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PL/SQL Assignment I

FREEWAYS LIMITED

Business Context:
Freeways Limited is a beverage distribution company operating in Rwanda. It works in the sales and distribution department of the beverage industry, serving as a Bralirwa distributor for popular drinks such as Mutzig, Primus, Turbo, Fanta, and Coca-Cola.

Data Challenge:

The company collects sales data from multiple regions and customers but struggles to analyze it effectively. They need to identify which products perform best in different regions, track customer purchasing behavior over time, and segment customers by spending levels. Without structured analysis, management cannot easily spot trends or make informed decisions about marketing and inventory.

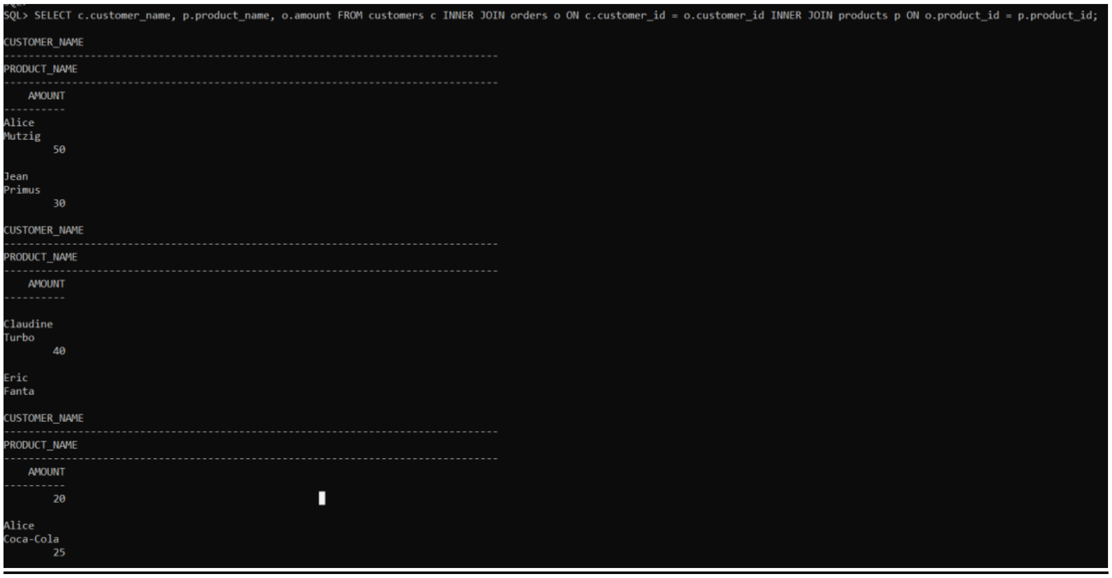
Expected Outcome:

By applying SQL JOINs and Window Functions, Freeways Limited expects to gain insights into:

- Top-selling products per region for better distribution planning.
- Customer segmentation to target promotions more effectively.
- Sales trends over time to guide inventory and marketing strategies.

SQL JOINS:

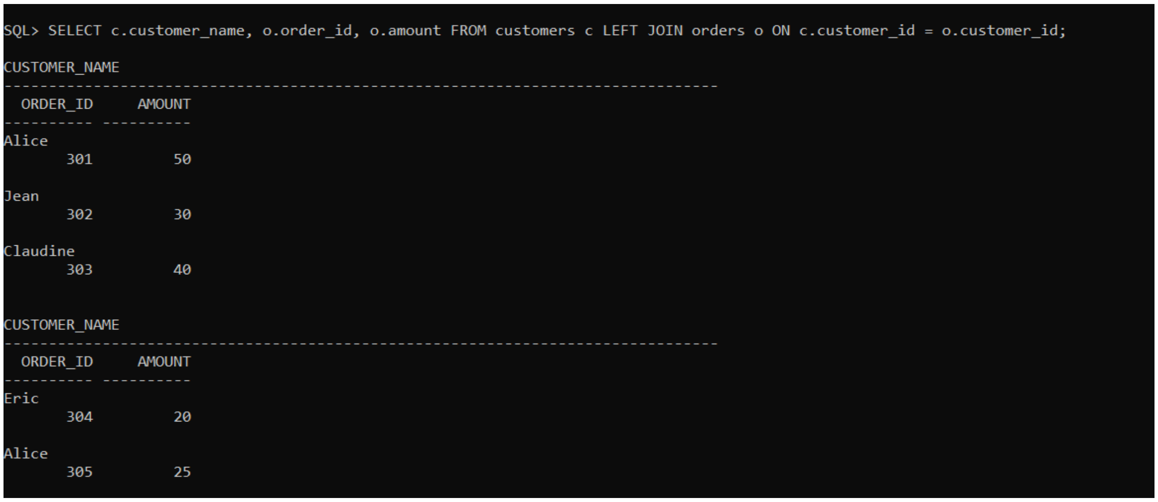
1. INNER JOIN



```
SQL> SELECT c.customer_name, p.product_name, o.amount FROM customers c INNER JOIN orders o ON c.customer_id = o.customer_id INNER JOIN products p ON o.product_id = p.product_id;

CUSTOMER_NAME
--------------------------------------------------------------------------------
PRODUCT_NAME
--------------------------------------------------------------------------------
    AMOUNT
----------
Alice
Mutzig
        50

Jean
Primus
        30

CUSTOMER_NAME
--------------------------------------------------------------------------------
PRODUCT_NAME
--------------------------------------------------------------------------------
    AMOUNT
----------

Claudine
Turbo
        40

Eric
Fanta

CUSTOMER_NAME
--------------------------------------------------------------------------------
PRODUCT_NAME
--------------------------------------------------------------------------------
    AMOUNT
----------
        20

Alice
Coca-Cola
        25
```

This view highlights only customers who have actually made purchases, showing the product bought and the quantity. For instance, Alice purchasing 50 units of Mutzig reflects a clear, active relationship between the customer and the product.

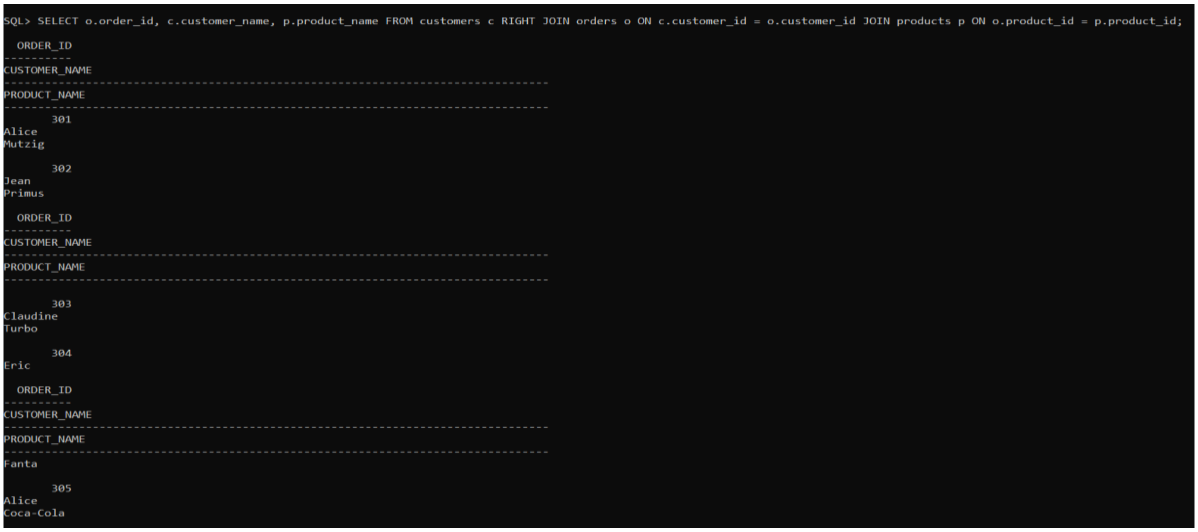
2. LEFT JOIN



```
SQL> SELECT c.customer_name, o.order_id, o.amount FROM customers c LEFT JOIN orders o ON c.customer_id = o.customer_id;

CUSTOMER_NAME
--------------------------------------------------------------------------------
  ORDER_ID     AMOUNT
---------- ----------
Alice
       301         50

Jean
       302         30

Claudine
       303         40


CUSTOMER_NAME
--------------------------------------------------------------------------------
  ORDER_ID     AMOUNT
---------- ----------
Eric
       304         20

Alice
       305         25
```

