

Experiment No: 5

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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 | |
|----|---|---|
| | 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 |  |
|---|--|---|
| | 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;
```