Experiment 5

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Section: 23BCS_KRG-2/A
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1. Aim:

Q1: Normal View vs. Materialized View

1. **Create a large dataset:**
   - Create a table named 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 views:**
   - Create a **normal view** and a **materialized view** for sales_summary, which includes total_quantity_sold, total_sales, and total_orders with aggregation.
3. **Compare performance:**
   - Compare the performance and execution time of both views.

Q2: 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**).

2. Tools Used: PgAdmin

3. Code:

Q1:

```
Q1:
-- 1. Create the table
CREATE TABLE transaction_data (
    id INT,
    value NUMERIC
```

```
);

-- 2. Insert 1 million records for id = 1
INSERT INTO transaction_data (id, value)
SELECT 1, (random() * 100)::NUMERIC
FROM generate_series(1, 1000000);

-- 3. Insert 1 million records for id = 2
INSERT INTO transaction_data (id, value)
SELECT 2, (random() * 100)::NUMERIC
FROM generate_series(1, 1000000);

-- 4. Create a 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;

-- 5. Analyze execution and performance
EXPLAIN ANALYZE
SELECT * FROM sales_summary_view;
```

Q2:

```
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;
```

4. Output

	QUERY PLAN 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

	QUERY PLAN 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

5. Learning Outcomes

1. Understand the difference between **normal views and materialized views**, and their impact on **query performance**.
2. Apply **aggregate functions** (COUNT, SUM, AVG) to summarize large datasets.
3. Learn to create **restricted views** to expose only **non-sensitive data**.
4. Implement **role-based access control** using DCL commands (GRANT, REVOKE).
5. Strengthen skills in **view creation, performance analysis, and secure data access**.