Categories of OLAP Tools

- **OLAP tools are categorized according to the architecture of the underlying database.**
- **Three main categories of OLAP tools include**
  - **Multi-dimensional OLAP (MOLAP or MD-OLAP)**
  - **Relational OLAP (ROLAP), also called multi-relational OLAP**
  - **Managed query environment (MQE)**

Multi-Dimensional OLAP (MOLAP)

- **Use specialized data structures and multi-dimensional Database Management Systems (MDDBMSs) to organize, navigate, and analyze data.**
- **Data is typically aggregated and stored according to predicted usage to enhance query performance.**

Multi-Dimensional OLAP (MOLAP)

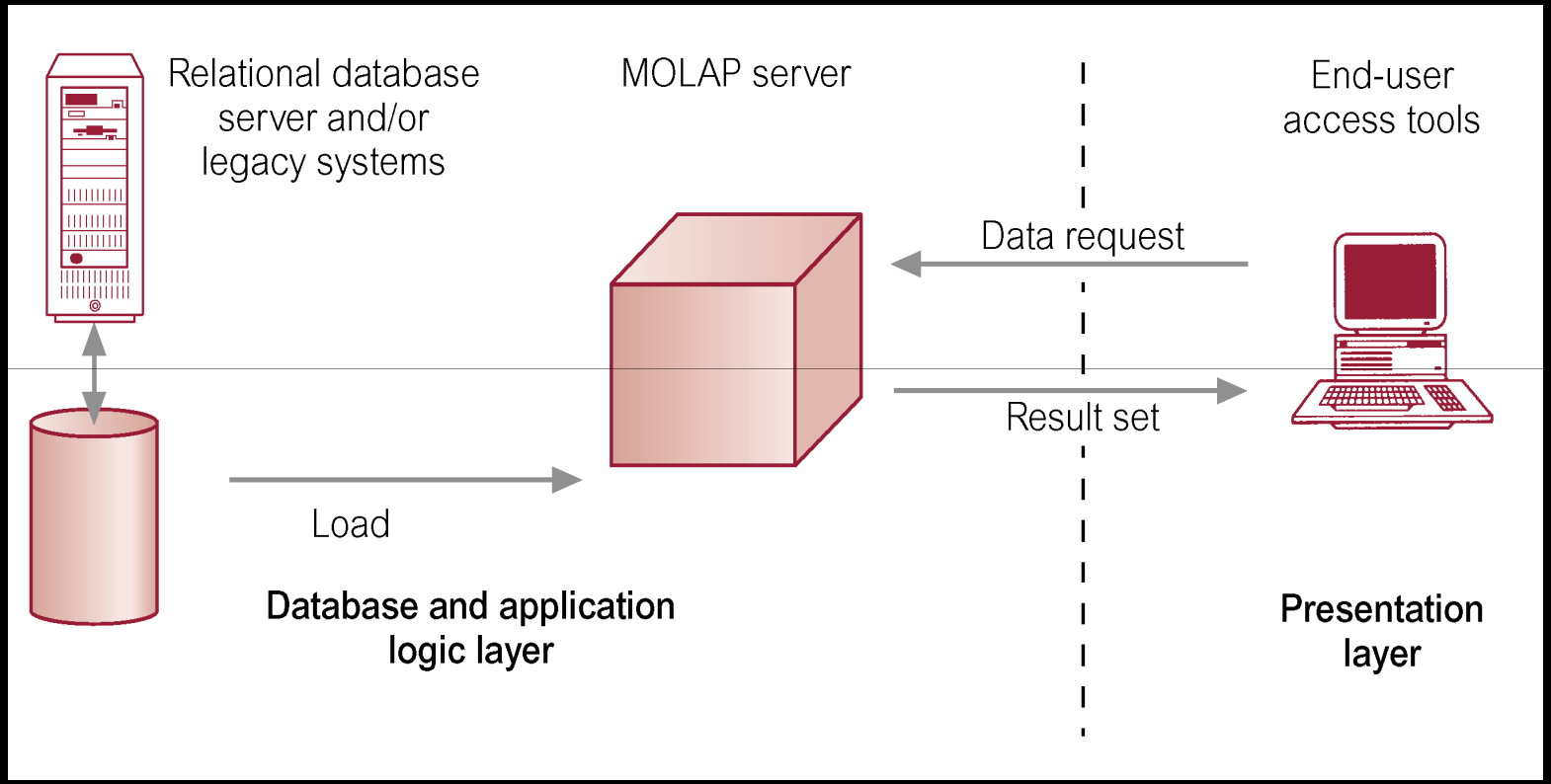
- **Use array technology and efficient storage techniques that minimize the disk space requirements through sparse data management.**

- **Provides excellent performance when data is used as designed, and the focus is on data for a specific decision-support application.**

