Day81 Intro. to Database   By: Loga Aswin

What is Data?

Data refers to facts, figures, observations, or descriptions that can be in various forms such as text, numbers, images, etc.

Types of Data:

- **Structured Data:** This type of data is highly organized and formatted, usually residing in fixed fields within a file. Examples include databases in a tabular format (like Excel sheets or SQL databases).
- **Unstructured Data:** Data that doesn't have a specific format or structure. Examples include text files, multimedia files, social media posts, etc.
- **Semi-structured Data:** Falls between structured and unstructured data, having some structure but not rigidly defined. Examples include XML files, JSON, etc.
- **Metadata:** Information that describes other data. For instance, in a library catalog, metadata could include the title, author, and publication date of a book.

What is Database?

A database is an organized collection of data stored and accessed electronically, managed by a Database Management System (DBMS).

Components:

- **Data:** The information stored within the database.
- **DBMS:** Software that allows users to interact with the database, managing data storage, retrieval, and security.
- **Schema:** The structure that defines the organization of data in the database.
- **Tables/Relations:** Entities holding related data organized in rows (tuples) and columns (attributes).
- **Queries:** Commands used to retrieve, manipulate, or modify data within the database.

Evolution of Databases:

Hierarchical Model:

Organized data in a tree-like structure.
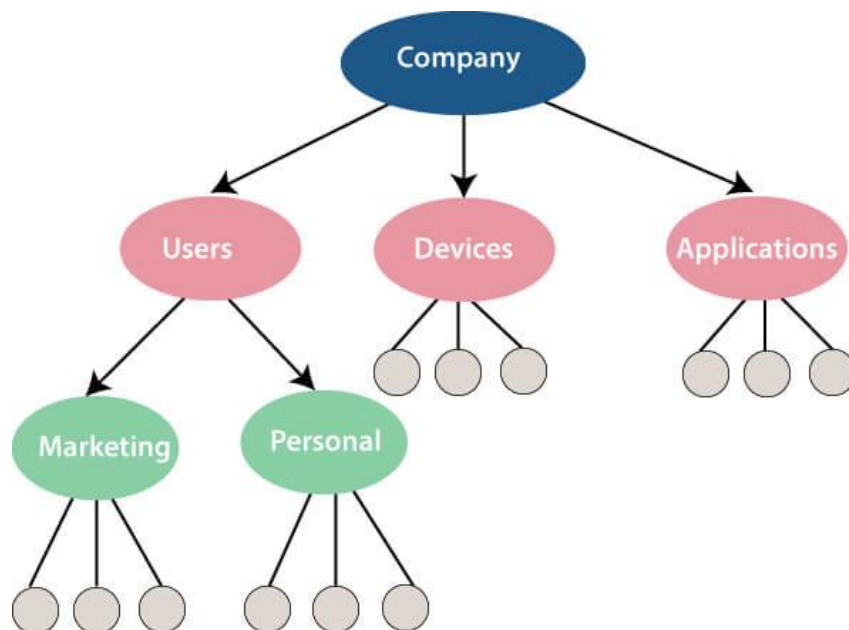
Network Data Model:

Enhanced the hierarchical model by allowing more complex relationships.

Introduced the concept of sets and links between records.

Relational Model:

Proposed by E.F. Codd, revolutionized the database world.

Organizes data into tables (relations), with rows (tuples) and columns (attributes).

Employs keys to establish relationships between tables.

Example: Oracle, MySQL, PostgreSQL.

Object-Oriented Database:
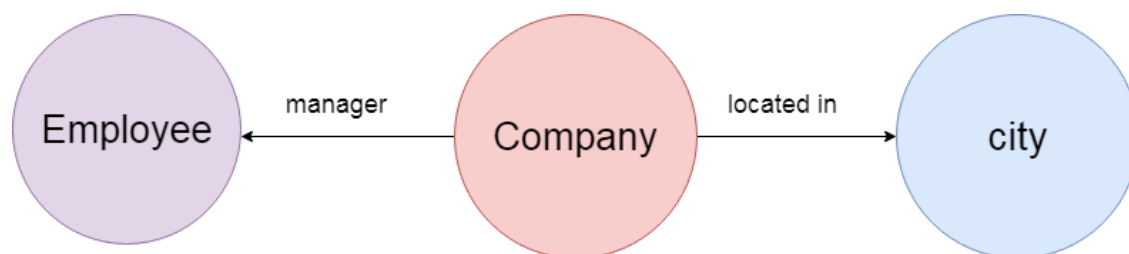
Stores data as objects, with attributes and methods.

Better suited for complex data structures and relationships.

Graph-Based Database:

Organizes data using graph structures (nodes, edges, properties).

Emphasizes relationships between entities.

Effective for highly interconnected data.

DBMS (Data Base Management System)

- It's a software used to store and retrieve databases1. Examples include Oracle and MySQL.
- DBMS allows various operations like creation, deletion, and modification of databases.
- DBMS provides an interface for users to create databases as per their needs.
- It accepts requests from applications and provides specific data through the operating system.
- DBMS provides security to the database.

RDBMS (Relational Database Management System):

RDBMS is a system based on the relational model. It's represented as a table with rows and columns.

Components:

The key components of a relational database include Table, Record/Tuple, Field/Column name/Attribute, Instance, Schema, and Keys. Each serves a specific function in the database system.