



MULTIDIMENSIONAL VS MULTIRELATIONAL OLAP

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ROLAP

- Data stored as in **relational database** i.e rows and columns in data warehouse.
- To display the data in multidimensional view, semantic layer called **metadata** is created
 - Metadata -> maps the dimension to relational tables
 - Metadata also supports aggregation
- ROLAP works with data that exist in a relational database.



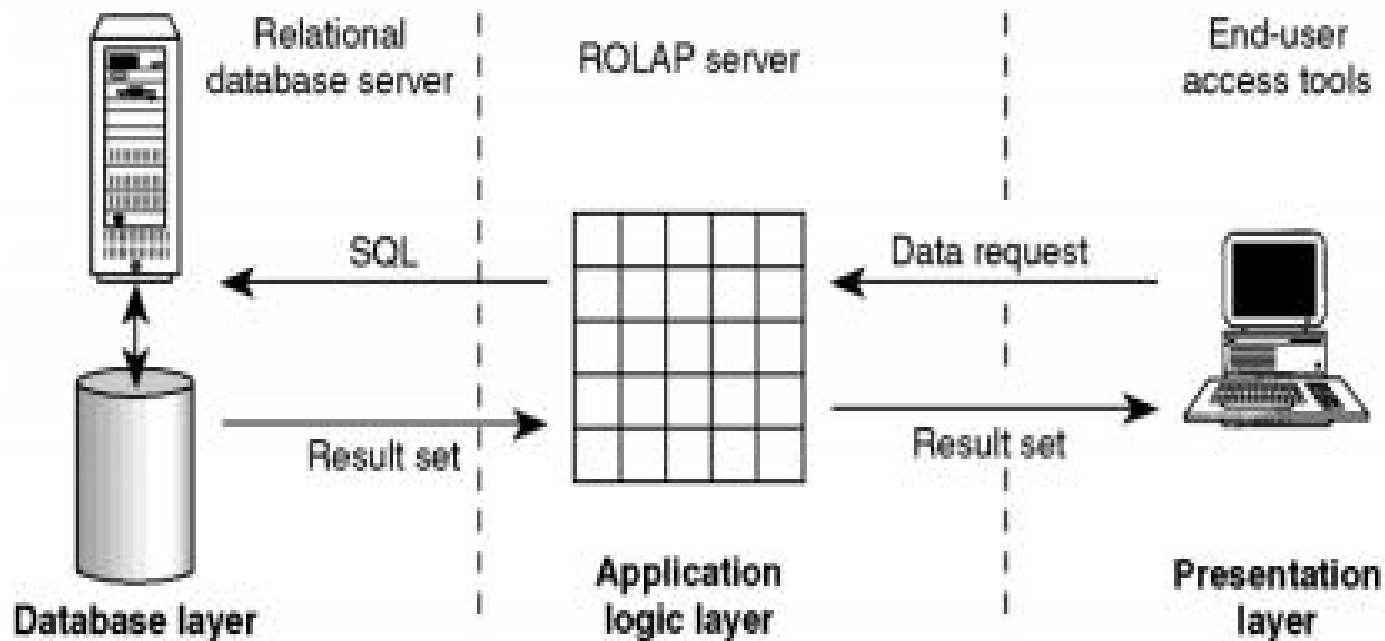
ROLAP

- Do not use **pre-calculated data cubes**, instead pose the query to standard relational database and its tables in order to bring back the data required to question.
- Has ability to drill down to the lowest level of detail in database
- Fetches data from main warehouse and **dynamically creates a multi-dimensional view of data** for user. But in MOLAP, static multidimensional view of data
- ROLAP deals with large volumes of data
- Processes slower compared to MOLAP



Relational OLAP Architecture

- ROLAP includes the following components –
 - Database server
 - ROLAP server
 - Front-end tool.





Advantages of ROLAP model

- **Scalability.** This type of OLAP system offers scalability for **managing large volumes of data**, and even when the data is steadily increasing.
- ROLAP servers can be easily used with existing RDBMS.
- **Data can be stored efficiently**, since no zero facts can be stored.
- ROLAP tools **do not use pre-calculated data cubes**.



