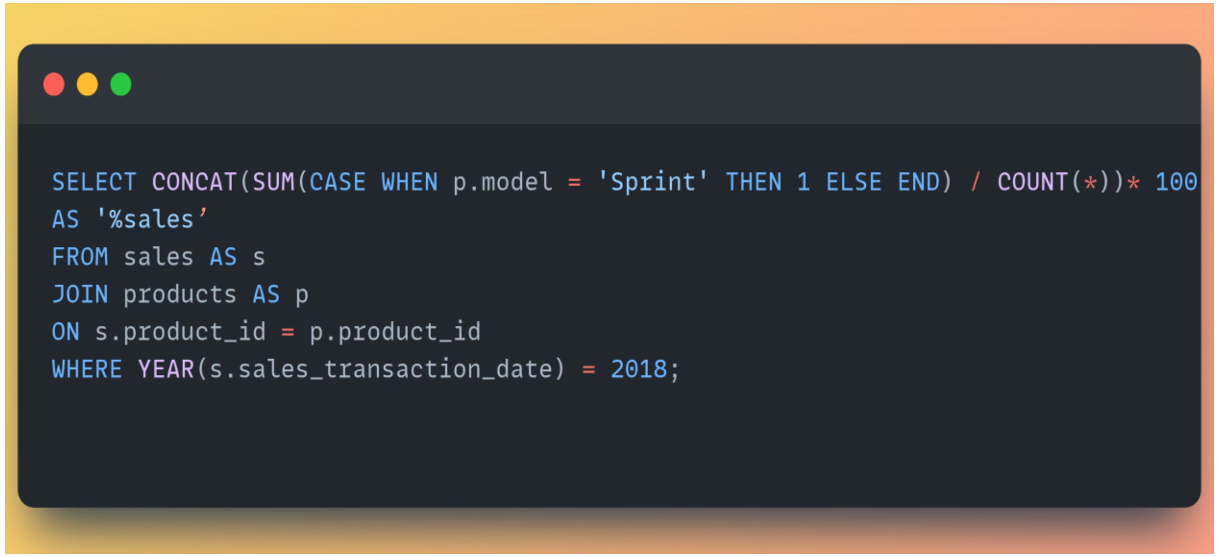
```
month   total_revenue
July    93923040 $
```

PROBLEMS & QUERIES

PROBLEM-4

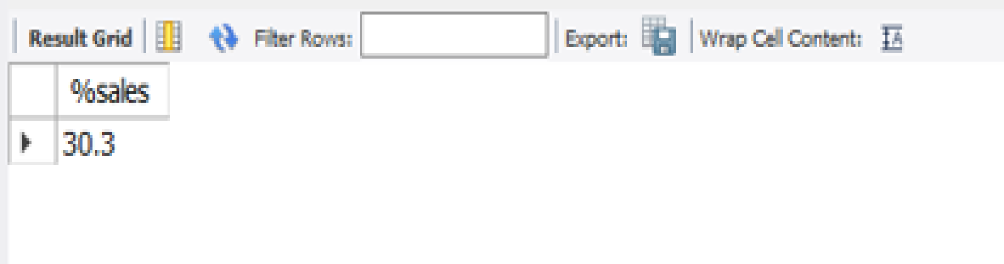
FIND THE PERCENTAGE OF SPRINT SCOOTER SALES COMPARED TO TOTAL EV SCOOTER SALES IN 2018

Query-4:



```sql
SELECT CONCAT(SUM(CASE WHEN p.model = 'Sprint' THEN 1 ELSE END) / COUNT(*))* 100
AS '%sales’
FROM sales AS s
JOIN products AS p
ON s.product_id = p.product_id
WHERE YEAR(s.sales_transaction_date) = 2018;
```

Output-4:



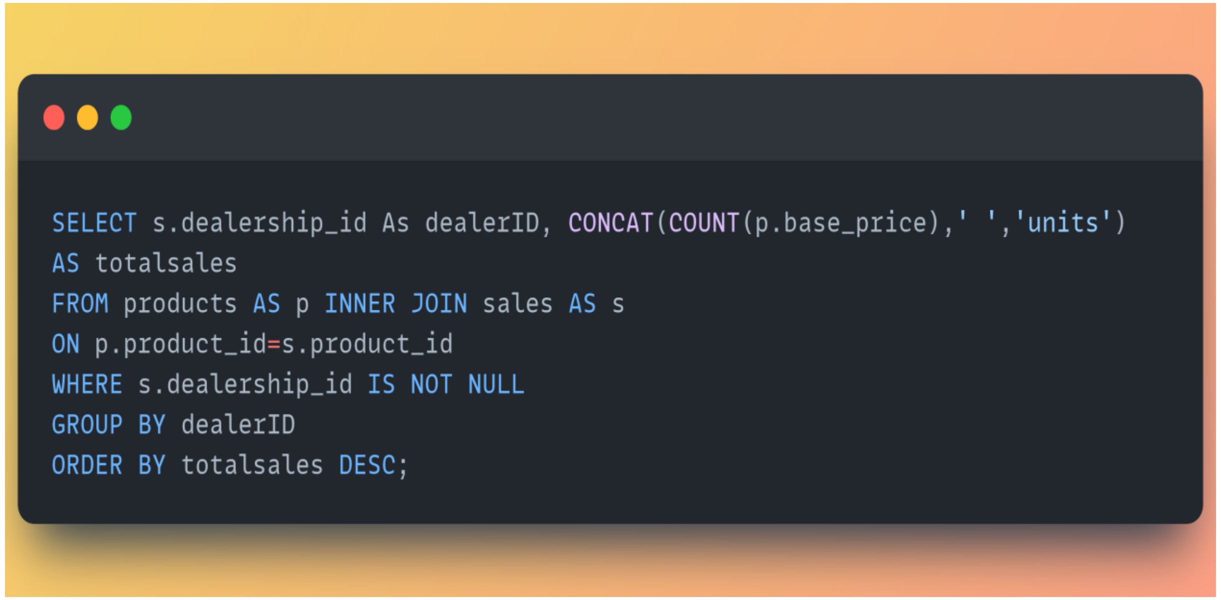
```
%sales
30.3
```

PROBLEMS & QUERIES

PROBLEM-5

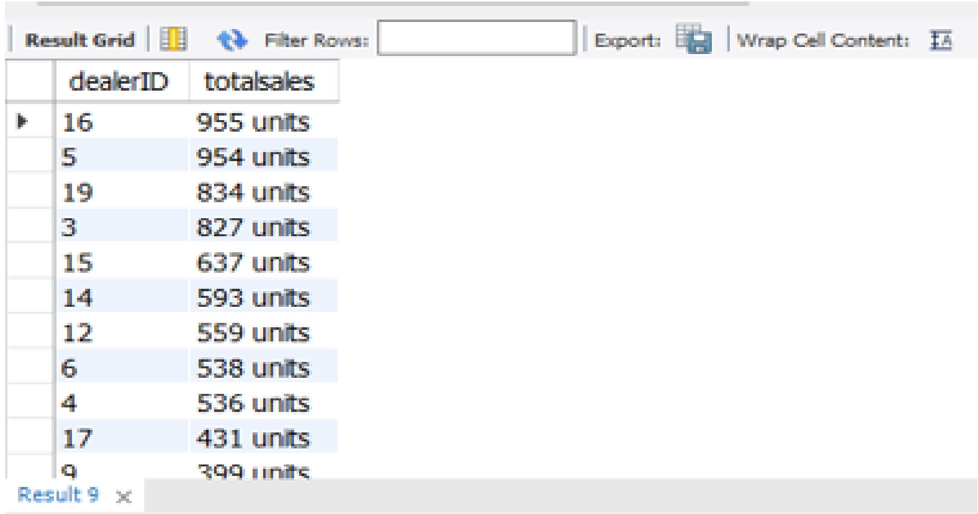
CALCULATE THE TOTAL SALES VOLUME OF SPRINT SCOOTERS FOR EACH DEALERSHIP

Query-5:



```sql
SELECT s.dealership_id As dealerID, CONCAT(COUNT(p.base_price),' ','units')
AS totalsales
FROM products AS p INNER JOIN sales AS s
ON p.product_id=s.product_id
WHERE s.dealership_id IS NOT NULL
GROUP BY dealerID
ORDER BY totalsales DESC;
```

Output-5:



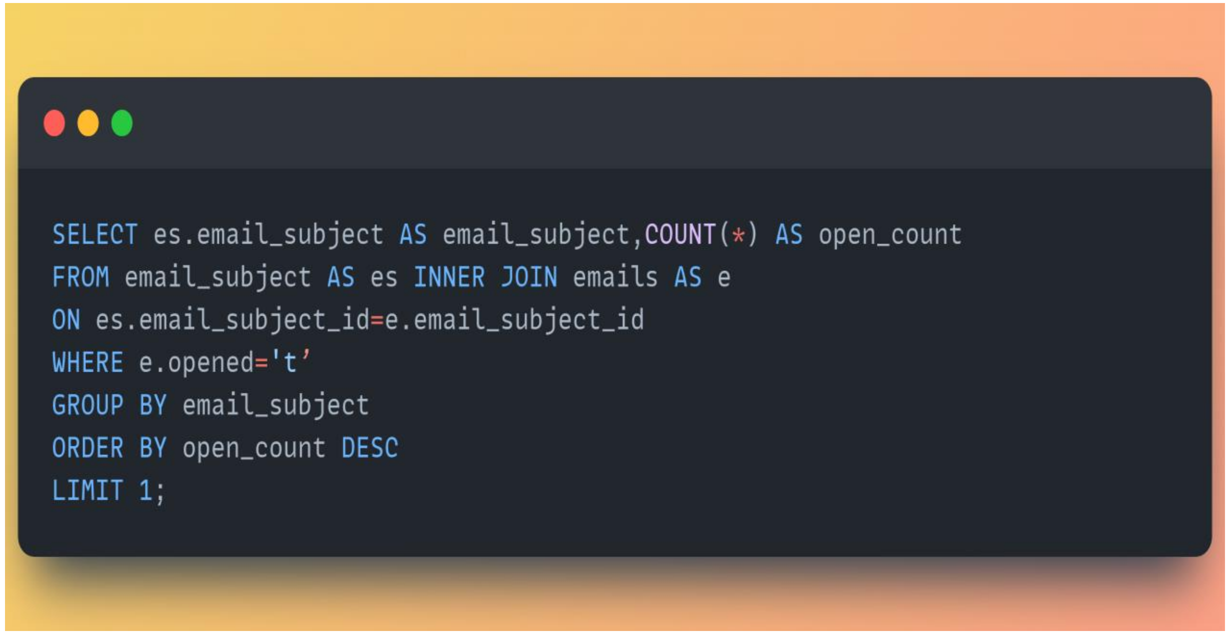
dealerID	totalsales
16	955 units
5	954 units
19	834 units
3	827 units
15	637 units
14	593 units
12	559 units
6	538 units
4	536 units
17	431 units
9	399 units

