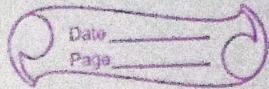


Module → I



- 1) DBMS :- Collection of interrelated data and a collection of programs to access that data.
- 2) Database :- Collection of data.
- 3) Needs and Benefits of database :-

An enterprise chooses to store its operational data in an integrated database because broadly a database provides the enterprise with centralized control of its operational data as data is one of its most valuable assets.

Benefits

- 1) Redundancy can be reduced.
- 2) Inconsistency can be avoided.
- 3) Security restrictions.
- 4) Data sharing
- 5) Integrity can be maintained.
- 6) Data Independence :- Capacity to change the Schema at one level of a database system without having to change the Schema at the next higher level.

- Ex:-
- 1) method of representation of alphanumeric data.
 - 2) Units (e.g metric vs furlongs)
 - 3) method of representation of numeric data (e.g. integer, long integer or floating integer).

Two types of Data Dependence.

Logical Data Independence

Physical Data Independence

1) Ability to change the conceptual scheme without changing external Schemas.	1) Ability to change the Internal schema without changing conceptual or external Schema.
2) Difficult to retrieving of data.	2) Easy to retrieve.
3) Concerned with Conceptual schema.	3) Concerned with internal Schema.
4) You need to change in the Application program if new fields are added or deleted from database.	4) Usually does not need change at Application program.
5) Ex:- Add / modify / Delete a new attribute.	5) Ex:- Change in compression techniques. Hashing algorithm, storage drives.

Importance of Data Independence

- 1) Improve the quality of data.
- 2) Database system maintenance becomes affordable.

Advantages of DBMS:-

- 1) Reduced data redundancy
- 2) Reduced updating errors and increased consistency
- 3) Improved data security.

Disadvantages of DBMS

- 1) Database system are complex, difficult, time consuming to design.
- 2) Substantial hardware and software start-up costs.
- 3) Initially training required for all programmers and users.

→ File processing System	Database Management System
1) Coordinates only physical access to the data.	1) Coordinates physical and logical access to a data
2) Introduces the amount of data duplication.	2) Reduces the amount of data duplication.
3) Does not support searching and implementation of right management.	3) Supports Searching and implementation of right management.
4) No way to restrict unauthorized access.	4) Restrict unauthorized access.
5) No way to recover a lost file.	5) Supports backup and recovery from system crashes.
6) No way to enforce integrity constraints.	6) Enforces integrity constraints.

Database Languages:-

- 1) Data Definition Language (DDL) :- It creates the framework of the database by specifying the database schema, which is the structure that represents the organization of data.

It common uses creation and alteration of tables, file, indexes and columns within the database.

Users :-

- 1) Create :- Creates a new database or objects such as table.
- 2) Alter :- Change the structure of a database or object.
- 3) Drop :- Delete the database or existing object.
- 4) Rename :- Renames the database or existing object.

Functions :-

- 1) Describe the schema and subschema.
- 2) Describe the datatype and name of each field.
- 3) Provide the data security restrictions.

- 2) Data Manipulation Language (DML) :- It is a language that enables users to access or manipulate data as organized by the appropriate data model. There are basically 2 types.

Procedural DML :- Requires a user to specify what data are needed and how to get those data.

Ex:- C++, Java, C language commands etc.

Non-procedural DML :- Require a user to specify what data are needed without specifying how to get those data.
Ex:- LISP, Prolog.

Data manipulation is:-

- The insertion of new information into the database.
- The deletion of information from the database.
- The modification of information stored in the database.
- The retrieval of information stored in the database.

3.) Data Control languages (DCL) :- Used for controlling data and access to the databases.

It allows user to grant or revoke privileges to the databases.

Functions :-

- 1) DCL Commands :- grant, revoke, rollback, alter, etc.
- 2) Aid the physical administration of the database such as dumping, logging, recovery, export and import of data etc.

Data administrator (DBA) :- A person who has central control over the data and program (system).

