[Task 4] Project: OLAP Operations

Objective: Perform OLAP operations (Drill Down, Rollup, Cube, Slice, and Dice) on the "sales_sample" table to analyze sales data. The project will include the following tasks:

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1) Database Creation:

- Create a database to store the sales data (Redshift or PostgreSQL).

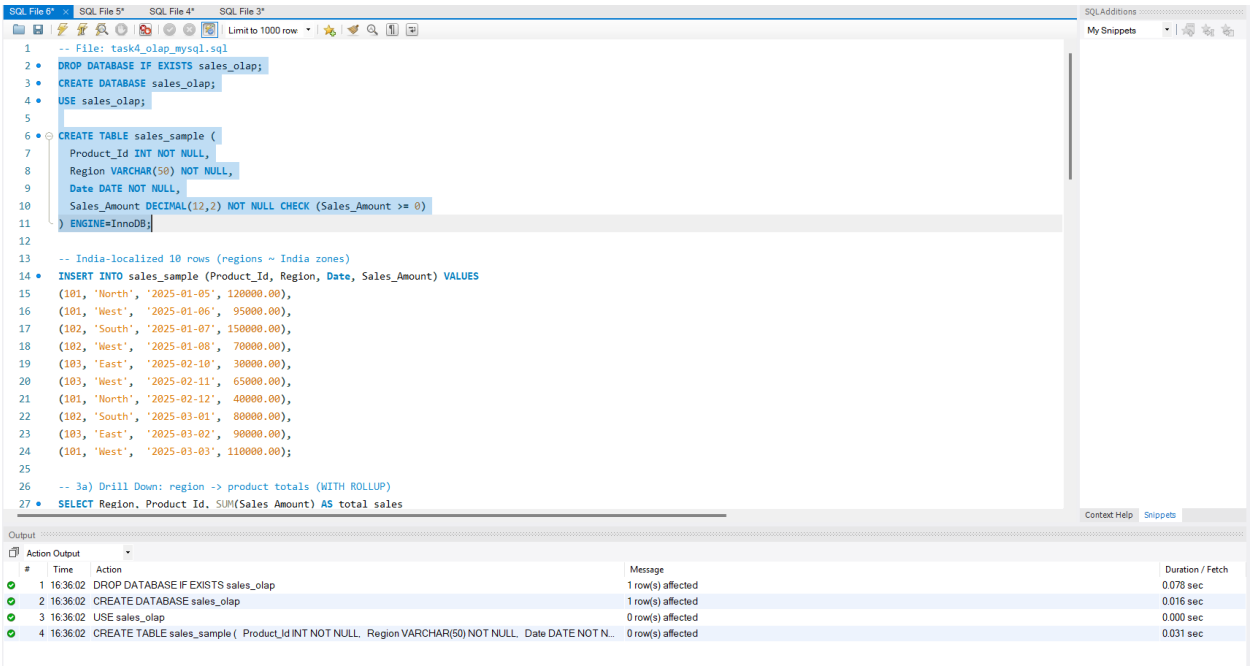
- Create a table named "sales_sample" with the specified columns:

Product_Id (integer)

Region (varchar(50)) – like East, West, etc.

Date (date)

Sales_Amount (int/numeric)



