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.

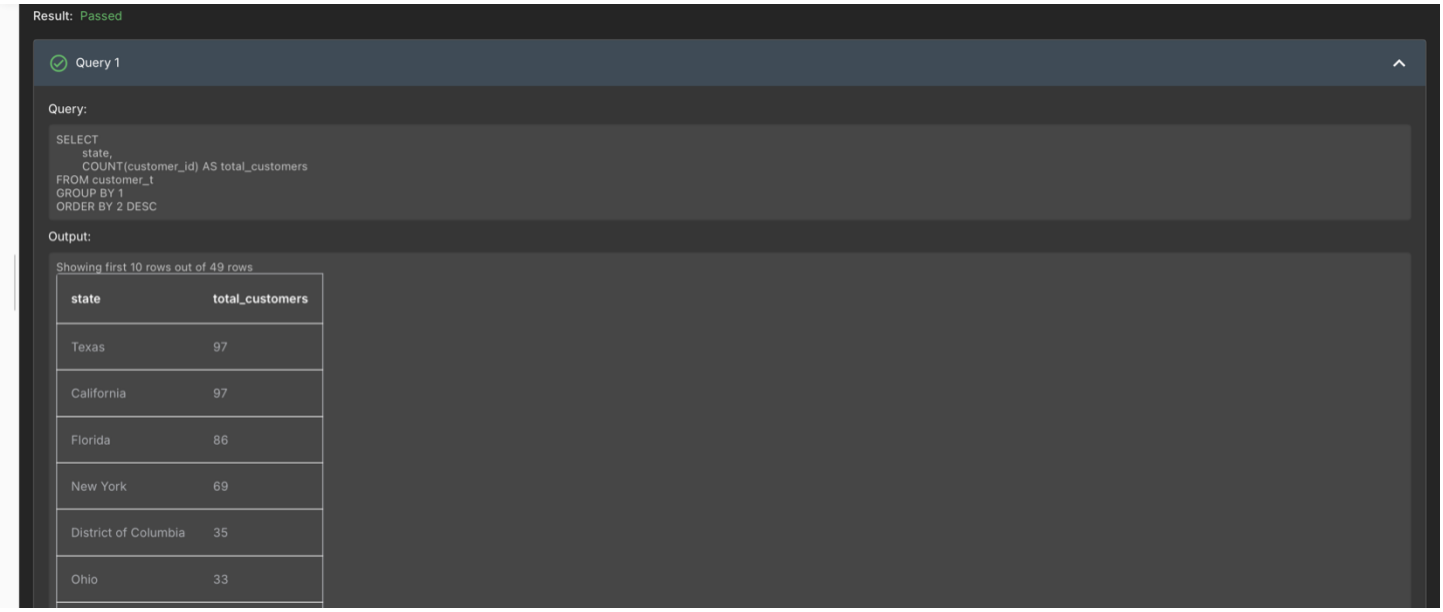
Business Questions

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

Solution Query:

```
SELECT
      state,
      COUNT(customer_id) AS total_customers
FROM customer_t
GROUP BY 1
ORDER BY 2 DESC;
```

Output:



Observations and Insights:

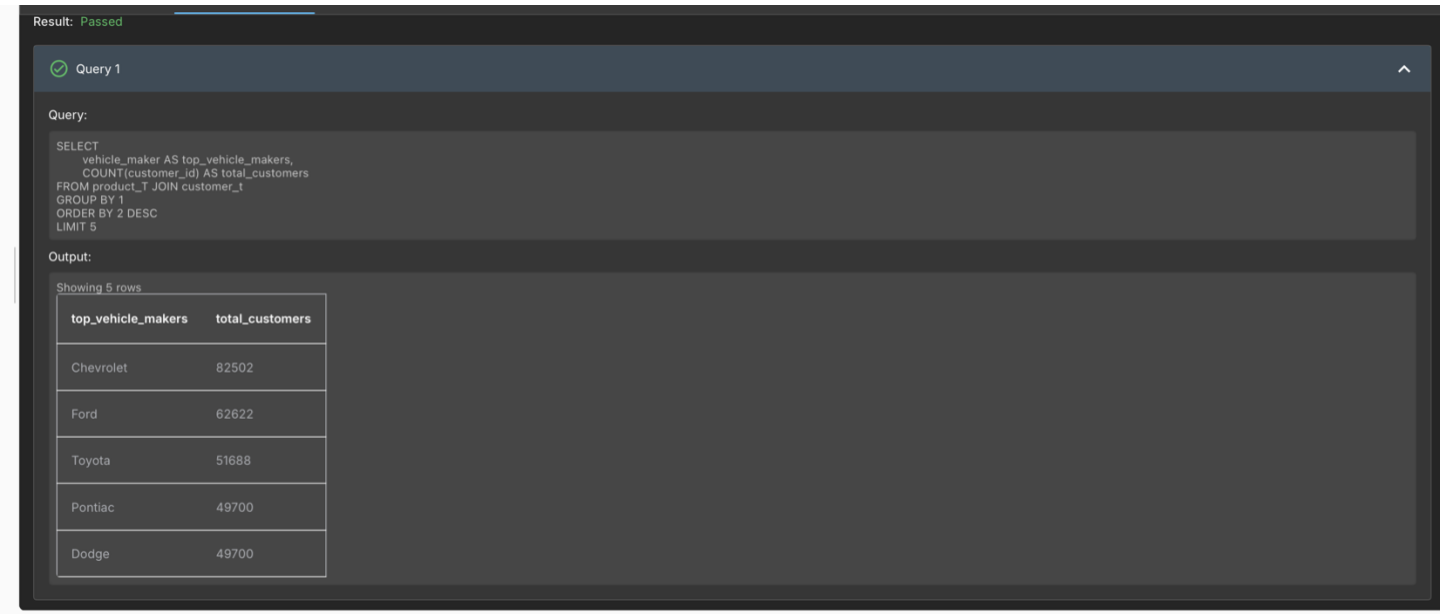
- New Wheels has their largest customer-base in states with some of the highest population in the US.
- New Wheels has close to their smallest customer-base in the Midwestern US
- States located along the Appalachian Mountain Range where internet service is not as reliable as in other states due to the terrain and wifi capabilities also have a smaller customer-base.

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

Solution Query:

```
SELECT
      vehicle_maker AS top_vehicle_makers,
      COUNT(customer_id) AS total_customers
FROM product_t JOIN customer_t
GROUP BY 1
ORDER BY 2 DESC
LIMIT 5;
```

Output:



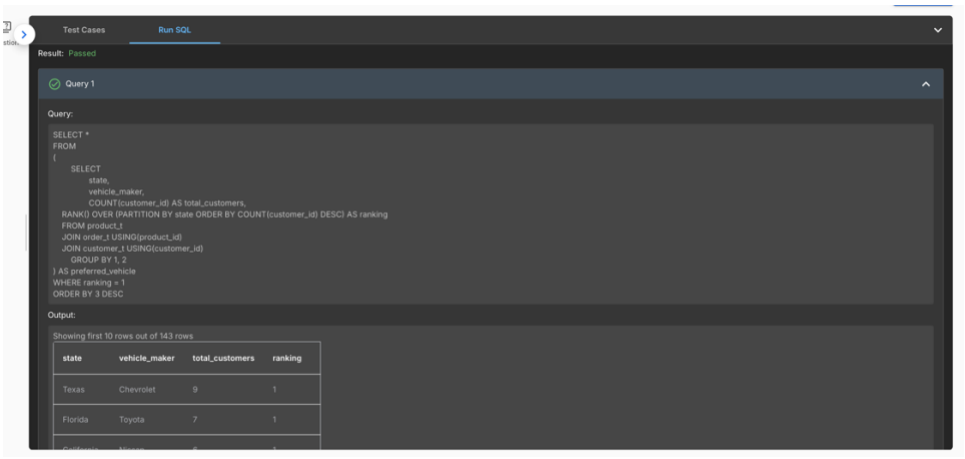
Observations and Insights:

- 4 out of the top 5 manufactures are US car-brands; cars made in America
- 4 of the 5 top manufactures produce trucks which is one of the most popular car makes in the country
- With the exception of Pontiac Chevy, Ford, Toyota and Dodge are popular enough to the extent where purchasing their vehicles from a re-saler and the care they get equal to that if purchased directly at the dealership.