Functions of DBA

- 1) Schema definition :- DBA creates the original database schema by executing a set of data definition statement in the PDL.
- 2) Storage structure and access method definition and strategy.
- 3) Grant of authorization for data access

(*) Database users :-

- 1) Application Programmers are computer professionals who write application programs.
- 2) Naïve users who interact with the system by invoking one of the application program that has been written previously.
Ex:- a bank teller who needs to transfer ~~\$ 50~~ \$ 50 from account A to account B invokes a program called transf.
- 3) Sophisticated users interact with the system without writing programs.
Ex:- An analyst can see total sales by region (N,S,E,W) or by product, or by product and region both.

(*) Data models :-

- 1) Entity - Relational model (E-R model)
- 2) Relational model
- 3) Network model
- 4) Hierarchical model

① E-R model :-

- Primarily a database design tool
- Represented in an Entity relationship diagram (ERD)
- Based on entities, attributes, relationships
- Complements the relational data model concepts.

Advantages of E-R model

- 1) Visual representation
- 2) Effective communication tool
- 3) Exceptional conceptual simplicity
- 4) Integrated with the relational data model.

Disadvantages of E-R model

- 1) Limited constraint representation
- 2) Limited relationship representation
- 3) NO data manipulation language.
- 4) Loss of information content.

② Relational model :-

- Consists of tables; links among entities are maintained with foreign keys.

Advantages

- 1) Same advantage of a network database without the complications.
- 2) Easier to conceptualize and maintain.

③ Network model :-

- Allows a record to be linked to more than one parent
→ Support many-to-many relationships.

Advantage

- Reduced data redundancy.

Disadvantage

- Complicated to build and difficult to maintain.

④ Hierarchical model :-

- Records are related hierarchically - easy categories
subcategory of the next level up.

Advantages :-

- 1) Promote data security.
- 2) Promote data independence.
- 3) Useful for large database.

Disadvantages :-

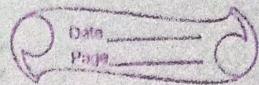
- 1) If a link is broken, the entire branch is lost.
- 2) Reduce considerable data redundancy.

 Six major steps that need to be taken in setting up database for a particular enterprise.

- 1) Define the high level requirements of the enterprise (System requirements specification)
- 2) Define a model containing all appropriate type of data and data relationships.
- 3) Define the integrity constraints on the data.
- 4) Define the physical level.
- 5) For each known problem to be solved on regular basis
- 6) Create / initialize the database.

 Responsibilities of database manager / storage manager

- 1) It is a program module that provide the interface b/w lower level data stored in the database and the application programs and queries submitted to the system.



- 2) Responsible for the interact with file manager.
- 3) Translates the ~~user~~ various DML statements into low level file system commands
- 4) Storage manager is responsible for storing, retrieving, updating data in the database.

Storage manager Components

- 1) Authorization and integrity manager
- 2) File manager (allocation of space on disk)
- 3) Transaction manager (which ensure that dbst remains in a consistent state).

Storage manager implements several data structures

- 1) Data files
- 2) Data dictionary
- 3) Indices

Architecture for a Database System / Phases of database design

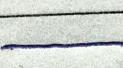
- 1) Internal level :-
 - 1) Closer to physical storage.
 - 2) Representing the total database as physically stored.
- 2) External level :-
 - 1) Closer to the user
 - 2) Data is viewed by individual user and gives individual user view
Ex:- Emp # CHAR(6)
- 3) Conceptual level :- "Level of indirection" b/w the other two levels
Community wrs.