PROBLEMS & QUERIES

PROBLEM-6

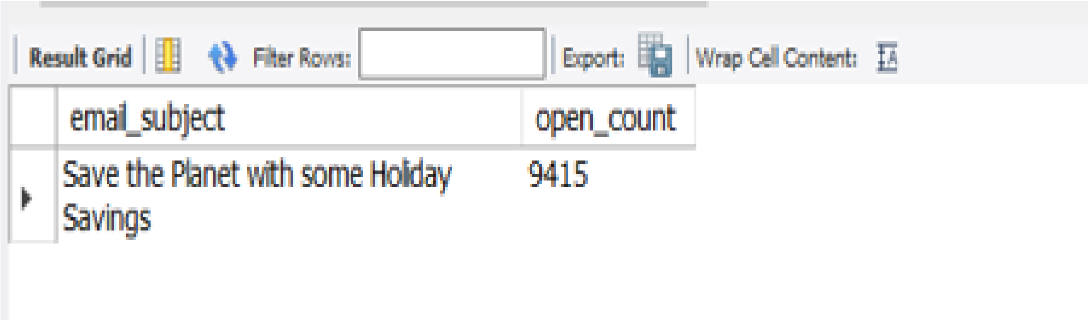
FIND THE EMAIL SUBJECT THAT WAS OPENED THE MOST

Query-6:



```sql
SELECT es.email_subject AS email_subject,COUNT(*) AS open_count
FROM email_subject AS es INNER JOIN emails AS e
ON es.email_subject_id=e.email_subject_id
WHERE e.opened='t’
GROUP BY email_subject
ORDER BY open_count DESC
LIMIT 1;
```

Output-6:



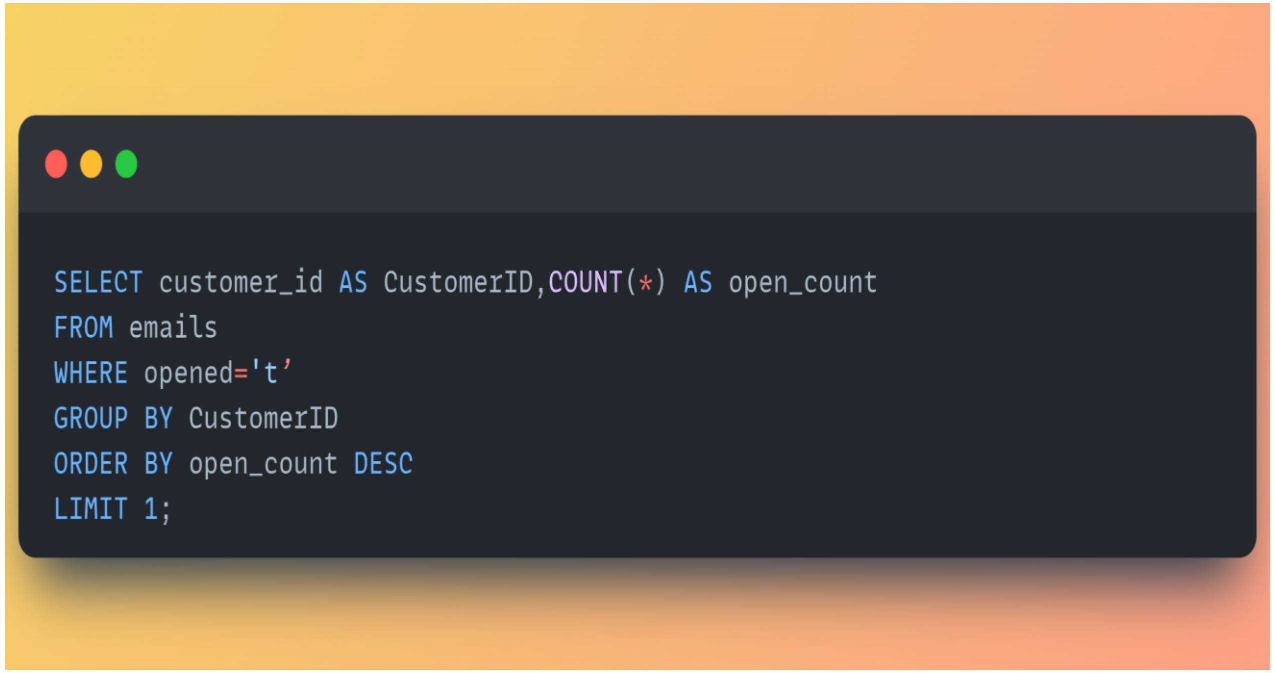
email_subject	open_count
Save the Planet with some Holiday Savings	9415

PROBLEMS & QUERIES

PROBLEM-7

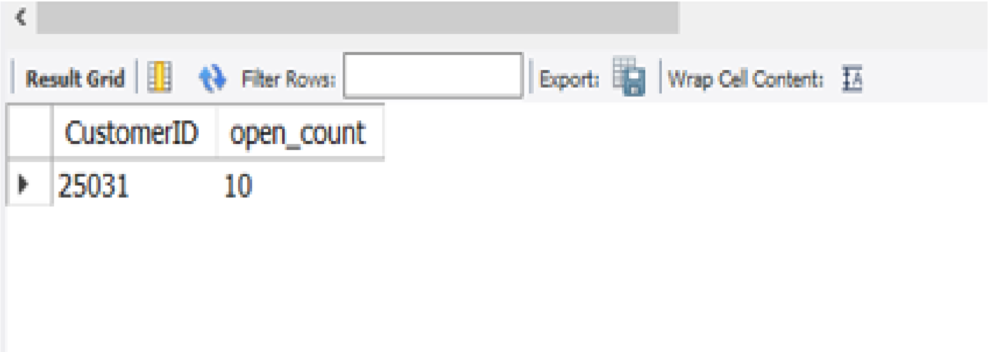
IDENTIFY THE CUSTOMER WHO OPENED THE MOST EMAILS

Query-7:



```
SELECT customer_id AS CustomerID,COUNT(*) AS open_count
FROM emails
WHERE opened='t’
GROUP BY CustomerID
ORDER BY open_count DESC
LIMIT 1;
```

Output-7:



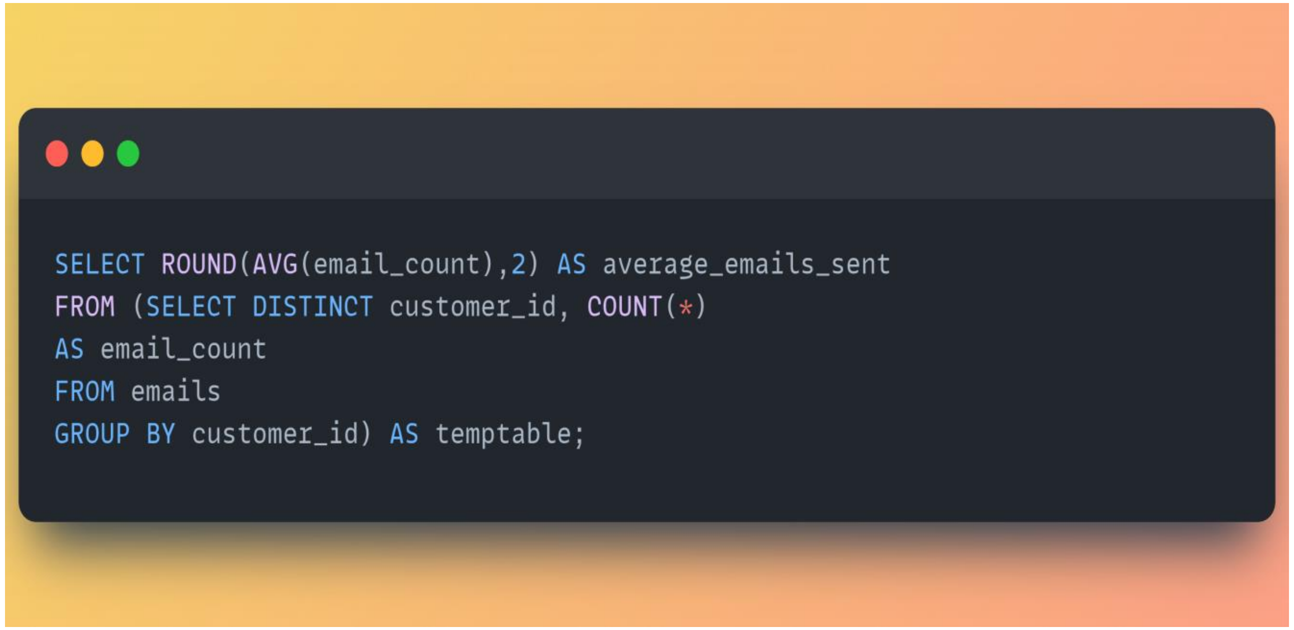
CustomerID	open_count
25031	10

PROBLEMS & QUERIES

PROBLEM-8

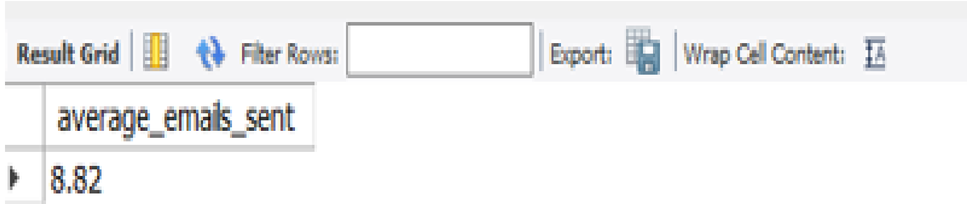
CALCULATE THE AVERAGE NUMBER OF EMAILS SENT PER CUSTOMER