This list shows all customers, even those who haven't placed any orders. If a customer has "NULL" in the order columns, it means they haven't bought anything yet. This makes it easy for Freeways Limited to spot inactive customers.

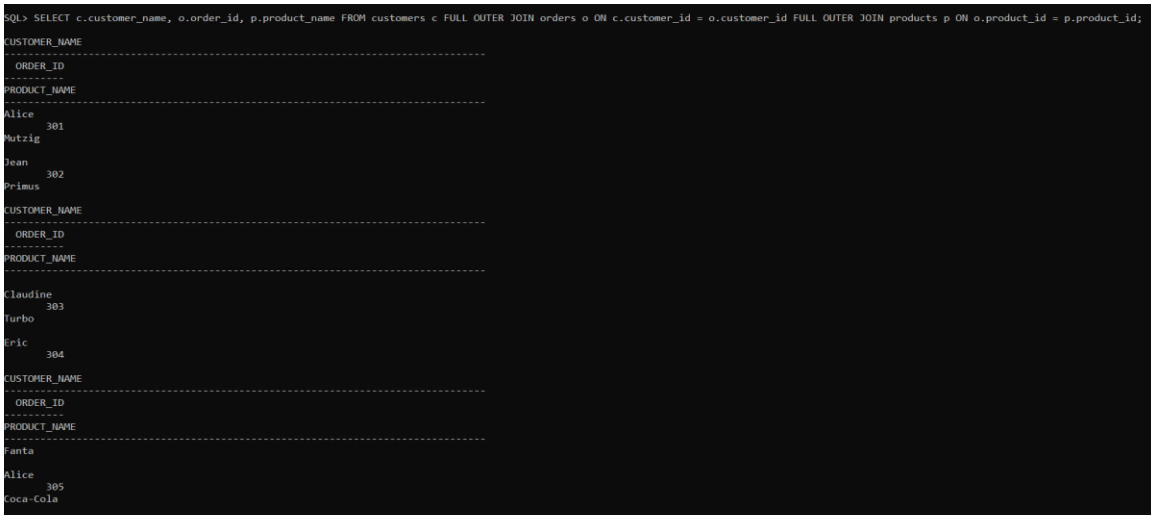
3. RIGHT JOIN



```
SQL> SELECT o.order_id, c.customer_name, p.product_name FROM customers c RIGHT JOIN orders o ON c.customer_id = o.customer_id JOIN products p ON o.product_id = p.product_id;

  ORDER_ID
----------
CUSTOMER_NAME
--------------------------------------------------------------------------------
PRODUCT_NAME
--------------------------------------------------------------------------------
       301
Alice
Mutzig

       302
Jean
Primus

  ORDER_ID
----------
CUSTOMER_NAME
--------------------------------------------------------------------------------
PRODUCT_NAME
--------------------------------------------------------------------------------

       303
Claudine
Turbo

       304
Eric

  ORDER_ID
----------
CUSTOMER_NAME
--------------------------------------------------------------------------------
PRODUCT_NAME
--------------------------------------------------------------------------------
Fanta

       305
Alice
Coca-Cola
```

This shows all orders, even when some customer details are missing. It’s especially helpful for auditing sales records and identifying cases where customer information is incomplete.

