

DATABASE MANAGEMENT SYSTEM

BCSC0003

By

Suman Kumar Bhattacharyya

Assistant Professor

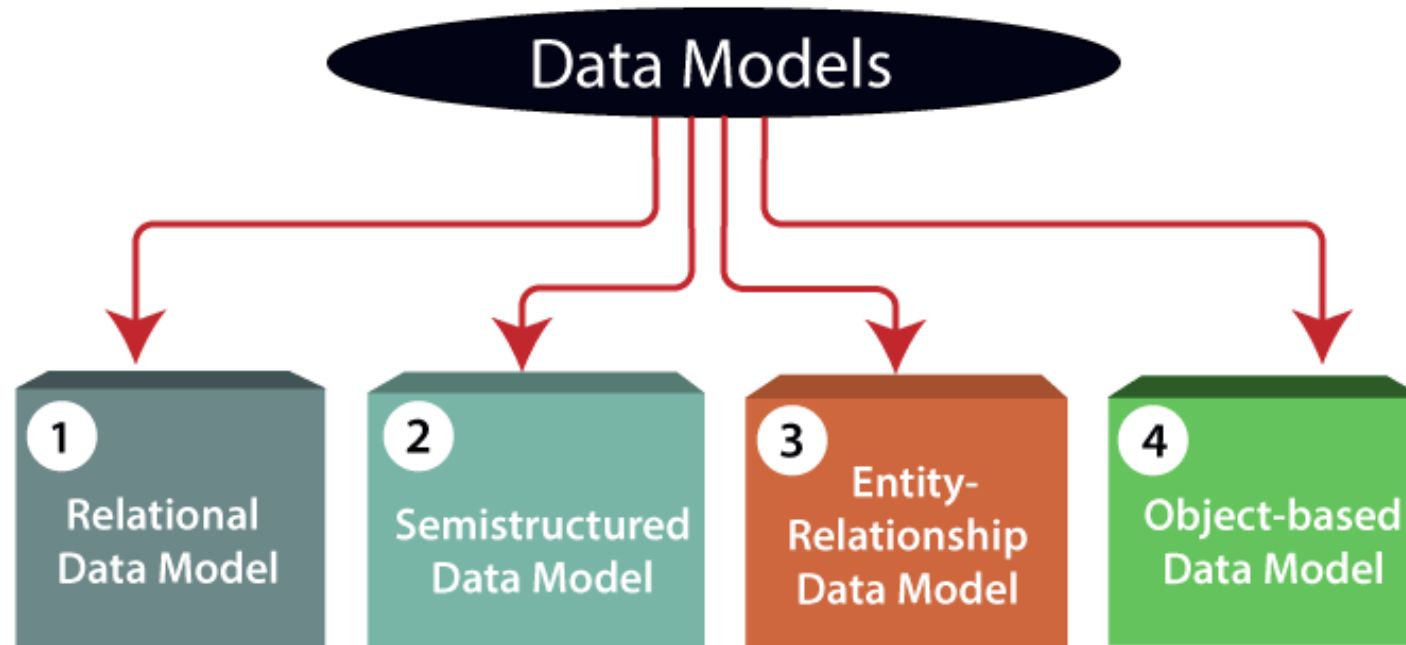
Computer Engineering and Application Department

Data Model

- A major purpose of a database system is to provide users with an abstract view of the data.
- That is, the system hides certain details of how the data are stored and maintained.
- A model is a representation of reality, 'real world' objects and events, and their associations.
- Data model is a collection of conceptual tools for describing data, data relationships, data semantics, and consistency constraints.

