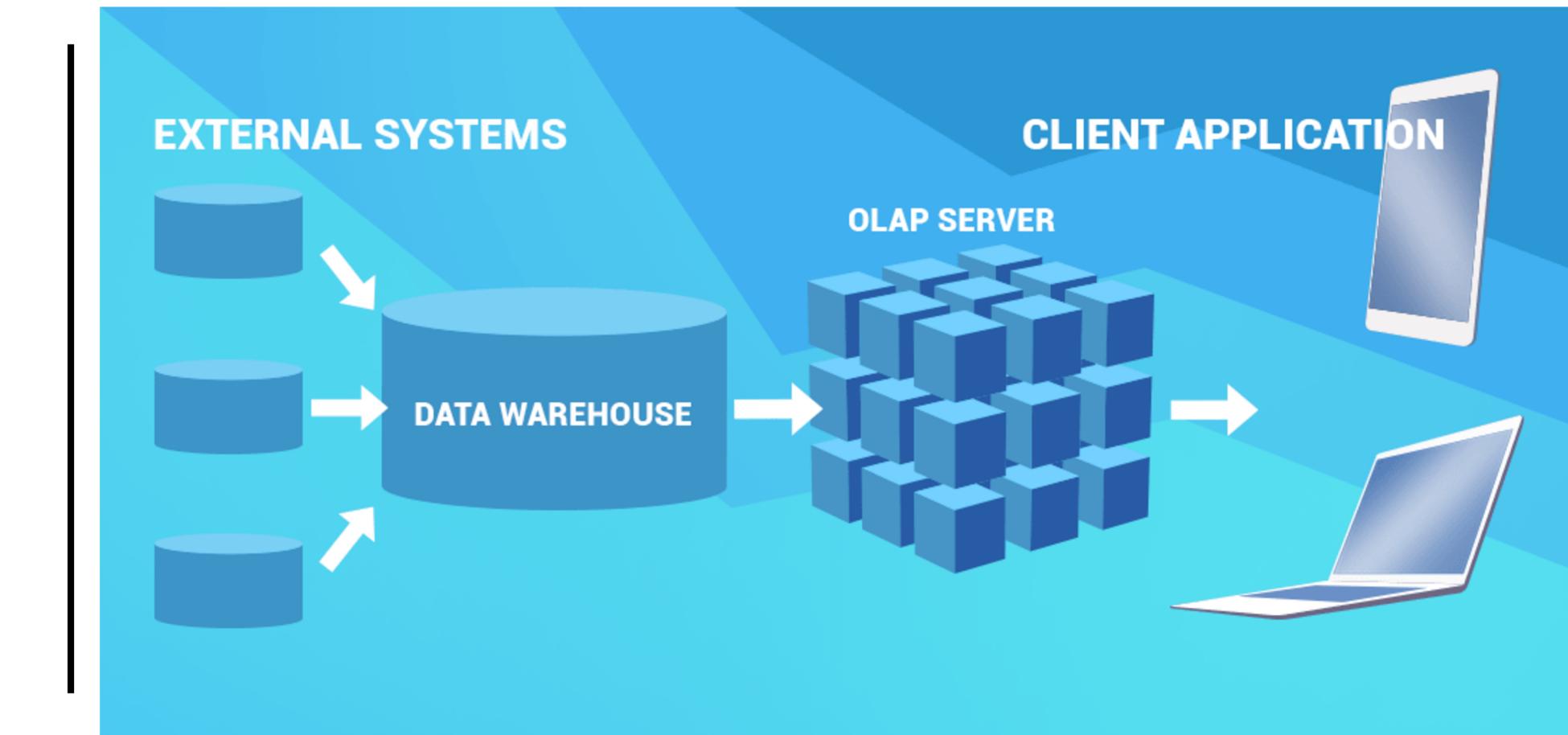


# **The Role and Evolution of Data Warehousing and OLAP in Modern Data Analytics**

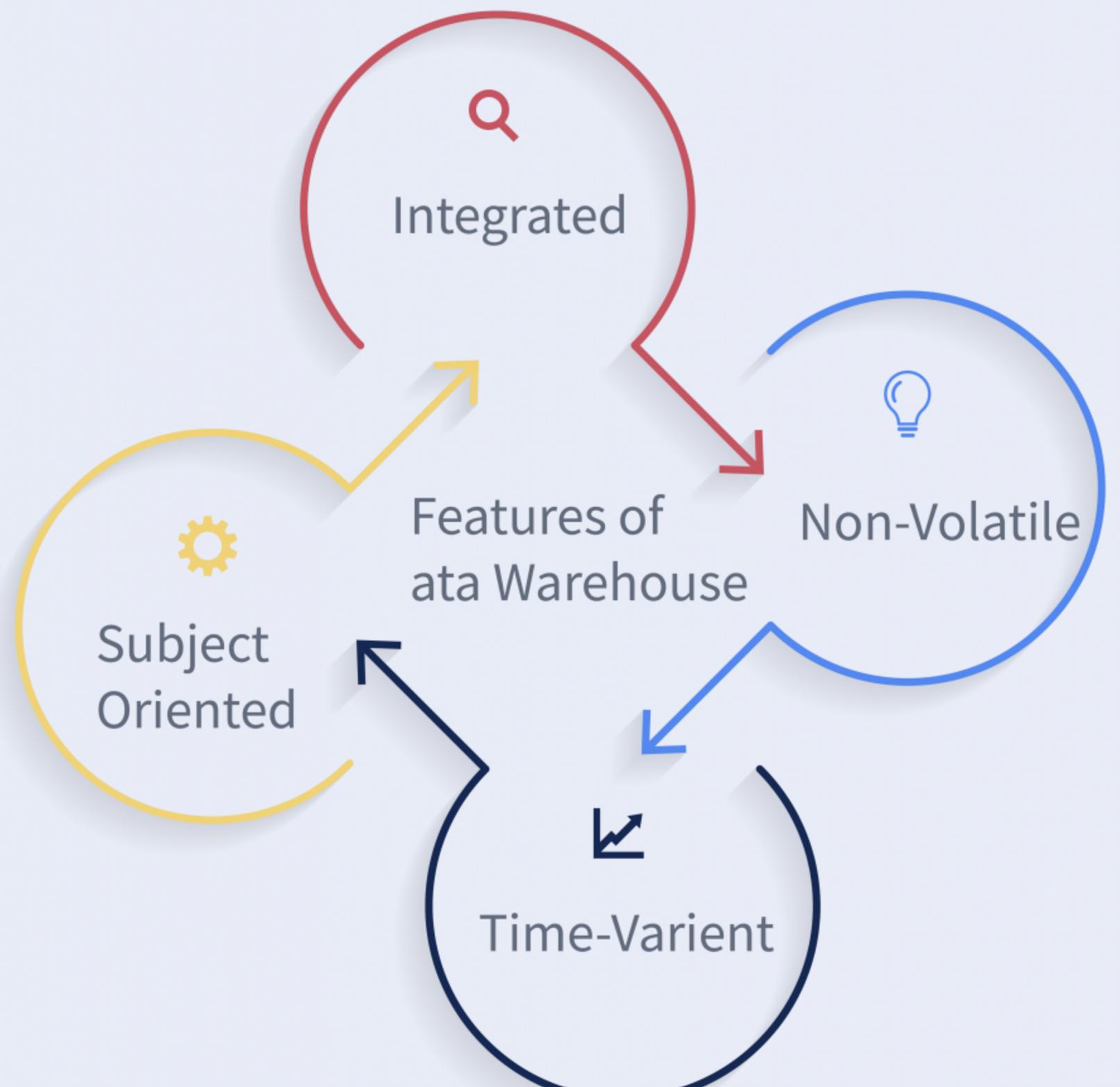
Presented by Hognogi Ana-Maria Cristina

# Introduction

Data is everywhere! Businesses need tools to manage and analyze it effectively. **Data Warehousing** stores data from