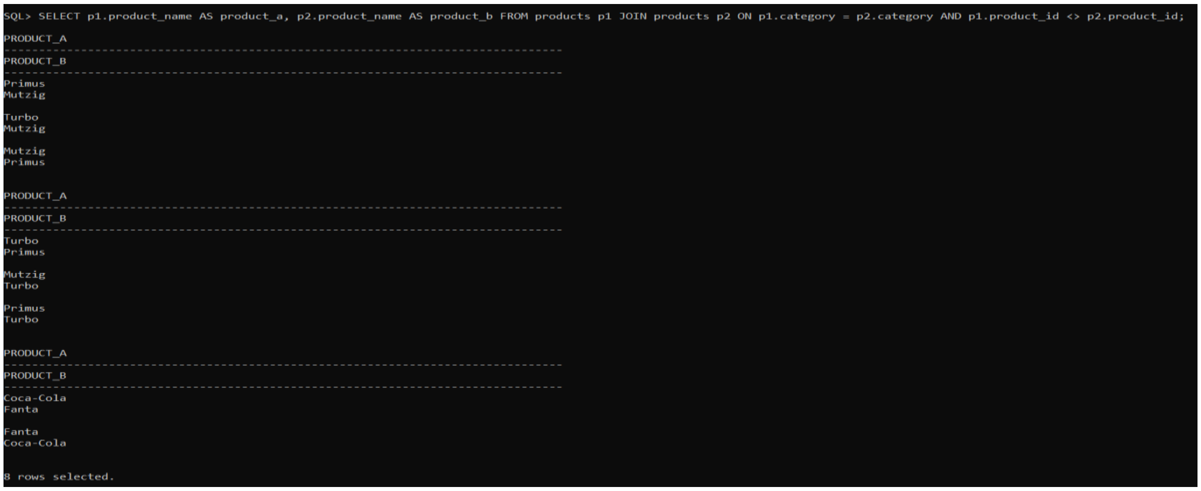
4. FULL OUTER JOIN



```
SQL> SELECT c.customer_name, o.order_id, p.product_name FROM customers c FULL OUTER JOIN orders o ON c.customer_id = o.customer_id FULL OUTER JOIN products p ON o.product_id = p.product_id;

CUSTOMER_NAME
--------------------------------------------------------------------------------
  ORDER_ID
----------
PRODUCT_NAME
--------------------------------------------------------------------------------
Alice
       301
Mutzig

Jean
       302
Primus

CUSTOMER_NAME
--------------------------------------------------------------------------------
  ORDER_ID
----------
PRODUCT_NAME
--------------------------------------------------------------------------------

Claudine
       303
Turbo

Eric
       304

CUSTOMER_NAME
--------------------------------------------------------------------------------
  ORDER_ID
----------
PRODUCT_NAME
--------------------------------------------------------------------------------
Fanta

Alice
       305
Coca-Cola
```

This combines customers and orders, displaying both matching and non-matching records. It provides a full picture of sales activity while also highlighting any gaps or missing information in the data.