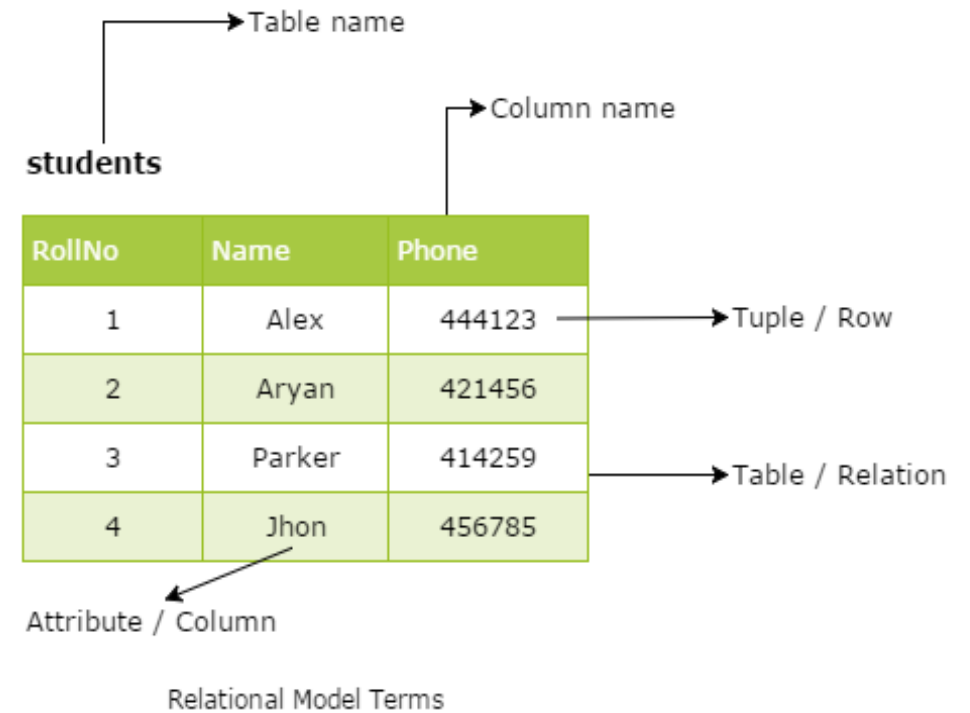
Data Model

The data models can be classified into four different categories,



Relational Model

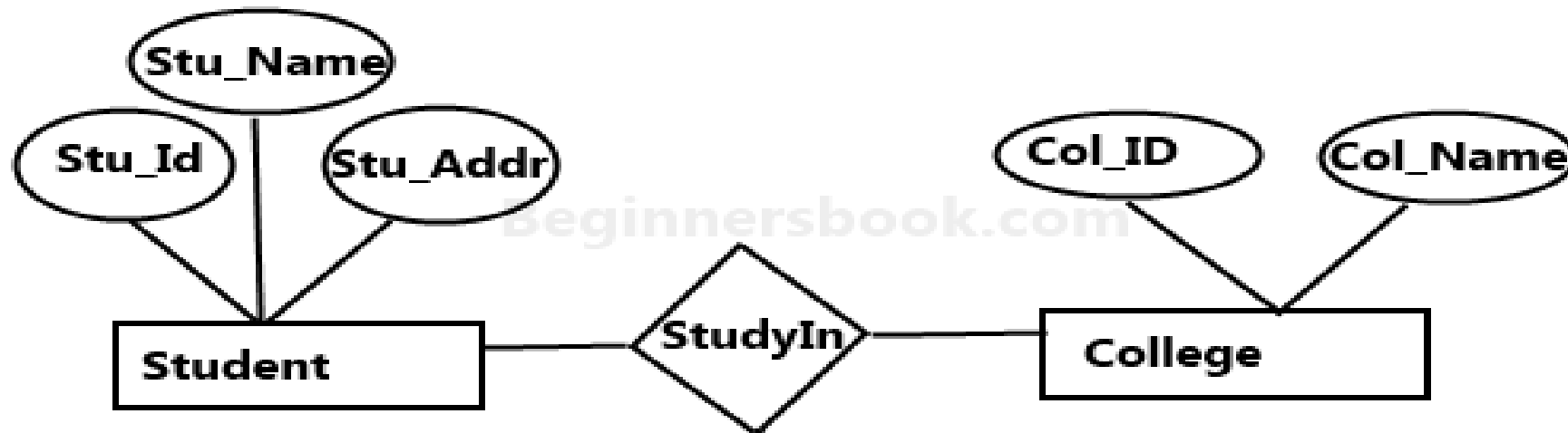
- The relational model uses a collection of tables to represent both data and the relationships among those data.
- Each table has multiple columns, and each column has a unique name.
- Tables are also known as relations.
- The relational model is an example of a record-based model.



Entity-Relationship Model

- The entity-relationship (E-R) data model uses a collection of basic objects, called entities, and relationships among these objects.
- An entity is a “thing” or “object” in the real world that is distinguishable from other objects.
- The entity-relationship model is widely used in database design.