multiple sources, while **OLAP** helps analyze it across dimensions, uncovering trends and insights.



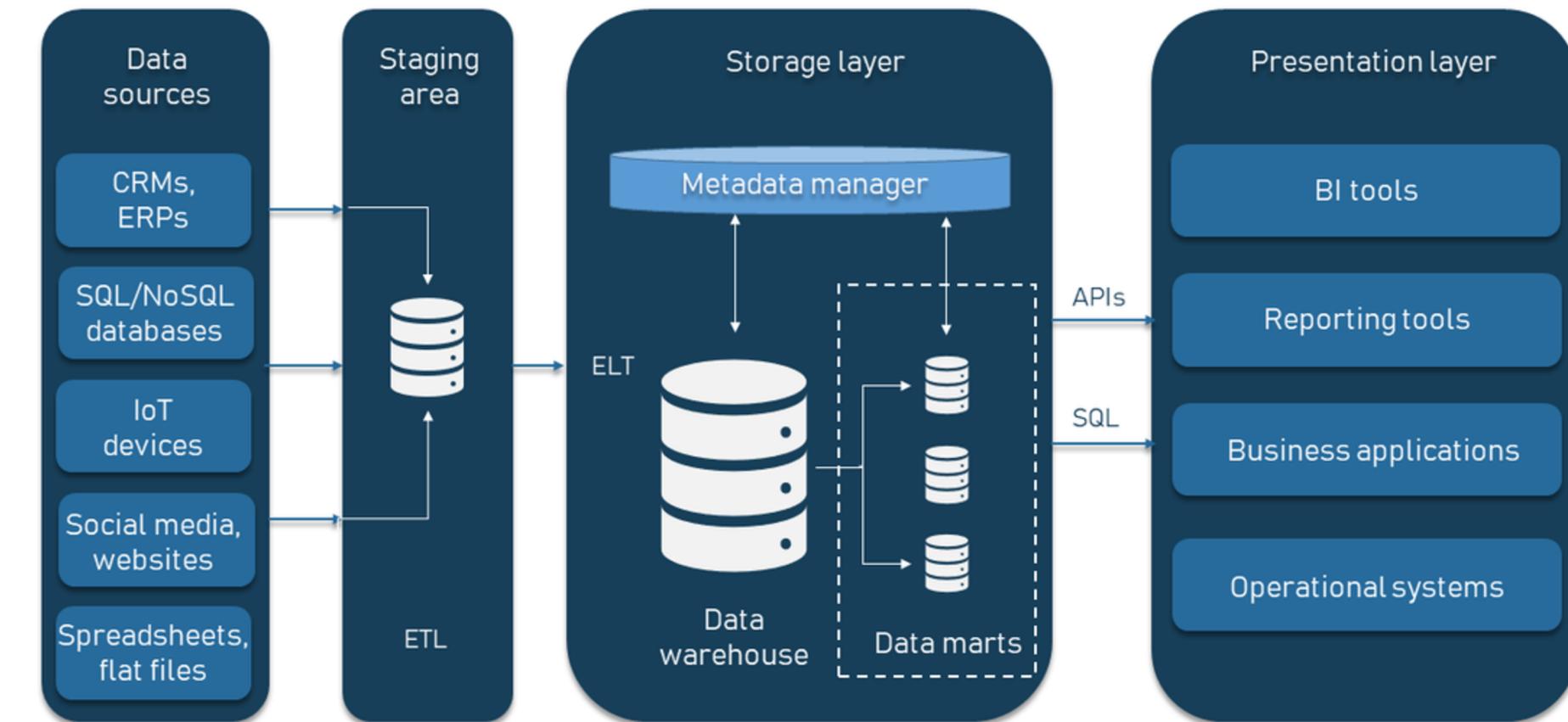
# What Is a Data Warehouse?



A central library for data that's subject-oriented, integrated, time-variant, and nonvolatile. It organizes information for long-term analysis and decision-making.

