

CSc 134

Database Management and File Organization

1. Introduction to Database Management Systems

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Database Management Systems

- Database
 - A database is a collection of related data .
- Database management System (DBMS)
 - A database management system is a collection of programs that enables users to create and maintain a database.

File Processing System versus DBMS

- Redundancy
 - Duplication, Waste Storage, Inconsistent
- Security
 - Beyond that provided by operating system
 - Authorized Access
- Self-Describing
 - Stores data, definition of database structure and constraints
- Integrity Constraints
 - Data type, relationships, uniqueness

File Processing System versus DBMS (Cont.)

- Data abstraction
 - A change in a file system requires a change in the program.
 - A conceptual representation of data without details of physical storage
- Multiple views
 - A DBMS supports multiple users to view the database in different ways.
 - A view may be a subset of the database, or contain virtual data derived from the database (not explicitly stored).
- Concurrency control
- Efficient query processing

Database Users

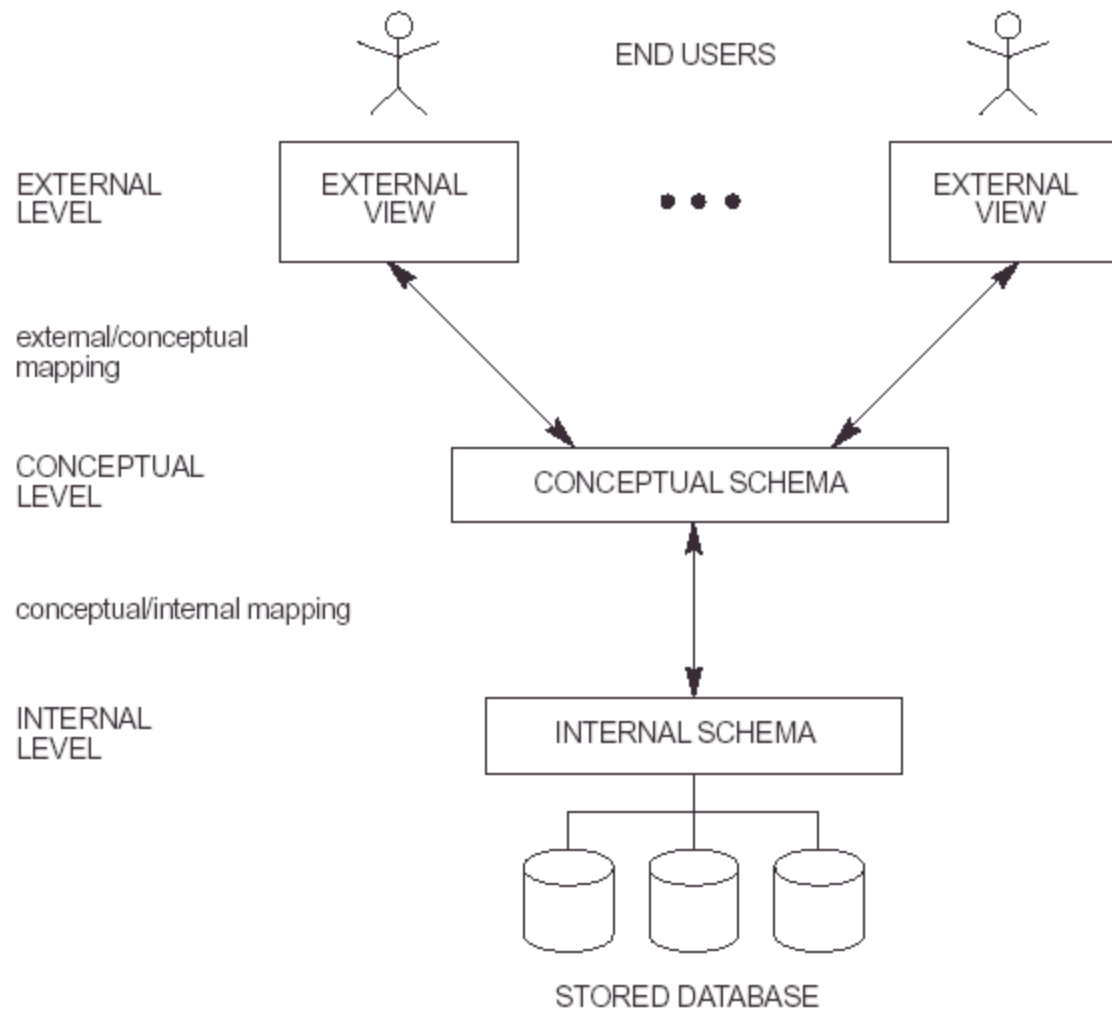
- Database Administrators (DBA)
 - Manage database and related software.
e.g. Monitor use of resource, authorized access to the database, and system performance
- Database Designers
 - Design the structure to represent and store data
 - Identify the data to be stored
- End Users
 - Casual end user: use sophisticated database query language
 - Naïve user: menu-driven interface
 - Sophisticated end users: familiar with DBMS to implement their applications.

Data Models

Data Model: A collection of concepts to describe the structure of a database.

- High-level / conceptual model
 - Entity-Relationship model
- Representational /implementation model
 - Relational data model
 - Object data model
 - Network model
 - Hierarchical model
- Low-level / physical data model
 - How data is stored in the disk

DBMS Architecture and Data Independency



Database Languages

- Data Definition Language (DDL)
 - Use to specify database schema
- Data Manipulation Language (DML)
 - Manipulate and access data (e.g. Insert, retrieve, delete, update)
- Comprehensive Integrated language
 - e.g. SQL
- Query Language
 - Part of DML to specify how to retrieve data from the database



These slides are based on the textbook:

R. Elmaseri and S. Navathe, *Fundamentals of Database Systems*, 6th Edition, Addison-Wesley.
Chapter1, Chapter 2.