E-R diagram

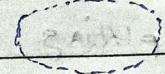
1) Rectangle  entity sets

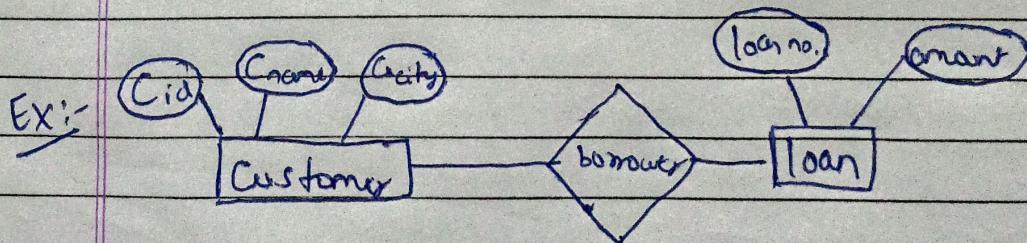
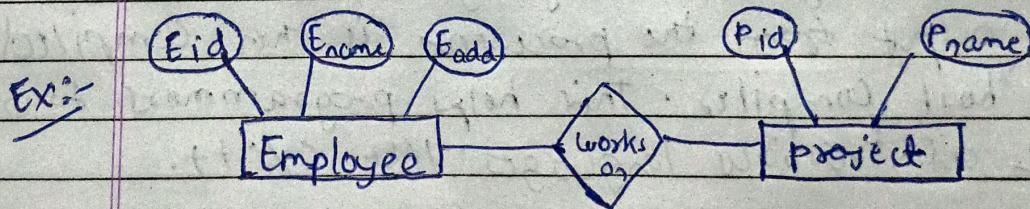
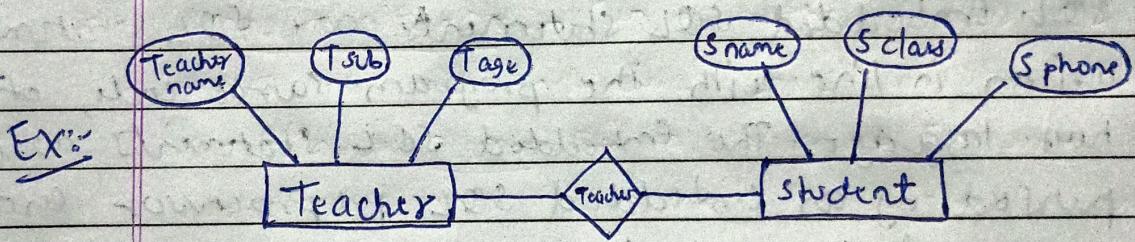
2) ellipses  Attribute

3) diamonds  relationship sets

4) Lines  Link

5) Double ellipse  multi valued

6)  Denied attribute



1) One to one



2) One to many



many to one

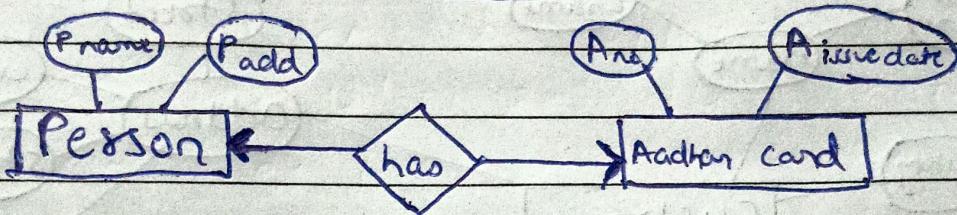


many to many

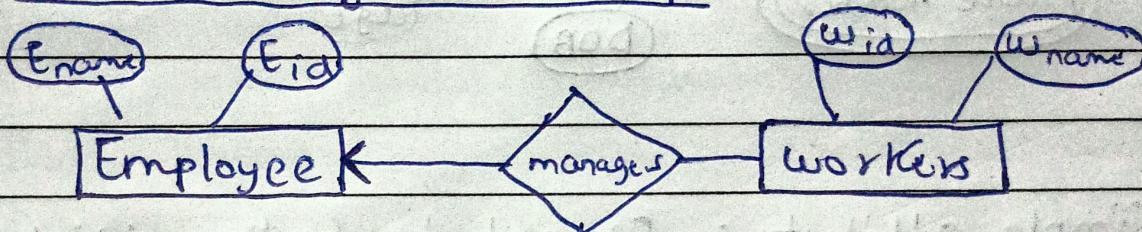


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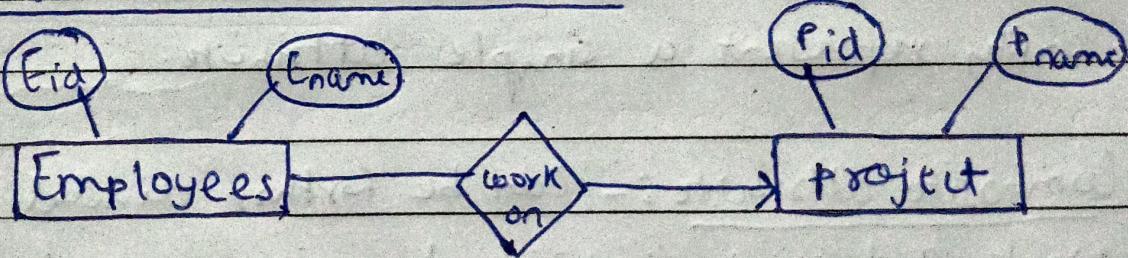
1) One to one relationship



