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| Experiment No.2 |
| Apply OLAP operations |
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**Aim:** To implement Perform OLAP Operations

**Objective:** Develop a program to implement OLAP operations

**Theory:**

**Online analytical processing**, or **OLAP** is an approach to answering [multidimensional analytical (](https://en.wikipedia.org/wiki/Multi-dimensional_analytical)MDA) queries swiftly in [computing O](https://en.wikipedia.org/wiki/Computing)LAP is part of the broader category of [business intelligence,](https://en.wikipedia.org/wiki/Business_intelligence) which also encompasses [relational database,](https://en.wikipedia.org/wiki/Relational_database) report writing and [data mining.](https://en.wikipedia.org/wiki/Data_mining) Typical applications of OLAP include [business reporting f](https://en.wikipedia.org/wiki/Business_reporting)or sales, [marketing,](https://en.wikipedia.org/wiki/Marketing) management reporting, [business process management (](https://en.wikipedia.org/wiki/Business_process_management)BPM), [budgeting a](https://en.wikipedia.org/wiki/Budget)nd [forecasting,](https://en.wikipedia.org/wiki/Forecasting) [financial reporting a](https://en.wikipedia.org/wiki/Financial_reporting)nd similar areas, with new applications coming up, such as [agriculture. T](https://en.wikipedia.org/wiki/Agriculture)he term OLAP was created as a slight modification of the traditional database term [online transaction processing (](https://en.wikipedia.org/wiki/Online_transaction_processing)OLTP).

OLAP tools enable users to analyze multidimensional data interactively from multiple perspectives. OLAP consists of three basic analytical operations: consolidation (roll-up), drill-down, and slicing and dicing. Consolidation involves the aggregation of data that can be accumulated and computed in one or more dimensions. For example, all sales offices are rolled up to the sales department or sales division to anticipate sales trends. By contrast, the drill-down is a technique that allows users to navigate through the details. For instance, users can view the sales by individual products that make up a region's sales. Slicing and dicing is a feature whereby users can take out (slicing) a specific set of data of the [OLAP cube a](https://en.wikipedia.org/wiki/OLAP_cube)nd view (dicing) the slices from different viewpoints. These viewpoints are sometimes called dimensions (such as looking at the same sales by salesperson or by date or by customer or by product or by region, etc.) The following are different types of OLAP models:

1. MOLAP (Multidimensional OLAP)

1. ROLAP (Relational OLAP)

1. HOLAP (Hybrid OLAP)

1. DOLAP (Desktop OLAP)

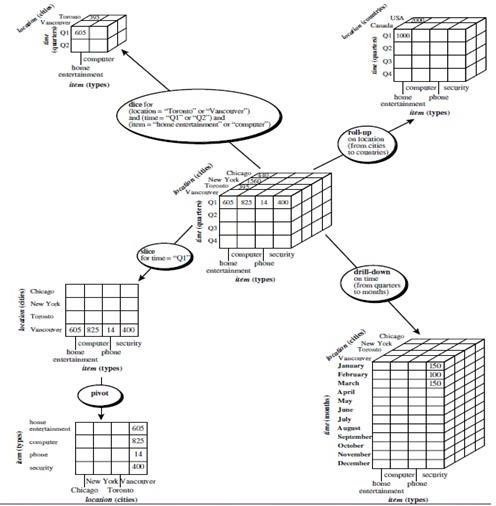


Figure 1: OLAP Operations

Roll-up: The roll-up operation (also called the drill-up operation by some vendors) performs aggregation on a data cube, either by climbing up a concept hierarchy for a dimension or by dimension reduction. Figure 1 shows the result of a roll-up operation performed on the central cube by climbing up the concept hierarchy for location given in Figure 1. This hierarchy was defined as the total order “street < city < province or state < country.” The roll-up operation shown aggregates the data by ascending the location hierarchy from the level of city to the level of country. In other words, rather than grouping the data by city, the resulting cube groups the data by country. When roll-up is performed by dimension reduction, one or more dimensions are removed from the given cube. For example, consider a sales data cube containing only the two dimensions location and time. Roll-up may be performed by removing, say, the time dimension, resulting in an aggregation of the total sales by location, rather than by location and by time.