# Data Warehouse Architecture

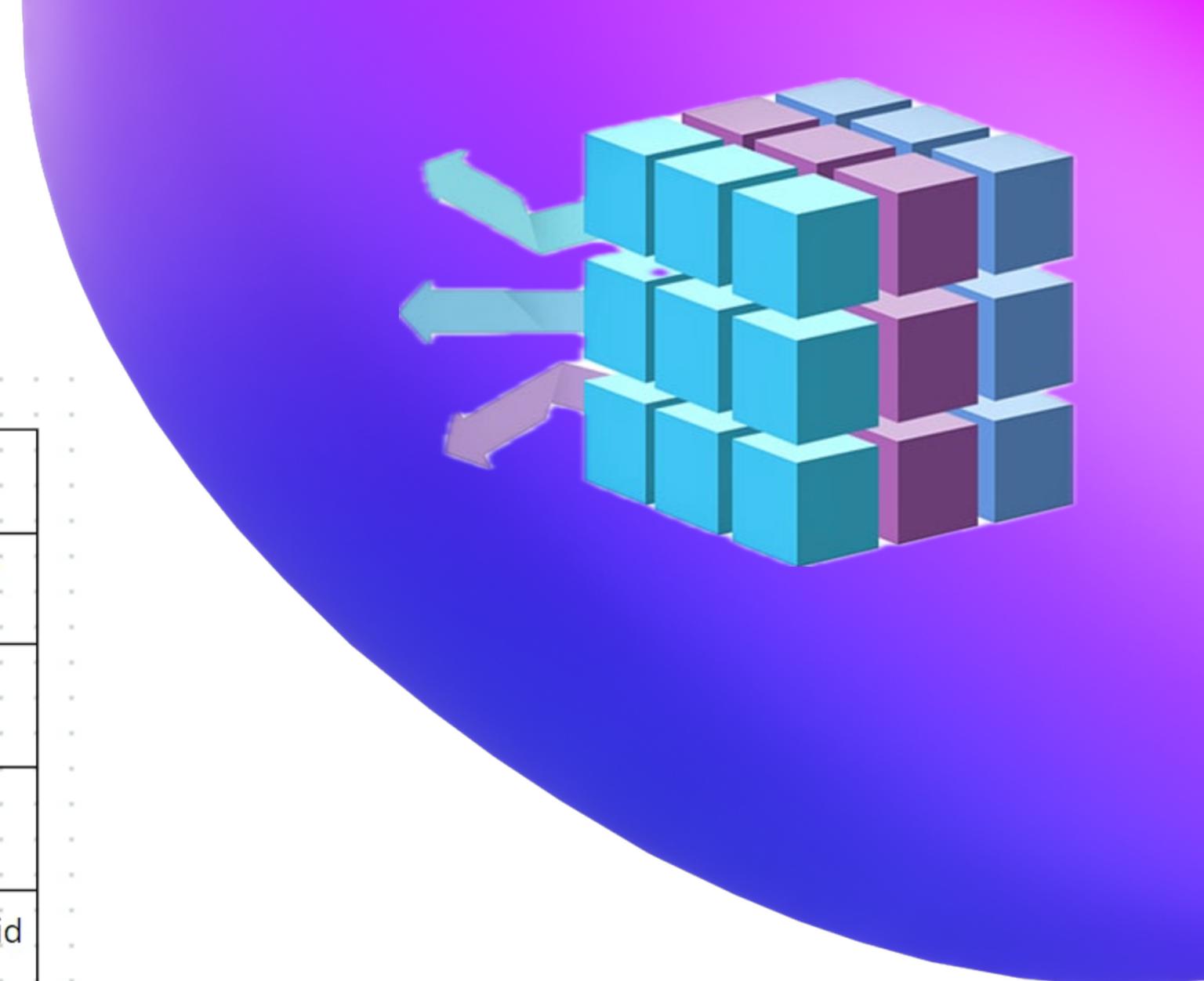
Four layers: data sources, ETL (cleaning and transforming), data storage (schemas like star and snowflake), and access tools (dashboards and queries).



|                             | <b>Database</b>    | <b>Data warehouse</b>            |
|-----------------------------|--------------------|----------------------------------|
| <b>Processing type</b>      | OLTP               | OLAP                             |
| <b>Optimized operations</b> | CRUD transactions  | Complex analytical queries       |
| <b>Data sources</b>         | Usually one        | Usually multiple                 |
| <b>Data model</b>           | Normalized         | Denormalized                     |
| <b>Data timelines</b>       | Daily to monthly   | Historical                       |
| <b>Data volume</b>          | Low to mid         | Mid to large                     |
| <b>Reliability</b>          | SQL ACID-compliant | Best in class are ACID-compliant |

