# Data Base Management System (22319)

## Unit1:Database System Concept

## (Weightage-12Marks)

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**Q1.Define Database Management System.(2marks)**

**Answer-**

- Data is the information which has been translated into a form that is more convenient to process or move.
- Database- The collection of related data is termed as Database which is organized in such a way that it can be easily retrieved and managed.
- A Database Management System (DBMS) is System software which manages the data. It can perform various tasks like creation , retrieval, insertion, modification and deletion of data to manage it in a systematic way as per requirement

**Q2. List disadvantages of typical file processing system.(2marks)**

1.Data Redundancy

2. Data Inconsistency

3. Limited Data Sharing

 4. Difficulty in Accessing Data

5. Data Dependence

6. Problem of Security

7. Concurrency Problems

8. Integrity Problems

9..Atomicity Problem

**Q3.List Advantages of DBMS.**

   **Or List advantages over DBMS Over File processing system also explain it. (2marks/4marks)**

**Ans-** Controls database redundancy: It can control data redundancy because it stores all the data in one single database file and that recorded data is placed in the database.

• Data sharing: In DBMS, the authorized users of an organization can share the data among multiple users.

• Easily Maintenance: It can be easily maintainable due to the centralized nature of the database system.

• Reduce time: It reduces development time and maintenance need.

• Backup: It provides backup and recovery subsystems which create automatic backup of data from hardware and software failures and restores the data if required.

• multiple user interface: It provides different types of user interfaces like graphical user interfaces, application program interfaces

**Q4.Define Instance and Schema (2marks)**

**Ans-**Instance-The data is stored in the database at particular moment is called as instance of the database.

Let's say a table teacher in our database whose name is School, suppose the table has 50 records so the instance of the database has 50 records for now and tomorrow we are going to add another fifty records so tomorrow the instance have total 100 records. This is called an instance.

 Schema- The design of a database is called the schema.

Types of Schema Physical Schema, Logical Schema ,View Schema

**Q5. Define – Data Abstraction and Data Redundancy (2marks)**

**Answer**

Data Abstraction

Extracting the important data by ignoring the remaining irrelevant details is known as abstraction.

This process of hiding irrelevant details from user is called data abstraction.

The complexity of database can be hiding from user by using different level of abstraction

Many end users are not computer trained so it is needed to hide complex data structures from them. Hiding complexity of data structures from end user through different levels is known as data abstraction. Levels-Physical,Logical,View level

Data Redundancy

The repetition of information is known as redundancy .

This redundancy leads to higher storage and access cost. It may lead to data inconsistency, that is different copies of the same data may have different values.

**Q6 Define Data Model . Enlist its types.(2marks)**

- The process of analysis of data object and their relationships to other data objects is known as data modeling.
- It is the conceptual representation of data in database.
- It is the first step in database designing.
- Data models define how data is connected to each other and how they are processed and stored inside the system.
- A data model provides a way to describe the design of a database at the physical, logical and view levels
- Types
- Data Models
    - Relational Model
    - Network Database Model
    - Object Oriented Data Model
    - Hierarchical Model
    - Entity Relationship Model
    - Physical Data Model

**Q7. State Components of E-R models/diagram (2marks)**

- Rectangle: Represents Entity sets.
- Ellipses: Attributes
- Diamonds: Relationship Set
- Lines: They link attributes to Entity Sets and Entity sets to Relationship Set
- Double Ellipses: Multivalued Attributes
- Dashed Ellipses: Derived Attributes
- Double Rectangles: Weak Entity Sets
- Double Lines: Total participation of an entity in a relationship set

**Q8.Explain Strong and Weak Entity . (4marks)**

## Strong Entity

- If an entity having it's own key attribute specified then it is a strong entity.
- Key attribute is used to identify that entity uniquely among set of entities in entity-set.
- An entity set that has sufficient attributes to form a primary key is called as Strong entity set.
- Example: Employee is a Strong entity with attributes as empid, name, address, salary, birthdate among which empid can be considered as primary key.
- Strong entity is denoted by a single rectangle.