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

Solution Query:

```
SELECT *
FROM
(
      SELECT
            state,
            vehicle_maker,
            COUNT(customer_id) AS total_customers,
    RANK() OVER (PARTITION BY state ORDER BY COUNT(customer_id) DESC) AS ranking
    FROM product_t
    JOIN order_t USING(product_id)
    JOIN customer_t USING(customer_id)
      GROUP BY 1, 2
) AS preferred_vehicle
WHERE ranking = 1
ORDER BY 3 DESC;
```



Observations and Insights:

- Each of the top brands make the most popular vehicle model in Americ a – pick up trucks
- As New Wheels is a re-sale brand customers have increased confidence in skipping the dealership for purchases

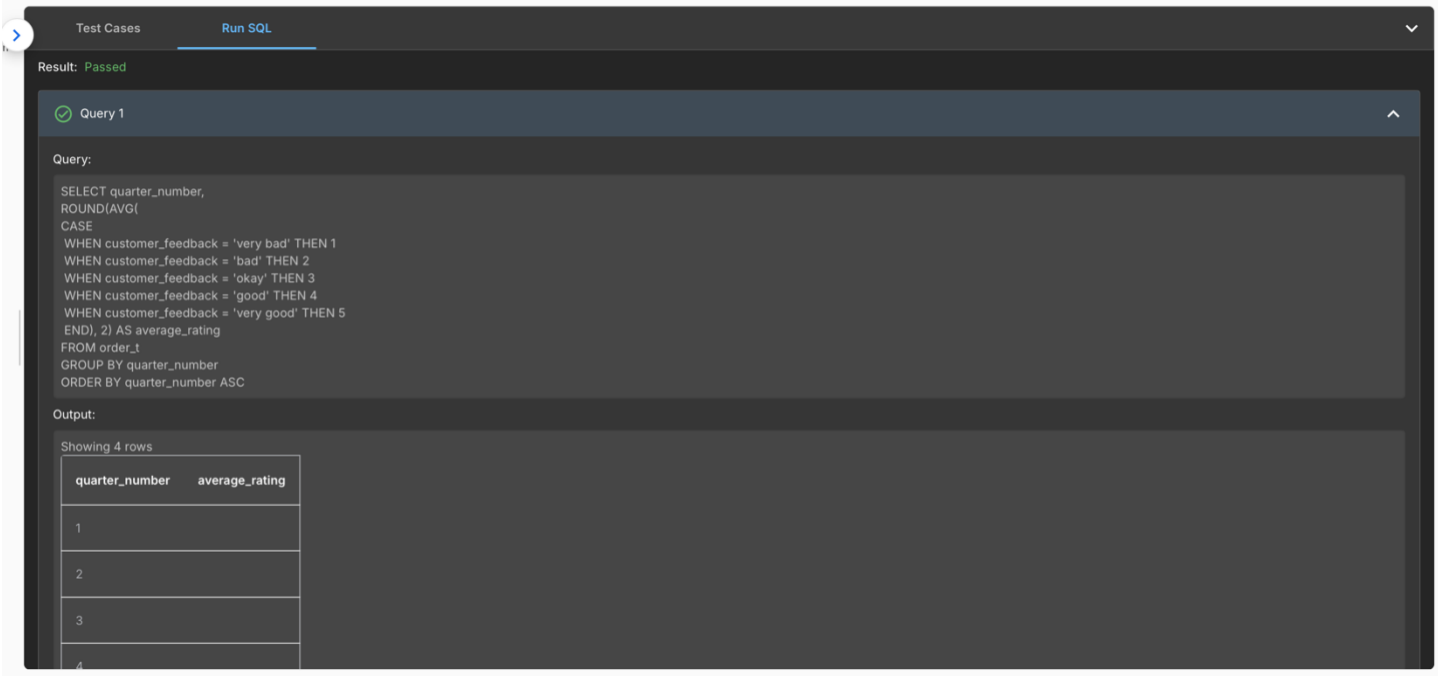
- The top 5 preferred brands are associated with low maintenance costs over time

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:

```
select quarter_number,
Round(avg(
case
      when customer_feedback = 'very bad' then 1
      when customer_feedback = 'bad' then 2
      when customer_feedback = 'okay' then 3
      when customer_feedback = 'good' then 4
    when customer_feedback = 'very good' then 5
end, 2) as average_rating
from order_t
Group by 1
Order by 1 ASC;)
```



Observations and Insights:

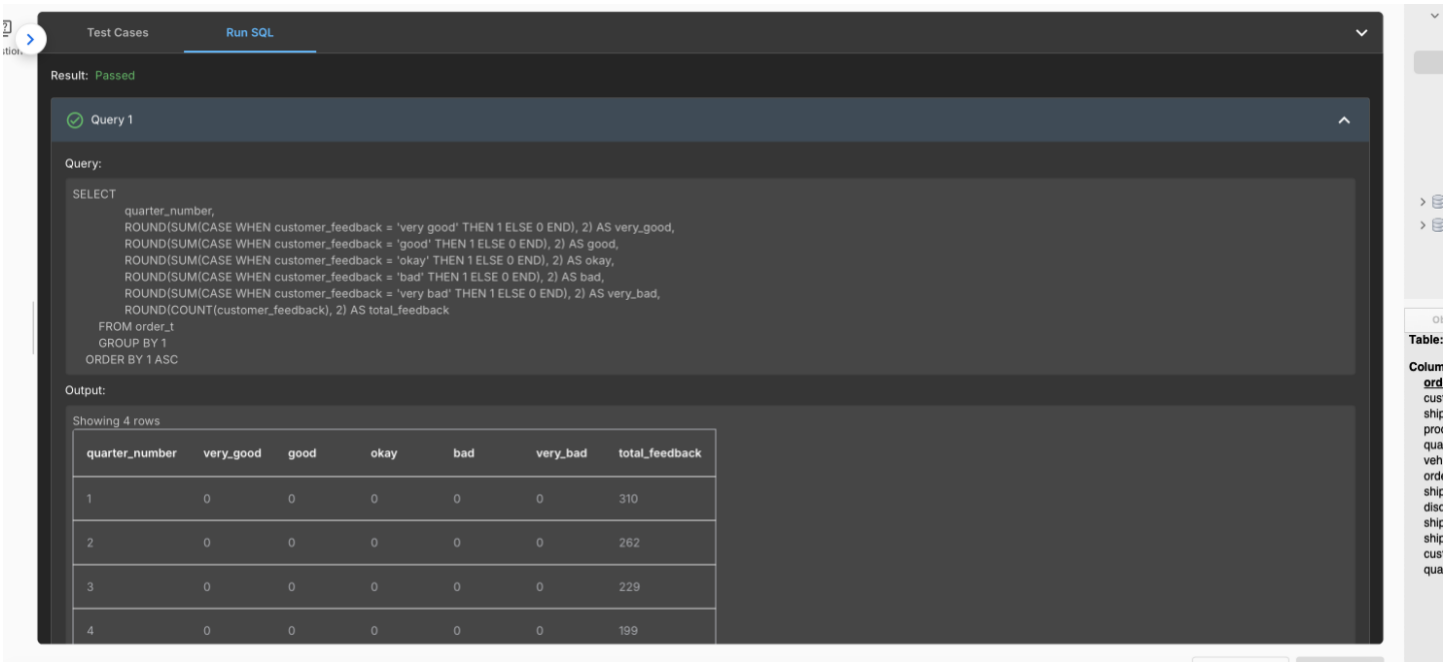
- Average customer rating declines as the year progresses
- Average customer rating positively correlates with time taken to ship orders
- Order shipping time greatly decreases quarter by quarter customer satisfaction

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

Solution Query:

```
SELECT

            quarter_number,

            ROUND(SUM(CASE WHEN customer_feedback = 'very good' THEN 1 ELSE 0
            END), 2) AS very_good,

            ROUND(SUM(CASE WHEN customer_feedback = 'good' THEN 1 ELSE 0 END), 2)
AS good,

            ROUND(SUM(CASE WHEN customer_feedback = 'okay' THEN 1 ELSE 0 END), 2)
AS okay,

            ROUND(SUM(CASE WHEN customer_feedback = 'bad' THEN 1 ELSE 0 END), 2)
AS bad,

            ROUND(SUM(CASE WHEN customer_feedback = 'very bad' THEN 1 ELSE 0 END),
            2) AS very_bad,

            ROUND(COUNT(customer_feedback), 2) AS total_feedback

FROM order_t

GROUP BY 1

ORDER BY 1 ASC
```

Output:



Observations and Insights:

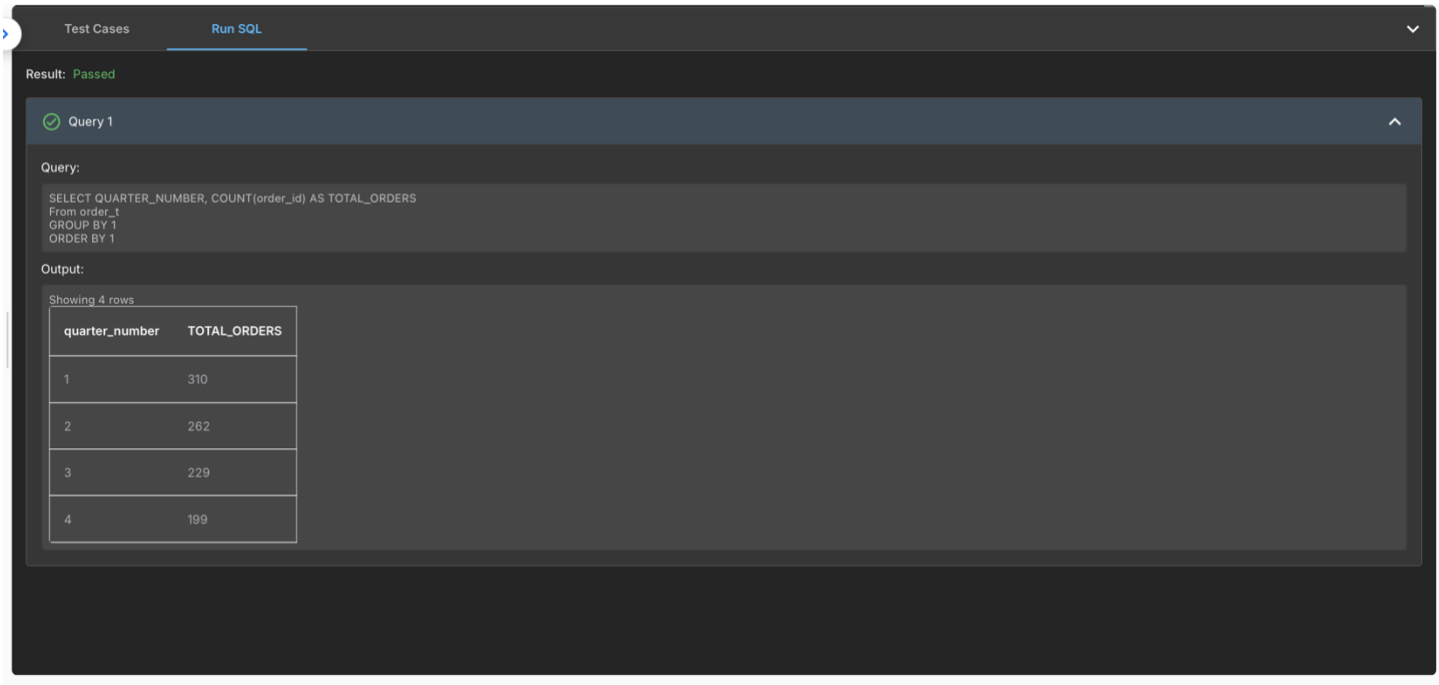
- Q1 and Q2 have the greatest number of feedback of ‘very good’
- This drastically changes in Q3 and Q4
- Q2 and Q3 see customer rating shift more towards the ‘good’ to ‘bad’ range

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

Solution Query:

```
SELECT QUARTER_NUMBER, COUNT(order_id) AS TOTAL_ORDERS
From orders_t
GROUP BY 1
ORDER BY 1;
```

Output:



Observations and Insights:

- The largest orders are made in Q1.
- Many vehicle purchases are made around the end of the year/the beginning of the previous year as consumers are looking for good deals present at this time
- Q4 has the fewest overall purchases as consumers are waiting for end of the year deals and next-year model releases.

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

Solution Query:

```
WITH QoQ AS

(

      SELECT quarter_number,

         ROUND(SUM(quantity * (vehicle_price - ((discount/100)*vehicle_price))),
0) AS revenue

      FROM order_t

      GROUP BY quarter_number)

SELECT quarter_number, revenue,

ROUND(LAG(revenue) OVER(ORDER BY quarter_number), 2) AS previous_revenue,

ROUND((revenue - LAG(revenue) OVER(ORDER BY quarter_number))/LAG(revenue)
OVER(ORDER BY quarter_number), 2) AS qoq_perc_change

FROM QoQ;

**Results would not show up in SQL Playground
```

