New Wheels Project

Introduction to SQL

Problem Statement

Business Context

A lot of people in the world share a common desire: to own a vehicle. A car or an automobile is seen as an object that gives the freedom of mobility. Many now prefer pre-owned vehicles because they come at an affordable cost, but at the same time, they are also concerned about whether the after-sales service provided by the resale vendors is as good as the care you may get from the actual manufacturers.

New-Wheels, a vehicle resale company, has launched an app with an end-to-end service from listing the vehicle on the platform to shipping it to the customer's location. This app also captures the overall after-sales feedback given by the customer.

Objective

New-Wheels sales have been dipping steadily in the past year, and due to the critical customer feedback and ratings online, there has been a drop in new customers every quarter, which is concerning to the business. The CEO of the company now wants a quarterly report with all the key metrics sent to him so he can assess the health of the business and make the necessary decisions.

As a data analyst, you see that there is an array of questions that are being asked at the leadership level that need to be answered using data. Import the dump file that contains various tables that are present in the database. Use the data to answer the questions posed and create a quarterly business report for the CEO.

Business Questions

Question 1: Find the total number of customers who have placed orders. What is the distribution of the customers across states?

Solution Query:

Total number of customers who placed orders:

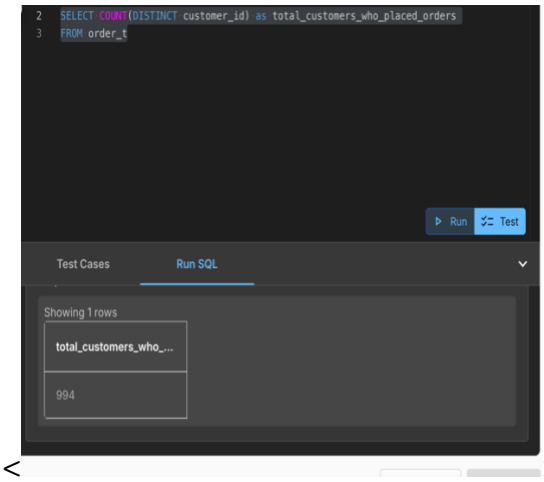
```
SELECT COUNT(DISTINCT customer_id) as total_customers_who_placed_orders
FROM order_t
```

Distribution across states:

```
SELECT state, COUNT(customer_id) as customer_count
FROM customer_t
GROUP BY state
ORDER BY customer_count DESC;
```

Output:

Total customers:



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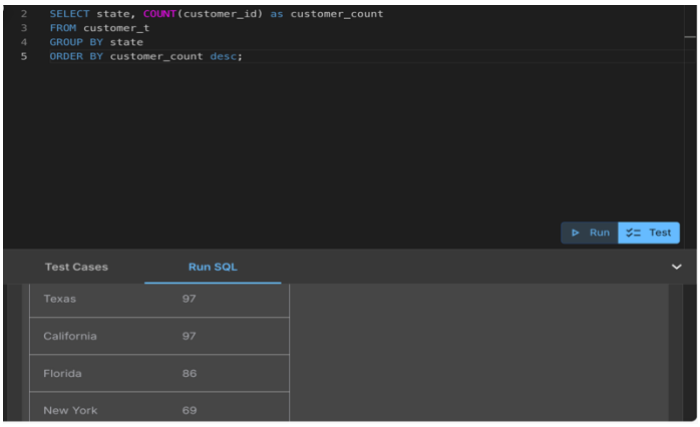
Distribution:



Observations and Insights:

- Texas, Cali, Florida, and New York are very high populated areas where the most orders were placed. Advertising should be focused here to continue to expand customer base.