Multi-Dimensional OLAP (MOLAP)

- **Traditionally, require a tight coupling with the application layer and presentation layer.**
- **Recent trends segregate the OLAP from the data structures through the use of published application programming interfaces (APIs).**

Typical Architecture for MOLAP Tools



MOLAP Tools - Development Issues

- **Underlying data structures are limited in their ability to support multiple subject areas and to provide access to detailed data.**

- **Navigation and analysis of data is limited because the data is designed according to previously determined requirements.**

MOLAP Tools - Development Issues

- **MOLAP products require a different set of skills and tools to build and maintain the database, thus increasing the cost and complexity of support.**

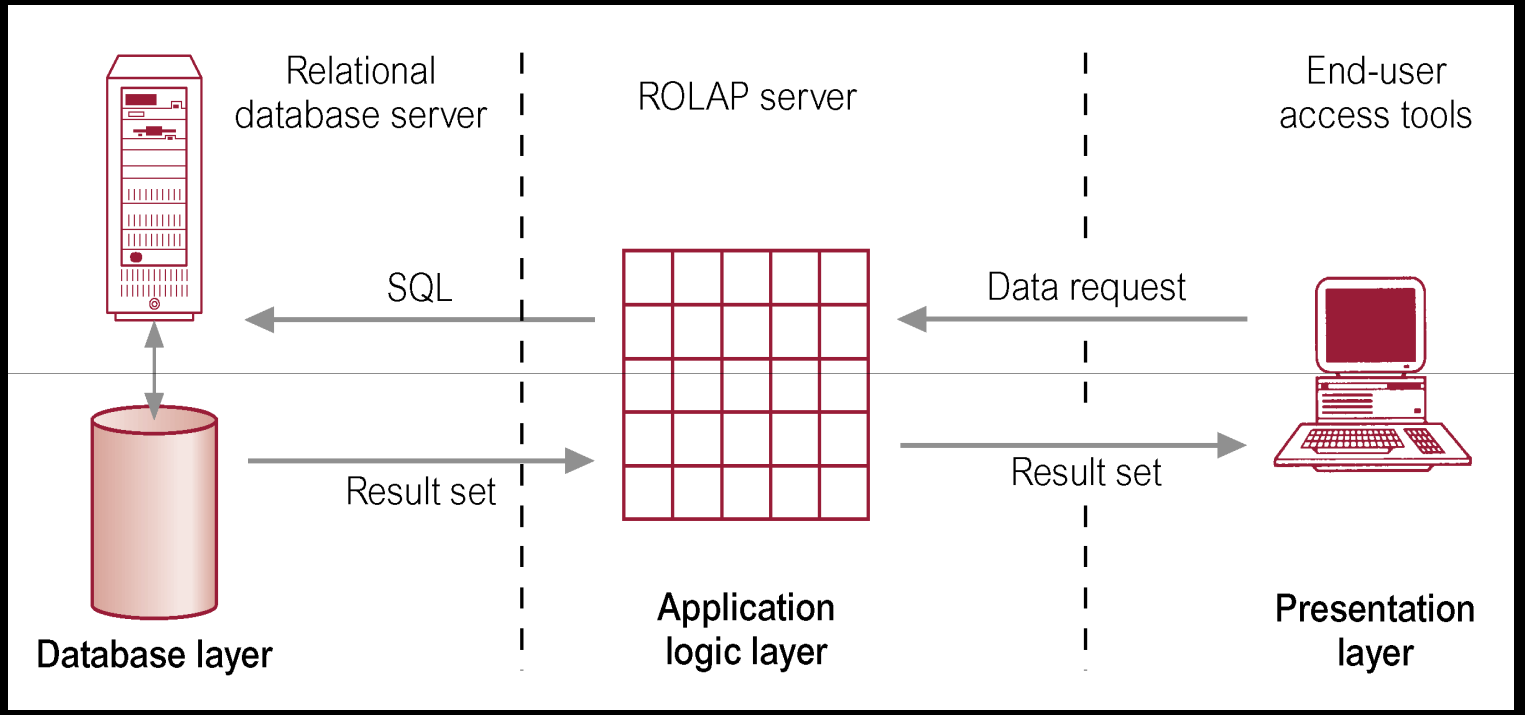
Relational OLAP (ROLAP)

- **Fastest-growing style of OLAP technology.**
- **Supports RDBMS products using a metadata layer - avoids need to create a static multi-dimensional data structure - facilitates the creation of multiple multi-dimensional views of the two-dimensional relation.**

Relational OLAP (ROLAP)

- **To improve performance, some products use SQL engines to support complexity of multi-dimensional analysis, while others recommend, or require, the use of highly denormalized database designs such as the star schema.**