Entity-Relationship Model

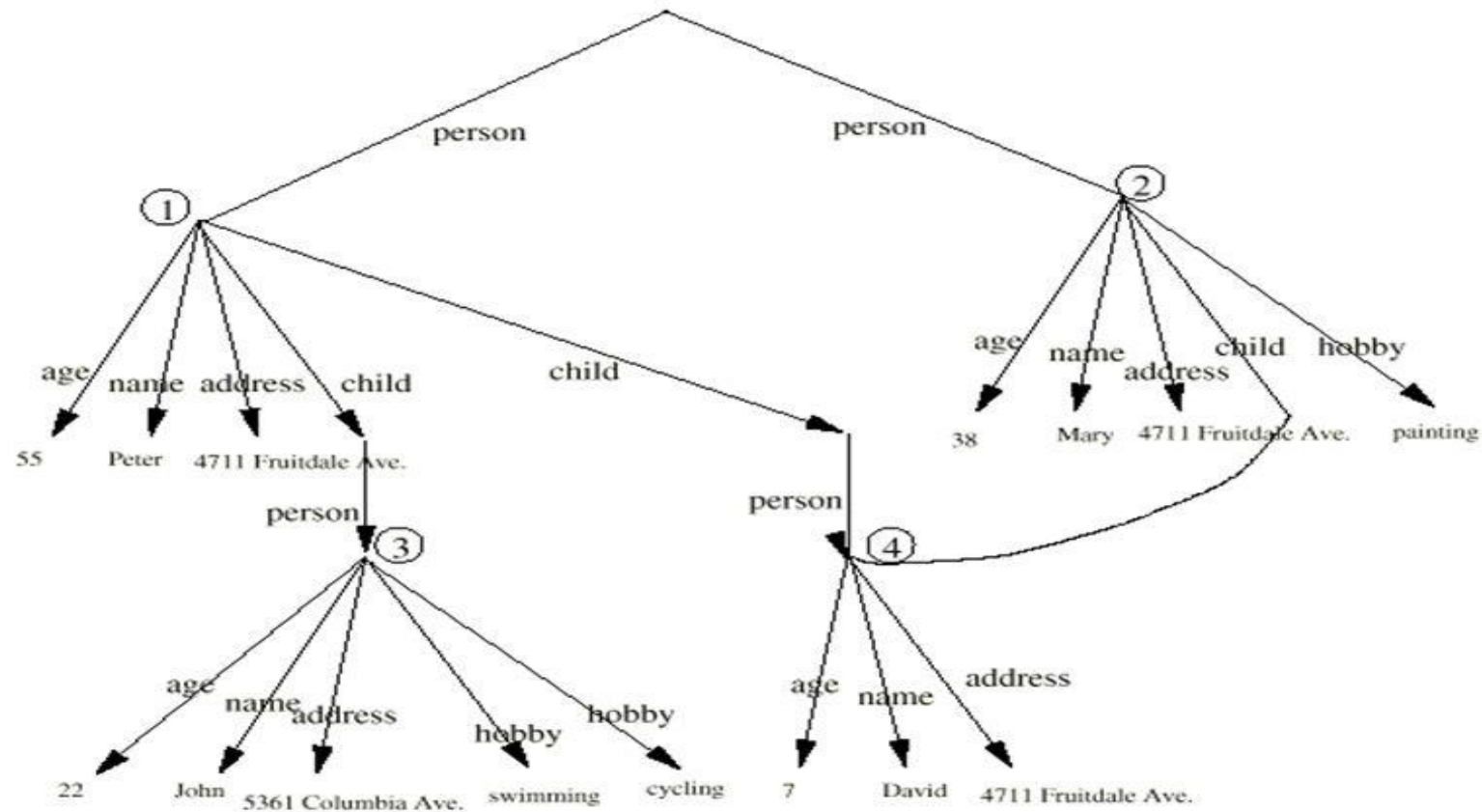


Sample E-R Diagram

Semi-structured Data Model

- The semi-structured data model permits the specification of data.
- In this case individual data items of the same type may have different sets of attributes.
- This is in contrast to the data models mentioned earlier, where every data item of a particular type must have the same set of attributes.

