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;
```