Typical Architecture for ROLAP Tools



ROLAP Tools - Development Issues

- **Middleware to facilitate the development of multi-dimensional applications. (Software that converts the two-dimensional relation into a multi-dimensional structure).**

- **Development of an option to create persistent, multi-dimensional structures with facilities to assist in the administration of these structures.**

Managed Query Environment (MQE)

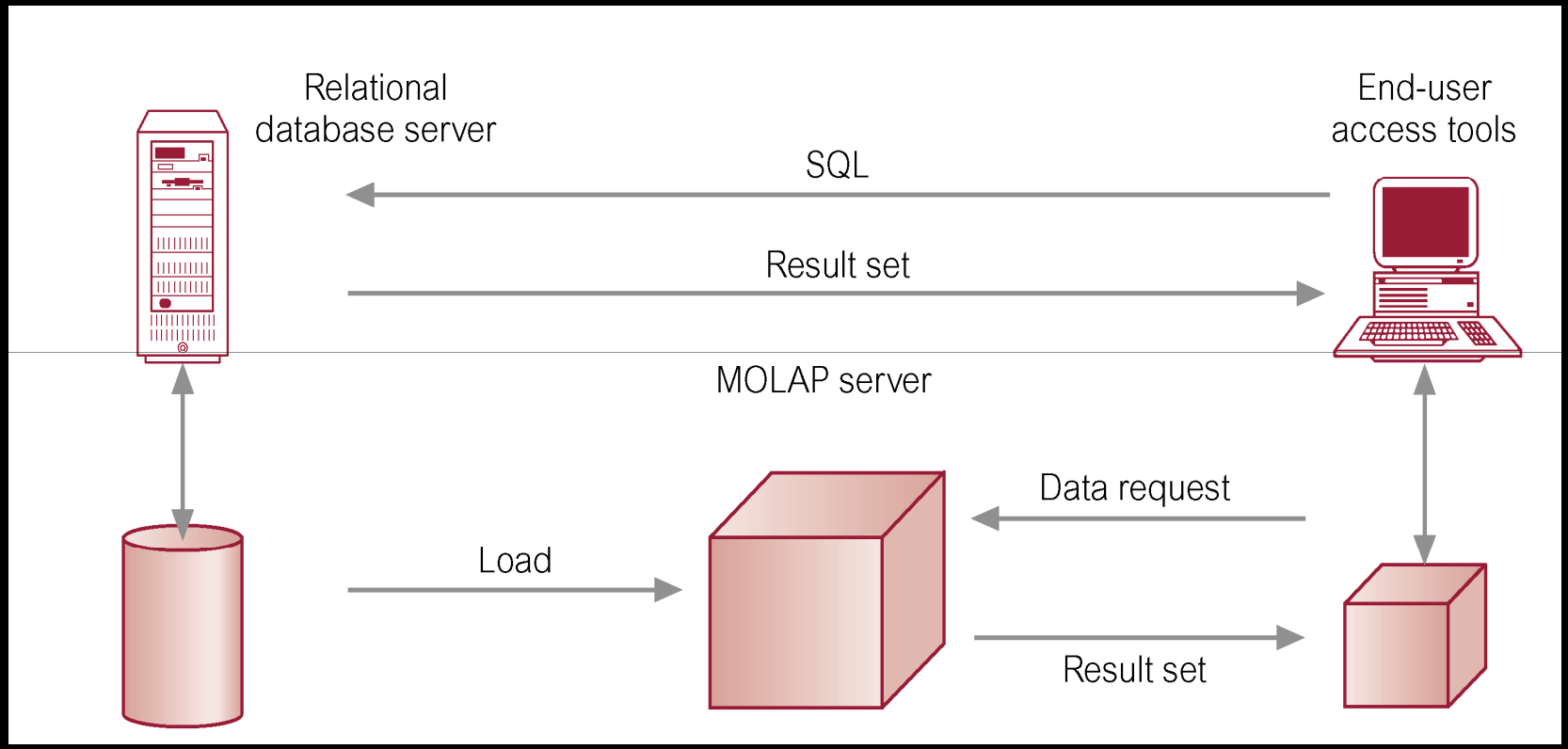
- **Relatively new development.**
- **Provide limited analysis capability, either directly against RDBMS products, or by using an intermediate MOLAP server.**

Managed Query Environment (MQE)

- **Deliver selected data directly from DBMS or via a MOLAP server to desktop (or local server) in form of a datacube, where it is stored, analyzed, and maintained locally.**

- **Promoted as being relatively simple to install and administer with reduced cost and maintenance.**

Typical Architecture for MQE Tools



MQE Tools - Development Issues

- **Architecture results in significant data redundancy and may cause problems for networks that support many users.**
- **Ability of each user to build a custom datacube may cause a lack of data consistency among users.**
- **Only a limited amount of data can be efficiently maintained.**