Output:

```
96 • WITH QoQ AS
97   (
98       SELECT quarter_number,
99           ROUND(SUM(quantity * (vehicle_price - ((discount/100)*vehicle_price))), 0) AS revenue
100      FROM order_t
101      GROUP BY quarter_number)
102  SELECT quarter_number, revenue,
103  ROUND(LAG(revenue) OVER(ORDER BY quarter_number), 2) AS previous_revenue,
104  ROUND((revenue - LAG(revenue) OVER(ORDER BY quarter_number))/LAG(revenue) OVER(ORDER BY quarter_number), 2) AS qoq_perc_change
105  FROM QoQ;
```

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Result Grid | Filter Rows: Search | Export:

quarter_number	revenue	previous_revenue	qoq_perc_chan...
1	39421580	NULL	NULL
2	32715830	39421580	-0.17
3	29229896	32715830	-0.11
4	23346780	29229896	-0.20

Observations and Insights:

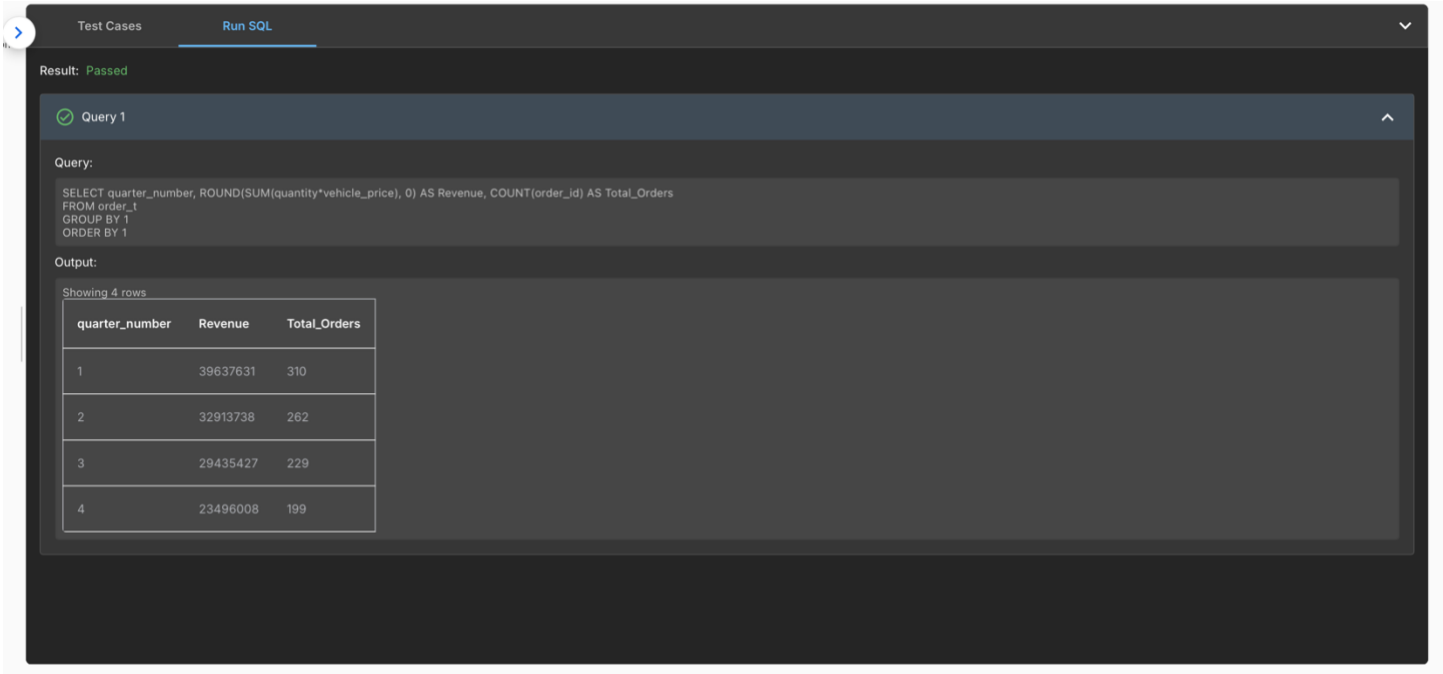
- **Despite decreasing customer satisfaction over the year, revenue change per quarter is still minimal.**
- **The customer base that uses New Wheels has confidence in their brand and their product.**

Question 8: What is the trend of net revenue and orders by quarters?