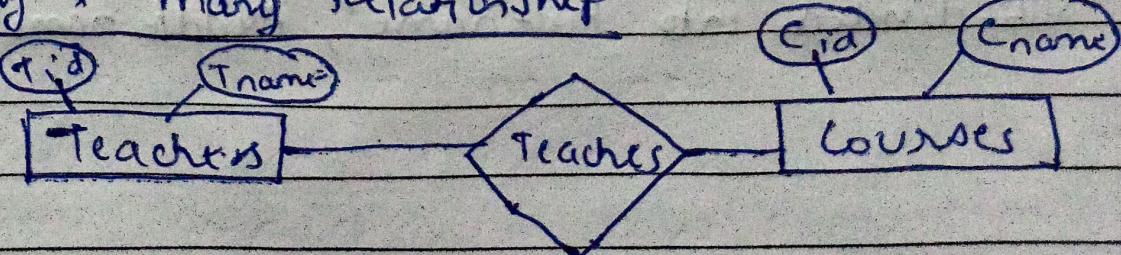
2) One to many relationship



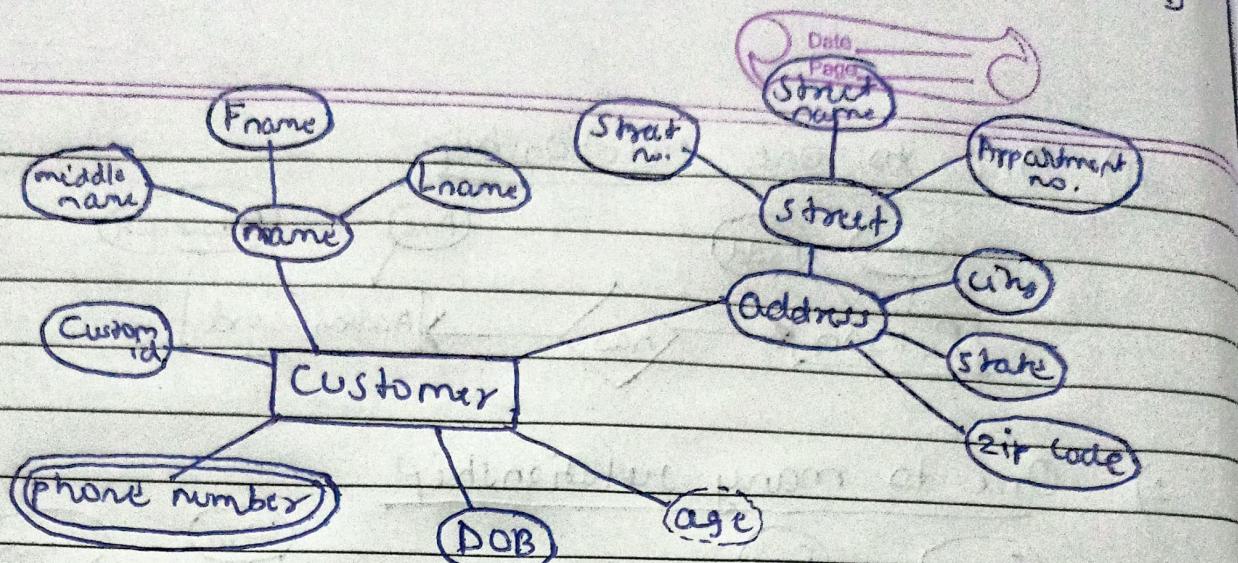
3) Many to one relationship



4) Many to many relationship



E-R diagram with Composite, multivalued, Derived attributes



a) Simple attribute :- Cannot be further divided into smaller parts.

Ex:- "First name", "last name" attributes of an employee entity represent a simple attribute.

b) Composite attribute :- Can be further divided into smaller units and each individual units contains specific meaning.

Ex:- Attribute name of an entity set Employee can be sub-divided into "First name", "Middle name", "Last name"