Drill-down: Drill-down is the reverse of roll-up. It navigates from less detailed data to more detailed data. Drill-down can be realized by either stepping down a concept hierarchy for a dimension or introducing additional dimensions. Figure 1 shows the result of a drill-down operation performed on the central cube by stepping down a concept hierarchy for time defined as “day < month < quarter < year.” Drill-down occurs by descending the time hierarchy from the level of quarter to the more detailed level of month. The resulting data cube details the total sales per month rather than summarizing them by quarter. Because a drill-down adds more detail to the given data, it can also be performed by adding new dimensions to a cube. For example, a drill-down on the central cube of Figure 1 can occur by introducing an additional dimension, such ascustomer group.

Slice and dice: The slice operation performs a selection on one dimension of the given cube, resulting in a subcube. Figure 1 shows a slice operation where the sales data are selected from the central cube for the dimension time using the criterion time = “Q1”. The dice operation defines a subcube by performing a selection on two or more dimensions. Figure 1 shows a dice operation on the central cube based on the following selection criteria that involve three dimensions: (location = “Toronto” or “Vancouver”) and (time = “Q1” or “Q2”) and (item = “home entertainment” or “computer”).

Pivot (rotate): Pivot (also called rotate) is a visualization operation that rotates the data axes in view in order to provide an alternative presentation of the data. Figure 1 shows a pivot operation where the item and location axes in a 2-D slice are rotated.

**Code and output**:

# 1.Roll Up

Select Time\_dw.yr, sum(total\_sales)

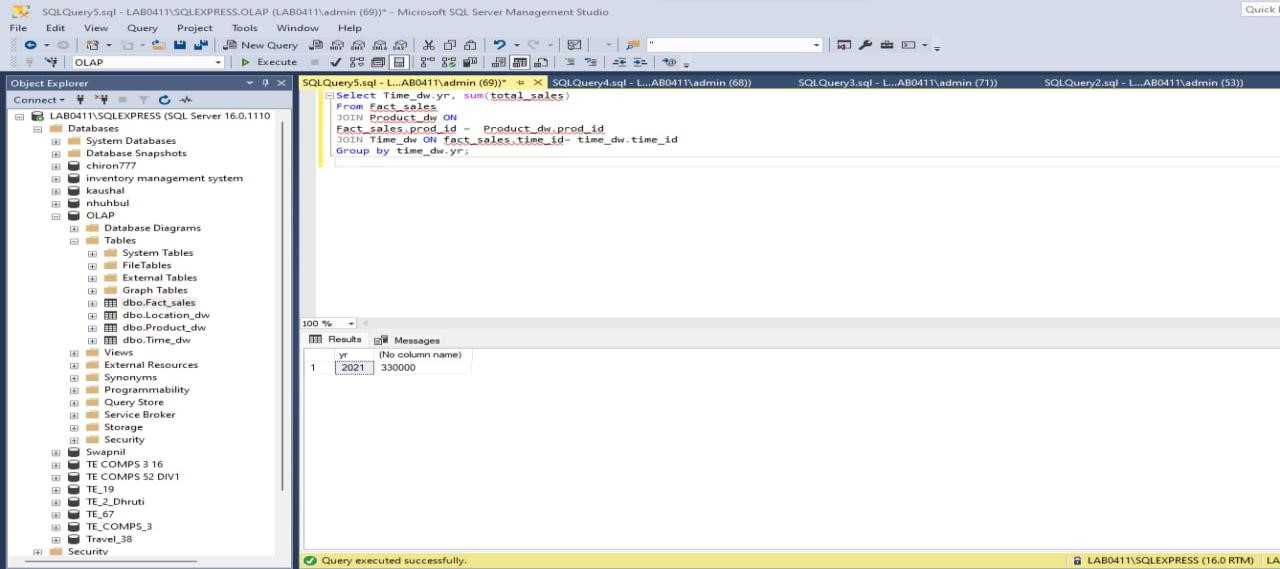
From Fact\_sales

JOIN Product\_dw ON

Fact\_sales.product\_id = Product\_dw.product\_id

JOIN Time\_dw ON fact\_sales.time\_id= time\_dw.time\_id

Group by time\_dw.yr;