Solution Query:

```
SELECT quarter_number, ROUND(SUM(quantity*vehicle_price), 0) AS Revenue,
COUNT(order_id) AS Total_Orders

FROM order_t

GROUP BY 1

ORDER BY 1;
```

Output:



Observations and Insights:

- More cars at a higher price point where purchased in Q1.
- Cars may not be a primary focus of consumer purchases in the spring and summer months.
- Again the lowest revnue and lowest number of orders occurred in Q4; this can be attributed to the holiday season and consumers waiting yearly car sale deals.

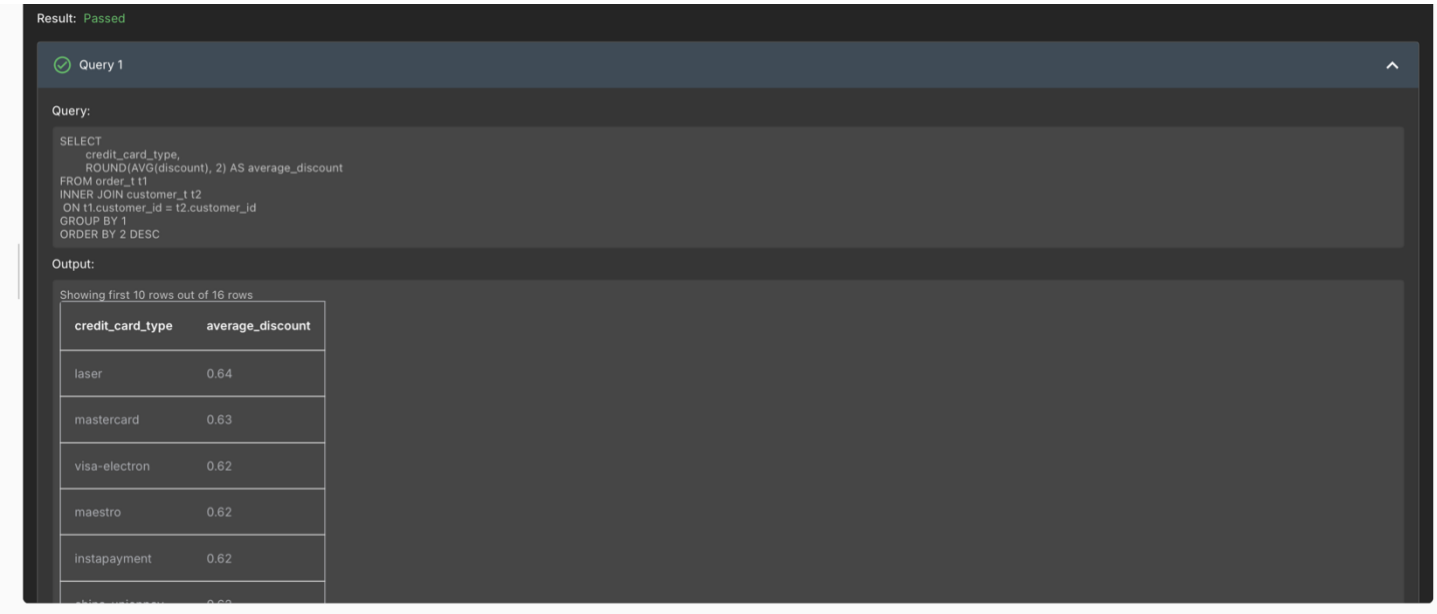
Question 9: What is the average discount offered for different types of credit cards?

Solution Query:

```
SELECT
      credit_card_type,
      ROUND(AVG(discount), 2) AS average_discount
FROM order_t t1 INNER JOIN customer_t t2
ON t1.customer_id = t2.customer_id
GROUP BY 1
ORDER BY 2 DESC;
```

Output:

.



