

Introduction to Databases.

Ortiz Vega Angelo

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Academic Area of Computer Engineering.

Cartago, Costa Rica.

-Keywords: DataBases, SQL, DBMS, DBA, Data Abstraction, Data Model, Database Schema, Schema Diagram, Snapshot, Database Languages.

-Content:

Database refers to a set of related data and the way it is organized.

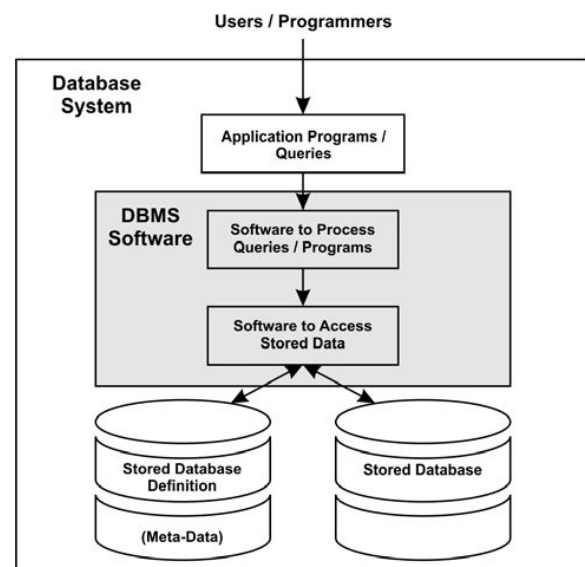
Access to these data is usually provided by a “database management system” (**DBMS**) consisting of an integrated set of computer software that allows users to interact with one or more databases and provides access to all of the data contained in the database.

The database systems are an essential component of life in modern society: most of us encounter several activities every day that involve some interaction with a database. Examples: Bank to deposit or withdraw funds, Hotel or airline reservation, Access a computerized library catalog.

A database represents some aspect of the real world, sometimes called the **miniworld** or the **universe of discourse (UoD)**. Changes to the miniworld are reflected in the database.

A database is a logically coherent collection of data with some inherent meaning. A random assortment of data cannot correctly be referred to as a database.

A database is **designed, built, and populated** with data for a specific purpose. It has an intended group of users and some preconceived applications in which these users are interested.



Database Administrator (DBA):

- Primary resource: the database itself.
- Secondary resource is the DBMS and related software.
- Administering these resources is the responsibility of the database administrator.
- Responsible for authorizing access to the database, coordinating and monitoring its use, and acquiring software and hardware resources as needed.

Database Designers:

- Are responsible for identifying the data to be stored in the database and for choosing appropriate structures to represent and store this data.

End Users:

- End users are the people whose jobs require access to the database for querying, updating and generating reports.
- The database primarily exists for this use.

Casual End Users:

- Occasionally access the database, but they may need different information each time.

Parametric End Users:

- Their main job function revolves around constantly querying and updating the database using

standard types of queries and updates that have been carefully programmed and tested.

Advantages of using the DBMS Approach:

- Controlling redundancy.
- Restricting unauthorized.
- Providing storage structures and search techniques for efficient query processing.
- Providing backup and recovery.
- Enforcing integrity constraints.
- Providing multiple user interfaces.
- Providing persistent storage for program objects.

Data Models, Schemas and Instances:

Data Abstraction: Refers to the suppression of details of data organization and storage, and the highlighting of the essential features for an improved understanding of data.

Data Model: Collection of concepts that can be used to describe structure of a database. Provides. Categories of Data Models:

1. **High-Level (Conceptual):** Provide concepts that are close to the way many users perceive data.
2. **Low-Level (Physical):** Provide concepts that describe the details of how data is stored on the computer storage media.
3. **Representational:** Which provide concepts that may be easily understood by end users

but that are not too far removed from the way data is organized in computer storage.

manipulations include: retrieval, insertion, deletion and modification of the data.

Database Schema: Is the description of the database. Which is specified during database design and is not expected to change frequently.

Schema Diagram: A displayed schema. Displays only some aspects of a schema, such as the name of record type and data items, and some types of constraints.

Database state or snapshot: The data in the database at a particular moment.

1. **Empty state:** its database schema only.
2. **Initial state:** when the database is first populated or loaded with the initial data.
3. **Valid state:** is a state that satisfies the structure and constraints specified in the schema.

Database Languages:

- **DDL (Data Definition Language):** Used by DBA and designers to define both schemas.
- **SDL (Storage Definition Language):** Used to specify the internal schema.
- **VDL (View Definition Language):** Used to specify user views and their mappings to conceptual schema.
- **DML (Data Manipulation Language):** Used to manipulate the database. Typical

Classification of Database Management Systems:

1. Data Model
 - a. Relational
 - b. Object
 - c. Hierarchical
 - d. Network
2. Number of Users
 - a. Single-user Systems
 - b. Multiuser Systems
3. Number of Computers
 - a. Centralized
 - b. Distributed