Data Model for Semi-Structured Data

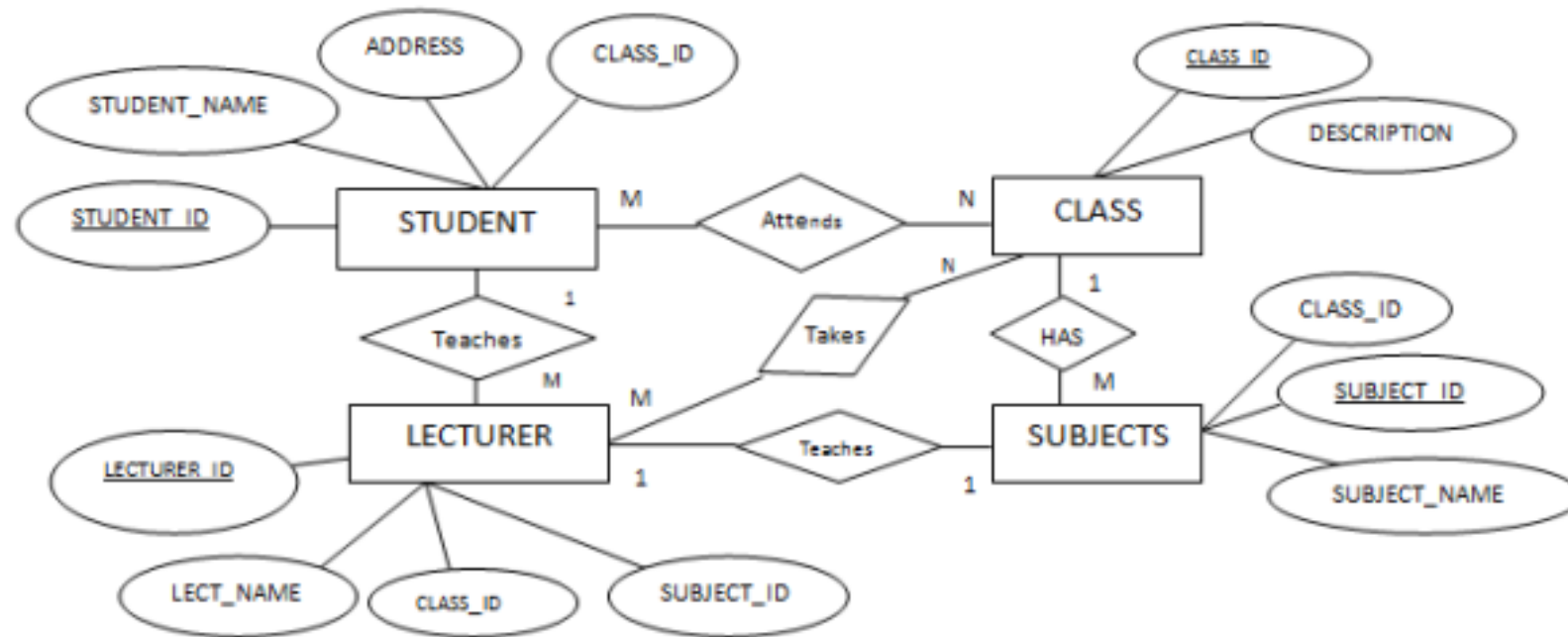


Object-Based Data Model.

- Object based data models use concepts such as entities, attributes, and relationships.
- Object-oriented programming (especially in Java, C++, or C#) has become the dominant software-development methodology.
- This led initially to the development of a distinct object-oriented data model, but today the concept of objects is well integrated into relational databases.
- Standards exist to store objects in relational tables.
- Database systems allow procedures to be stored in the database system and executed by the database system.

Object-Based Data Model.