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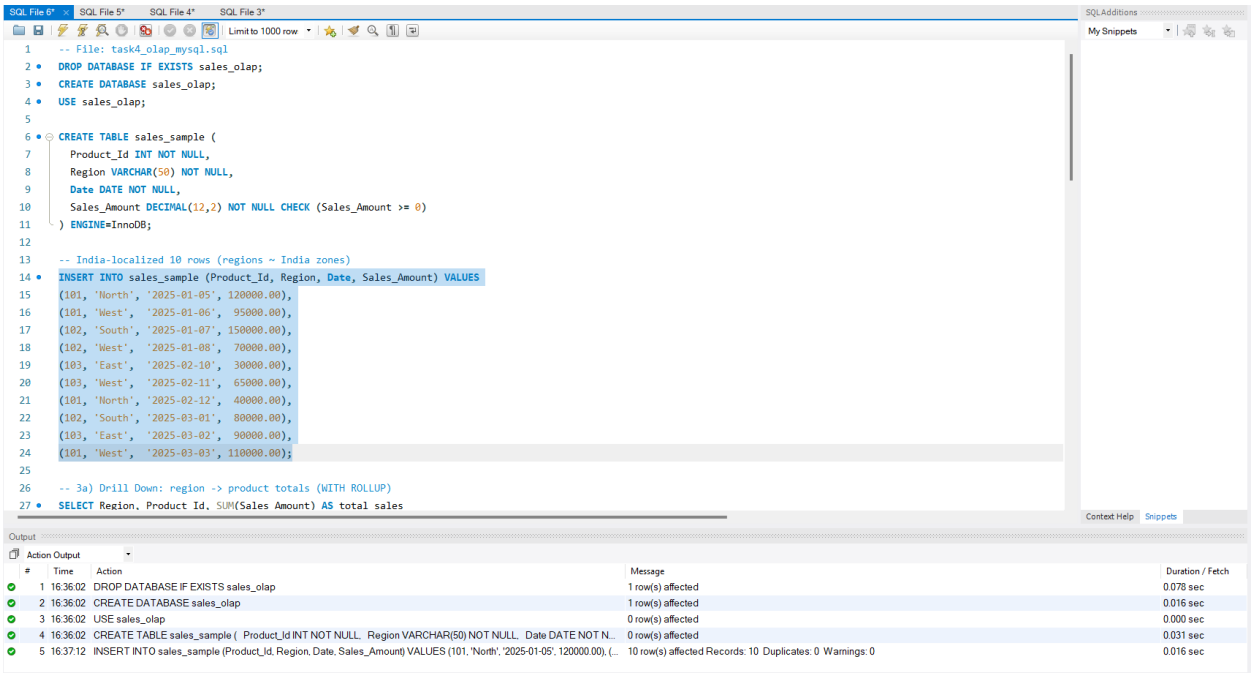
2) Data Creation:

- Insert 10 sample records into the "sales_sample" table, representing sales data.



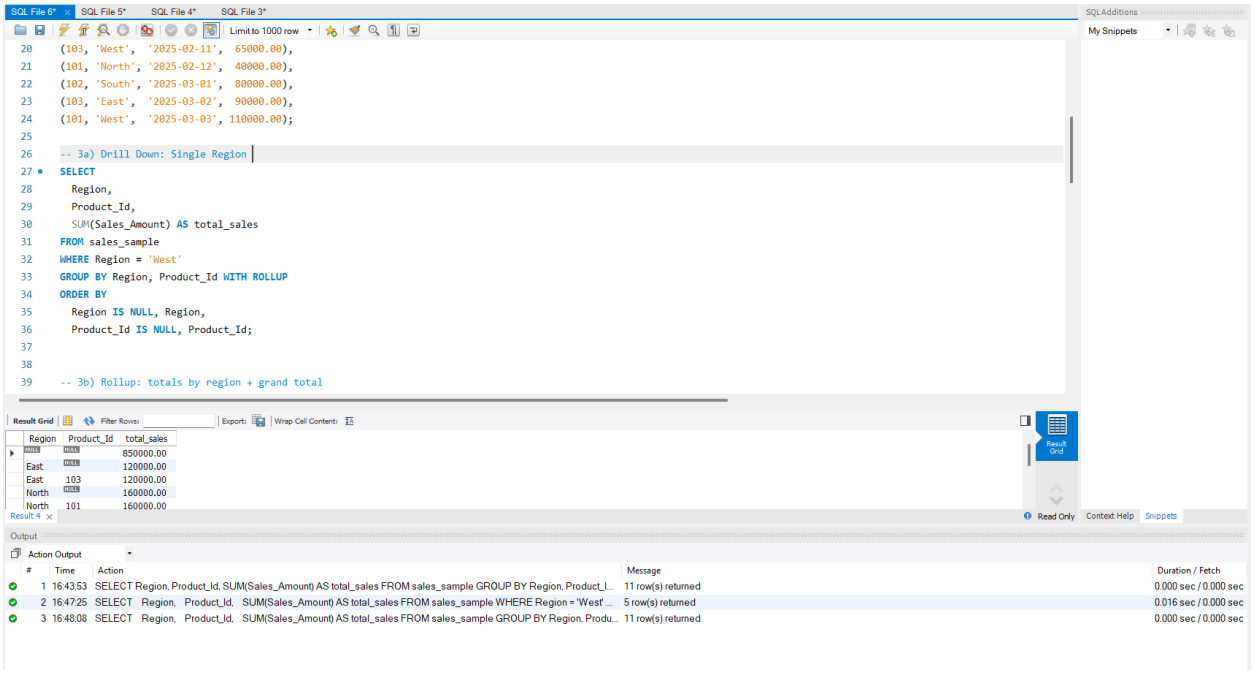
```
-- File: task4_olap_mysql.sql
DROP DATABASE IF EXISTS sales_olap;
CREATE DATABASE sales_olap;
USE sales_olap;

CREATE TABLE sales_sample (
  Product_Id INT NOT NULL,
  Region VARCHAR(50) NOT NULL,
  Date DATE NOT NULL,
  Sales_Amount DECIMAL(12,2) NOT NULL CHECK (Sales_Amount >= 0)
) ENGINE=InnoDB;

-- India-localized 10 rows (regions ~ India zones)
INSERT INTO sales_sample (Product_Id, Region, Date, Sales_Amount) VALUES
(101, 'North', '2025-01-05', 120000.00),
(101, 'West',  '2025-01-06',  95000.00),
(102, 'South', '2025-01-07', 150000.00),
(102, 'West',  '2025-01-08',  70000.00),
(103, 'East',  '2025-02-10',  30000.00),
(103, 'West',  '2025-02-11',  65000.00),
(101, 'North', '2025-02-12',  40000.00),
(102, 'South', '2025-03-01',  80000.00),
(103, 'East',  '2025-03-02',  90000.00),
(101, 'West',  '2025-03-03', 110000.00);

-- 3a) Drill Down: region -> product totals (WITH ROLLUP)
SELECT Region, Product_Id, SUM(Sales_Amount) AS total_sales
```