Query-8:



```
SELECT ROUND(AVG(email_count),2) AS average_emails_sent
FROM (SELECT DISTINCT customer_id, COUNT(*)
AS email_count
FROM emails
GROUP BY customer_id) AS temptable;
```

Output-8:



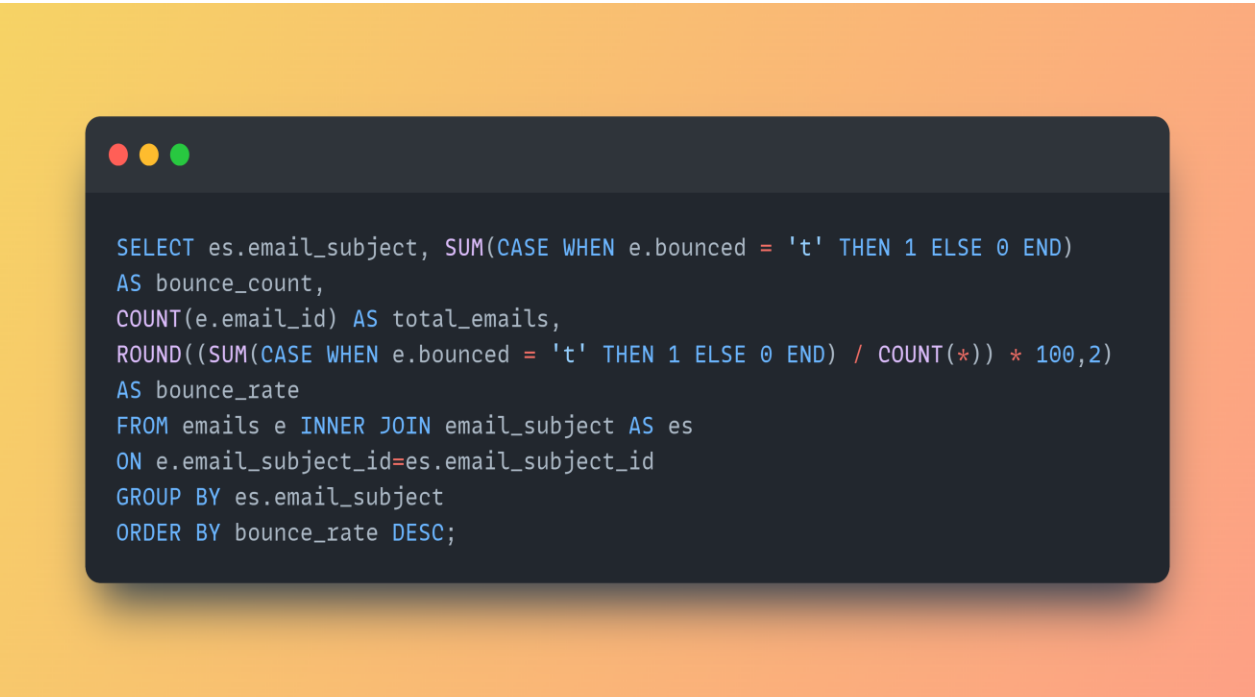
average_emails_sent
8.82

PROBLEMS & QUERIES

PROBLEM-9

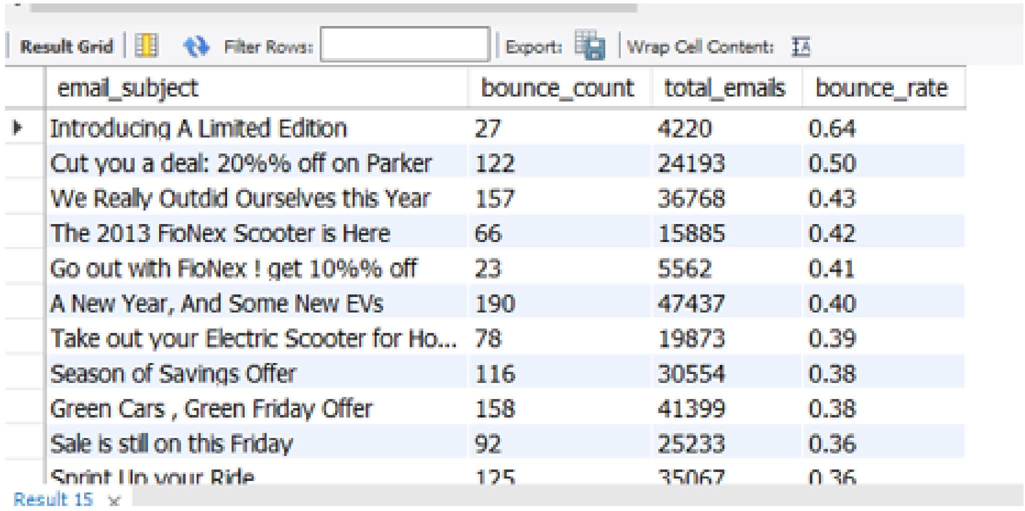
CALCULATE THE BOUNCE RATE FOR EACH EMAIL SUBJECT

Query-9:



```
SELECT es.email_subject, SUM(CASE WHEN e.bounced = 't' THEN 1 ELSE 0 END)
AS bounce_count,
COUNT(e.email_id) AS total_emails,
ROUND((SUM(CASE WHEN e.bounced = 't' THEN 1 ELSE 0 END) / COUNT(*)) * 100,2)
AS bounce_rate
FROM emails e INNER JOIN email_subject AS es
ON e.email_subject_id=es.email_subject_id
GROUP BY es.email_subject
ORDER BY bounce_rate DESC;
```

Output-9:



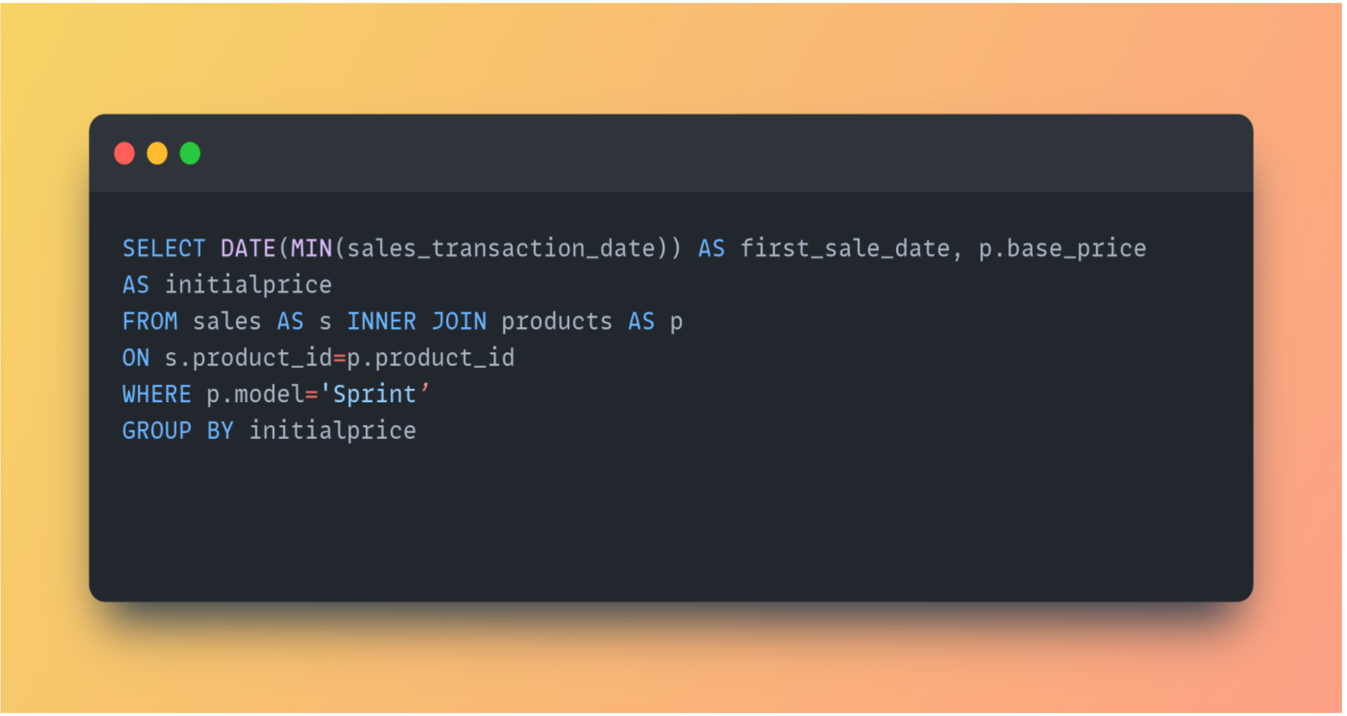
email_subject	bounce_count	total_emails	bounce_rate
Introducing A Limited Edition	27	4220	0.64
Cut you a deal: 20%% off on Parker	122	24193	0.50
We Really Outdid Ourselves this Year	157	36768	0.43
The 2013 FioNex Scooter is Here	66	15885	0.42
Go out with FioNex ! get 10%% off	23	5562	0.41
A New Year, And Some New EVs	190	47437	0.40
Take out your Electric Scooter for Ho...	78	19873	0.39
Season of Savings Offer	116	30554	0.38
Green Cars , Green Friday Offer	158	41399	0.38
Sale is still on this Friday	92	25233	0.36
Sprint Up your Ride	125	35067	0.36

PROBLEMS & QUERIES

PROBLEM-10

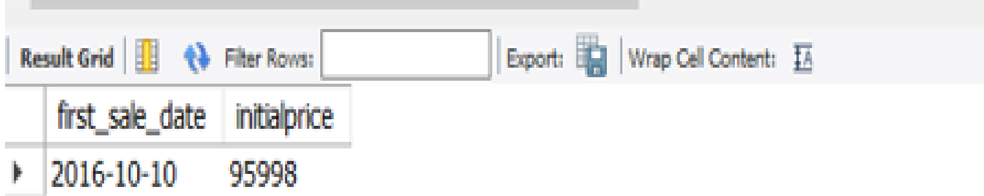
FIND THE DATE ON WHICH THE FIRST SPRINT SCOOTER WAS SOLD,WHAT WAS IT'S PRICE ON THAT TIME

