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**Data engineering - Batch 1**

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## **ASSESSMENT - RDBMS**

### **Relational Database Management System (RDBMS):**

A Relational Database Management System organizes information into tables, where each table is a category. Each row in a table represents a specific piece of information, and each column labels a type of data. The system uses a unique label for each piece of information, making it easy to find and connect related data. This organized system uses a language called SQL to interact with and retrieve information efficiently. It ensures data remains stable and secure, like a well-organized digital filing system for managing and accessing data.

### **Benefits of RDBMS**

- RDBMS enforces data integrity through constraints, ensuring accuracy and consistency in the stored information.
- Data is organized in tables, providing a structured and systematic way to store and manage information.
- RDBMS supports transactions, allowing a series of operations to be treated as a single unit, ensuring consistency and reliability.

### **Data warehousing**

Data warehousing is a centralized repository of data collected from various sources within an organization. The purpose of a data warehouse is to support decision-making processes by providing a comprehensive and historical view of the organization's data.

### **Benefits of Data Warehousing:**

- Improved decision making through access to timely information.
- Enhanced data quality and consistency.
- Historical analysis and trend identification.
- Support for business intelligence and reporting.

**OLTP (Online Transaction Processing):**

OLTP is used by traditional operational systems, typically Relational Database Management Systems. It handles transactional operations, focusing on quick and efficient processing of high volumes of short, real-time transactions. Examples include order processing, inventory management, and online banking transactions.

**Advantages of OLTP**

- optimized for quick and efficient processing of large numbers of transactions
- ensures data integrity and consistency by enforcing database constraints and transactional rules, maintaining the accuracy of business data.

**OLAP (Online Analytical Processing):**

OLAP, is a category of software tools and applications designed for complex analysis of large volumes of multidimensional data.

**OLAP architecture**

OLAP architecture involves extracting and transforming data from diverse sources, storing it in multidimensional cubes for optimized analysis. Users interact with these cubes using client tools and query languages, exploring data through a multidimensional lens. The architecture emphasizes quick and interactive access to aggregated data for business intelligence and decision-making.

**ROLAP (Relational OLAP):**

- Stores data in relational databases.
- Utilizes standard relational database management systems
- Enables multidimensional analysis by creating virtual cubes on the SQL queries.
- Offers flexibility in data storage and accommodates diverse data sources.

**MOLAP (Multidimensional OLAP):**

- Stores data in a multidimensional database optimized for fast query performance.
- Uses a dedicated MOLAP server to pre-aggregate and store data in a cube structure.

- Facilitates quick retrieval of pre-calculated aggregations, ensuring faster analytical queries.
- Typically provides a better user experience for interactive and real-time analysis.

### **Structured Query Language**

SQL, is a standardized programming language used for managing and manipulating relational databases. It provides a set of commands for defining, querying, updating, and administering databases.

### **Features**

- MySQL is freely available for use, modification, and distribution, fostering a large and active community of developers and users.
- Known for its simplicity and straightforward setup, MySQL is accessible to both beginners and experienced developers.
- MySQL is designed for efficient performance, offering fast query execution and response times suitable for a variety of applications.
- MySQL supports both vertical and horizontal scaling, allowing users to handle growing data volumes and increasing workloads.
- MySQL is cross-platform, compatible with Linux, Windows, and macOS, providing flexibility in choosing the operating system.
- MySQL seamlessly integrates with popular programming languages, web frameworks, and development tools, enhancing its flexibility.