## Weak Entity

- The entity which **does not have any key attribute** is known as weak entity. The weak entity has a partial discriminator key. Weak entity depends on the strong entity for its existence. Weak entity is denoted with the double rectangle
- The entity set which does not have sufficient attributes to form a primary key is called as Weak entity set. A weak entity is an entity that cannot be uniquely identified by its attributes alone; therefore, it must use a foreign key in conjunction with its attributes to create a primary key. The foreign key is typically a primary key of an entity it is related to.
- Example: Employee has "dependents" with name, birthdate, and relationship to employee and it can be related to employee with the help of empid, so "dependents" is a weak entity which depends on strong entity "Employee".

**Q9.Explain and Draw Three level Architecture (4marks)**

  **Or Draw Three level architecture (2marks)**

  **Or State and explain three levels of Data abstraction or Schemas.(4marks)**
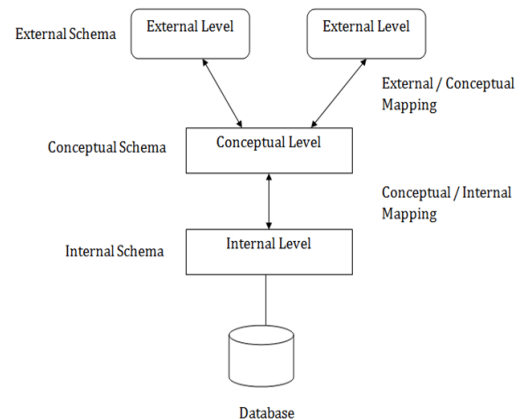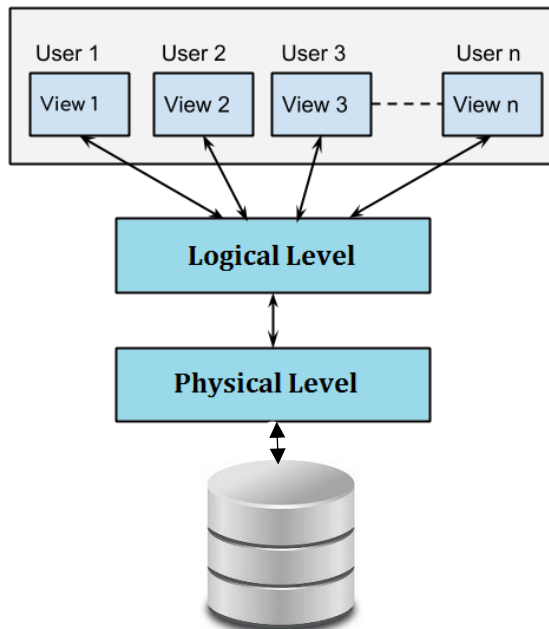


- **Physical Level** –This is the lowest level in the three level architecture. The physical level describes how data is actually stored in the database. In the lowest level, this data is stored in the external hard drives like hard disk, magnetic tapes etc.

- **Logical Level**- This is the next higher level of abstraction which is used to describe what data the database stores, and what relationships exist in between the data items. Database administrators use the logical level of abstraction to decide what information to keep in a database.

- **View Level-** It is the highest level of data abstraction. This level describes the user interaction with database system. End user interacts with system with the help of GUI and enters the details at the screen at view level. User is not aware of how the data is stored and what data is stored; such details are hidden from them

**Q10.Difference Between Network and Hierarchical Model (4marks)**

 **Or Compare Relational and Hierarchical Model (4marks)**

## HIERARCHICAL  VS NETWORK VS RELATIONAL DATABASE MODEL

| HIERARCHICAL | NETWORK | RELATIONAL |
|---|---|---|
| A structure of data organized in a tree like model using parent, child relationships | A database model that allows multiple records to be linked to the same owner file | A database model to manage data as tuples grouped into relations (tables) |
| Arranges data in a tree similar structure | Organizes data in a graph structure | Arranges data in tables |
| Represents "one to many" relationship | Represents "many to many" relationship | Represent both "one to many" and "many to many" relationships |
| Difficult to access data | Easier to access data | Easier to access data |
| Less flexible | Flexible | Flexible |