Output

#	Time	Action	Message	Duration / Fetch
1	16:36:02	DROP DATABASE IF EXISTS sales_olap	1 row(s) affected	0.078 sec
2	16:36:02	CREATE DATABASE sales_olap	1 row(s) affected	0.016 sec
3	16:36:02	USE sales_olap	0 row(s) affected	0.000 sec
4	16:36:02	CREATE TABLE sales_sample (Product_Id INT NOT NULL, Region VARCHAR(50) NOT NULL, Date DATE NOT N...	0 row(s) affected	0.031 sec
5	16:37:12	INSERT INTO sales_sample (Product_Id, Region, Date, Sales_Amount) VALUES (101, 'North', '2025-01-05', 120000.00), (...	10 row(s) affected Records: 10 Duplicates: 0 Warnings: 0	0.016 sec

3) Perform OLAP operations:

a) Drill Down — Analyze sales data at a more detailed level. Write a query to perform drill down from region to product level to understand sales performance.



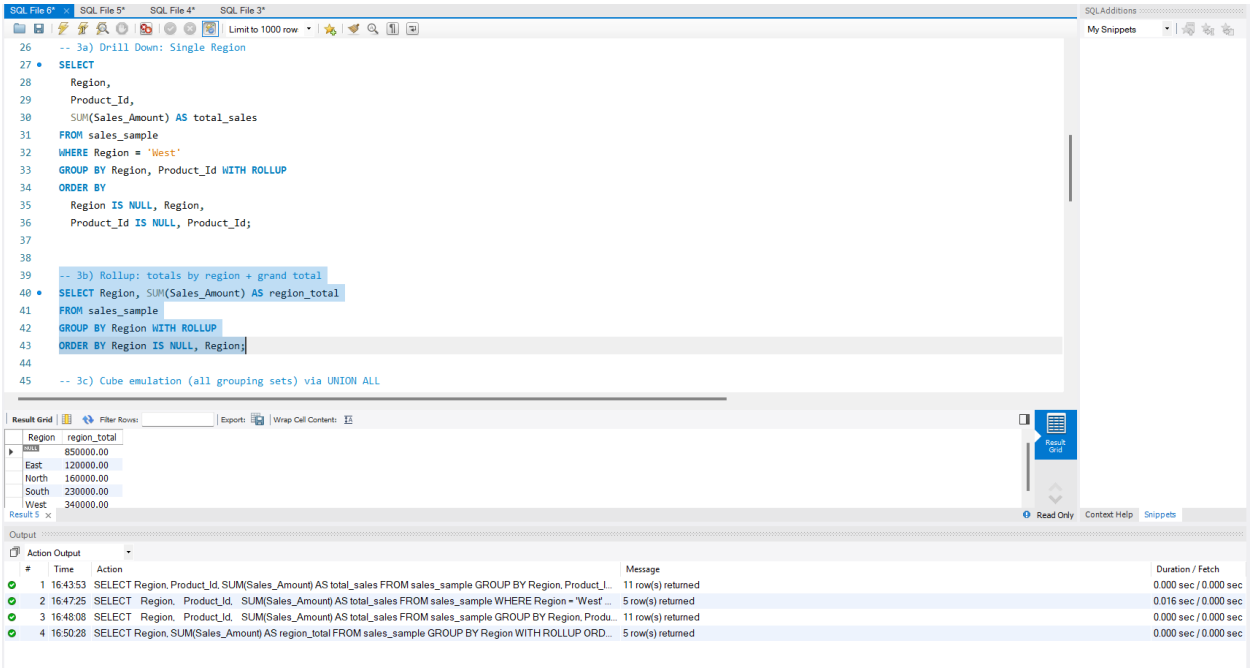
```
(103, 'West',  '2025-02-11',  65000.00),
(101, 'North', '2025-02-12',  40000.00),
(102, 'South', '2025-03-01',  80000.00),
(103, 'East',  '2025-03-02',  90000.00),
(101, 'West',  '2025-03-03', 110000.00);

-- 3a) Drill Down: Single Region
SELECT
  Region,
  Product_Id,
  SUM(Sales_Amount) AS total_sales
FROM sales_sample
WHERE Region = 'West'
GROUP BY Region, Product_Id WITH ROLLUP
ORDER BY
  Region IS NULL, Region,
  Product_Id IS NULL, Product_Id;


-- 3b) Rollup: totals by region + grand total
```

Region	Product_Id	total_sales
		850000.00
East		120000.00
East	103	120000.00
North		160000.00
North	101	160000.00

Output

#	Time	Action	Message	Duration / Fetch
1	16:43:53	SELECT Region, Product_Id, SUM(Sales_Amount) AS total_sales FROM sales_sample GROUP BY Region, Product_I...	11 row(s) returned	0.000 sec / 0.000 sec
2	16:47:25	SELECT Region, Product_Id, SUM(Sales_Amount) AS total_sales FROM sales_sample WHERE Region = 'West' ...	5 row(s) returned	0.016 sec / 0.000 sec
3	16:48:08	SELECT Region, Product_Id, SUM(Sales_Amount) AS total_sales FROM sales_sample GROUP BY Region, Produ...	11 row(s) returned	0.000 sec / 0.000 sec

b) Rollup — To summarize sales data at different levels of granularity. Write a query to perform roll up from product to region level to view total sales by region.

