Experiment 5

Student Name: Hiten Mehta **UID: 23BCS14058**
Branch: B.E./C.S.E. **Section/Group: KRG_1-B**
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Question : Normal View vs. Materialized View

1. Create a large dataset:

   - Create a table names transaction_data (id , value) with 1 million records.
   - take id 1 and 2, and for each id, generate 1 million records in value column
   - Use Generate_series () and random() to populate the data.

2. Create a normal view and materialized view to for sales_summary, which includes total_quantity_sold, total_sales, and total_orders with aggregation

3. Compare the performance and execution time of both.

Solution:

```
CREATE TABLE transaction_data (
   id INT,
   value NUMERIC
);
```

Insert 1 million records for id = 1

```
INSERT INTO transaction_data (id, value)
SELECT 1, (random() * 100)::numeric
FROM generate_series(1, 1000000);
```

Insert 1 million records for id = 2

```
INSERT INTO transaction_data (id, value)
```

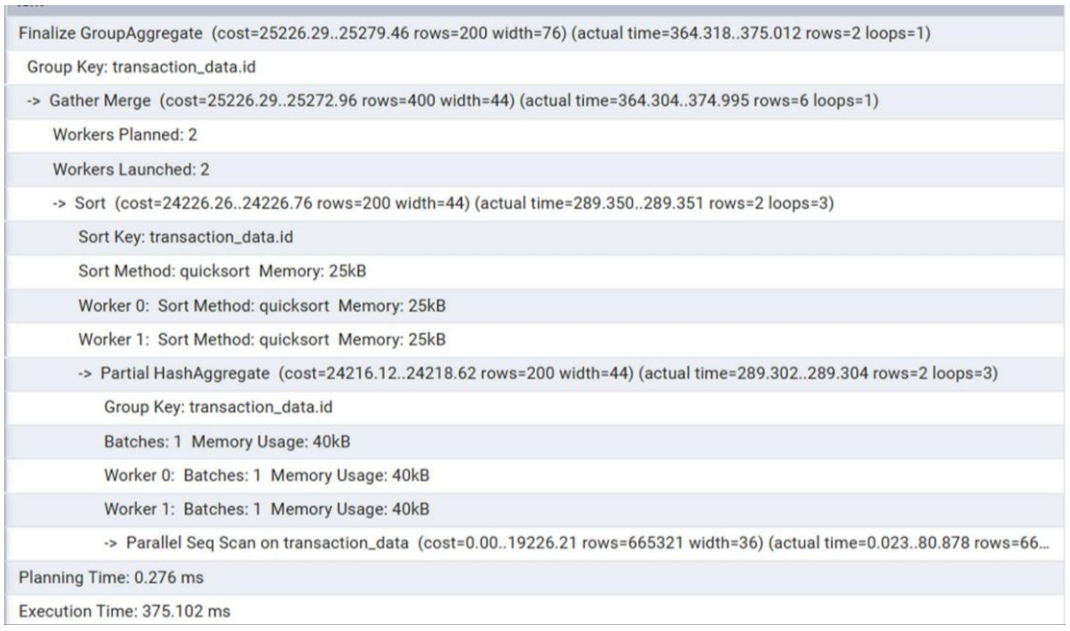
```
SELECT 2, (random() * 100)::numeric
FROM generate_series(1, 1000000);
```

WITH NORMAL VIEW

```
CREATE OR REPLACE VIEW sales_summary_view AS
SELECT
    id,
    COUNT(*) AS total_orders,
    SUM(value) AS total_sales,
    AVG(value) AS avg_transaction
FROM transaction_data
GROUP BY id;
```

EXPLAIN ANALYZE

```
SELECT * FROM sales_summary_view;
```



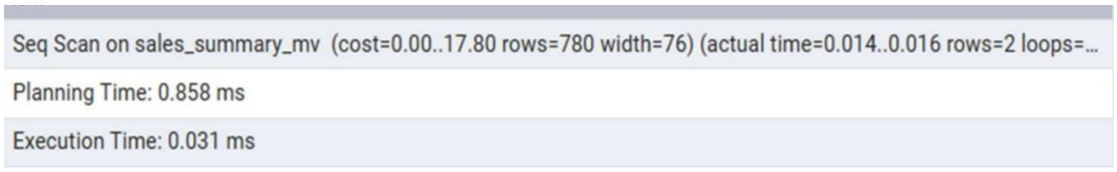
```
Finalize GroupAggregate  (cost=25226.29..25279.46 rows=200 width=76) (actual time=364.318..375.012 rows=2 loops=1)
  Group Key: transaction_data.id
  -> Gather Merge  (cost=25226.29..25272.96 rows=400 width=44) (actual time=364.304..374.995 rows=6 loops=1)
        Workers Planned: 2
        Workers Launched: 2
        -> Sort  (cost=24226.26..24226.76 rows=200 width=44) (actual time=289.350..289.351 rows=2 loops=3)
              Sort Key: transaction_data.id
              Sort Method: quicksort  Memory: 25kB
              Worker 0:  Sort Method: quicksort  Memory: 25kB
              Worker 1:  Sort Method: quicksort  Memory: 25kB
              -> Partial HashAggregate  (cost=24216.12..24218.62 rows=200 width=44) (actual time=289.302..289.304 rows=2 loops=3)
                    Group Key: transaction_data.id
                    Batches: 1  Memory Usage: 40kB
                    Worker 0:  Batches: 1  Memory Usage: 40kB
                    Worker 1:  Batches: 1  Memory Usage: 40kB
                    -> Parallel Seq Scan on transaction_data  (cost=0.00..19226.21 rows=665321 width=36) (actual time=0.023..80.878 rows=66...
Planning Time: 0.276 ms
Execution Time: 375.102 ms
```

WITH MATERIALIZED VIEW

```
CREATE MATERIALIZED VIEW sales_summary_mv AS
SELECT
    id,
    COUNT(*) AS total_orders,
    SUM(value) AS total_sales,
    AVG(value) AS avg_transaction
FROM transaction_data
GROUP BY id;
```

EXPLAIN ANALYZE

```
SELECT * FROM sales_summary_mv;
```



```
Seq Scan on sales_summary_mv  (cost=0.00..17.80 rows=780 width=76) (actual time=0.014..0.016 rows=2 loops=...
Planning Time: 0.858 ms
Execution Time: 0.031 ms
```

Hard Level Problem

Question : Securing Data Access with Views and Role-Based Permissions

The company TechMart Solutions stores all sales transactions in a central database. A new reporting team has been formed to analyze sales but they should not have direct access to the base tables for security reasons.
The database administrator has decided to:

1. Create restricted views to display only summarized, non-sensitive data.
2. Assign access to these views to specific users using DCL commands (GRANT, REVOKE).

Solution:

```
CREATE VIEW vW_ORDER_SUMMARY AS
SELECT
   O.order_id,
   O.order_date,
   P.product_name,
   C.full_name,
   (P.unit_price * O.quantity) - ((P.unit_price * O.quantity) * O.discount_percent / 100)
AS final_cost
FROM customer_master AS C
JOIN sales_orders AS O
   ON O.customer_id = C.customer_id
JOIN product_catalog AS P
   ON P.product_id = O.product_id;

SELECT * FROM vW_ORDER_SUMMARY;



CREATE ROLE CLIENT_USER
LOGIN
PASSWORD 'client_password';

GRANT SELECT ON vW_ORDER_SUMMARY TO CLIENT_USER;

REVOKE SELECT ON vW_ORDER_SUMMARY FROM CLIENT_USER;
```