# What Is OLAP?

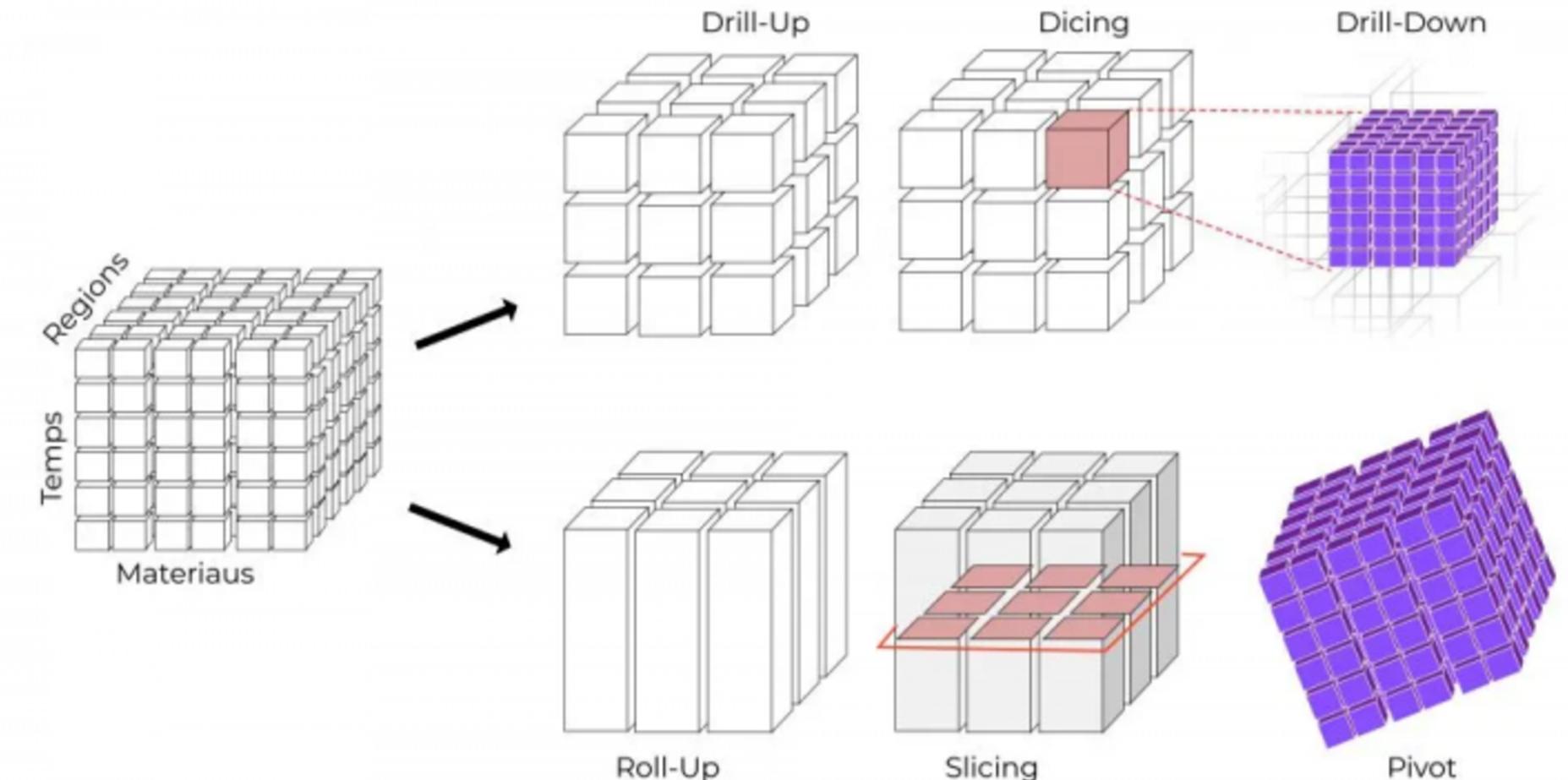
| Aspect          | OLAP (Online Analytical Processing)             | OLTP (Online Transaction Processing)               |
|-----------------|---|--|
| Purpose         | Used for data analysis and decision-making      | Used for managing day-to-day transactions          |
| Data Operations | Complex queries for data retrieval (read-heavy) | Simple queries for data manipulation (write-heavy) |
| Data Volume     | Deals with large volumes of historical data     | Deals with current, real-time transactional data   |
| Normalization   | Data is often denormalized for faster analysis  | Data is highly normalized to avoid redundancy      |
| Response Time   | Slower due to complex queries                   | Fast responses for quick transactions              |



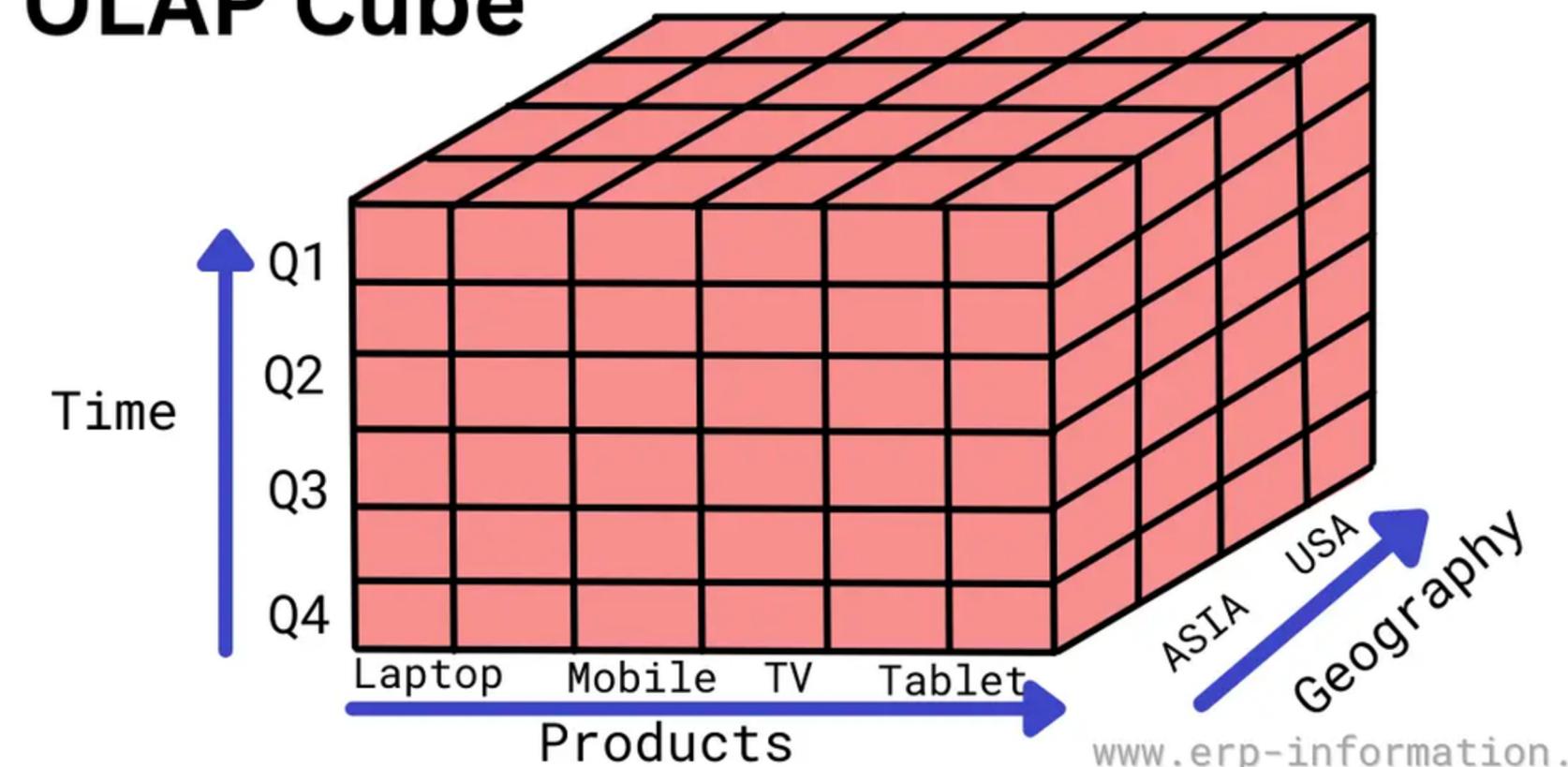
OLAP organizes data in multidimensional 'cubes,' letting users explore it across perspectives like time, location, and product. It's the key to interactive, real-time analysis.