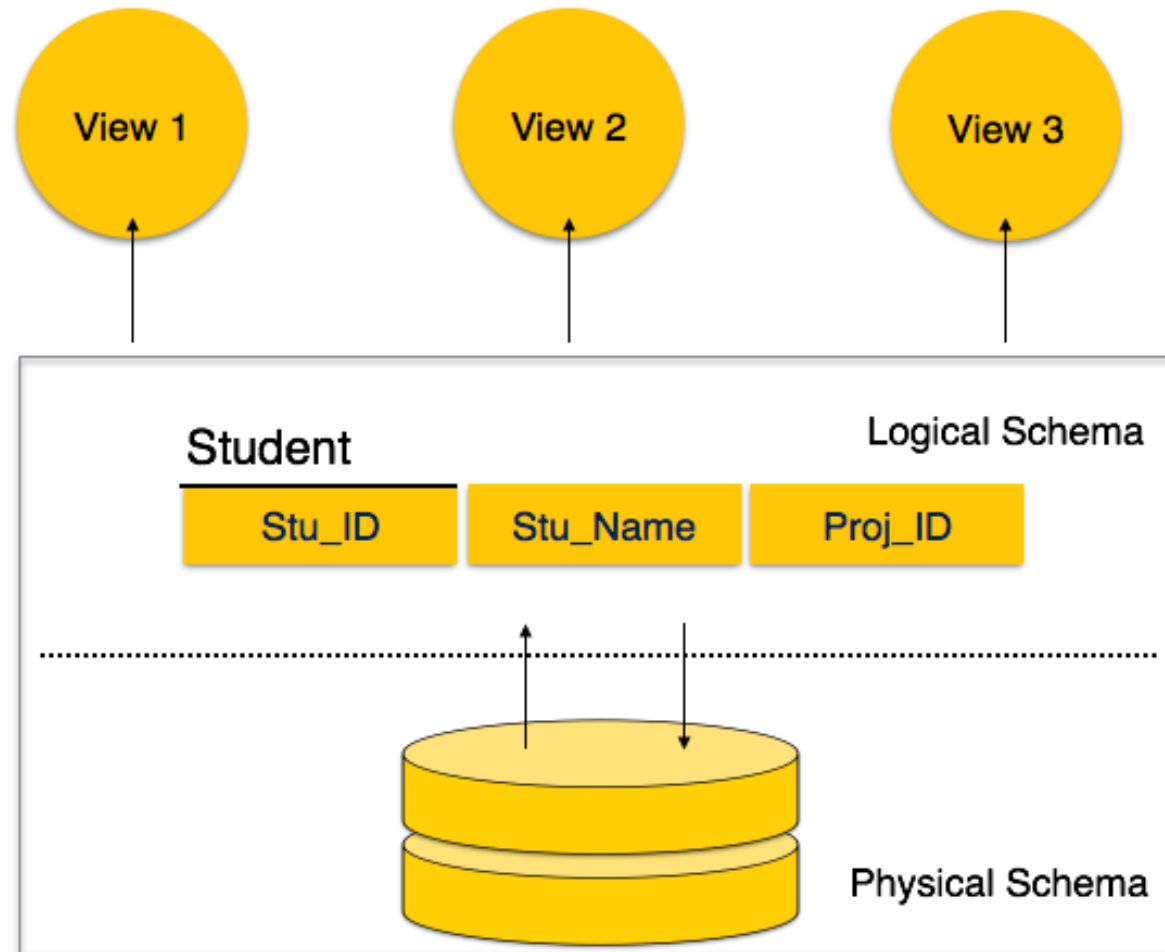
- Object based data models use concepts such as entities, attributes, and relationships



Schemas

- A database schema is the skeleton structure.
- It represents the logical view of the entire database.
- It defines how the data is organized and how the relations among them are associated.
- It formulates all the constraints that are to be applied on the data.
- A database schema defines its entities and the relationship among them.
- It contains a descriptive detail of the database, which can be depicted by means of schema diagrams.
- It's the database designers who design the schema to help programmers understand the database and make it useful.

Schemas



Schemas

A database schema can be divided broadly into two categories –

Physical Database Schema

- This schema pertains to the actual storage of data and its form of storage like files, indices, etc.
- It defines how the data will be stored in a secondary storage.

Logical Database Schema

- This schema defines all the logical constraints that need to be applied on the data stored.
- It defines tables, views, and integrity constraints.