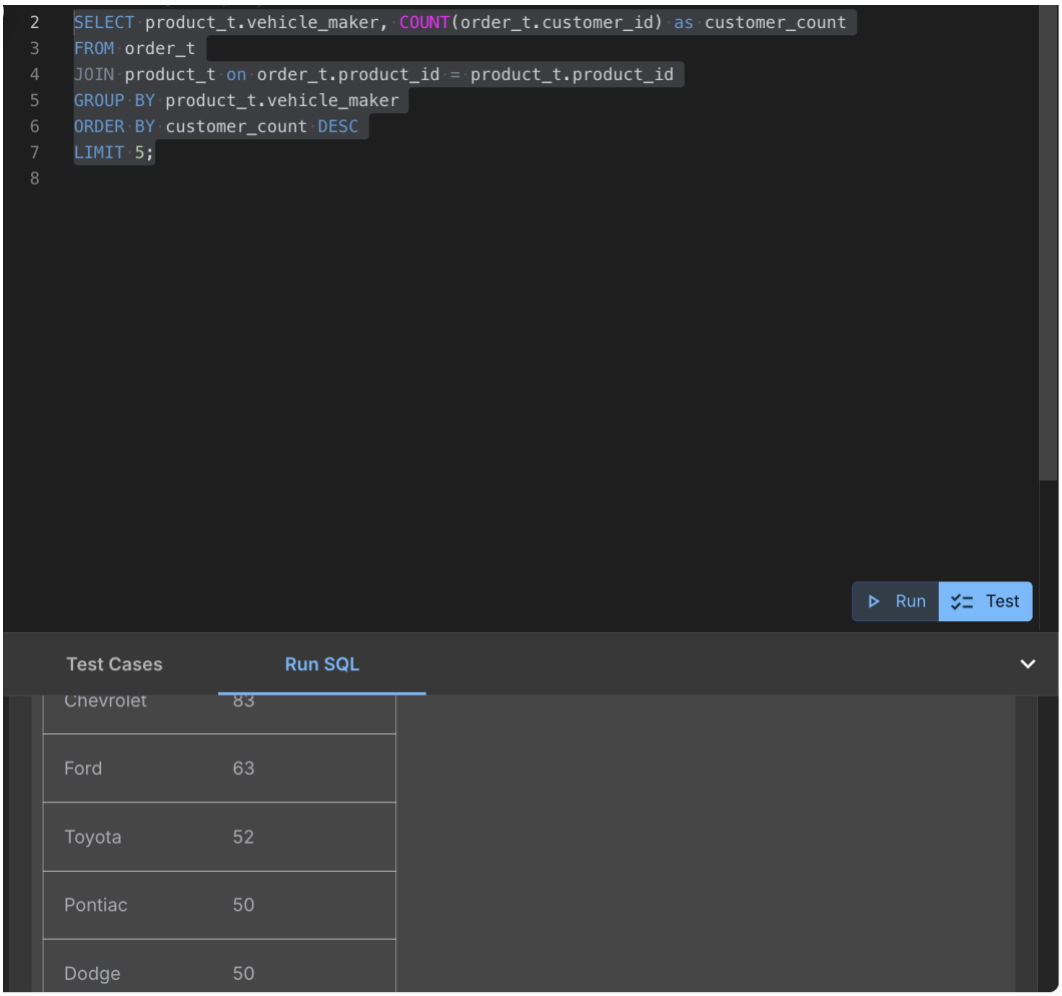
- These areas are where New wheels could think about establishing some sort of incentives like trade ins or loyalty programs
- Establish delivery centers in these states to streamline and reduce delivery times.

Question 2: Which are the top 5 vehicle makers preferred by the customers?

Solution Query:

```
SELECT product_t.vehicle_maker, COUNT(order_t.customer_id) as customer_count
FROM order_t
JOIN product_t on order_t.product_id = product_t.product_id
GROUP BY product_t.vehicle_maker
ORDER BY customer_count DESC
LIMIT 5;
```

Output:



Observations and Insights:

- These brands being preferred could be signs for some sort of partnership in the future.
- These brands could help with the incentive of the loyalty programs as they are preferred and likely to lead to a repeat customer.
- Focus more on carrying these types of vehicles at all times for improved customer satisfaction.

Question 3: Which is the most preferred vehicle maker in each state?

Solution Query:

```
SELECT
  state,
  vehicle_maker,
  order_count
FROM (
  SELECT
    customer_t.state,
    product_t.vehicle_maker,
    COUNT(order_t.order_id) AS order_count,
    ROW_NUMBER() OVER (
      PARTITION BY customer_t.state
      ORDER BY COUNT(order_t.order_id) DESC
    ) AS rn
  FROM
    customer_t
    JOIN order_t ON customer_t.customer_id = order_t.customer_id
    JOIN product_t ON order_t.product_id = product_t.product_id
  GROUP BY
    customer_t.state,
    product_t.vehicle_maker
) ranked
WHERE rn = 1
ORDER BY state;
```

Output:

Alaska	Chevrolet	2
Arizona	Pontiac	3
Arkansas	Volkswagen	1
California	Nissan	6
Colorado	Chevrolet	5

Observations and Insights:

- Chevrolet dominates in most states
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Question 4: Find the overall average rating given by the customers. What is the average rating in each quarter?