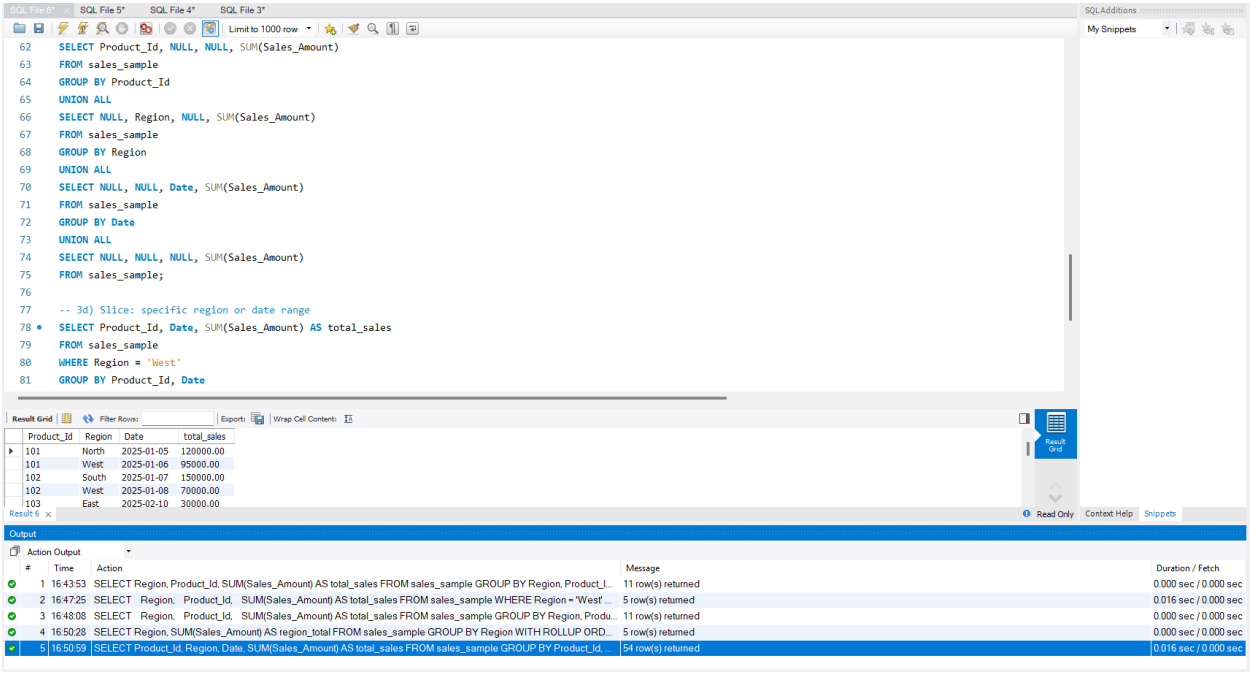


```
-- 3a) Drill Down: Single Region
SELECT
  Region,
  Product_Id,
  SUM(Sales_Amount) AS total_sales
FROM sales_sample
WHERE Region = 'West'
GROUP BY Region, Product_Id WITH ROLLUP
ORDER BY
  Region IS NULL, Region,
  Product_Id IS NULL, Product_Id;


-- 3b) Rollup: totals by region + grand total
SELECT Region, SUM(Sales_Amount) AS region_total
FROM sales_sample
GROUP BY Region WITH ROLLUP
ORDER BY Region IS NULL, Region;

-- 3c) Cube emulation (all grouping sets) via UNION ALL
```

Region	region_total
NULL	850000.00
East	120000.00
North	160000.00
South	230000.00
West	340000.00

#	Time	Action	Message	Duration / Fetch
1	16:43:53	SELECT Region, Product_Id, SUM(Sales_Amount) AS total_sales FROM sales_sample GROUP BY Region, Product_I...	11 row(s) returned	0.000 sec / 0.000 sec
2	16:47:25	SELECT Region, Product_Id, SUM(Sales_Amount) AS total_sales FROM sales_sample WHERE Region = 'West' ...	5 row(s) returned	0.016 sec / 0.000 sec
3	16:48:08	SELECT Region, Product_Id, SUM(Sales_Amount) AS total_sales FROM sales_sample GROUP BY Region, Produ...	11 row(s) returned	0.000 sec / 0.000 sec
4	16:50:28	SELECT Region, SUM(Sales_Amount) AS region_total FROM sales_sample GROUP BY Region WITH ROLLUP ORD...	5 row(s) returned	0.000 sec / 0.000 sec

c) Cube — To analyze sales data from multiple dimensions simultaneously. Write a query to explore sales data from different perspectives, such as product, region, and date.