# How Does OLAP Work?

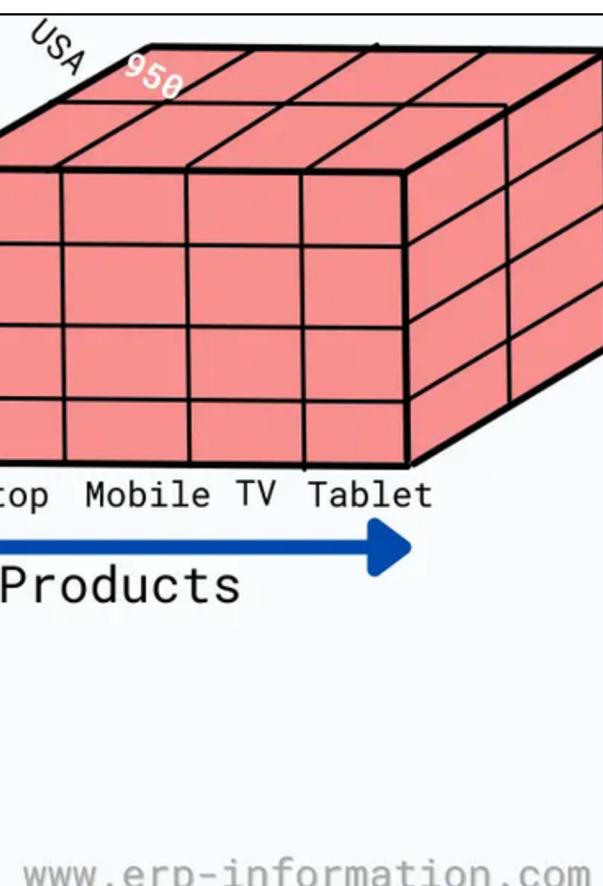
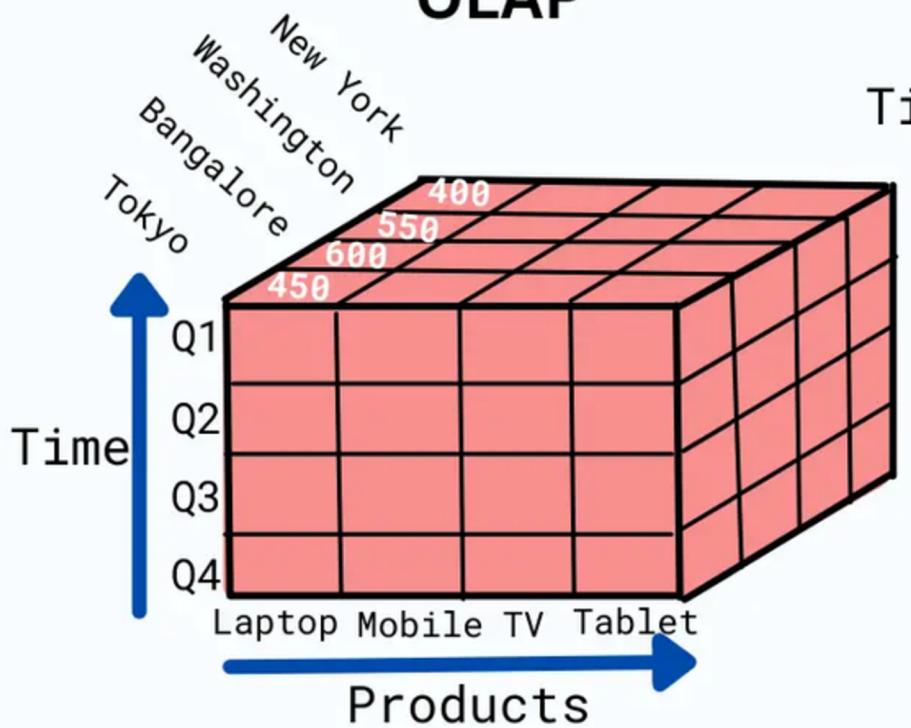
Data is extracted from various sources and stored in the Data Warehouse. It is then cleaned, transformed, and organized into OLAP cubes, where it is pre-calculated and aggregated for analysis. Finally, users query the OLAP cubes to access the data.