# 2.Drill Down

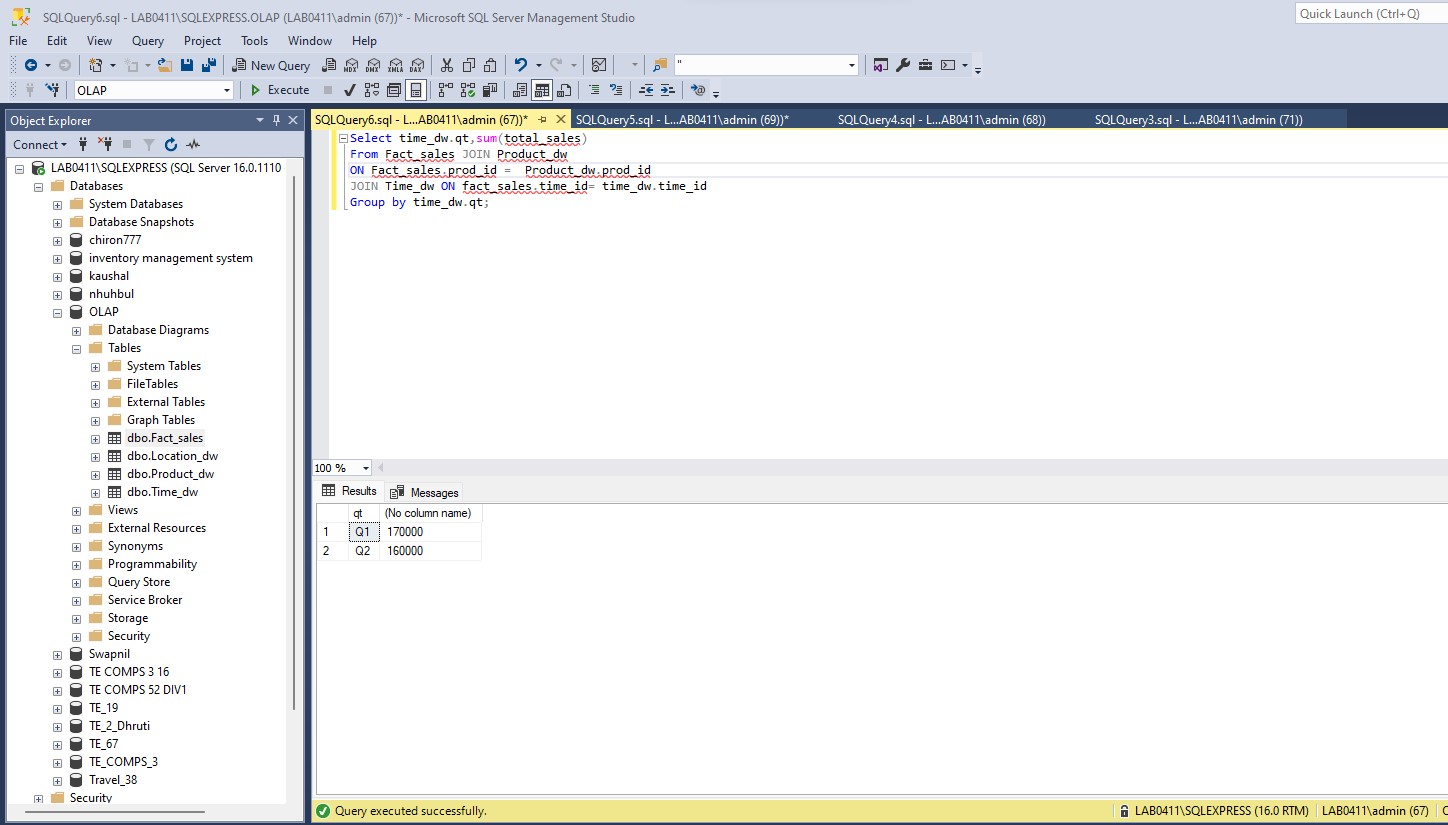
Select time\_dw.qt,sum(total\_sales)