Query-10:



```sql
SELECT DATE(MIN(sales_transaction_date)) AS first_sale_date, p.base_price
AS initialprice
FROM sales AS s INNER JOIN products AS p
ON s.product_id=p.product_id
WHERE p.model='Sprint’
GROUP BY initialprice
```

Output-10:



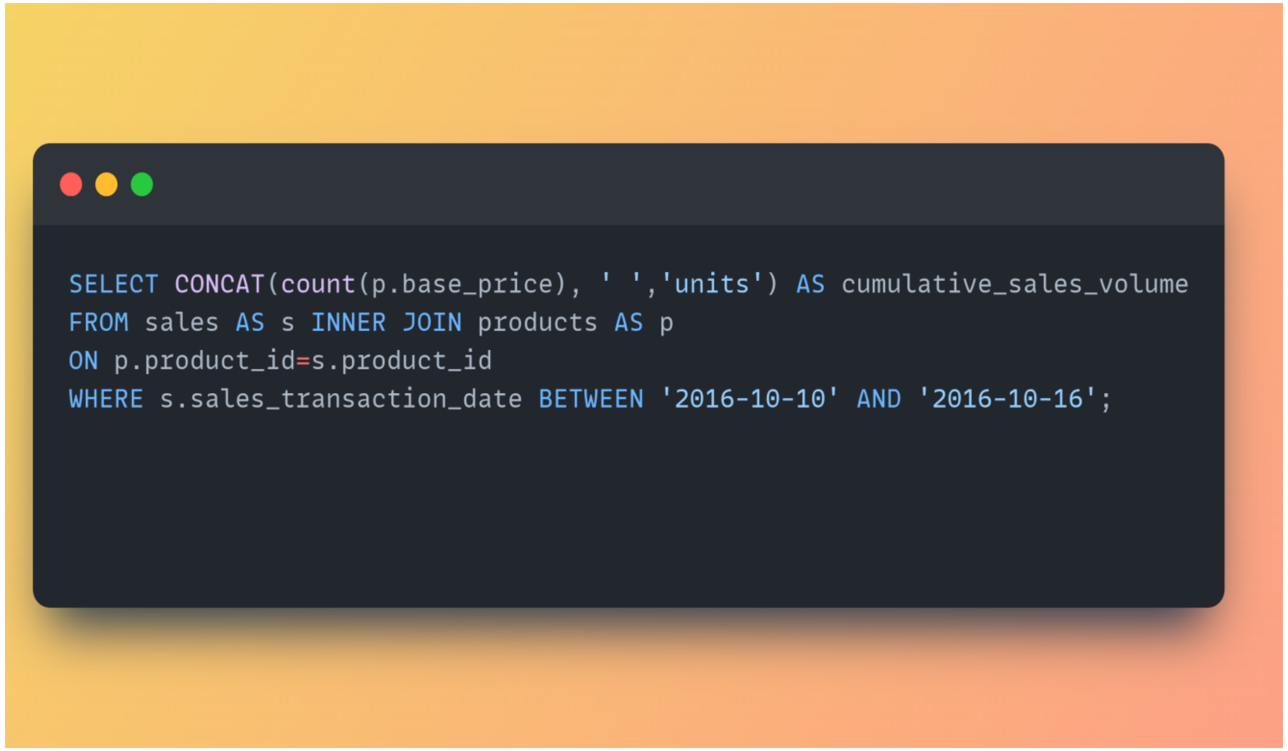
first_sale_date	initialprice
2016-10-10	95998

PROBLEMS & QUERIES

PROBLEM-11

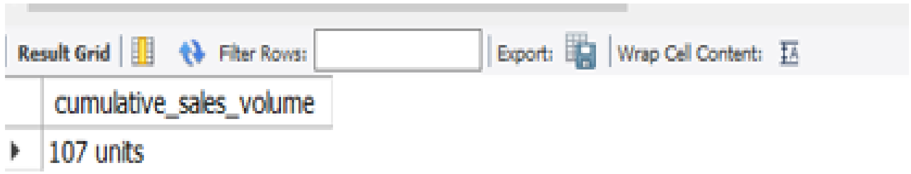
WHAT IS THE CUMULATIVE SALES VOLUME (IN UNITS) FOR THE FIRST 7 DAYS BETWEEN 10- 10 -2016 AND 16-10-2016?

Query-11:



```
SELECT CONCAT(count(p.base_price), ' ','units') AS cumulative_sales_volume
FROM sales AS s INNER JOIN products AS p
ON p.product_id=s.product_id
WHERE s.sales_transaction_date BETWEEN '2016-10-10' AND '2016-10-16';
```

Output-11:



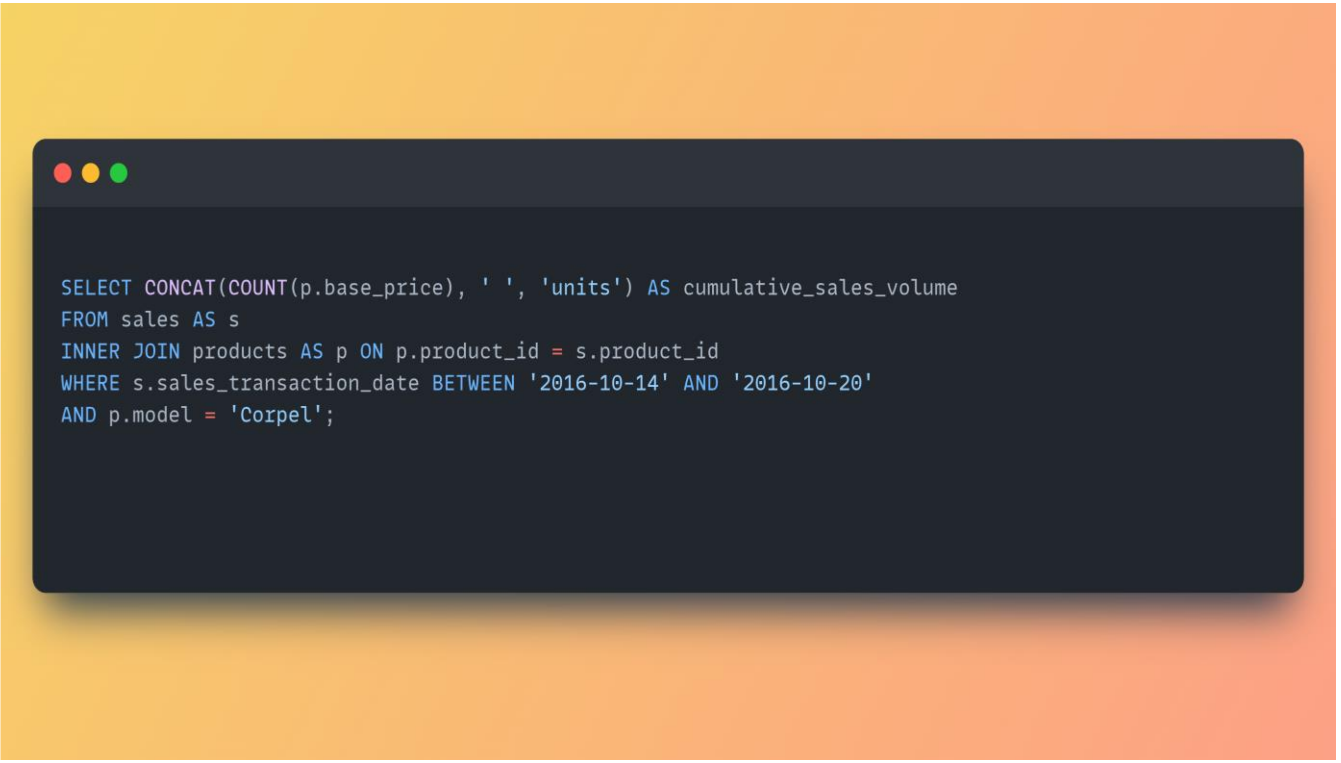
cumulative_sales_volume
107 units

PROBLEMS & QUERIES

PROBLEM-12

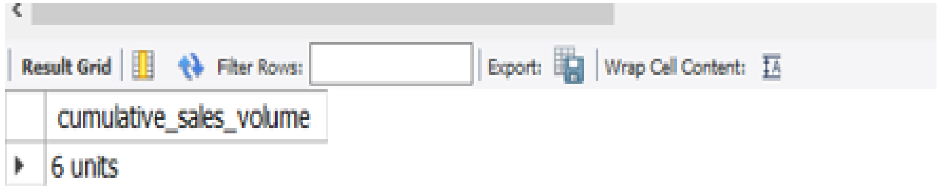
ON 20TH OCT, WHAT ARE THE LAST 7 DAYS' CUMULATIVE SALES OF CORPEL AUTOMOBILE (IN UNITS)?