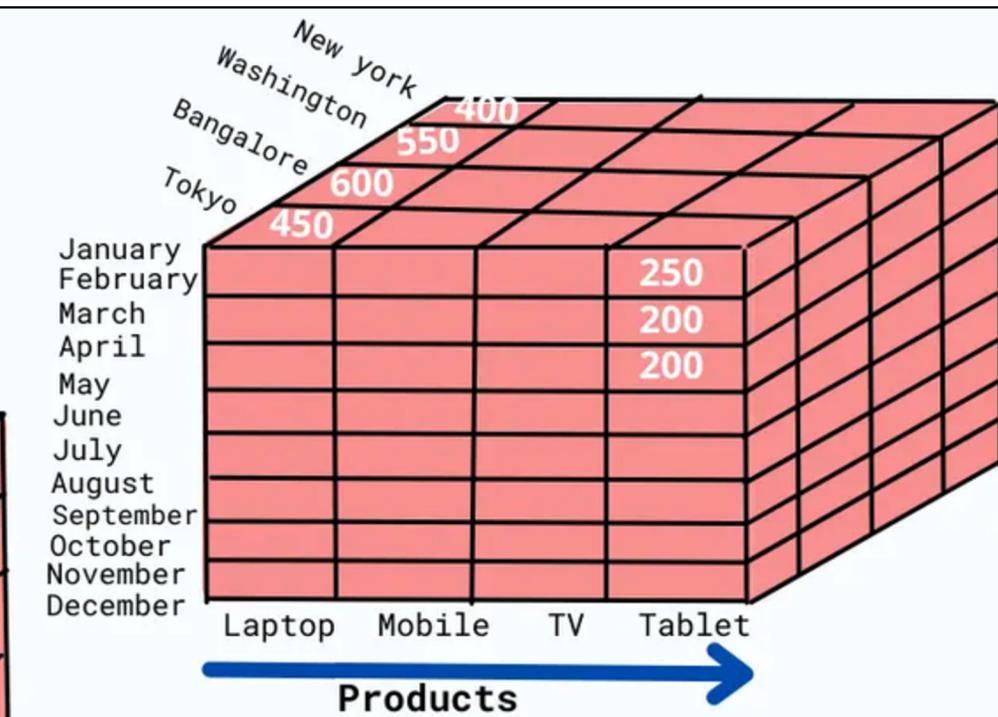
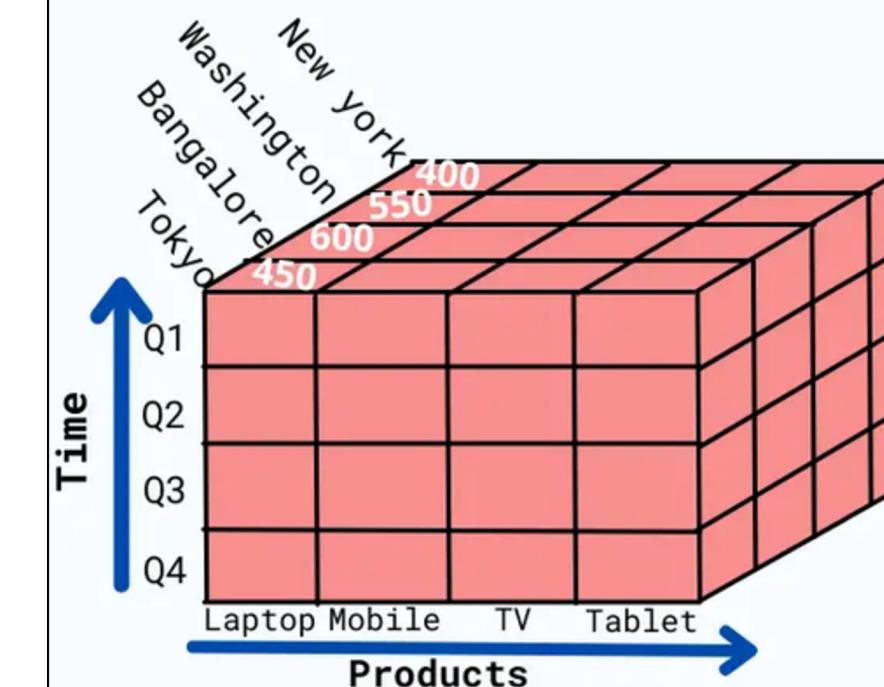
## OLAP Cube