5. SELF JOIN

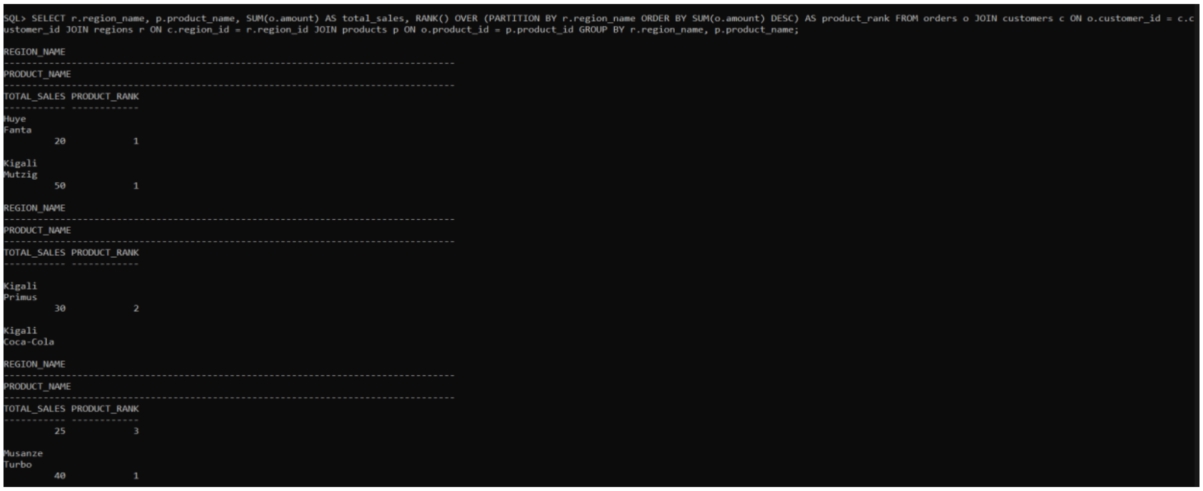


```
SQL> SELECT p1.product_name AS product_a, p2.product_name AS product_b FROM products p1 JOIN products p2 ON p1.category = p2.category AND p1.product_id <> p2.product_id;

PRODUCT_A
--------------------------------------------------------------------------------
PRODUCT_B
--------------------------------------------------------------------------------
Primus
Mutzig

Turbo
Mutzig

Mutzig
Primus


PRODUCT_A
--------------------------------------------------------------------------------
PRODUCT_B
--------------------------------------------------------------------------------
Turbo
Primus

Mutzig
Turbo

Primus
Turbo


PRODUCT_A
--------------------------------------------------------------------------------
PRODUCT_B
--------------------------------------------------------------------------------
Coca-Cola
Fanta

Fanta
Coca-Cola


8 rows selected.
```

This compares products within the same category. For example, both Mutzig and Primus fall under “Beer.” It helps Freeways Limited understand how products compete within each category.

WINDOW FUNTION QUERIES:

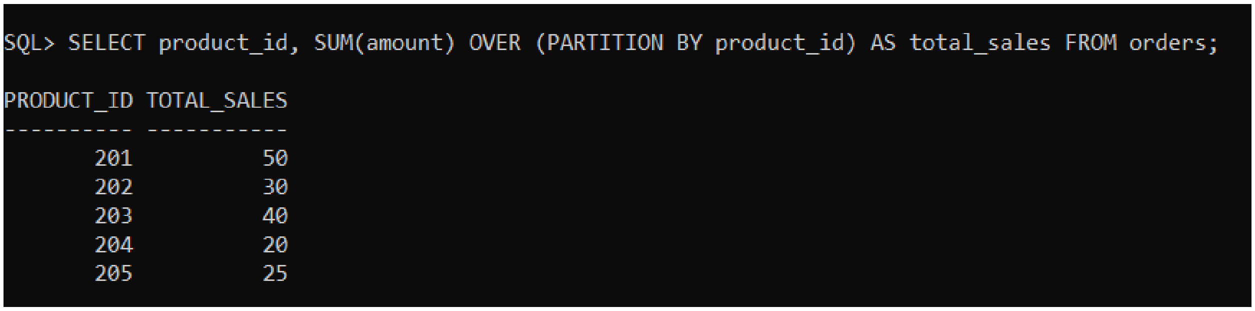
- Ranking (Top products per region)



```
SQL> SELECT r.region_name, p.product_name, SUM(o.amount) AS total_sales, RANK() OVER (PARTITION BY r.region_name ORDER BY SUM(o.amount) DESC) AS product_rank FROM orders o JOIN customers c ON o.customer_id = c.c
ustomer_id JOIN regions r ON c.region_id = r.region_id JOIN products p ON o.product_id = p.product_id GROUP BY r.region_name, p.product_name;

REGION_NAME
--------------------------------------------------------------------------------
PRODUCT_NAME
--------------------------------------------------------------------------------
TOTAL_SALES PRODUCT_RANK
----------- ------------
Huye
Fanta
         20            1

Kigali
Mutzig
         50            1

REGION_NAME
--------------------------------------------------------------------------------
PRODUCT_NAME
--------------------------------------------------------------------------------
TOTAL_SALES PRODUCT_RANK
----------- ------------

Kigali
Primus
         30            2

Kigali
Coca-Cola

REGION_NAME
--------------------------------------------------------------------------------
PRODUCT_NAME
--------------------------------------------------------------------------------
TOTAL_SALES PRODUCT_RANK
----------- ------------
         25            3

Musanze
Turbo
         40            1
```