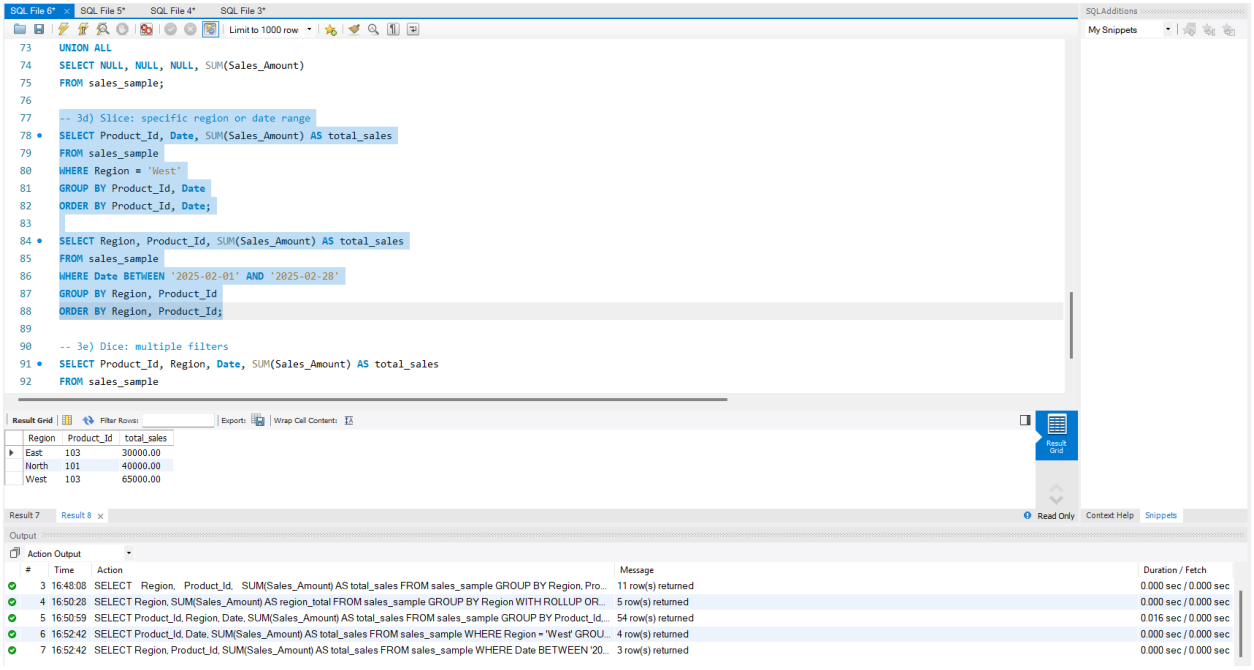


```
SELECT Product_Id, NULL, NULL, SUM(Sales_Amount)
FROM sales_sample
GROUP BY Product_Id
UNION ALL
SELECT NULL, Region, NULL, SUM(Sales_Amount)
FROM sales_sample
GROUP BY Region
UNION ALL
SELECT NULL, NULL, Date, SUM(Sales_Amount)
FROM sales_sample
GROUP BY Date
UNION ALL
SELECT NULL, NULL, NULL, SUM(Sales_Amount)
FROM sales_sample;

-- 3d) Slice: specific region or date range
SELECT Product_Id, Date, SUM(Sales_Amount) AS total_sales
FROM sales_sample
WHERE Region = 'West'
GROUP BY Product_Id, Date
```

Product_Id	Region	Date	total_sales
101	North	2025-01-05	120000.00
101	West	2025-01-06	95000.00
102	South	2025-01-07	150000.00
102	West	2025-01-08	70000.00
103	East	2025-02-10	30000.00

#	Time	Action	Message	Duration / Fetch
1	16:43:53	SELECT Region, Product_Id, SUM(Sales_Amount) AS total_sales FROM sales_sample GROUP BY Region, Product_I...	11 row(s) returned	0.000 sec / 0.000 sec
2	16:47:25	SELECT Region, Product_Id, SUM(Sales_Amount) AS total_sales FROM sales_sample WHERE Region = 'West' ...	5 row(s) returned	0.016 sec / 0.000 sec
3	16:48:08	SELECT Region, Product_Id, SUM(Sales_Amount) AS total_sales FROM sales_sample GROUP BY Region, Produ...	11 row(s) returned	0.000 sec / 0.000 sec
4	16:50:28	SELECT Region, SUM(Sales_Amount) AS region_total FROM sales_sample GROUP BY Region WITH ROLLUP ORD...	5 row(s) returned	0.000 sec / 0.000 sec
5	16:50:59	SELECT Product_Id, Region, Date, SUM(Sales_Amount) AS total_sales FROM sales_sample GROUP BY Product_Id, ...	54 row(s) returned	0.016 sec / 0.000 sec

d) Slice — To extract a subset of data based on specific criteria. Write a query to slice the data to view sales for a particular region or date range.



e) Dice — To extract data based on multiple criteria. Write a query to view sales for specific combinations of product, region, and date.