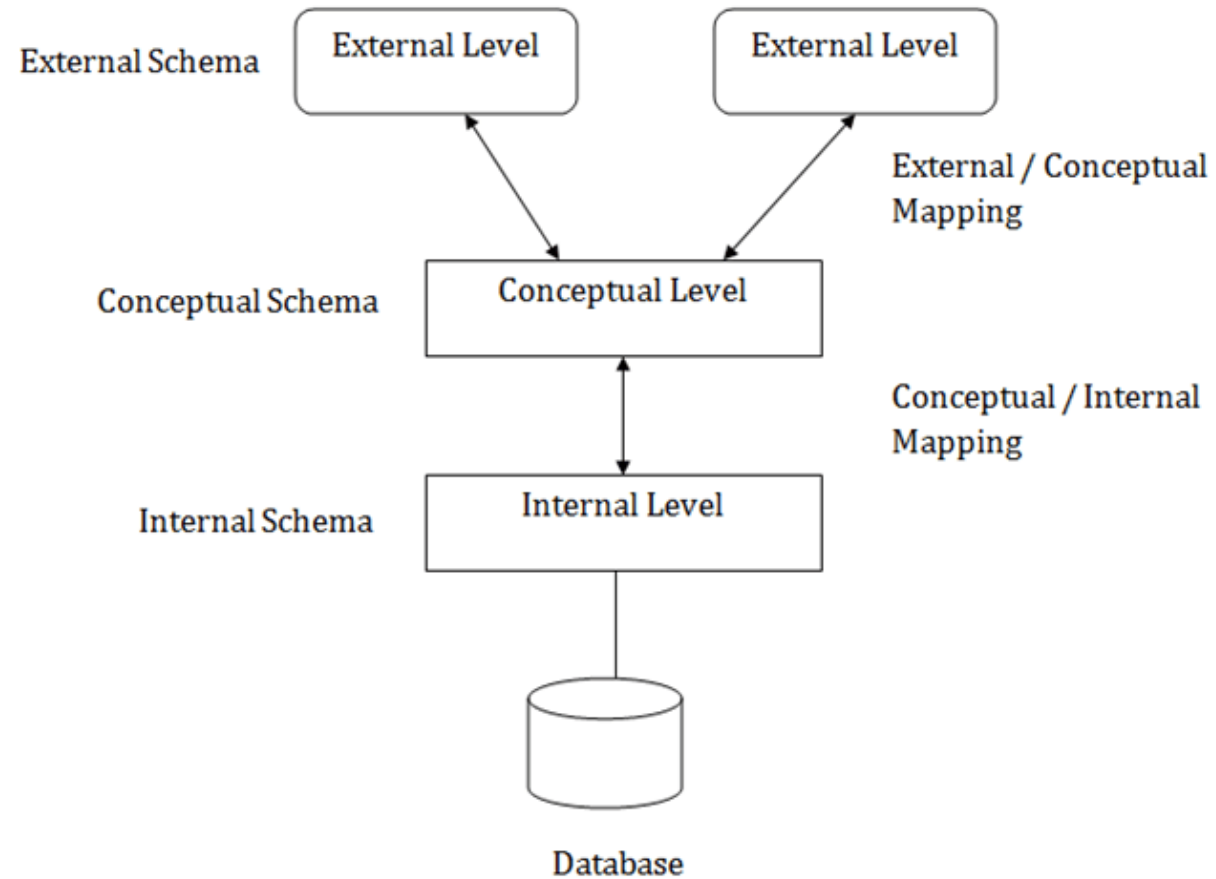
Schemas

- So Schema is the logical structure of the database
e.g., the database consists of information about a set of customers and accounts and the relationship between them)
Eg: emp(ssn,name,fname).
- Database schema is designed when the database doesn't exist at all.
- Once the database is operational, it is very difficult to make any changes to it.
- A database schema does not contain any data or information.

Schemas

- Defines DBMS schemas at *three levels*:
 - **Internal schema** at the internal level to describe physical storage structures and access paths. Typically uses a *physical* data model.
 - **Conceptual schema** at the conceptual level to describe the structure and constraints for the *whole* database for a community of users. Uses a *conceptual* or an *implementation* data model.
 - **External schemas** at the external level to describe the various user views. Usually uses the same data model as the conceptual level.

Schemas



Instances

- A database instance is a state of operational database with data at any given time.
- It contains a snapshot of the database.
- Database instances tend to change with time.
- A DBMS ensures that its every instance (state) is in a valid state, by diligently following all the validations, constraints, and conditions that the database designers have imposed.

Instances

- **Instance** – the actual content of the database at a particular point in time
 - Analogous to the value of a variable
 - Eg: EMP

SSN	NAME	FNAME
1	AMIT	PRAKHAR
2	RAJ	JAI

Thanks