Ranks products by sales volume within each region. For example, in Kigali, Mutzig might rank #1, showing it’s the most popular product there.

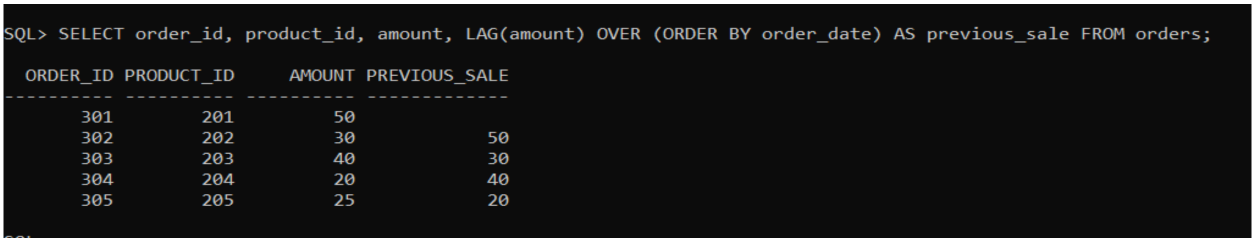
- Aggregate (Cumulative Sales per Product)



```
SQL> SELECT product_id, SUM(amount) OVER (PARTITION BY product_id) AS total_sales FROM orders;

PRODUCT_ID TOTAL_SALES
---------- -----------
       201          50
       202          30
       203          40
       204          20
       205          25
```

Calculates total sales for each product across all regions. This helps Freeways Limited see which drinks (like Primus or Coca-Cola) generate the highest overall revenue.

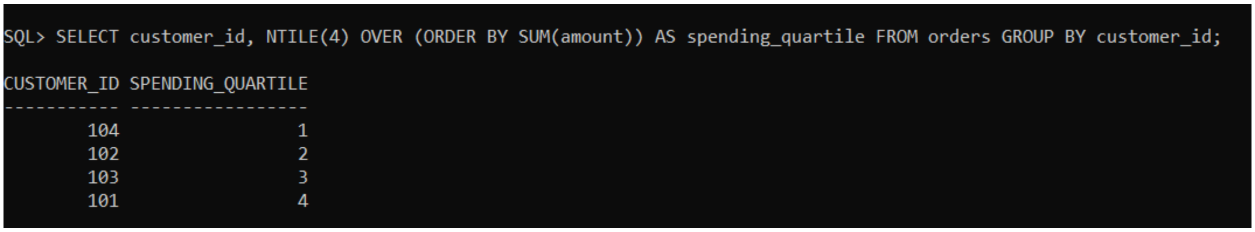
- Navigation (Compare Current vs. Previous Sale)



```
SQL> SELECT order_id, product_id, amount, LAG(amount) OVER (ORDER BY order_date) AS previous_sale FROM orders;

  ORDER_ID PRODUCT_ID     AMOUNT PREVIOUS_SALE
---------- ---------- ---------- -------------
       301        201         50
       302        202         30            50
       303        203         40            30
       304        204         20            40
       305        205         25            20
```

Shows each sale alongside the previous one. This helps track sales trends over time, e.g., noticing that Turbo sales dropped compared to the last order.