Observations and Insights:

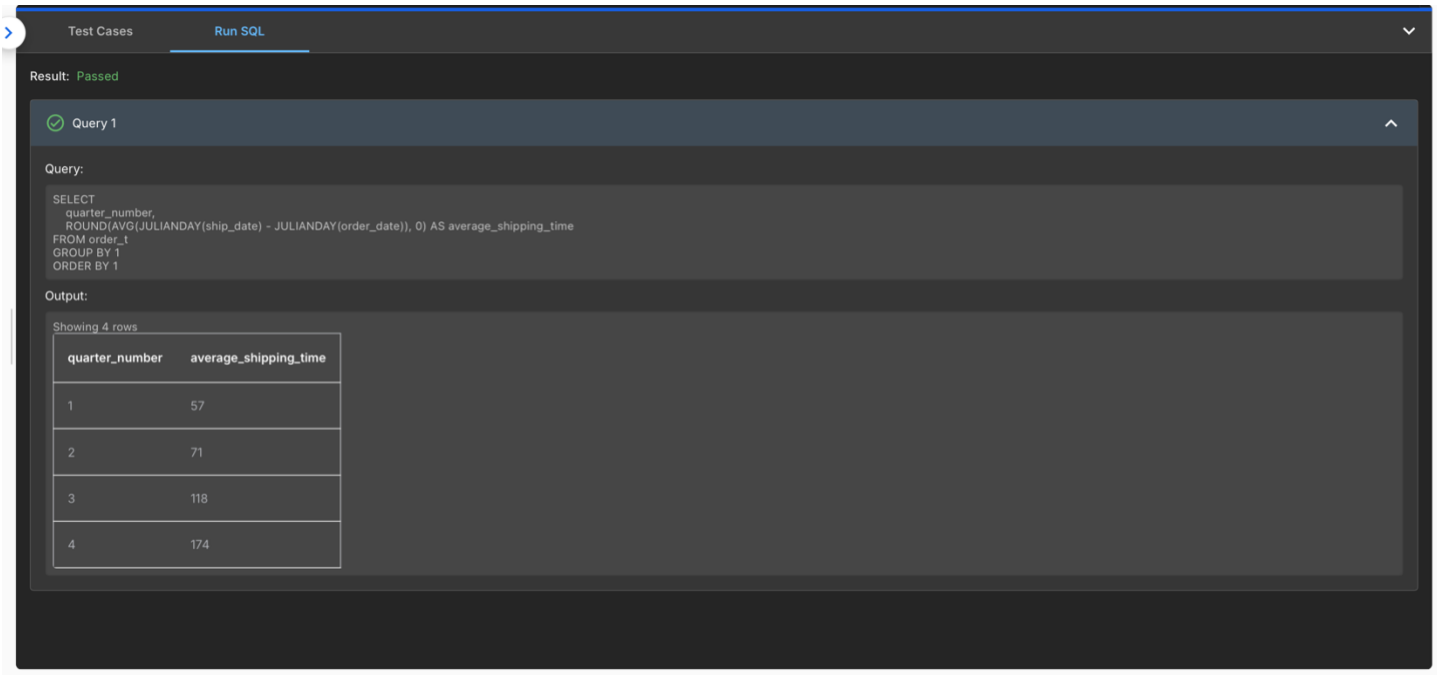
- Visa & Mastercard combat brand competition between them by offering nearly comparable average discounts.
- New Wheels may want to offer a credit card brokered through Visa or Mastercard by offering member discounts for card holders.
- As AMEX offers one of the smallest average discounts and is associated with higher vendor fees, New Wheels may want to debate dropping them as a form of accepted payment.

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

Solution Query:

```
SELECT quarter_number, ROUND(AVG(JULIANDAY(ship_date) - JULIANDAY(order_date)),
0)

AS average_shipping_time

FROM order_t

GROUP BY 1

ORDER BY 1;
```

Output:



Observations and Insights:

- As previously seen the largest number of purchases are made in Q1; however purchases made in Q1 have the shortest shipping time.
- While the fewest number of orders are made in Q4, these orders have the longest shipping time. As New Wheels is a car re-saler this may indicate a logistics system issue in getting cars to customers.

- In Q4, customers are not selling their vehicles; this can decrease the car inventory for New Wheels as a re-sale as customers are either holding out for the car they want to purchase to hit the market or are waiting for to purchase the older vehicles of customers wishing to upgrade.

Business Metrics Overview

Total Revenue	Total Orders	Total Customers	Average Rating
$125,482,804	1,000	994	3.12
Last Quarter Revenue	**Last quarter Orders**	**Average Days to Ship**	**% Good Feedback**
$23,496,008	199	105	20.58%

Business Recommendations

- Increase ad revenue to spread brand awareness
- Invest in logistics supply-chain in order to get cars to buyers faster
- Partner with a company like CarFax that can provide vehicle accident/repair reports to increase customer confidence in brand which would thusly increase feedback.