

DB Sheet 1,2 Ans

1- Define the following:

| | |
|------------------------------------|---|
| Database | A collection of related data |
| Database Management System. | A software package/system to facilitate the creation and maintenance of a computerized database |
| Application Program | accesses the database by sending queries or requests for data to the DBMS |
| Query | causes some data to be retrieved. |
| Transaction | may cause some data to be read and some data to be written into the database |
| Protection of Database | includes system protection against hardware or software malfunction (or crashes) and security protection against unauthorized or malicious access. |

2- List the types of Databases and Database Applications?

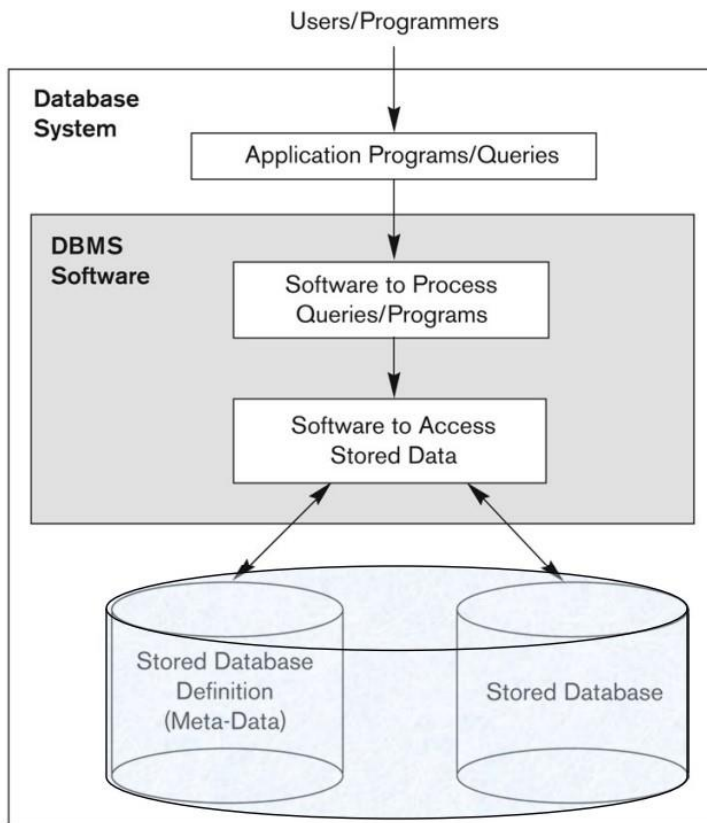
- Traditional applications:

- **Numeric and textual databases**

- More recent applications:

- **Multimedia databases**
 - Store images, audio, Clips, and video stream digitally.
- **Geographic Information Systems (GIS)**
 - Store and analyze maps, weather data, and satellite images.
- **Data warehouses**
 - Extract and analyze useful business information from very large database.
 - Support decision making.

3. Draw a simplified architecture for a database system?



4. What are the Database properties?

- A database represents some aspect of the real world, sometimes called the mini-world.
- A database is a logically coherent collection of data some inherent meaning.
- A database is designed, built, and populated with data for a specific purpose.

5. What is the meaning of Defining the database?

a database involves specifying the data types, structures, and constraints of the data to be stored in the database.

6. What are the Main Characteristics of the Database Approach?

- Self-describing nature of a database system
- Insulation between program and data
- Data abstraction
- Support of multiple views of the data
- Sharing of data and multi-user transaction processing

7. What are the Database Users?

Users may be divided into

- who actually use and control the database content
- who design, develop and maintain database applications (called “Actors on the Scene”)
- who design and develop the DBMS software and related tools, and the computer systems operators (called “Workers Behind the Scene”).

8. What are the advantages of using the Database Approach?

- Controlling redundancy in data storage and in development and maintenance efforts
- Restricting unauthorized access to data.
- Providing persistent storage for program Objects
- Providing storage structures (e.g., indexes) for efficient query processing
- Providing optimization of queries for efficient processing
- Providing backup and recovery services

9. What is meant of the Data Model?

A set of concepts to describe the structure of a database, the operations for manipulating these structures, and certain constraints that the database should obey.

10. What are the Categories of Data Models?

- Conceptual (high-level, semantic) data models
- Physical (low-level, internal) data models
- Implementation (representational) data models