From Fact\_sales JOIN Product\_dw

ON Fact\_sales.product\_id = Product\_dw.product\_id

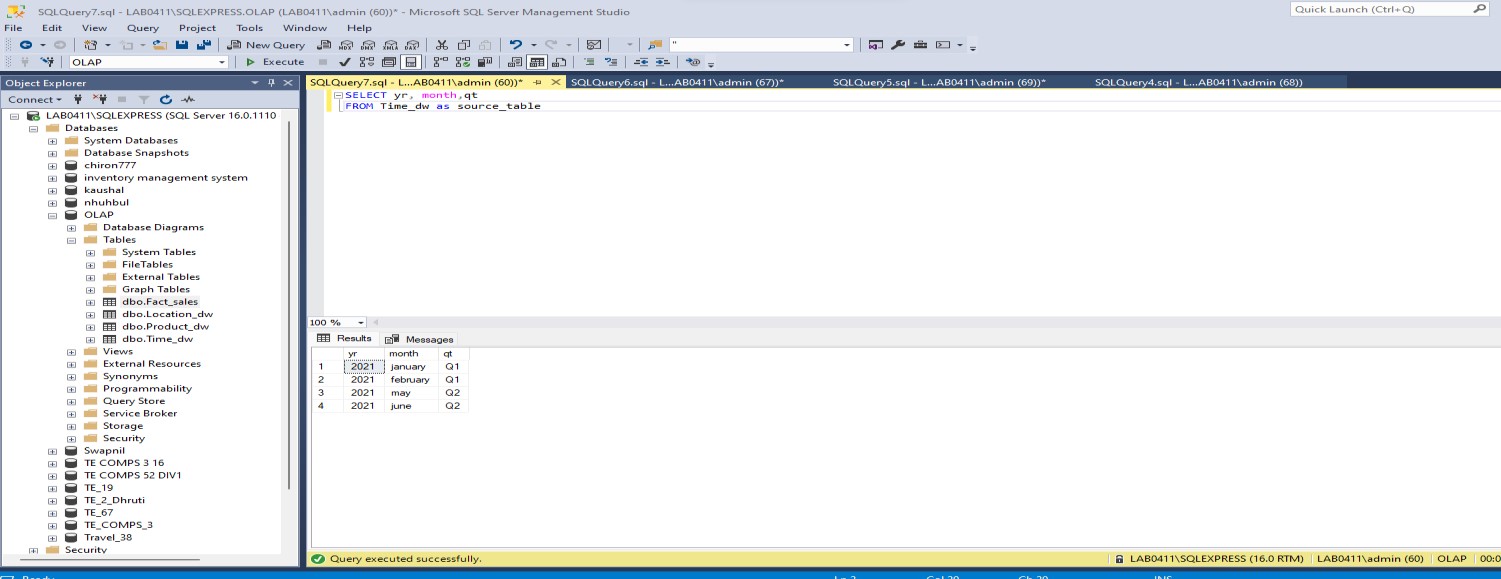
JOIN Time\_dw ON fact\_sales.time\_id= time\_dw.time\_id

Group by time\_dw.qt;