## Roll-up Operation in OLAP

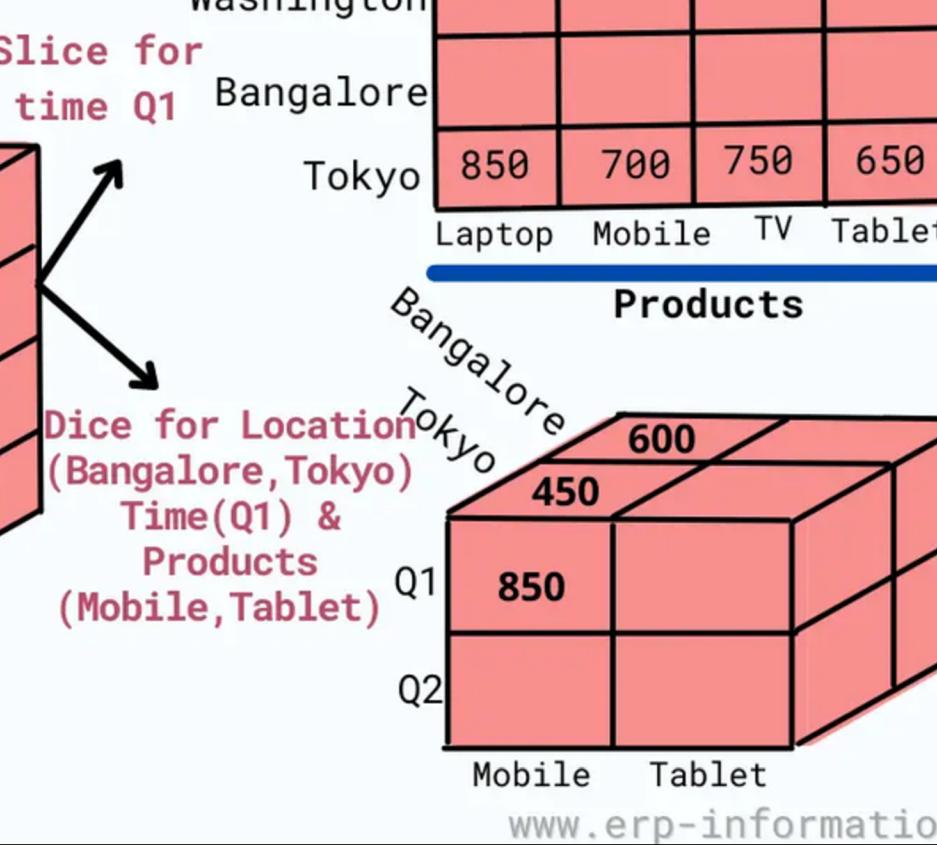
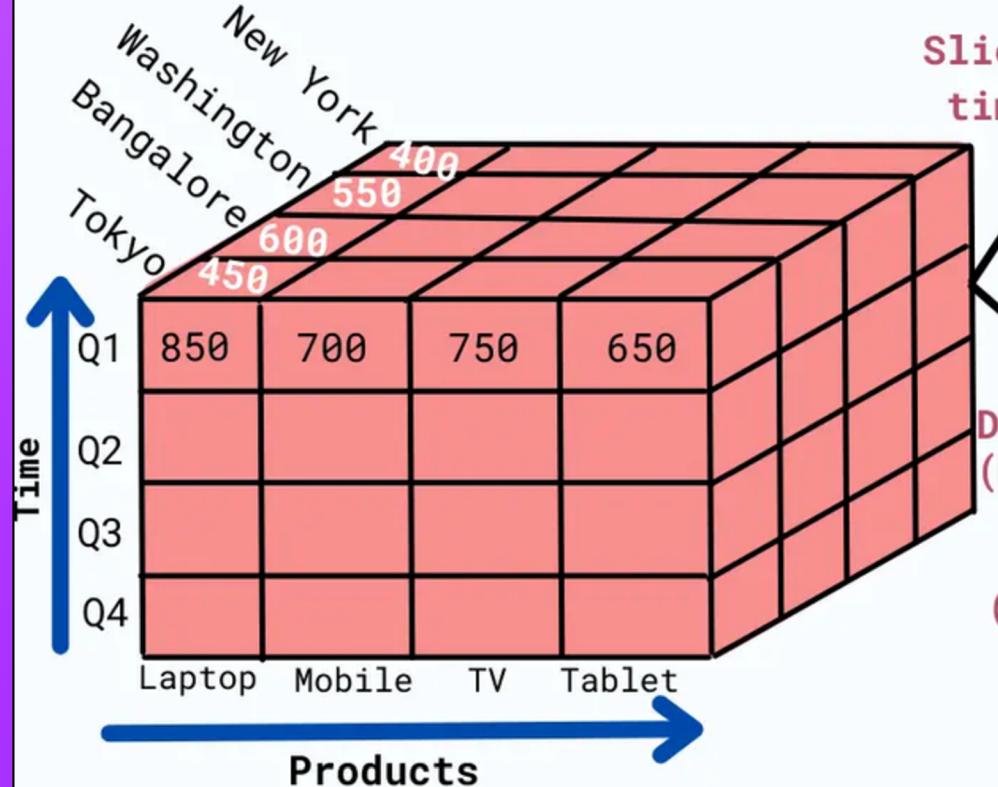


## Drill Down Operation in OLAP

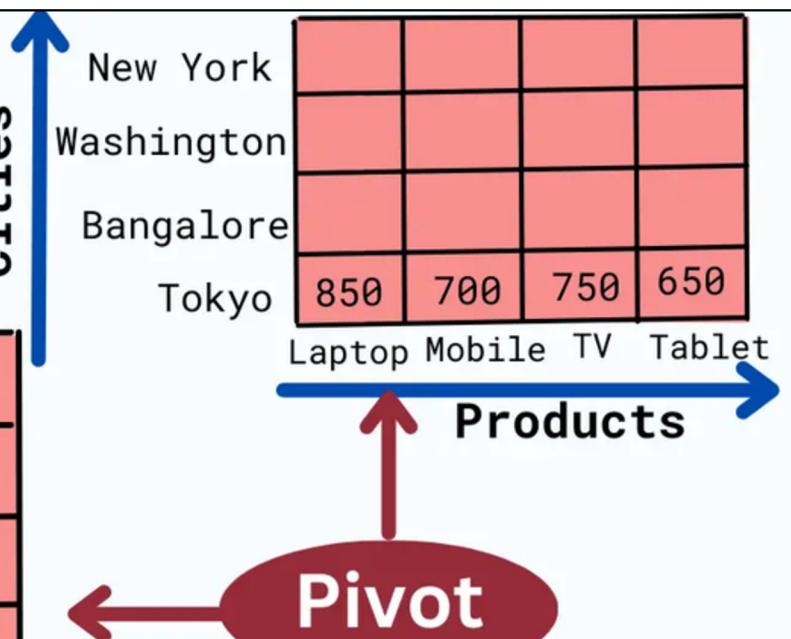
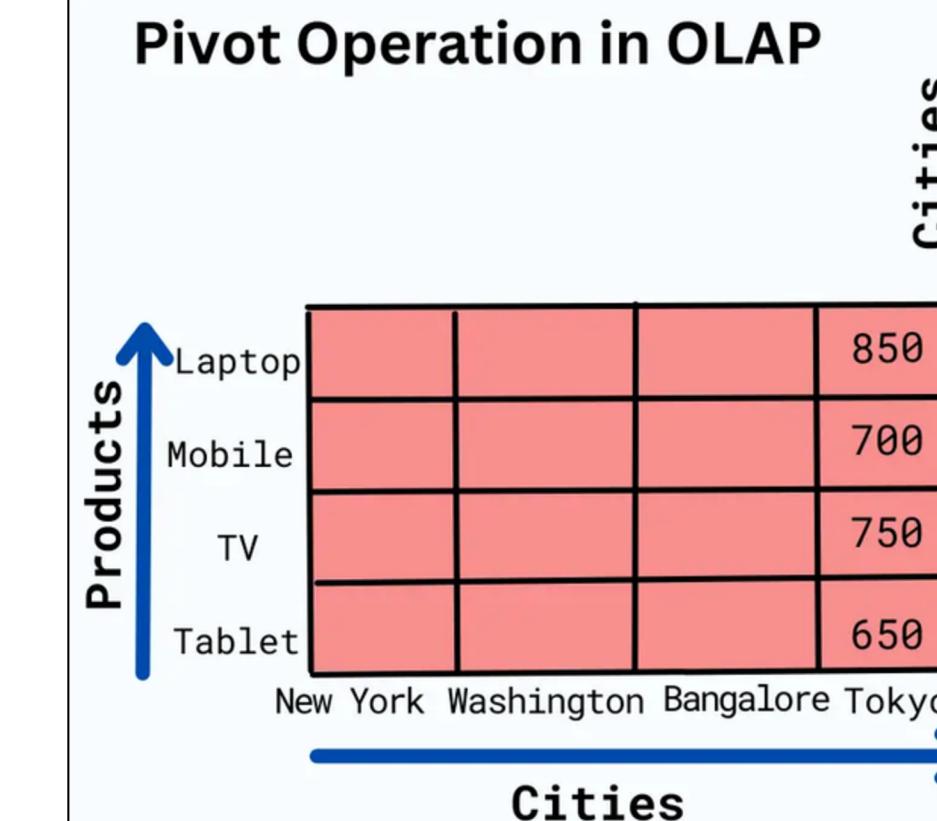


