International University, VNU-HCMC

School of Computer Science and Engineering

Lecture 1: INTRODUCTION

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Purpose of the lecture

- Understand the relationship between data, information, and knowledge in supporting decision-making
- Recognize what a database is and its role in organizing and storing data
- Introduce the concept and key functions of a Database Management System (DBMS) for efficient and secure data management

Question

- Can you think of an example where raw data was transformed into useful information, and then into actionable knowledge?

Outline

- Data/ Information/ Knowledge
- What is a database?
- What is database management (DBMS)?

Data/ Information/ Knowledge

What is a database?

- Definition
- Key Features
- Types of Databases
- Examples

Definition

- A database is an organized collection of data, stored and managed electronically, that allows users to efficiently store, retrieve, update, and manage information.

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DATABASE

Key Features

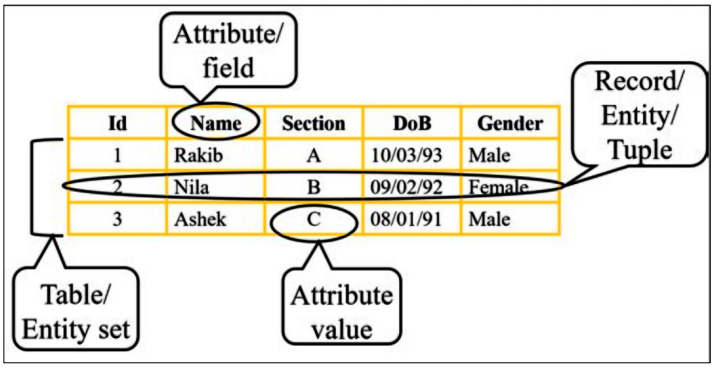
- Structured storage – Data is arranged in tables, records, and fields (for relational databases) or in other formats (e.g., document, graph).
- Efficient access – Designed to quickly search, filter, and retrieve information.

Key Features

- Data integrity – Maintains accuracy and consistency of data over time.
- Security control – Manages who can view or change the data.
- Multi-user support – Allows concurrent access by multiple users without conflict.

Types of Databases

- Relational Database (RDBMS): Stores data in tables with relationships (e.g., MySQL, PostgreSQL).



Nguồn từ storage.googleapis.com

Types of Databases

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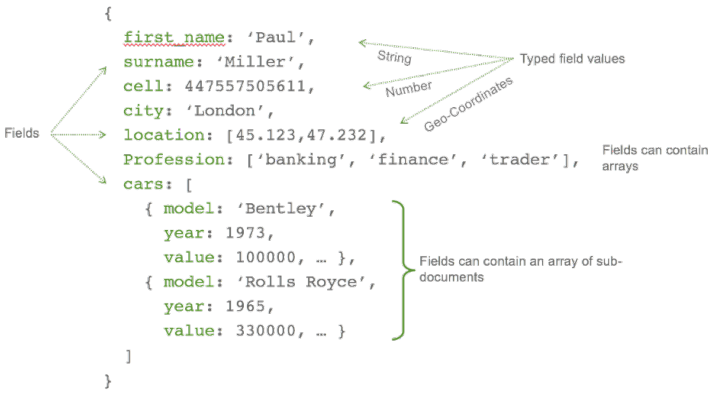
- NoSQL Database: Stores unstructured/semi-structured data (e.g., MongoDB, Cassandra).



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Types of Databases

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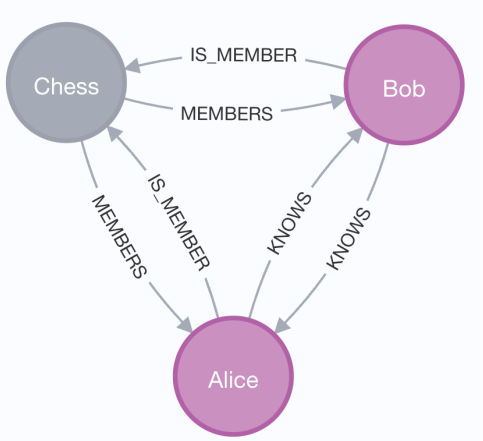
- Graph Database: Stores data as nodes and relationships (e.g., Neo4j).