**3. Pivot** SELECT yr, month,qt

FROM Time\_dw as source\_table



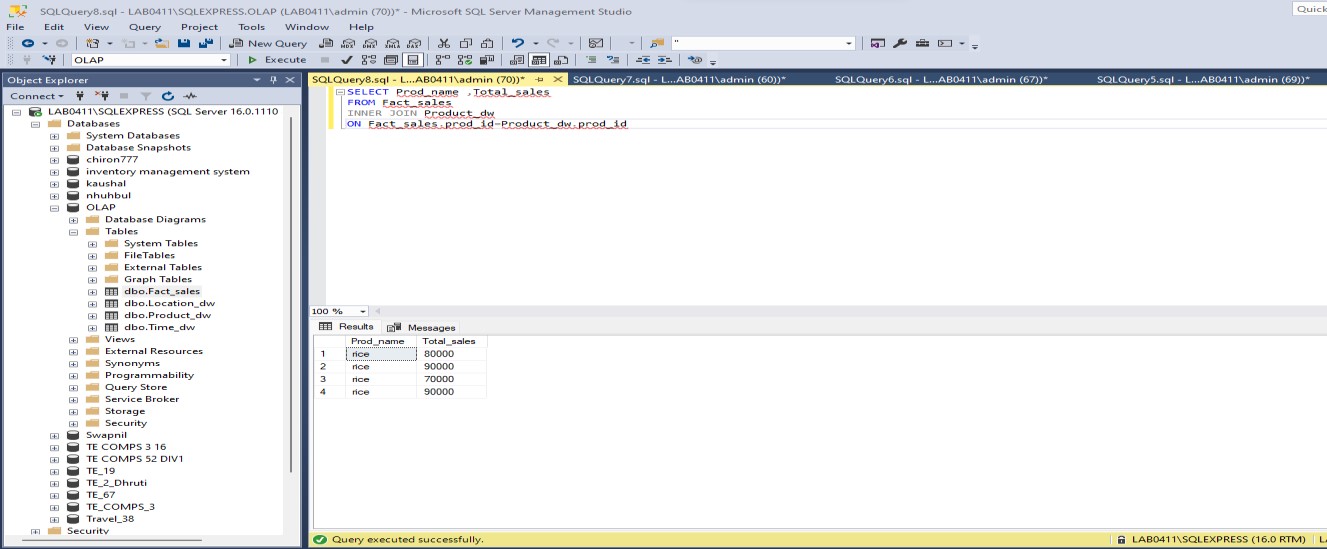
# 4.Slice

SELECT Prod\_name ,Total\_sales

FROM Fact\_sales

INNER JOIN Product\_dw

ON Fact\_sales.prod\_id=Product\_dw.prod\_id



# 5.Dice

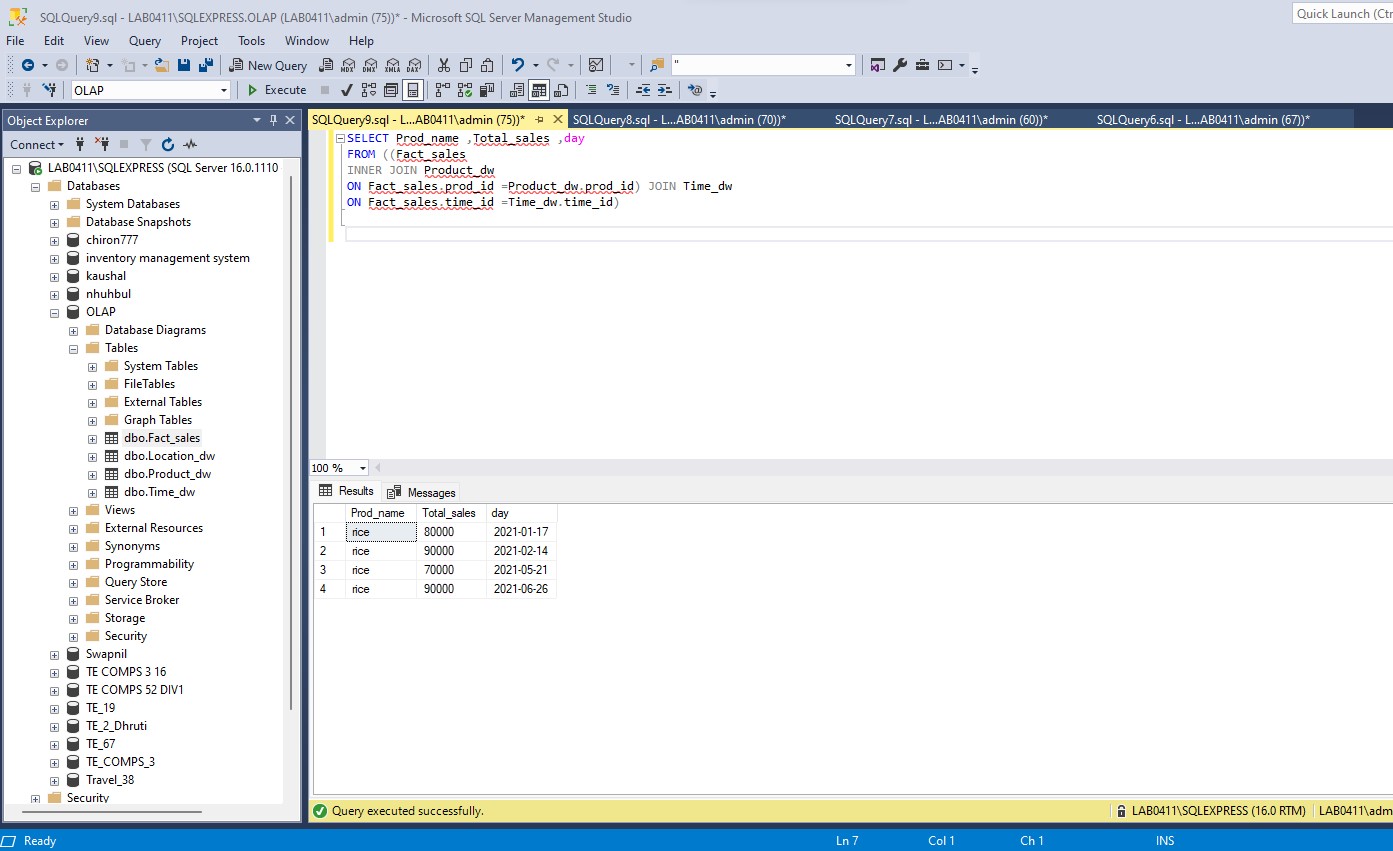
SELECT Prod\_name ,Total\_sales ,day

FROM ((Fact\_sales

INNER JOIN Product\_dw

ON Fact\_sales.prod\_id =Product\_dw.prod\_id) JOIN Time\_dw

ON Fact\_sales.time\_id =Time\_dw.time\_id)



**Conclusion:** OLAP (Online Analytical Processing) operations allow users to analyze multidimensional data from multiple perspectives. OLAP operations enhance data analysis by allowing users to explore and visualize data from various dimensions and levels of detail.