Consider the following mapping for ratings: “Very Bad”: 1, “Bad”: 2, “Okay”: 3, “Good”: 4, “Very Good”: 5

Solution Query:

AVG Rating by Customers Query:

```
SELECT
  AVG(
    CASE customer_feedback
      WHEN 'Very Bad' THEN 1
      WHEN 'Bad' THEN 2
      WHEN 'Okay' THEN 3
      WHEN 'Good' THEN 4
      WHEN 'Very Good' THEN 5
      ELSE NULL
    END
  ) AS overall_average_rating
FROM order_t
WHERE customer_feedback IS NOT NULL;
```

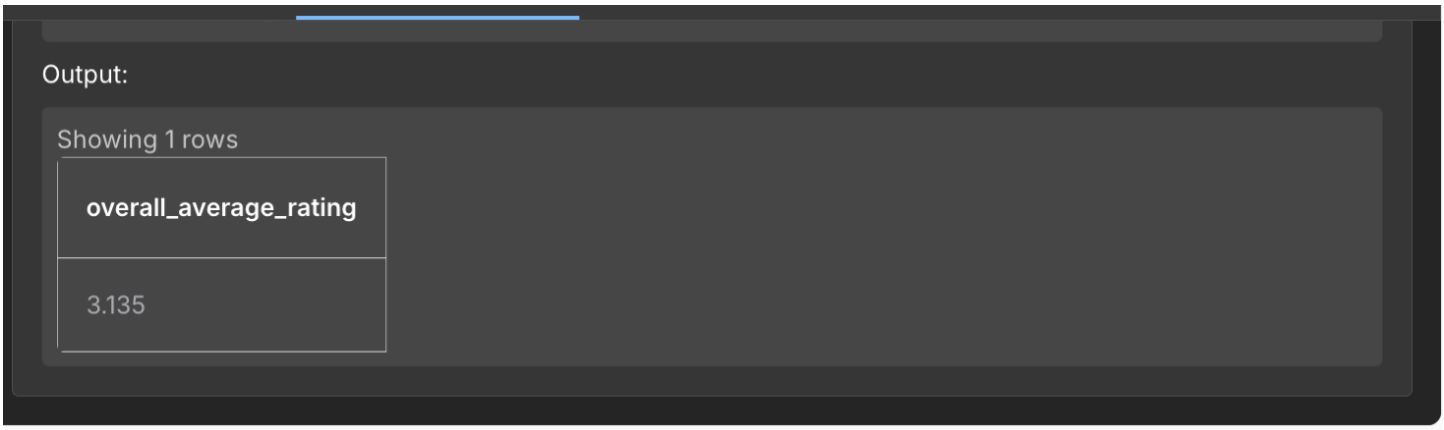
AVG RATING PER QUARTER QUERY:

```
SELECT
  quarter_number,
  AVG(
    CASE customer_feedback
      WHEN 'Very Bad' THEN 1
      WHEN 'Bad' THEN 2
      WHEN 'Okay' THEN 3
      WHEN 'Good' THEN 4
      WHEN 'Very Good' THEN 5
      ELSE NULL
    END
  ) AS average_rating
```