Types of Databases

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- Cloud Database: Hosted on cloud platforms (e.g., Amazon RDS, Google Cloud SQL) rather than on local hardware.
- Supported types: Relational, NoSQL database.

Examples

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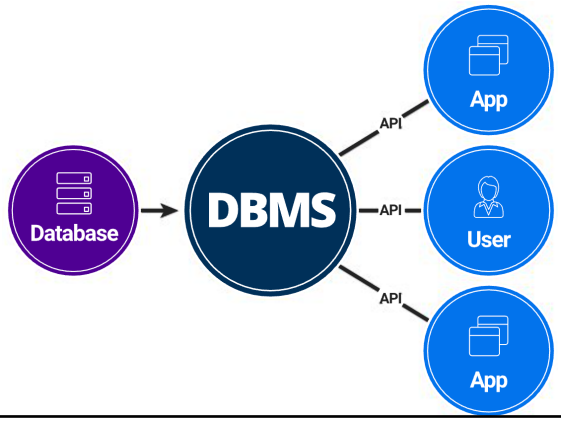
- Banking systems storing customer transactions
- E-commerce websites store product details and orders
- Hospital systems storing patient records

What is database management (DBMS)?

- Definition
- Key Functions of a DBMS
- Types of DBMS
- Benefits of Using a DBMS
- Example

Definition

- A Database Management System (DBMS) is software that enables users and applications to interact with a database. It allows users to create, read, update, and delete data (CRUD operations) while ensuring security, integrity, and efficiency in data handling.



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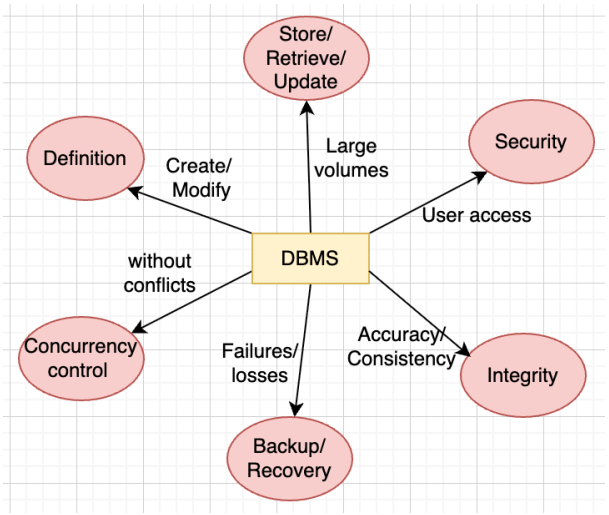
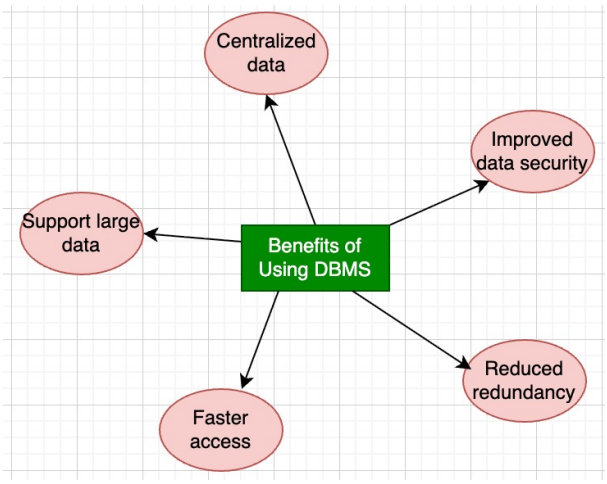
Key Functions of a DBMS



Types of DBMS

- Relational DBMS (RDBMS) – Stores data in tables with relationships (e.g., MySQL, PostgreSQL, Oracle).
- NoSQL DBMS – Stores unstructured/semi-structured data (e.g., MongoDB, Cassandra).
- In-Memory DBMS – Stores data in RAM for faster performance (e.g., Redis).
- Cloud DBMS – Hosted on cloud platforms (e.g., Amazon RDS, Google Cloud SQL).

Benefits of Using a DBMS



Example

- In an online shopping platform:
  - The database stores product information, customer profiles, and orders.
  - DBMS (e.g., MySQL) handles queries like “Find all orders from last month” and ensures only authorized staff can update prices.

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Thank you for your attention!