Experiment No: 5

Student Name: Khushi Kumari   **UID: 23BCS10988**

Branch: B.E./C.S.E.   **Section/Group: KRG_3B**

Semester: 5th

Subject Name: ADBMS

Subject Code: 23CSP-333

Medium Level Problem

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;
```

| | QUERY PLAN 🔒<br>text |
|---|---|
| 1 | Finalize GroupAggregate  (cost=25226.29..25279.46 rows=200 width=76) (actual time=364.318..375.012 rows=2 loops=1) |
| 2 | Group Key: transaction_data.id |
| 3 | -> Gather Merge  (cost=25226.29..25272.96 rows=400 width=44) (actual time=364.304..374.995 rows=6 loops=1) |
| 4 | Workers Planned: 2 |
| 5 | Workers Launched: 2 |
| 6 | -> Sort  (cost=24226.26..24226.76 rows=200 width=44) (actual time=289.350..289.351 rows=2 loops=3) |
| 7 | Sort Key: transaction_data.id |
| 8 | Sort Method: quicksort  Memory: 25kB |
| 9 | Worker 0: Sort Method: quicksort  Memory: 25kB |
| 10 | Worker 1: Sort Method: quicksort  Memory: 25kB |
| 11 | -> Partial HashAggregate  (cost=24216.12..24218.62 rows=200 width=44) (actual time=289.302..289.304 rows=2 loops=3) |
| 12 | Group Key: transaction_data.id |
| 13 | Batches: 1  Memory Usage: 40kB |
| 14 | Worker 0: Batches: 1  Memory Usage: 40kB |
| 15 | Worker 1: Batches: 1  Memory Usage: 40kB |
| 16 | -> Parallel Seq Scan on transaction_data  (cost=0.00..19226.21 rows=665321 width=36) (actual time=0.023..80.878 rows=66... |
| 17 | Planning Time: 0.276 ms |
| 18 | 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;
```

| | QUERY PLAN<br>text | 🔒 |
|---|---|---|
| 1 | Seq Scan on sales_summary_mv  (cost=0.00..17.80 rows=780 width=76) (actual time=0.014..0.016 rows=2 loops=... | |
| 2 | Planning Time: 0.858 ms | |
| 3 | 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;
```