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# OLAP Operations in SQL



Iqra Bismi · [Follow](#)

3 min read · Feb 20



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*OLAP (Online Analytical Processing) is a technology that allows users to perform complex business analysis on large volumes of data from multiple sources.*

One of the key features of OLAP is the ability to perform operations like Rollup and Cube. Rollup and Cube are OLAP operations that are used to summarize data in a hierarchical manner. These operations are typically used in data warehousing and business intelligence applications to create multi-dimensional views of data.

Rollup is an operation that aggregates data from multiple levels of a hierarchy. For example, if you have a product hierarchy with categories, subcategories, and products, you could use the Rollup operation to aggregate sales data at the category level, the subcategory level, and the product level. The Rollup operation creates summary rows by rolling up data from lower levels of the hierarchy to higher levels. This allows users to see both the detailed data and the summary data in a single view.

The Cube operation is similar to the Rollup operation, but it creates summary rows for all possible combinations of the dimensions in the data.

For example, if you have a sales data set with dimensions for time, product, and region, the Cube operation would create summary rows for all possible combinations of these dimensions (e.g. total sales by product and region for a particular time period). The Cube operation allows users to analyze data from multiple perspectives and gain insights into relationships between dimensions.

Below is an example to use Rollup and Cube operation in Sql.

### *Rollup*

Suppose we have a table named Sales with columns for ProductCategory, ProductSubcategory, and SalesAmount. To perform the Rollup operation and summarize the data at multiple levels of the hierarchy, we can use the following query:

```
SELECT ProductCategory, ProductSubcategory, SUM(SalesAmount) as  
TotalSales FROM Sales GROUP BY ProductCategory, ProductSubcategory  
WITH ROLLUP;
```

Using the WITH ROLLUP option will include summary rows in the output for each level of the hierarchy. The output of this query will include rows for each combination of ProductCategory and ProductSubcategory, as well as summary rows for each level of the hierarchy

ProductCategory	Product Subcategory	TotalSales
Electronics	Audio	10000
Electronics	Video	15000
Furniture	Living Room	20000
Furniture	Bedroom	12000
NULL	NULL	57000

Output using Rollup

In this figure, the summary row with NULL values for ProductCategory and ProductSubcategory represents the total sales for all products in the Sales table. The summary row with NULL value for ProductSubcategory represents the total sales for each ProductCategory. And the summary rows with NULL values for ProductCategory represent the grand total of sales for all categories and subcategories.

## Cube

We can use the following query to perform Cube OLAP operation:

```
SELECT ProductCategory, ProductSubcategory, SUM(SalesAmount) as
TotalSales FROM Sales GROUP BY CUBE(ProductCategory,
ProductSubcategory);
```

Using the cube operator to include summary rows in the output for all combinations of levels of the hierarchy.

ProductCategory	Product Subcategory	TotalSales
Electronics	Audio	10000
Electronics	Video	15000
Electronics	NULL	25000
Furniture	Living Room	20000
Furniture	Bedroom	12000
Furniture	NULL	32000
NULL	Audio	10000
NULL	Video	15000
NULL	Living Room	20000
NULL	Bedroom	12000
NULL	NULL	57000

Output using Cube

The output of this query will include rows for each combination of ProductCategory and ProductSubCategory, as well as summary rows for each level of the hierarchy. In this example, the summary row with NULL values

for ProductCategory and ProductSubCategory represents the total sales for all products in the Sales table. The summary row with NULL value for ProductSubCategory represents the total sales for each ProductCategory. The summary row with NULL values for ProductCategory represents the total sales for each ProductSubCategory. And the other summary rows represent

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Hence,OLAP operations like ROLLUP and CUBE allow us to perform complex calculations and analysis on large data sets.

*Thank you for Reading!!!*

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**Written by Iqra Bismi**

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Data Scientist at Salesforce <https://www.linkedin.com/in/iqra-bismi/>  
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