Query-12:



```sql
SELECT CONCAT(COUNT(p.base_price), ' ', 'units') AS cumulative_sales_volume
FROM sales AS s
INNER JOIN products AS p ON p.product_id = s.product_id
WHERE s.sales_transaction_date BETWEEN '2016-10-14' AND '2016-10-20'
AND p.model = 'Corpel';
```

Output-12:



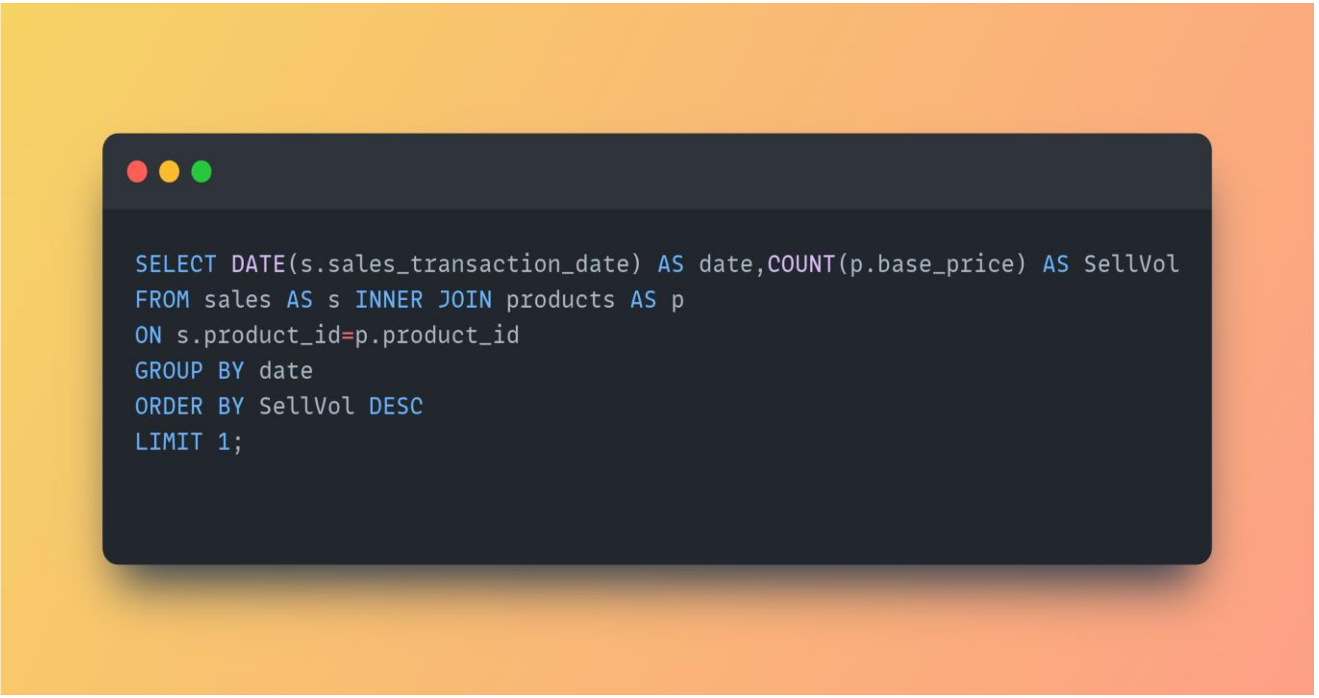
cumulative_sales_volume
6 units

PROBLEMS & QUERIES

PROBLEM-13

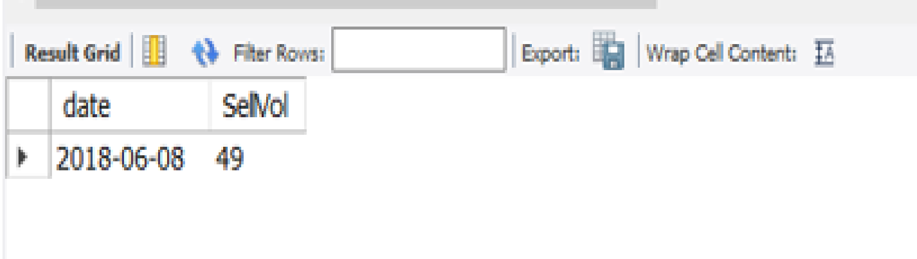
ON WHICH DATE DID THE SALES VOLUME REACH ITS HIGHEST POINT?

Query-13:



```sql
SELECT DATE(s.sales_transaction_date) AS date,COUNT(p.base_price) AS SellVol
FROM sales AS s INNER JOIN products AS p
ON s.product_id=p.product_id
GROUP BY date
ORDER BY SellVol DESC
LIMIT 1;
```

Output-13:



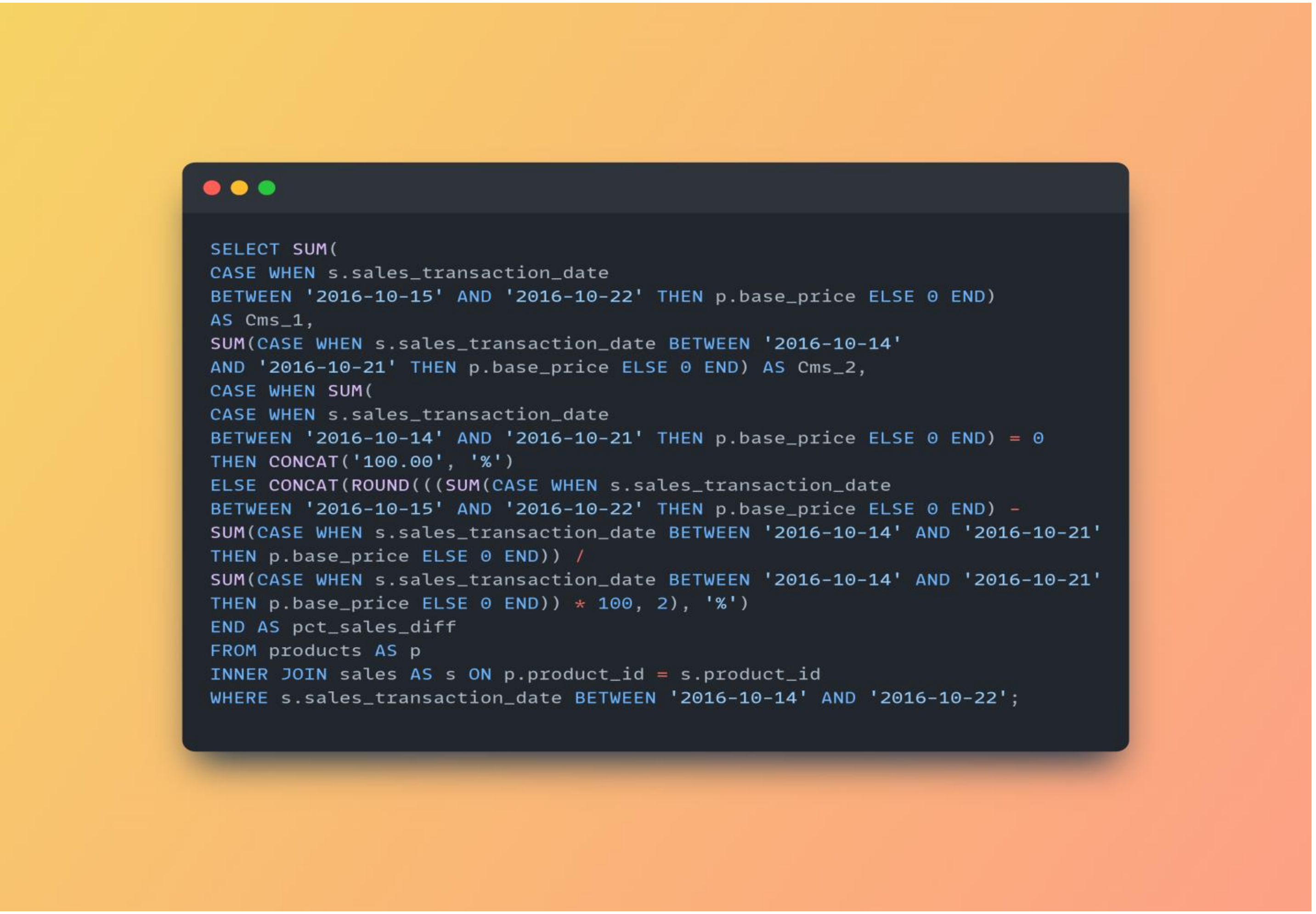
date	SelVol
2018-06-08	49

PROBLEMS & QUERIES

PROBLEM-14

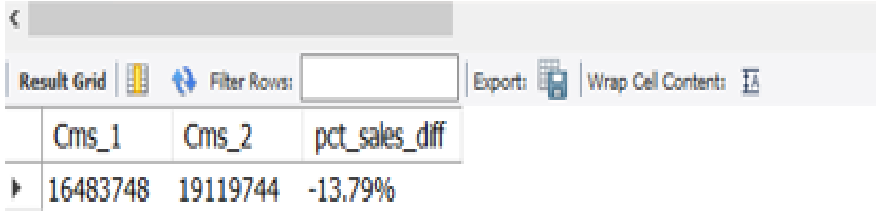
ON 22-10-2016 BY WHAT PERCENTAGE, CUMULATIVE SALES OF LAST 7 DAYS DROPPED COMPARED TO LAST 7 DAYS CUMULATIVE SALES ON 21-10-2016?

Query-14:



```
SELECT SUM(
CASE WHEN s.sales_transaction_date
BETWEEN '2016-10-15' AND '2016-10-22' THEN p.base_price ELSE 0 END)
AS Cms_1,
SUM(CASE WHEN s.sales_transaction_date BETWEEN '2016-10-14'
AND '2016-10-21' THEN p.base_price ELSE 0 END) AS Cms_2,
CASE WHEN SUM(
CASE WHEN s.sales_transaction_date
BETWEEN '2016-10-14' AND '2016-10-21' THEN p.base_price ELSE 0 END) = 0
THEN CONCAT('100.00', '%')
ELSE CONCAT(ROUND(((SUM(CASE WHEN s.sales_transaction_date
BETWEEN '2016-10-15' AND '2016-10-22' THEN p.base_price ELSE 0 END) -
SUM(CASE WHEN s.sales_transaction_date BETWEEN '2016-10-14' AND '2016-10-21'
THEN p.base_price ELSE 0 END)) /
SUM(CASE WHEN s.sales_transaction_date BETWEEN '2016-10-14' AND '2016-10-21'
THEN p.base_price ELSE 0 END)) * 100, 2), '%')
END AS pct_sales_diff
FROM products AS p
INNER JOIN sales AS s ON p.product_id = s.product_id
WHERE s.sales_transaction_date BETWEEN '2016-10-14' AND '2016-10-22';
```

Output-14:



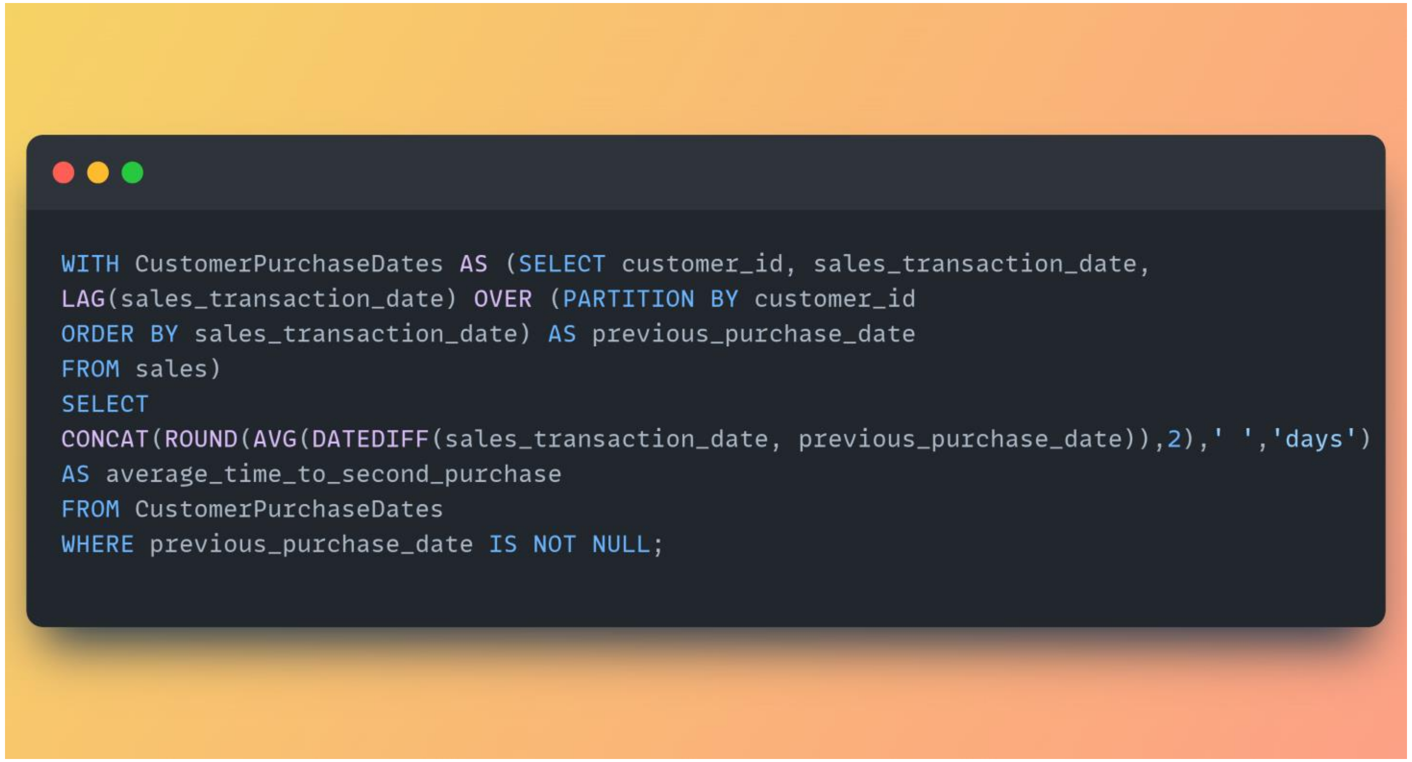
Cms_1	Cms_2	pct_sales_diff
16483748	19119744	-13.79%

PROBLEMS & QUERIES

PROBLEM-15

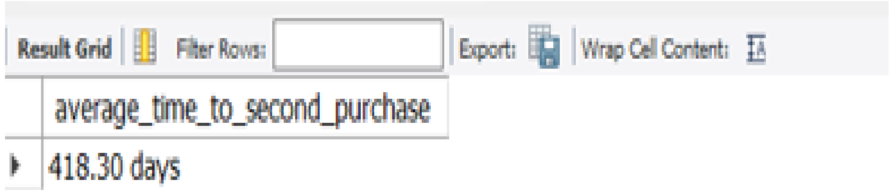
CALCULATE THE AVERAGE TIME IT TAKES FOR A CUSTOMER TO MAKE A SECOND PURCHASE

Query-15:



```
WITH CustomerPurchaseDates AS (SELECT customer_id, sales_transaction_date,
LAG(sales_transaction_date) OVER (PARTITION BY customer_id
ORDER BY sales_transaction_date) AS previous_purchase_date
FROM sales)
SELECT
CONCAT(ROUND(AVG(DATEDIFF(sales_transaction_date, previous_purchase_date)),2),' ','days')
AS average_time_to_second_purchase
FROM CustomerPurchaseDates
WHERE previous_purchase_date IS NOT NULL;
```

Output-15:



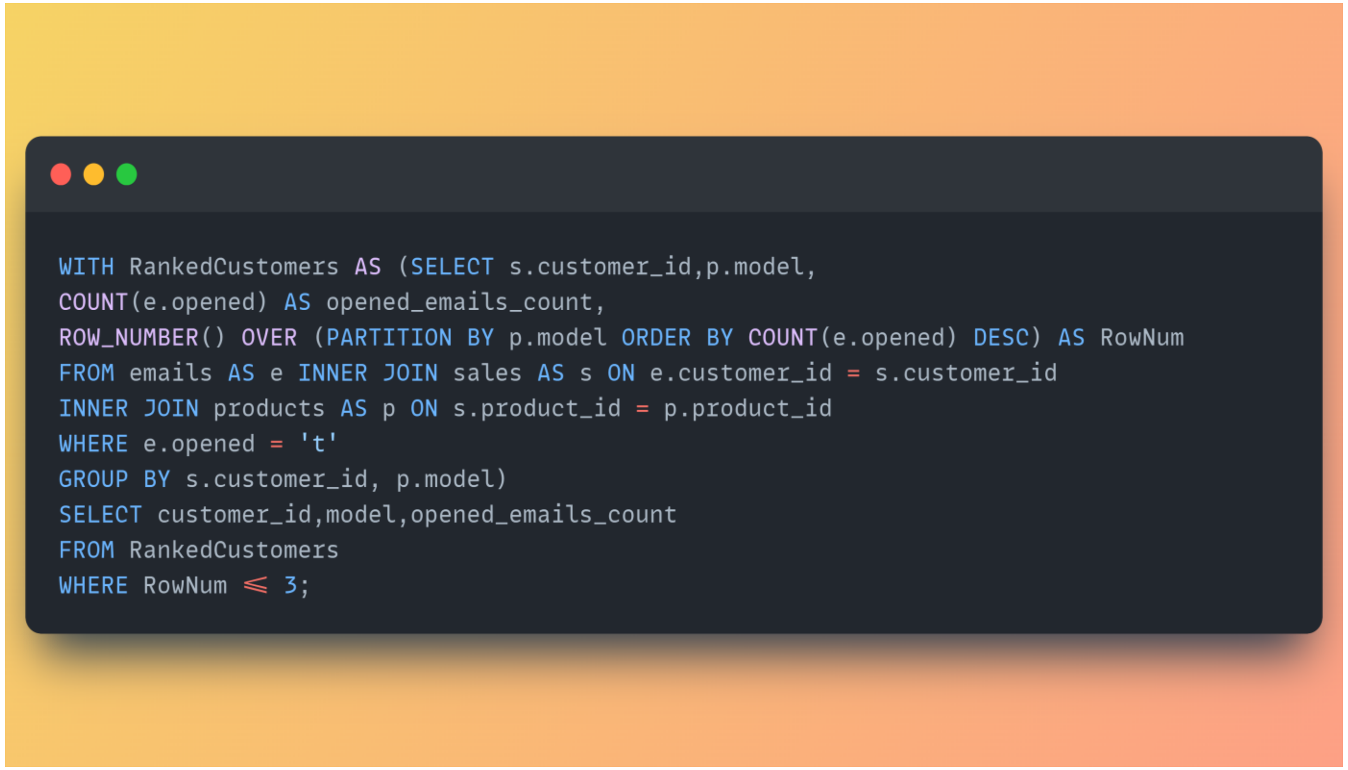
```
average_time_to_second_purchase
418.30 days
```

PROBLEMS & QUERIES

PROBLEM-16

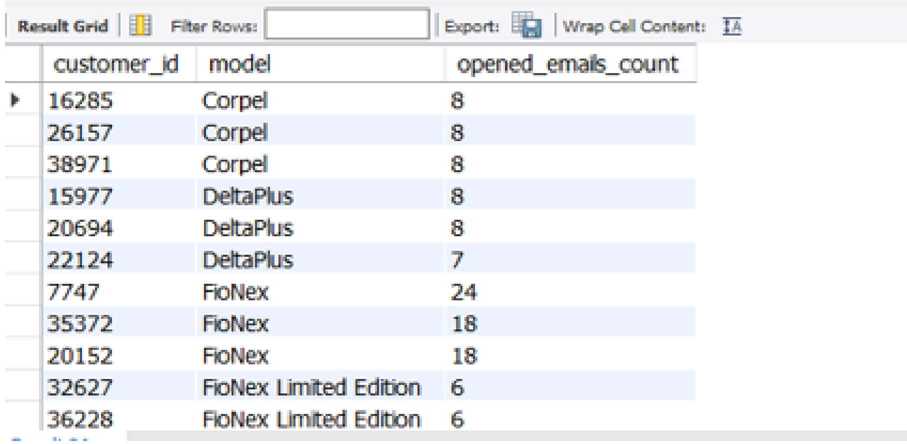
FIND THE TOP 3 CUSTOMERS WITH THE HIGHEST NUMBER OF OPENED EMAILS FOR EACH PRODUCT MODEL

Query-16:



```sql
WITH RankedCustomers AS (SELECT s.customer_id,p.model,
COUNT(e.opened) AS opened_emails_count,
ROW_NUMBER() OVER (PARTITION BY p.model ORDER BY COUNT(e.opened) DESC) AS RowNum
FROM emails AS e INNER JOIN sales AS s ON e.customer_id = s.customer_id
INNER JOIN products AS p ON s.product_id = p.product_id
WHERE e.opened = 't'
GROUP BY s.customer_id, p.model)
SELECT customer_id,model,opened_emails_count
FROM RankedCustomers
WHERE RowNum <= 3;
```

Output-16:



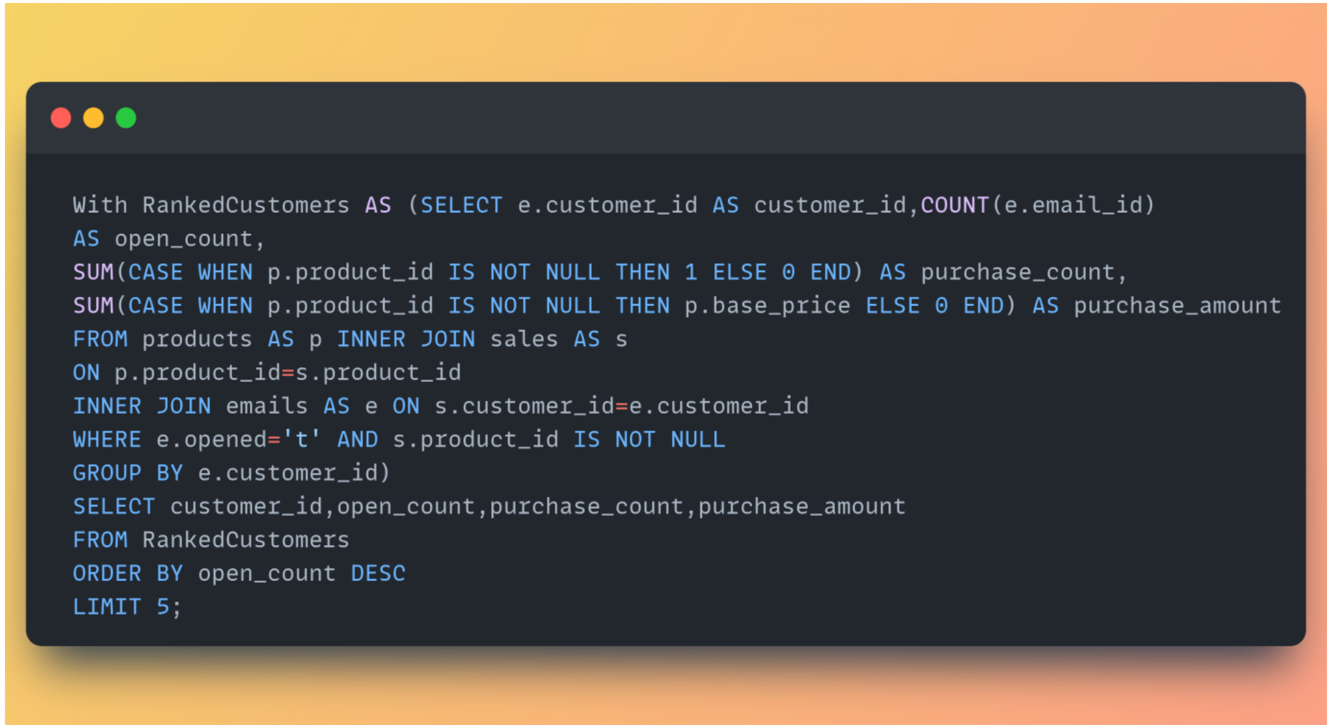
customer_id	model	opened_emails_count
16285	Corpel	8
26157	Corpel	8
38971	Corpel	8
15977	DeltaPlus	8
20694	DeltaPlus	8
22124	DeltaPlus	7
7747	FioNex	24
35372	FioNex	18
20152	FioNex	18
32627	FioNex Limited Edition	6
36228	FioNex Limited Edition	6

PROBLEMS & QUERIES

PROBLEM-17

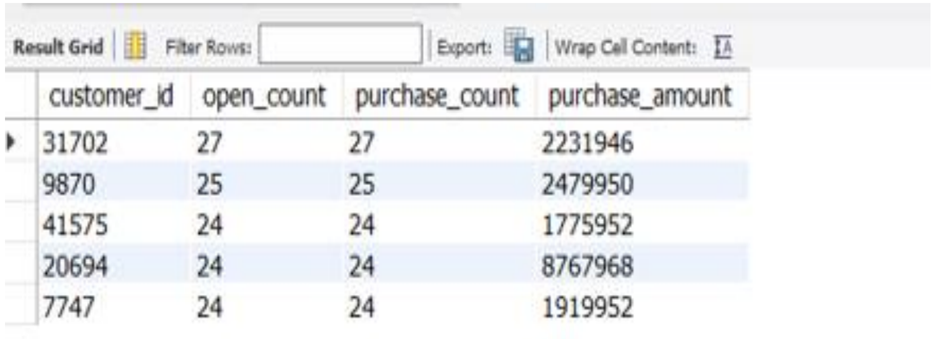
IDENTIFY THE TOP 5 CUSTOMERS WHO OPENED THE MOST EMAILS AND ALSO MADE A PURCHASE. INCLUDE THE NUMBER OF EMAILS OPENED AND THE TOTAL PURCHASE AMOUNT FOR EACH CUSTOMER

Query-17:



```
With RankedCustomers AS (SELECT e.customer_id AS customer_id,COUNT(e.email_id)
AS open_count,
SUM(CASE WHEN p.product_id IS NOT NULL THEN 1 ELSE 0 END) AS purchase_count,
SUM(CASE WHEN p.product_id IS NOT NULL THEN p.base_price ELSE 0 END) AS purchase_amount
FROM products AS p INNER JOIN sales AS s
ON p.product_id=s.product_id
INNER JOIN emails AS e ON s.customer_id=e.customer_id
WHERE e.opened='t' AND s.product_id IS NOT NULL
GROUP BY e.customer_id)
SELECT customer_id,open_count,purchase_count,purchase_amount
FROM RankedCustomers
ORDER BY open_count DESC
LIMIT 5;
```

Output-17:



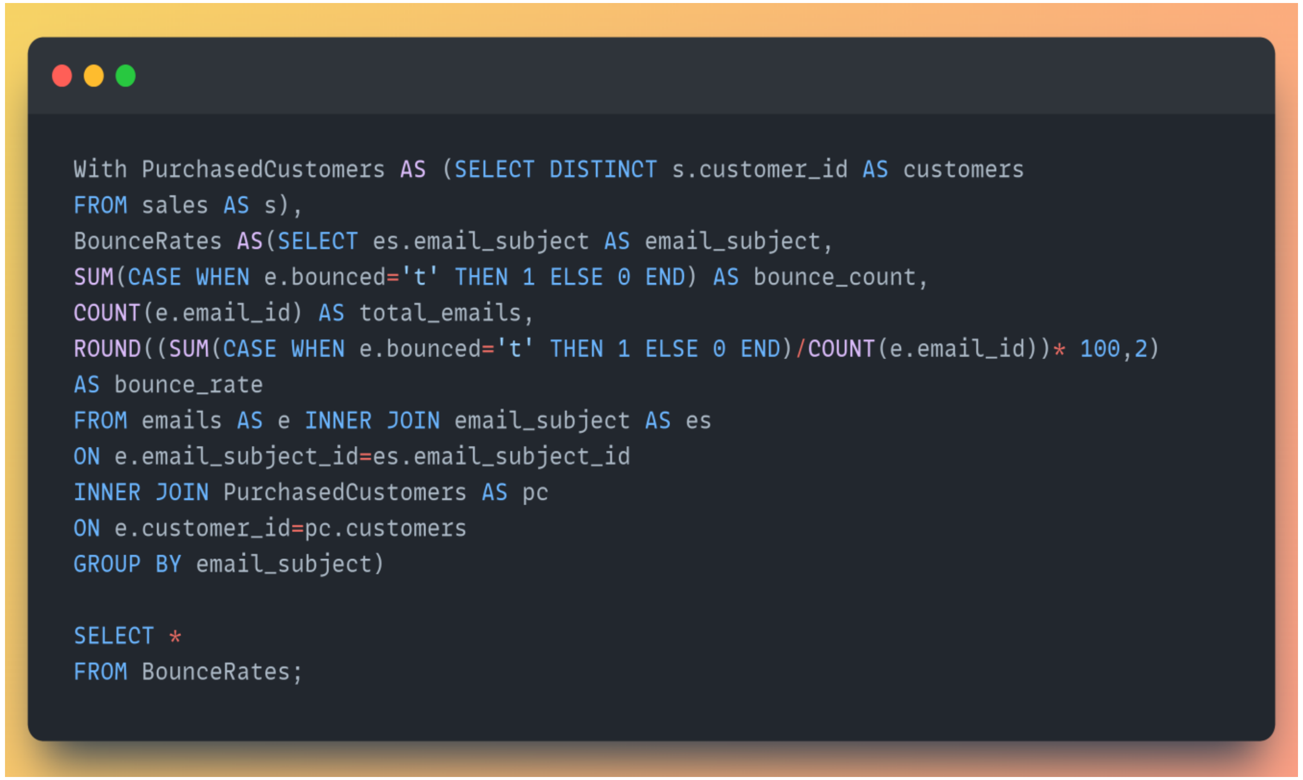
customer_id	open_count	purchase_count	purchase_amount
31702	27	27	2231946
9870	25	25	2479950
41575	24	24	1775952
20694	24	24	8767968
7747	24	24	1919952

PROBLEMS & QUERIES

PROBLEM-18

CALCULATE THE BOUNCE RATE FOR EACH EMAIL SUBJECT, CONSIDERING ONLY EMAILS SENT TO CUSTOMERS WHO HAVE MADE A PURCHASE.INCLUDE THE EMAIL SUBJECT AND THE BOUNCE RATE