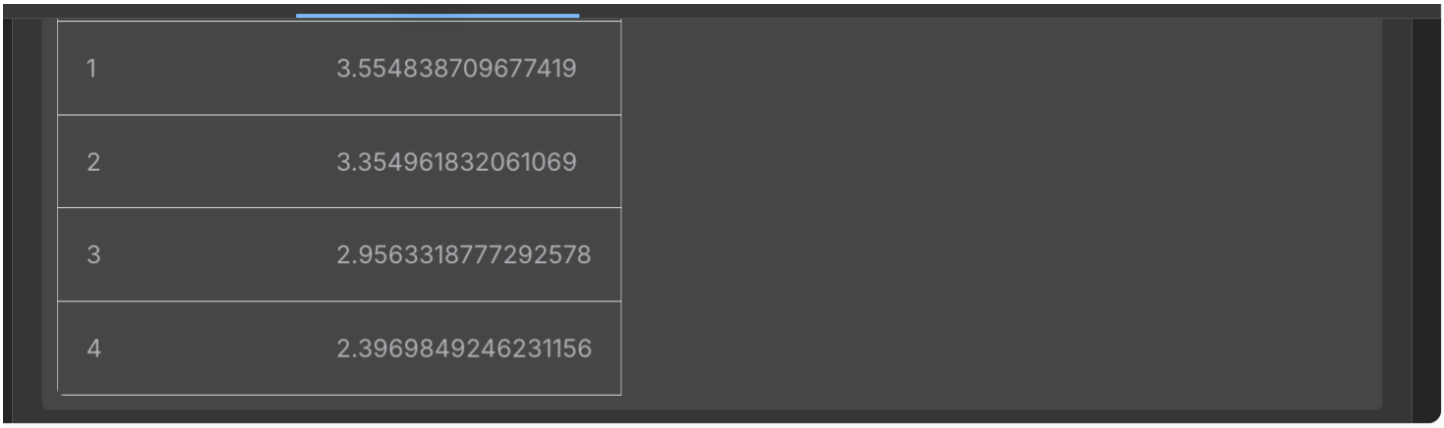
```
FROM order_t
WHERE customer_feedback IS NOT NULL
GROUP BY quarter_number
ORDER BY quarter_number;
```

Output:

PER CUSTOMER:



PER QUARTER:



Observations and Insights:

- The ratings got worse as the year went on
- Most customers weren't blown away and just barely satisfied with their orders
- There's plenty of room for improvement.

Question 5: Find the percentage distribution of feedback from the customers. Are customers getting more dissatisfied over time?

Solution Query:

Percentage Distribution of feedback query:

```
SELECT
  customer_feedback,
  COUNT(*) AS feedback_count,
  ROUND(100.0 * COUNT(*) / SUM(COUNT(*)) OVER (), 2) AS feedback_percentage
FROM order_t
WHERE customer_feedback IS NOT NULL
GROUP BY customer_feedback
ORDER BY feedback_count DESC;
```

Dissatisfied over time query:

```
SELECT
  quarter_number,
  SUM(CASE WHEN customer_feedback IN ('Very Bad', 'Bad') THEN 1 ELSE 0 END) AS dissatisfied_count,
  COUNT(*) AS total_feedbacks,
  ROUND(100.0 * SUM(CASE WHEN customer_feedback IN ('Very Bad', 'Bad') THEN 1 ELSE 0 END) / COUNT(*), 2) AS
dissatisfied_percentage
FROM order_t
WHERE customer_feedback IS NOT NULL
GROUP BY quarter_number
ORDER BY quarter_number;
```

Output:

Overall Distribution of Feedback:

Very Good	226	22.6
Good	215	21.5
Okay	202	20.2
Bad	182	18.2
Very Bad	175	17.5

Dissatisfaction over time:

quarter_number	dissatisfied_count	total_feedbacks	dissatisfied_percentage
1	69	310	22.26
2	76	262	29.01
3	93	229	40.61
4	119	199	59.8

Observations and Insights:

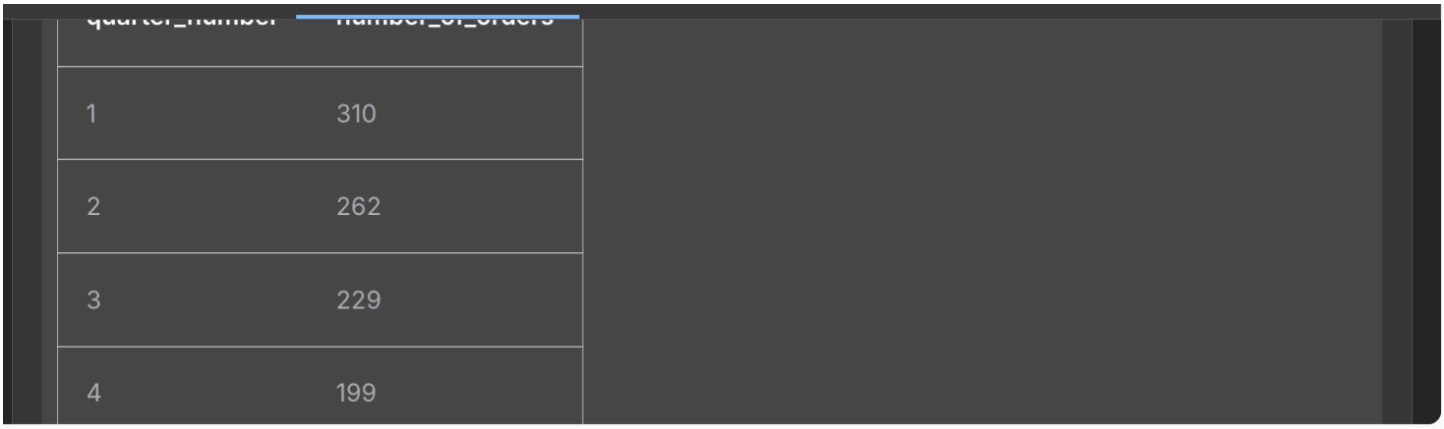
- Customers grew more unsatisfied as the year went on.
- Increasing bad reviews are a warning though the very good feedback total is the highest.
- It's worth looking into why during the later years reviews get worse.

Question 6: What is the trend of the number of orders by quarter?

Solution Query:

```
SELECT
  quarter_number,
  COUNT(*) AS number_of_orders
FROM order_t
GROUP BY quarter_number
ORDER BY quarter_number;
```

Output:



quarter_number	number_of_orders
1	310
2	262
3	229
4	199

Observations and Insights:

- There's a decreasing trend in order totals as the year goes on
- Finding out what could be causing this can help with customer satisfaction.
- This mirrors the percentage of dissatisfied customers growing throughout the year

Question 7: Calculate the net revenue generated by the company. What is the quarter-over-quarter % change in net revenue?

Solution Query:

Net Rev Query:

```
SELECT
   SUM(quantity * vehicle_price * (1 - discount)) AS net_revenue
FROM order_t;
```

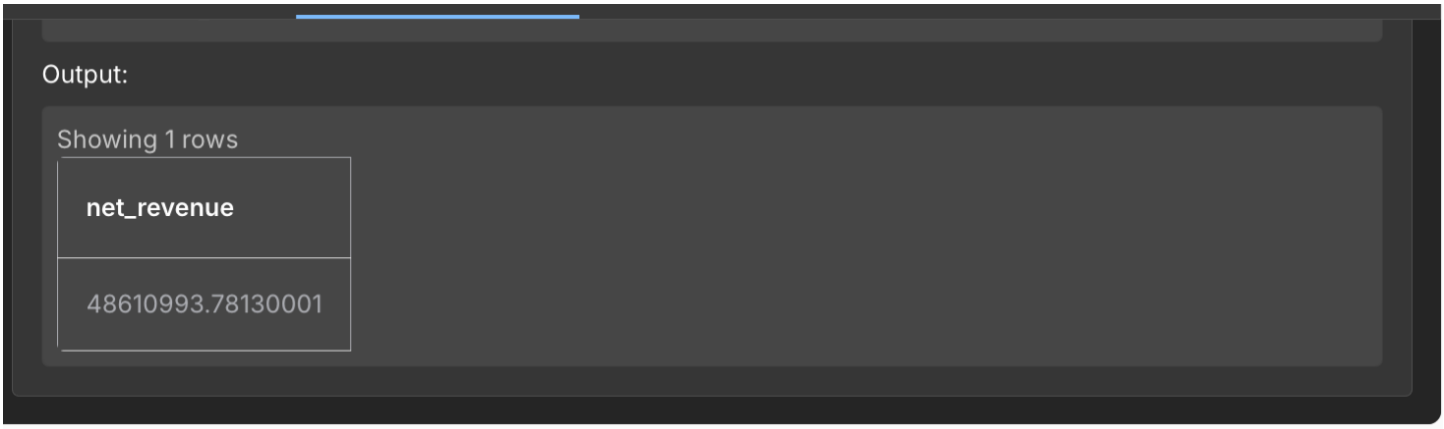
Quarter-over-quarter % change query:

```
SELECT
   curr.quarter_number,
   curr.net_revenue,
   prev.net_revenue AS previous_quarter_revenue,
   ROUND(
      CASE
         WHEN prev.net_revenue IS NULL OR prev.net_revenue = 0 THEN NULL
         ELSE 100.0 * (curr.net_revenue - prev.net_revenue) / prev.net_revenue
      END, 2
   ) AS pct_change_qoq
FROM
   (
      SELECT quarter_number,
            SUM(quantity * vehicle_price * (1 - discount)) AS net_revenue
      FROM order_t
      GROUP BY quarter_number
   ) curr
LEFT JOIN
   (
      SELECT quarter_number,
            SUM(quantity * vehicle_price * (1 - discount)) AS net_revenue
      FROM order_t
      GROUP BY quarter_number
   ) prev
ON curr.quarter_number = prev.quarter_number + 1
```