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| Network model | Hierarchical model |
|---|---|
| ① Represent tree like structure with many roots. | ① Represent tree like structure with one root. |
| ② Reflects many to many relationship | Reflect one to many. |
| ③ Relationship is represented as pointer or links. | ③ Relationship between records of parent-child. |
| ④ It uses client server architecture? | not. |
| ⑤ Easier to access data. | ⑤ Difficult to access data. |
| ⑥ Flexible. | ⑥ Less flexible. |
| ⑦ how have many out to child. | ⑦ there can be only one parent. |

**Q11.** Draw an E-R diagram of library management system considering issue and return, fine calculation facility, also show primary key, weak entity and strong entity(6MARKS)
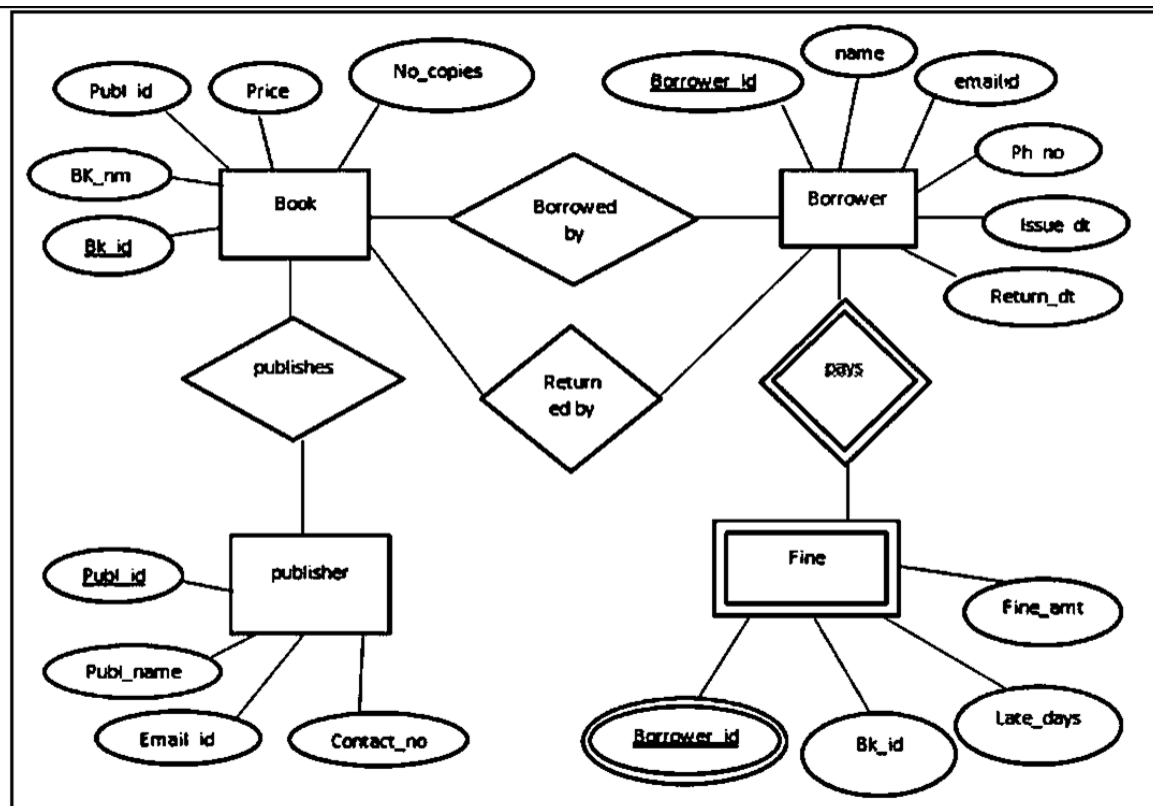


**Q12.** Draw E-R diagram of Banking system considering deposite, withdrawl facility. Also show primary key, weak entity, strong entity.(6MARKS)



