



Multidimensional Database Management Systems

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What Is a Multidimensional Database?

- A multidimensional database is a storage mechanism for dimensional data. It consists of **dimensions** and **cubes**.
- Facts are stored in cube cells referenced by the atomic values of the dimension, similar to a multidimensional array.
- Aggregations are precalculated at higher levels in each dimension and stored in the cube cells, too.
- The underlying structure is very compact and fast compared to a relational star schema.
- The drawback being it takes longer to add/update data as the time to precalculate each aggregation can be time-intensive.

OLAP, ROLAP, HOLAP, MOLAP

- OLAP, or online analytical processing, is the act of exploring and interacting with dimensional data (facts and dimensions).
- OLAP can be done with relational data, multidimensional data, or both.

OLAP Type	DBMS	Data Stored in:
ROLAP	Relational	Star schema
MOLAP	Multidimensional	Cube
HOLAP	Hybrid (Both)	Data in star schema, aggregates in cube

Multidimensional Database Key Features

- Consolidate multiple data sources into a single cube
- Independent processing of facts and dimensions
- Semantic model:
 - Unknown members
 - Robust attribute properties
 - Define hierarchies
- Predefined aggregates (attribute relationships)
- Calculations/KPIs
- Perspectives