Drawbacks of ROLAP model

- **Demand for higher resources:** ROLAP needs **high utilization of manpower, software, and hardware** resources.
- **Aggregately data limitations.** ROLAP tools use SQL for all calculation of aggregate data. However, there are no set limits to the for handling computations.
- **Slow query performance.** Query performance in this model is **slow** when compared with MOLAP



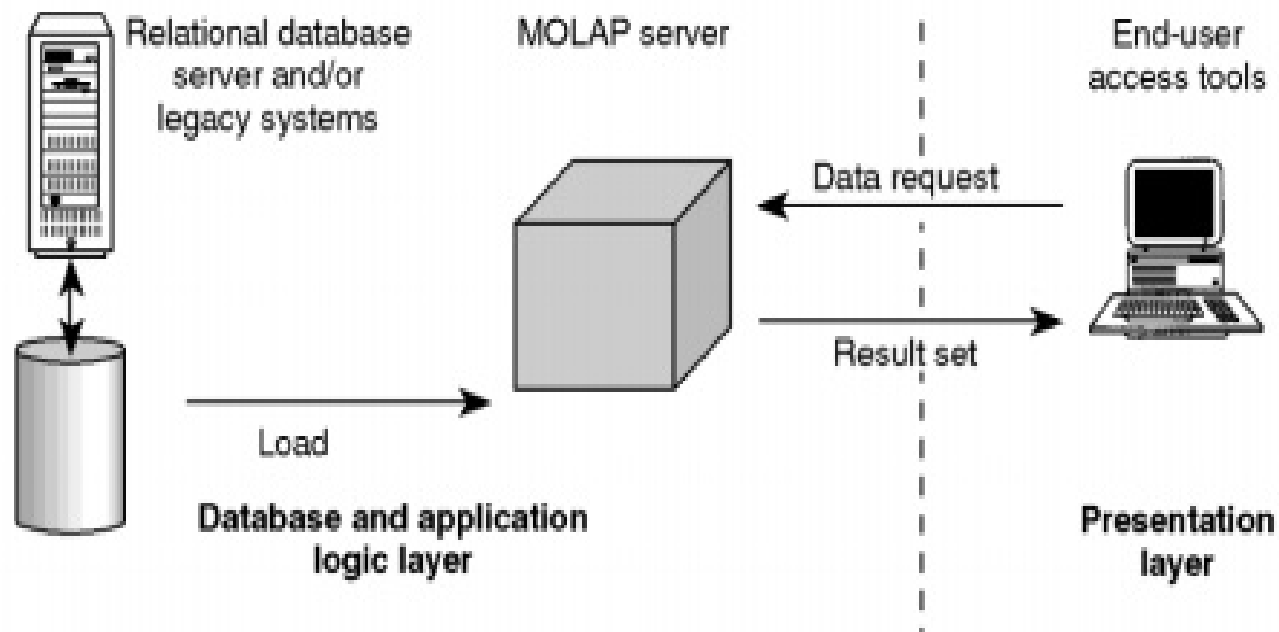
MOLAP

- MOLAP uses **array-based multidimensional storage** engines to display multidimensional views of data. Basically, they use an OLAP cube.
- Use **Multi-Dimensional Database Management System (MDDMS)** to organize, analyze data, aggregate data -> this requires tight coupling with application layer and presentation layer.
- MOLAP tools **require pre-computation and storage of derived data**, like consolidation – the operation is known as procesing
- Applications requiring iterative & comprehensive time series analysis of trends uses MOLAP.
- Examples:
 - Arbor Software's Essbase
 - Oracle's Express Server
 - Pilot Software's LightShip Server



MOLAP Architecture

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Challenges

- Limitations in ability of data structures to support multiple subject areas of data & detailed data required by many analysis.
- When dimensions change, data structure will be physically reorganized



Advantages of MOLAP

- Excellent performance
- **Smaller on-disk size of data** compared to data stored in relational database due to compression technique
- Effective data extraction achieved through pre-structuring of aggregated data
- MOLAP allows **fastest indexing** to the pre-computed summarized data.



Disadvantages of MOLAP

- Some MOLAP methodologies introduce **data redundancy**
- Requires additional investment
 - Human and capital resources needed
- The storage utilization may be low if the data set is sparse.