ER Diagram of a Bank
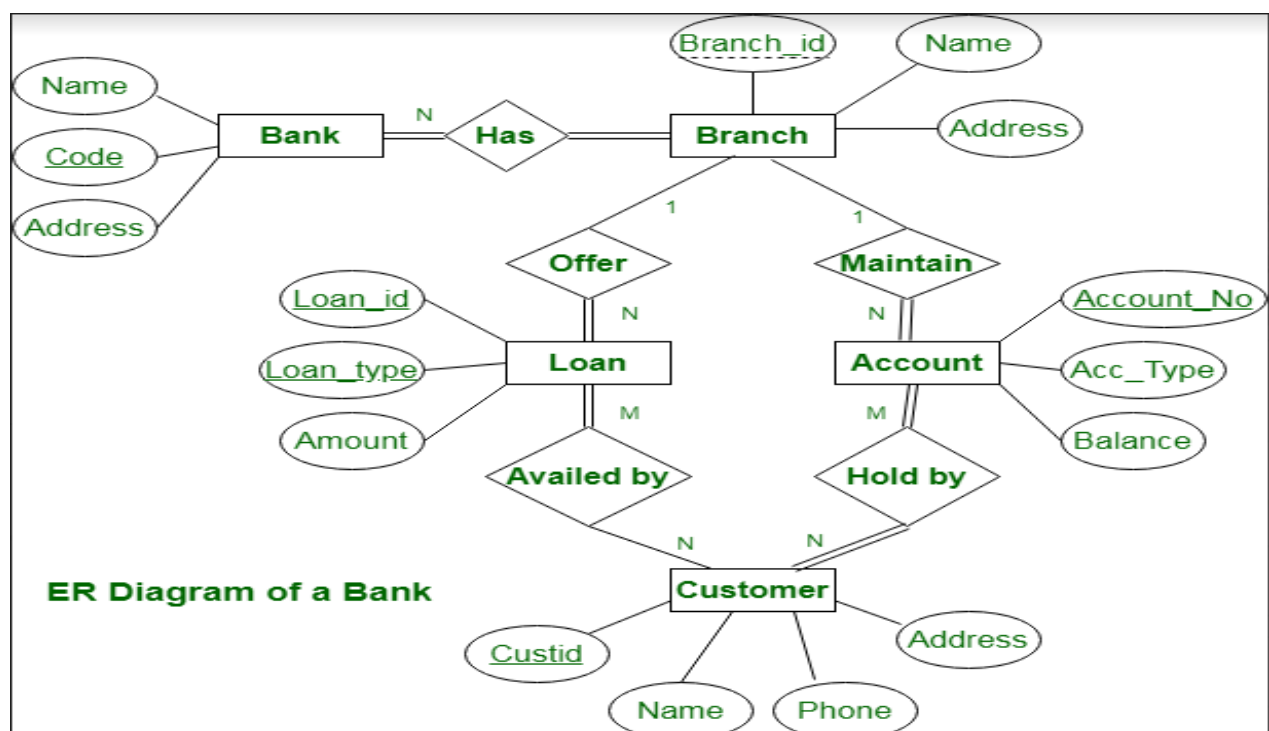
**Q12. Draw and Explain Overall Structure Of DBMS. (4MARKS)**

  **& Also explain storage manager and query processor components**

Components of DBMS structure are classified in 3 categories as:

1. **Query processor :**
   o <u>Embedded DML pre compiler:</u> It converts DML statements embedded in application. Program to normal procedural calls in host language.
   o <u>DML Compiler</u>: It translates DML statements of high level language into low level instruction that a query evaluation engine understands.
   o <u>DDL interpreter:</u> It interprets DDL statements and records them in a set of tables containing metadata.
   o <u>Query evaluation Engine:</u> It executes low level instructions generated by DML compiler and issued by query processor to select efficient ways to execute query. DDL interpreter. It has following components,
2. **Storage Manager Components** :
   o Transaction manager: It ensures that the database remains in consistent state despite of the system failure and that concurrent transaction execution proceeds without conflicting.
   o File Manager: It manages the allocation of space on disk storage and data structures used to represent information stored on disk
   o Buffer Manager: It is responsible for fetching data from disk storage into main memory and deciding what data to cache memory.
3. **Disk storage :**
   o Data files: It stores the database.
   o Data Dictionary: It stores metadata that hold particular values. Indices: Provide fast access to data items that hold particular values.
   o Statistical data: It stores statistical information about the data in the database.