Database Management System 3
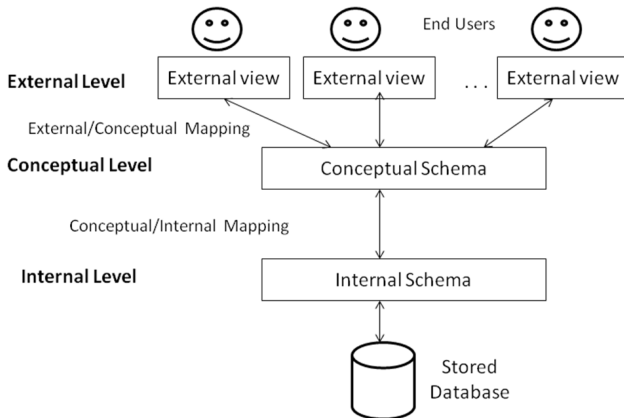## 3-Level Abstraction of Database

Chittaranjan Pradhan
School of Computer Engineering,
KIIT University

3-Level Abstraction of Database

3-Level Abstraction of Database

The goal of the ANSI/SPARC 3-level abstraction is to separate the user applications and the physical database. It deals with the data, the relationship between them and the different access methods implemented on the database. The logical design of a database is called a *schema*

3-Level Abstraction of Database...

External/View Level

The external level includes a number of external schemas or user views. Each external schema or user view describes the part of the database that a particular user group is interested in and hides the details of the database from that user group

Conceptual Level

The conceptual level has a conceptual schema, which describes the structure of the whole database for a community of users. The conceptual schema hides the details of physical storage structures and concentrates on describing entities, data types, relationships and constraints

It represents global view of the entire database. Thus; for a database, there is only one conceptual schema available

3-Level Abstraction of Database...

Internal Level

The internal level has an internal schema, which describes the physical storage structure of the database system. Like conceptual schema, there is only one internal schema available for a database. It is the one which is closest to physical storage

The internal schema not only defines the various stored record types, but also specifies what indices exist, how stored fields are represented

Mapping and Data Independence

Mapping and Data Independence

In a database system based on the 3-level architecture, each user group refers only to its own external schema. The process of transforming requests and results between different levels are called mapping

Conceptual/Internal Mapping

It defines the correspondence between the conceptual view and the stored database. *Physical Data Independence* indicates that the internal schema can be changed without any change to the conceptual schema

External/Conceptual Mapping

It defines the correspondence between a particular external view and the conceptual view. *Logical Data Independence* indicates that the conceptual schema can be changed without affecting the existing external schemas

Database Users

Different database users are:

Naive Users

They are the normal or unsophisticated users who interact with the system by invoking application programs that have been written previously. The typical user interface for naive users is a form interface, where the user can fill in appropriate fields of the form

Application Programmers

They are computer professionals who write application programs to access data from the database. Application programmers can use different tools to develop user interfaces

Database Users...

Sophisticated Users

They interact with the system without creating any application program. Rather, they form their requests in a database query language and submit each such query to a query processor. *Analysts* who submit queries to explore data in the database fall in this category

Specialized Users

They are sophisticated users who write specialized database applications that don't fit into the traditional data processing framework

Database Administrator(DBA)

The person who has central control of the whole database system is called DBA. The DBA coordinates all the activities of the database system

Database Users...

The roles of DBA are:

- DBA creates the original database schema by executing a set of DDL statements
- DBA defines and controls the access methods for the different users
- DBA carries out changes to the schema and physical organization to reflect the changing needs of the organization, or to alter the physical organization to improve performance
- By granting different types of authorization, DBA can regulate which parts of the database various users can access
- DBA specifies the different types of constraints to different tables or objects
- DBA is responsible for the periodically backing up the database
- DBA ensures that enough free disk space is available for normal operations and upgrading disk space as required
- DBA monitors the jobs running on the database and ensures that the performance is not degraded by very expensive tasks submitted by some users