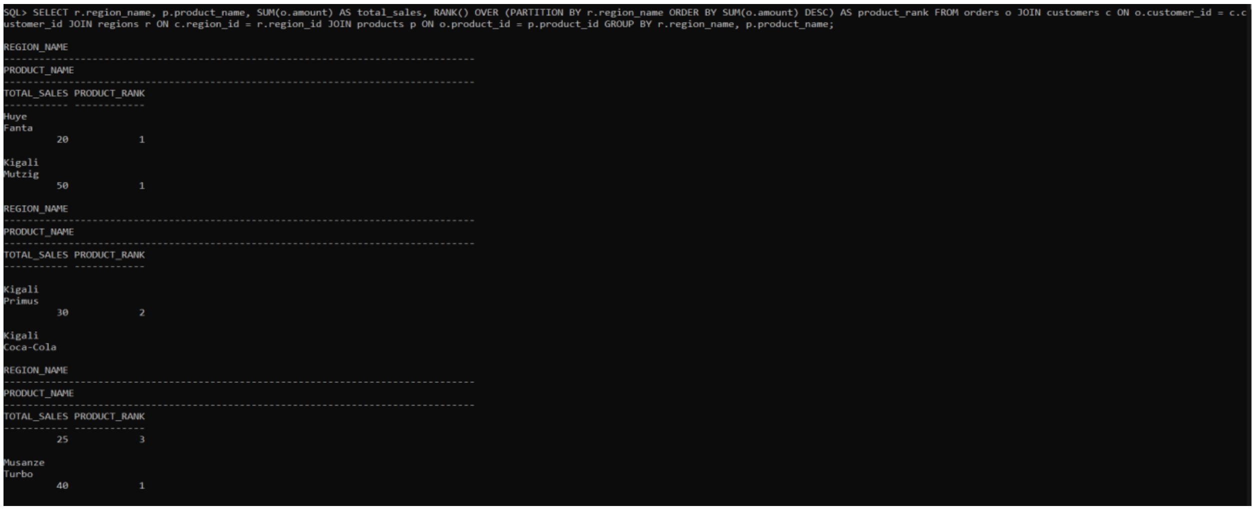
- Distribution (Customer Spending Quartiles)



```
SQL> SELECT customer_id, NTILE(4) OVER (ORDER BY SUM(amount)) AS spending_quartile FROM orders GROUP BY customer_id;

CUSTOMER_ID SPENDING_QUARTILE
----------- -----------------
        104                 1
        102                 2
        103                 3
        101                 4
```

Divides customers into four spending groups. Freeways Limited can identify high-value customers (quartile 4) and low-value ones (quartile 1) for targeted promotions.

- Average (Regional Sales Averages)



```
SQL> SELECT r.region_name, p.product_name, SUM(o.amount) AS total_sales, RANK() OVER (PARTITION BY r.region_name ORDER BY SUM(o.amount) DESC) AS product_rank FROM orders o JOIN customers c ON o.customer_id = c.c
ustomer_id JOIN regions r ON c.region_id = r.region_id JOIN products p ON o.product_id = p.product_id GROUP BY r.region_name, p.product_name;

REGION_NAME
--------------------------------------------------------------------------------
PRODUCT_NAME
--------------------------------------------------------------------------------
TOTAL_SALES PRODUCT_RANK
----------- ------------
Huye
Fanta
         20            1

Kigali
Mutzig
         50            1

REGION_NAME
--------------------------------------------------------------------------------
PRODUCT_NAME
--------------------------------------------------------------------------------
TOTAL_SALES PRODUCT_RANK
----------- ------------

Kigali
Primus
         30            2

Kigali
Coca-Cola

REGION_NAME
--------------------------------------------------------------------------------
PRODUCT_NAME
--------------------------------------------------------------------------------
TOTAL_SALES PRODUCT_RANK
----------- ------------
         25            3

Musanze
Turbo
         40            1
```

Calculates the average sales amount per region. This helps compare performance across Kigali, Musanze, and Huye, highlighting which areas need more marketing support.