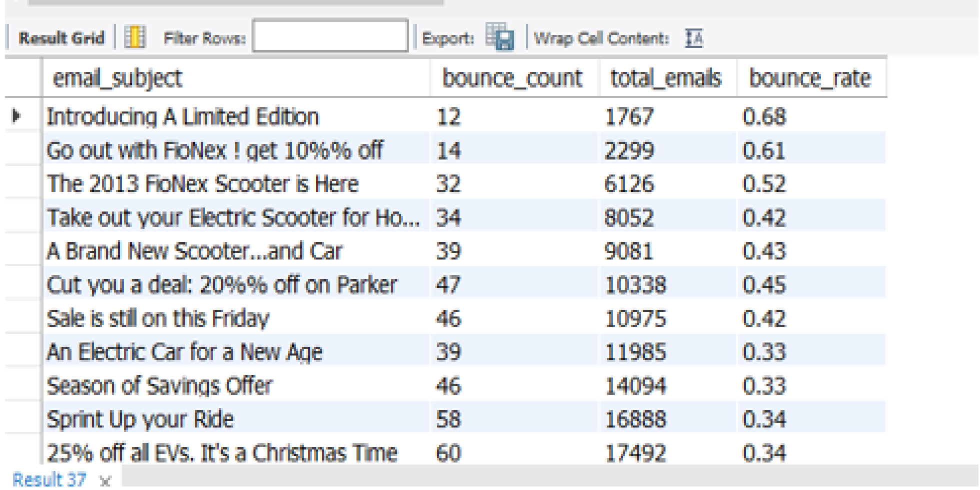
Query-18:



```
With PurchasedCustomers AS (SELECT DISTINCT s.customer_id AS customers
FROM sales AS s),
BounceRates AS(SELECT es.email_subject AS email_subject,
SUM(CASE WHEN e.bounced='t' THEN 1 ELSE 0 END) AS bounce_count,
COUNT(e.email_id) AS total_emails,
ROUND((SUM(CASE WHEN e.bounced='t' THEN 1 ELSE 0 END)/COUNT(e.email_id))* 100,2)
AS bounce_rate
FROM emails AS e INNER JOIN email_subject AS es
ON e.email_subject_id=es.email_subject_id
INNER JOIN PurchasedCustomers AS pc
ON e.customer_id=pc.customers
GROUP BY email_subject)

SELECT *
FROM BounceRates;
```

Output-18:



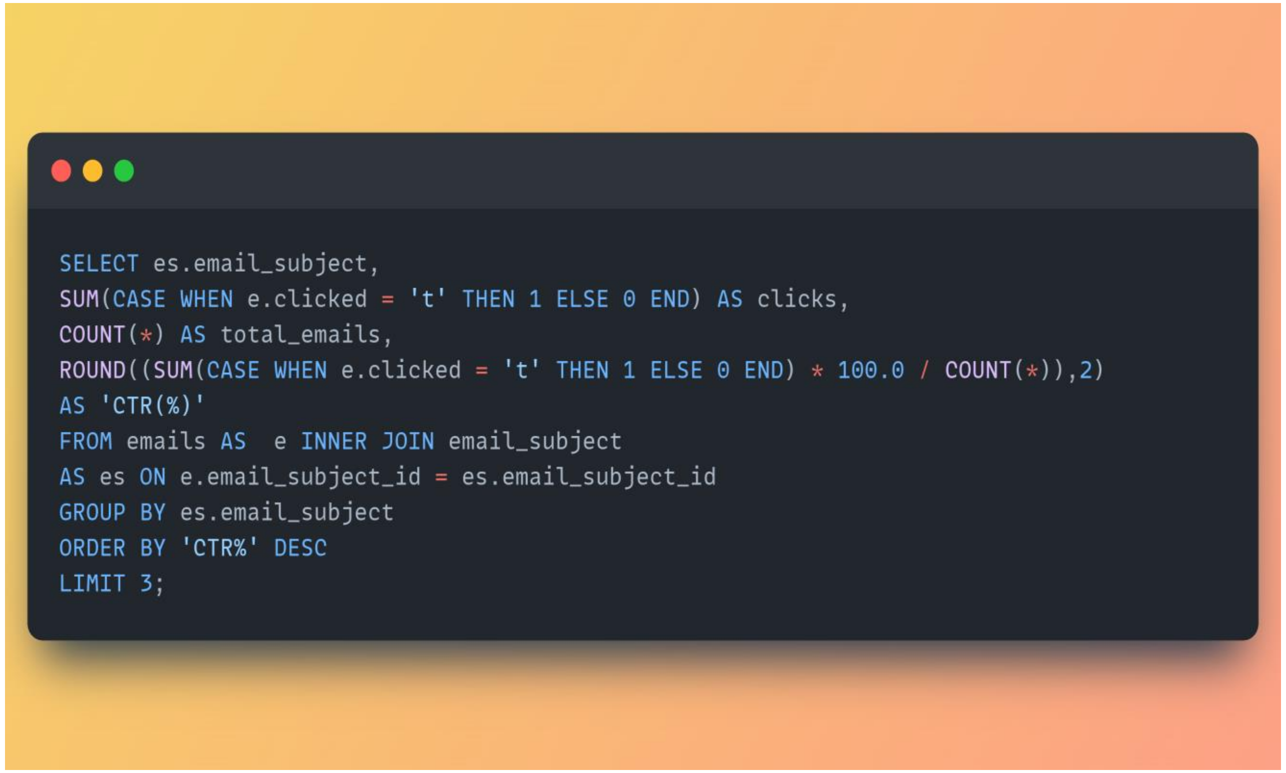
email_subject	bounce_count	total_emails	bounce_rate
Introducing A Limited Edition	12	1767	0.68
Go out with FioNex ! get 10%% off	14	2299	0.61
The 2013 FioNex Scooter is Here	32	6126	0.52
Take out your Electric Scooter for Ho...	34	8052	0.42
A Brand New Scooter...and Car	39	9081	0.43
Cut you a deal: 20%% off on Parker	47	10338	0.45
Sale is still on this Friday	46	10975	0.42
An Electric Car for a New Age	39	11985	0.33
Season of Savings Offer	46	14094	0.33
Sprint Up your Ride	58	16888	0.34
25% off all EVs. It's a Christmas Time	60	17492	0.34

PROBLEMS & QUERIES

PROBLEM-19

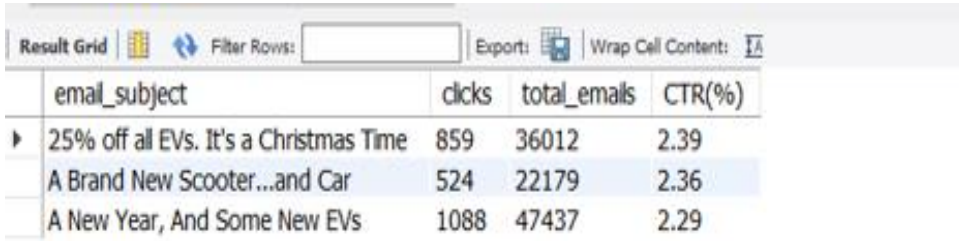
CALCULATE THE CLICK-THROUGH RATE (CTR) FOR TOP 2 EMAIL ADVERTISEMENT SUBJECT

Query-19:



```
SELECT es.email_subject,
SUM(CASE WHEN e.clicked = 't' THEN 1 ELSE 0 END) AS clicks,
COUNT(*) AS total_emails,
ROUND((SUM(CASE WHEN e.clicked = 't' THEN 1 ELSE 0 END) * 100.0 / COUNT(*)),2)
AS 'CTR(%)'
FROM emails AS  e INNER JOIN email_subject
AS es ON e.email_subject_id = es.email_subject_id
GROUP BY es.email_subject
ORDER BY 'CTR%' DESC
LIMIT 3;
```

Output-19:



email_subject	clicks	total_emails	CTR(%)
25% off all EVs. It's a Christmas Time	859	36012	2.39
A Brand New Scooter...and Car	524	22179	2.36
A New Year, And Some New EVs	1088	47437	2.29

INSIGHTS

WHAT DID I FIND?

This entire project has yielded intriguing and valuable insights that can assist the business in tracking its progress and accelerating its growth.

- In 2016, the **Sprint Scooter** model generated approximately $56.25 million in revenue, contributing to **30.3%** of total electric vehicle scooter sales.
- The month **of September in 2016** had the highest total sales revenue, reaching **$100.05** million.
- The first Sprint Scooter was sold on **October 10, 2016**, at an initial price of $95,998.
- The cumulative sales volume for the first 7 days between October 10, 2016, and October 16, 2016, was **107 units.**
- On October 20, 2016, the cumulative sales volume for Corpel automobiles was 6 units over the last 7 days.
- The highest sales volume date was June 8, 2018, **with 49 units sold**.
- The email subject **"Save the Planet with some Holiday Savings"** had the highest open count, with 9,415 opens.

INSIGHTS

WHAT DID I FIND?

This entire project has yielded intriguing and valuable insights that can assist the business in tracking its progress and accelerating its growth.

- **Customer 25031** opened the most emails, with a total of 10 opens.
- On average, customers took approximately **418.30 days** to make their second purchase.
- The top 3 customers with the **highest number of opened emails** for each product model were identified.
- The top 5 customers who **opened the most emails and also made a purchase** were listed, along with their purchase counts and amounts.
- **Bounce rates** for each email subject were calculated, considering only emails sent to customers who made a purchase.
- The click-through rates (CTR) for the top 2 email advertisement subjects were calculated, with **"25% off all EVs. It's a Christmas Time" having the highest CTR at 2.39%.**

CONCLUSIONS

SO WHAT'S NEXT?

To engage in more successful business, the company should:

- **Leverage Product Success:** Invest in the Sprint Scooter line and consider similar premium launches.
- **Capitalizing on Seasonality:** Plan marketing campaigns around peak sales months, like September.
- **Promotions Strategy:** Continue with engaging email subject lines for better customer engagement.
- **Customer Retention:** Work on strategies to reduce the time between first and second purchases.
- **Data-Driven Marketing:** Focus on personalized marketing efforts for top customers and product models.
- **CTR Optimization:** Analyze and replicate successful email ad campaigns for higher CTR.

ACHIEVEMENTS

WHAT DID I LEARN?

This project has provided a platform for significant achievements and personal growth, offering valuable insights and learnings,

- **Data-Driven Expertise:** Developed strong data analysis skills, enabling me to extract valuable insights and make informed decisions.
- **Strategic Acumen:** Enhanced strategic thinking, contributing to project success and business growth.
- **Marketing Proficiency:** Gained expertise in marketing strategies, including campaign timing and customer engagement.
- **Pricing Strategies:** Acquired knowledge of how pricing impacts product performance in the market.
- **Customer Focus:** Embraced a customer-centric approach, improving loyalty and satisfaction.
- **Continuous Improvement:** Embraced the concept of continuous improvement, refining strategies for better results.
- **Adaptability:** Learned to adapt strategies based on data insights and changing market conditions.
- **Success Replication:** Recognized the effectiveness of replicating successful campaigns for consistent growth.

THANK YOU

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