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## Slice and Dice Operation in OLAP



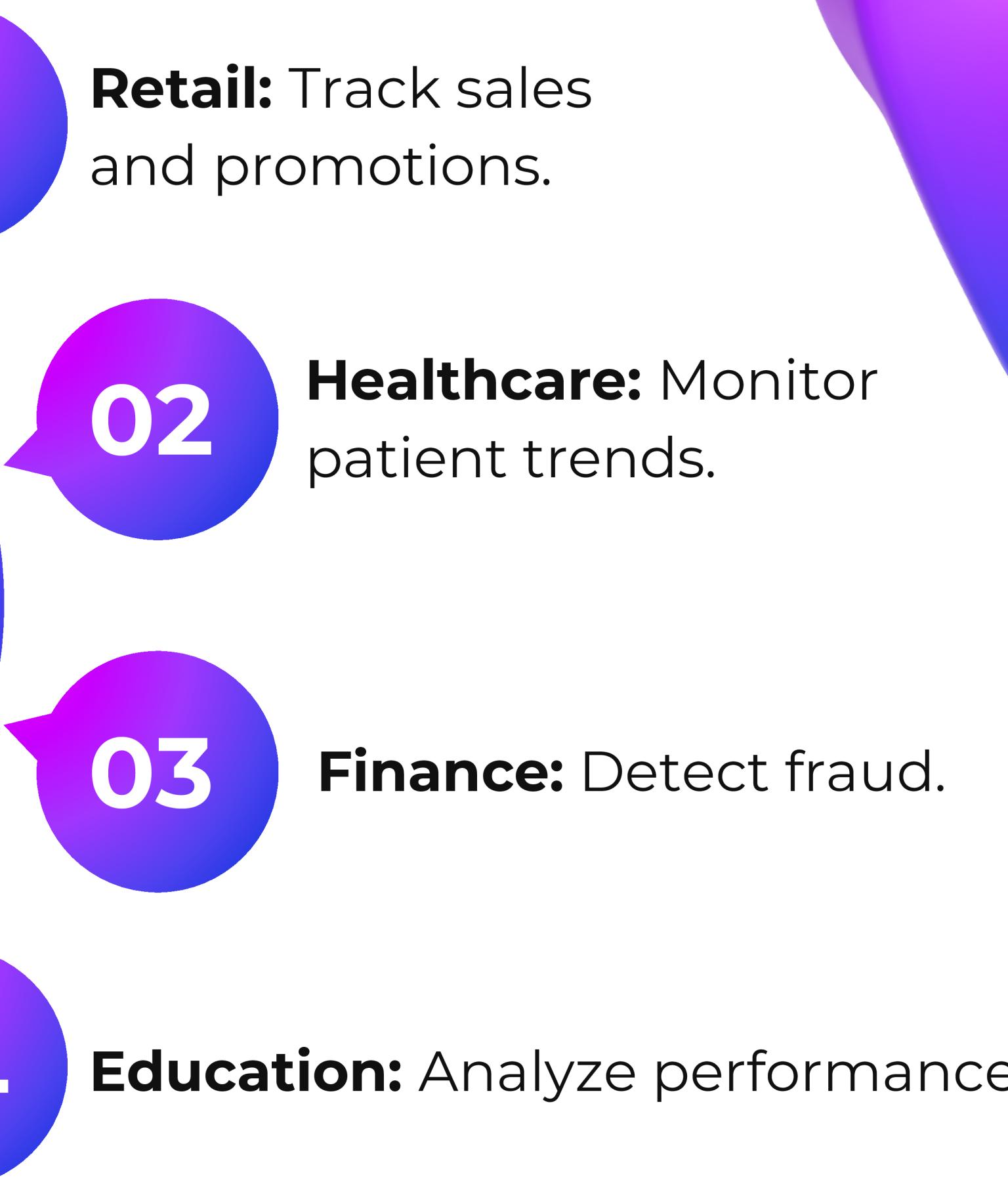
## Pivot Operation in OLAP



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## Applications of OLAP



04

**Education:** Analyze performance.

01

**Retail:** Track sales and promotions.

02

**Healthcare:** Monitor patient trends.

03

**Finance:** Detect fraud.



# Top 15 Popular Data Warehouse Tools

**Amazon Redshift**

**Amazon DynamoDB**

**IBM Db2 Warehouse**

**Microsoft Azure**

**PostgreSQL**

**Oracle Autonomous  
Warehouse**

**Google BigQuery**

**Amazon S3**

**MariaDB**

**Snowflake**

**Teradata**

**MarkLogic**

**Micro Focus Vertica**

**Amazon RDS**

**Cloudera**

# Resource page

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