MOLAP (Multidimensional Online Analytical Processing)

What is MOLAP?

Multidimensional OLAP (MOLAP) is a classical OLAP that facilitates data analysis by using a multidimensional data cube. Data is pre-computed,pre-summarized, and stored in a MOLAP (a major difference from ROLAP).

Using a MOLAP, a user can use multidimensional view data with different facets. Multidimensional data analysis is also possible if a relational database is used. By that would require querying data from multiple tables. On the contrary, MOLAP has all possible combinations of data already stored in a multidimensional array. MOLAP can access this data directly. Hence, MOLAP is faster compared to Relational Online Analytical Processing (ROLAP).

In this tutorial, you will learn-

Key Points

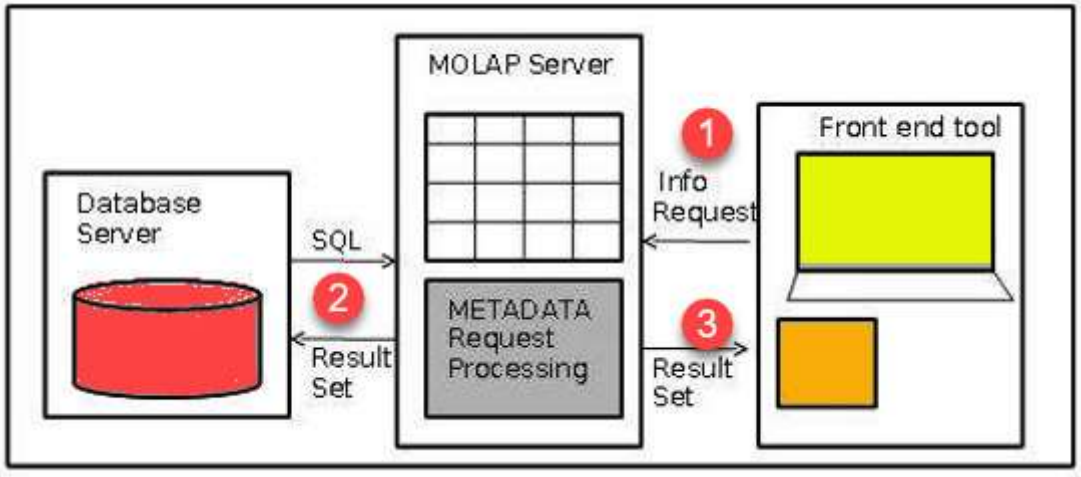
- In MOLAP, operations are called processing.
- MOLAP tools process information with the same amount of response time irrespective of the level of summarizing.

- MOLAP tools remove complexities of designing a relational database to store data for analysis.
- MOLAP server implements two level of storage representation to manage dense and sparse data sets.
- The storage utilization can be low if the data set is sparse.
- Facts are stored in multi-dimensional array and dimensions used to query them.

MOLAP Architecture

MOLAP Architecture includes the following components −

- Database server.
- MOLAP server.
- Front-end tool.



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Above given MOLAPArchitectures, shown in given figure

1. The user request reports through the interface
2. The application logic layer of the MDDB retrieves the stored data from Database
3. The application logic layer forwards the result to the client/user.

MOLAP architecture mainly reads the precompiled data. MOLAP architecture has limited capabilities to dynamically create aggregations or to calculate results that have not been pre-calculated and stored.

For example, an accounting head can run a report showing the corporate P/L account or P/L account for a specific subsidiary. The MDDB would retrieve precompiled Profit & Loss figures and display that result to the user.

Implementation considerations is MOLAP

- In MOLAP it's essential to consider both maintenance and storage implications to creating strategy for building cubes.
- Proprietary languages used to query MOLAP. However, it involves extensive click and drag support for example MDX by Microsoft.
- Difficult to scale because the number and size of cubes required when dimensions increase.
- API's should provide for probing the cubes.
- Data structure to support multiple subject areas of data analyses which data can be navigated and analyzed. When the navigation changes, the data structure needs to be physically reorganized.
- Need different skill set and tools for Database administrator to build, maintain the database.

MOLAP Advantages

- MOLAP can manage, analyze and store considerable amounts of multidimensional data.
- Fast Query Performance due to optimized storage, indexing, and caching.
- Smaller sizes of data as compared to the relational database.
- Automated computation of higher level of aggregates data.
- Help users to analyze larger, less-defined data.
- MOLAP is easier to the user that's why It is a suitable model for inexperienced users.
- MOLAP cubes are built for fast data retrieval and are optimal for slicing and dicing operations.
- All calculations are pre-generated when the cube is created.

MOLAP Disadvantages

- One major weakness of MOLAP is that it is less scalable than ROLAP as it handles only a limited amount of data.
- The MOLAP also introduces data redundancy as it is resource intensive
- MOLAP Solutions may be lengthy, particularly on large data volumes.
- MOLAP products may face issues while updating and querying models when dimensions are more than ten.

- MOLAP is not capable of containing detailed data.
- The storage utilization can be low if the data set is highly scattered.
- It can handle the only limited amount of data therefore, it's impossible to include a large amount of data in the cube itself.

MOLAP Tools

- Essbase (http://www.oracle.com/technetwork/middleware/essbase/overview/index.html) - Tools from Oracle that has a multidimensional database.

- Express Server (http://www.oracle.com/technetwork/database/database-technologies/express-edition/downloads/index.html) - Web-based environment that runs on Oracle database.

- Yellowfin (https://www.yellowfinbi.com/) - Business analytics tools for creating reports and dashboards.

- Clear Analytics (http://www.clearanalyticsbi.com/) - Clear analytics is an Excel-based business solution.

- SAP Business Intelligence (https://support.sap.com/en/my-support/software-downloads.html) - Business analytics solutions from SAP

Summary:

- Multidimensional OLAP (MOLAP) is a classical OLAP that facilitates data analysis by using a multidimensional data cube.
- MOLAP tools process information with the same amount of response time irrespective of the level of summarizing.
- MOLAP server implements two level of storage to manage dense and sparse data sets.
- MOLAP can manage, analyze, and store considerable amounts of multidimensional data.
- It helps to automate computation of higher level of aggregates data
- It is less scalable than ROLAP as it handles only a limited amount of data.

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