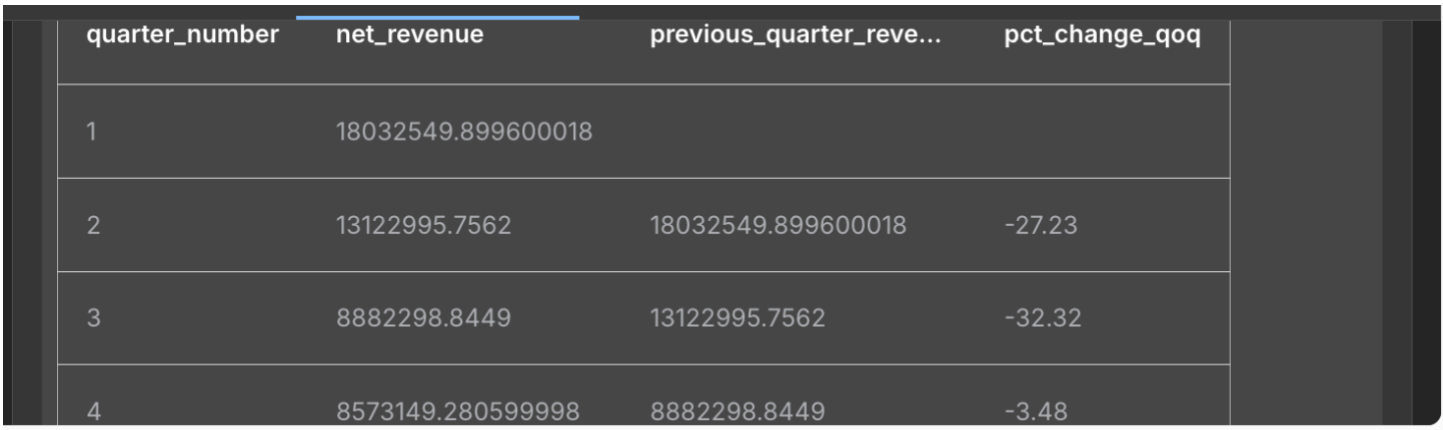
```
ORDER BY curr.quarter_number;
```

Output:

Net Rev:



Quarter over Quarter:



quarter_number	net_revenue	previous_quarter_reve...	pct_change_qoq
1	18032549.899600018		
2	13122995.7562	18032549.899600018	-27.23
3	8882298.8449	13122995.7562	-32.32
4	8573149.280599998	8882298.8449	-3.48

Observations and Insights:

- Just like the reviews and order counts, the net revenue trended downward as the year went on
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Question 8: What is the trend of net revenue and orders by quarters?