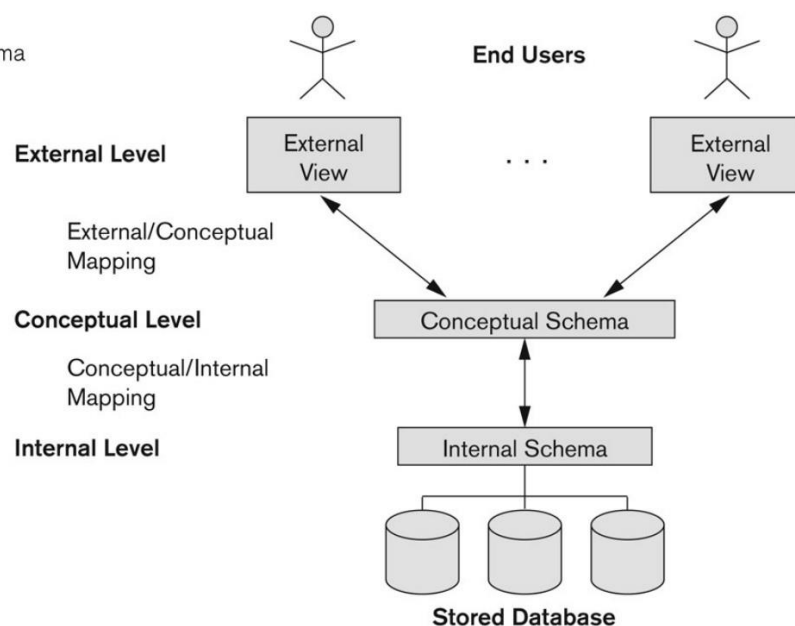
11. What are the meant of the following

| | |
|--------------------------------|--|
| Schema Diagram. | An illustrative display of (most aspects of) a database schema. |
| Database State. | The actual stored data in a database at a particular moment in time. |
| | The content of a database at a moment in time. |
| Initial Database State. | The database state when it is initially loaded into the system. |
| Valid State. | A state that satisfies the structure and constraints of the database. |

12. Defines DBMS schemas at three levels and draw the three-schema architecture.

- Internal schema
 - at the internal level to describe physical storage structures and access paths (e.g., indexes).
- Conceptual schema
 - at the conceptual level to describe the structure and constraints for the whole database for a community of users.
- External schemas
 - at the external level to describe the various user views.

Figure 2.2
The three-schema architecture.



13. What is the difference of the Database Schema and Database state?

- **Database Schema:**

- The description of a database
- changes very infrequently.

- **Example of Database Schema →**

STUDENT

| Name | Student_number | Class | Major |
|------|----------------|-------|-------|
|------|----------------|-------|-------|

COURSE

| Course_name | Course_number | Credit_hours | Department |
|-------------|---------------|--------------|------------|
|-------------|---------------|--------------|------------|

PREREQUISITE

| Course_number | Prerequisite_number |
|---------------|---------------------|
|---------------|---------------------|

SECTION

| Section_identifier | Course_number | Semester | Year | Instructor |
|--------------------|---------------|----------|------|------------|
|--------------------|---------------|----------|------|------------|

GRADE_REPORT

| Student_number | Section_identifier | Grade |
|----------------|--------------------|-------|
|----------------|--------------------|-------|

Figure 2.1

Schema diagram for the database in Figure 1.2.

- **Database state:**

- The content of a database at a moment in time.
- changes every time the database is updated.

- **Example of Database state →**

COURSE

| Course_name | Course_number | Credit_hours | Department |
|---------------------------|---------------|--------------|------------|
| Intro to Computer Science | CS1310 | 4 | CS |
| Data Structures | CS3320 | 4 | CS |
| Discrete Mathematics | MATH2410 | 3 | MATH |
| Database | CS3380 | 3 | CS |

SECTION

| Section_identifier | Course_number | Semester | Year | Instructor |
|--------------------|---------------|----------|------|------------|
| 85 | MATH2410 | Fall | 04 | King |
| 92 | CS1310 | Fall | 04 | Anderson |
| 102 | CS3320 | Spring | 05 | Knuth |
| 112 | MATH2410 | Fall | 05 | Chang |
| 119 | CS1310 | Fall | 05 | Anderson |
| 135 | CS3380 | Fall | 05 | Stone |

GRADE_REPORT

| Student_number | Section_identifier | Grade |
|----------------|--------------------|-------|
| 17 | 112 | B |
| 17 | 119 | C |
| 8 | 85 | A |
| 8 | 92 | A |
| 8 | 102 | B |
| 8 | 135 | A |

PREREQUISITE

| Course_number | Prerequisite_number |
|---------------|---------------------|
| CS3380 | CS3320 |
| CS3380 | MATH2410 |
| CS3320 | CS1310 |

14. What are the kinds of Data Independence and define each one?

- **Logical Data Independence**: The capacity to change the conceptual schema without having to change the external schemas and their associated application programs.
- **Physical Data Independence**: The capacity to change the internal schema without having to change the conceptual schema.

15. What are the Database Management System “DBMS” Languages and its uses?

| “DBMS” Languages | Used To |
|--|---|
| Data Definition Language (DDL) | Used by the DBA and database designers to specify the conceptual schema of a database. |
| Storage definition language (SDL) | Used to define internal schema |
| View definition language (VDL) | Used to specify user views / mapping to conceptual schema. |
| Data Manipulation Language (DML) | Used to specify database retrievals and updates. |

16. What are the kinds of the Database Management System “DBMS” Architectures what are the differences between them?

Centralized DBMS:

- Combines everything into single system
- Connected through a remote terminal

Client-Server DBMS:

- Provide appropriate interfaces through a client software module to access and utilize the various server resources.
- Connected to the servers via some form of a network.