Solution Query:

```
SELECT
  quarter_number,
  COUNT(*) AS number_of_orders,
  SUM(quantity * vehicle_price * (1 - discount)) AS net_revenue
FROM order_t
GROUP BY quarter_number
ORDER BY quarter_number;
```

Output:

quarter_number	number_of_orders	net_revenue
1	310	18032549.899600018
2	262	13122995.7562
3	229	8882298.8449
4	199	8573149.280599998

Observations and Insights:

- Continuous downward trend in key performance metrics
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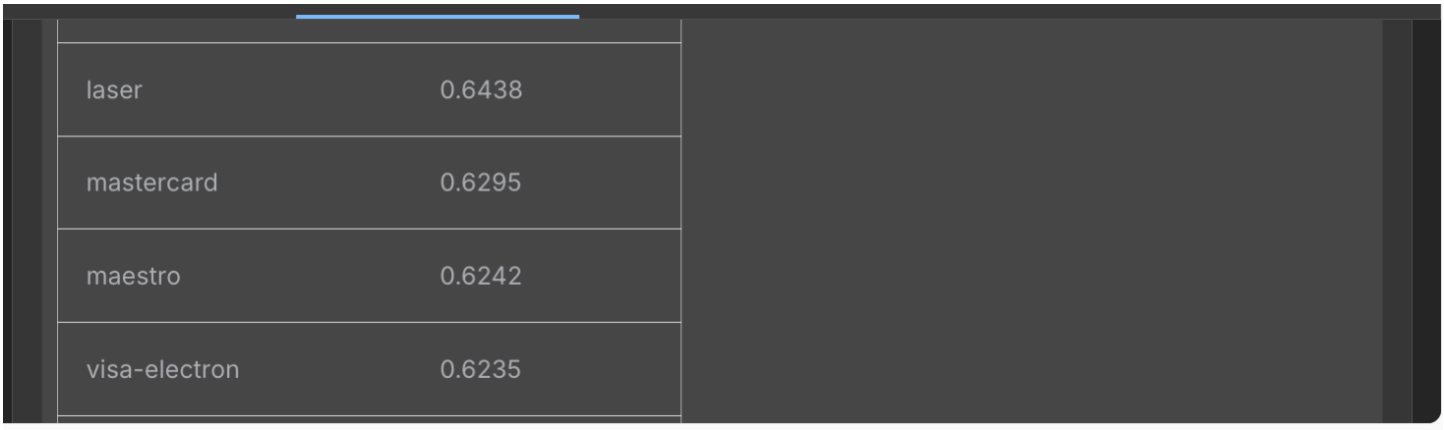
Question 9: What is the average discount offered for different types of credit cards?

.6 = .6 not 60% in this case

Solution Query:

```
SELECT
  customer_t.credit_card_type,
  ROUND(AVG(order_t.discount), 4) AS average_discount
FROM
  customer_t
JOIN
  order_t
ON
  customer_t.customer_id = order_t.customer_id
WHERE
  order_t.discount IS NOT NULL
GROUP BY
  customer_t.credit_card_type
ORDER BY
  average_discount DESC;
```

Output:



laser	0.6438
mastercard	0.6295
maestro	0.6242
visa-electron	0.6235

Observations and Insights:

- Laser offers the biggest discount but not by much.
- Opportunity to maybe introduce some sort of benefit for using a particular credit card by increasing discount for some.

- Discount isn’t big enough for customers to see any real value.

Question 10: What is the average time taken to ship the placed orders for each quarter?

Solution Query:

```
SELECT
  quarter_number,
  AVG(
    CASE ship_mode
      WHEN 'Same Day' THEN 1
      WHEN 'First Class' THEN 2
      WHEN 'Standard Class' THEN 5
      WHEN 'Second Class' THEN 7
      ELSE NULL
    END
  ) AS avg_expected_shipping_days
FROM
  order_t
WHERE
  ship_mode IS NOT NULL
GROUP BY
  quarter_number
ORDER BY
  quarter_number;
```

Output:

1	3.8645161290322583
2	3.9770992366412212
3	3.6026200873362444
4	3.6231155778894473

Business Metrics Overview

Total Revenue	Total Orders	Total Customers	Average Rating
< 48610993.>	<1000>	<994>	<3.1>
Last Quarter Revenue	**Last quarter Orders**	**Average Days to Ship**	**% Good Feedback**
<8573149>	<199>	<3.7>	<%21>

Note: These values must be derived using SQL queries. Some of them may have already been obtained while answering previous questions.

Business Recommendations

- Act on the feedback from customers. Identify the recurring issues. Implement better polices for customers.
- Leverage Partnerships where possible. Collaborate with banks that could offer better discounts or auto loans.
- Improve quality of vehicles. Quality Assurance could help to ensure cars meet high standards before resale and improve satisfaction.