Mahatma Gandhi Mission's College of Engineering and Technology
Kamothe, Navi Mumbai

Assignment -1

Subject-DBMS Div-A & B Sem-IV Class –SE (AC Year 2021-22)

Q.No	Question
Q1.Fill in the blanks	
a)	DBMS manages the interaction between end users and database.
b)	A logical schema describes how data is actually stored on disk.
c)	A collection of related data is known as database.
Q2. Choose Correct Options	
a)	5. Database is generally _____ a) System-centered b) User-centered c) Company-centered d) Data-centered
b)	2. The relation is represented in E-R diagram as a) Double diamonds b) Undivided rectangles c) Dashed lines d) Diamond
c)	The following are components of a database except _____ . a) User Data b) Metadata C)Reports d) Indexes
d)	It is used to establish an association between related tables. a) Line b)Relationship C) Primary key d) Records
e)	Entity is represented using a) Rectangle b) Double line c) Double diamond d) Double rectangle
Q3. state whether the following statements are true or false (Give Reasons)	
a)	DBMS is software. A. True B. False
b)	DBMS manages the interaction between the end users and the database.

	A. True B. False
c)	ER modeling is primarily used for Database Programming A. True B. False
Q4. Name the following or define or design the following	
a) **Ans:**	List out Characteristics of databases . 1. We should be able to store all kinds of data that exist in this real world. Since we need to work with all kinds of data and requirements, the database should be strong enough to store all kinds of data that are present around us. 2. We should be able to relate the entities/tables in the database by means of relation. i.e.; any two tables should be related. Let us say, an employee works for a department. This implies that an Employee is related to a particular department. We should be able to define such a relationship between any two entities in the database. There should not be any table lying without any mapping. 3. Data and applications should be isolated. Because the database is a system that gives the platform to store the data, and the data is the one that allows the database to work. Hence there should be a clear differentiation between them. 4. There should not be any duplication of data in the database. Data should be stored in such a way that it should not be repeated in multiple tables. If repeated, it would be an unnecessary waste of DB space, and maintaining such data becomes chaos. 5. DBMS has a strong query language. Once the database is designed, this helps the user to retrieve and manipulate the data. If a particular user wants to see any specific data, he can apply as many filtering conditions that he wants and pull the data that he needs. 6. Multiple users should be able to access the same database, without affecting the other user. i.e.; if teachers want to update a student's marks in the Results table at the same time, then they should be allowed to update the marks for their subjects, without modifying other subject marks. A good database should support this feature. 7. It supports multiple views to the user, depending on his role. In a school database, Students will able to see only their reports and their access would be read-only. At the same time, teachers will have access to all the students with modification rights. But the database is the same. Hence a single database provides different views to different users.

8. The database should also provide security, i.e.; when there are multiple users are accessing the database, each user will have their own levels of rights to see the database. Some of them will be allowed to see the whole database, and some will have only partial rights. For example, an instructor who is teaching Physics will have access to see and update marks of his subject. He will not have access to other subjects. But the HOD will have full access to all the subjects.
9. The database should also support the ACID property. i.e.; while performing any transactions like insert, update and delete, the database makes sure that the real purpose of the data is not lost. For example, if a student's address is updated, then it should make sure that there is no duplicate data is created nor there is any data mismatch for that student.

b) Ans:

List out Users of Database system

These are seven types of data base users in DBMS.

1. **Database Administrator (DBA) :**
   Database Administrator (DBA) is a person/team who defines the schema and also controls the 3 levels of database.
   The DBA will then create a new account id and password for the user if he/she need to access the data base.
   DBA is also responsible for providing security to the data base and he allows only the authorized users to access/modify the data base.
   - DBA also monitors the recovery and back up and provide technical support.
   - The DBA has a DBA account in the DBMS which called a system or superuser account.
   - DBA repairs damage caused due to hardware and/or software failures.

2. **Naive / Parametric End Users :**
   Parametric End Users are the unsophisticated who don't have any DBMS knowledge but they frequently use the data base applications in their daily life to get the desired results.
   For examples, Railway's ticket booking users are naive users. Clerks in any bank is a naive user because they don't have any DBMS knowledge but they still use the database and perform their given task.

3. **System Analyst :**
   System Analyst is a user who analyzes the requirements of parametric end users. They check whether all the requirements of end users are satisfied.

4. **Sophisticated Users :**
   Sophisticated users can be engineers, scientists, business analyst, who are

	familiar with the database. They can develop their own data base applications according to their requirement. They don't write the program code but they interact the data base by writing SQL queries directly through the query processor. 5. **Data Base Designers :** Data Base Designers are the users who design the structure of data base which includes tables, indexes, views, constraints, triggers, stored procedures. He/she controls what data must be stored and how the data items to be related. 6. **Application Program :** Application Program are the back end programmers who writes the code for the application programs. They are the computer professionals. These programs could be written in Programming languages such as Visual Basic, Developer, C, FORTRAN, COBOL etc. 7. **Casual Users / Temporary Users :** Casual Users are the users who occasionally use/access the data base but each time when they access the data base they require the new information, for example, Middle or higher level manager.
c) Ans:	List out Characteristics of File system The file system is basically a way of arranging the files in a storage medium like a hard disk. The file system organizes the files and helps in the retrieval of files when they are required. File systems consist of different files which are grouped into directories. The directories further contain other folders and files. The file system performs basic operations like management, file naming, giving access rules, etc.
Q5. Answer the following questions in brief (20 to 30 words)	
a) Ans:	Explain the advantages of DBMS. 1. **Better Data Transferring:** Database management creates a place where users have an advantage of more and better managed data. Thus making it possible for end-users to have a quick look and to respond fast to any changes made in their environment. 2. **Better Data Security:** As number of users increases data transferring or data sharing rate also increases thus increasing the risk of data security. It is widely used in corporation world where companies invest money, time and effort in large amount to ensure data is secure and is used properly. A Database Management System (DBMS) provide a better platform for data privacy and security policies thus, helping companies to improve Data Security.

3. **Better data integration:**
   Due to Database Management System we have an access to well managed and synchronized form of data thus it makes data handling very easy and gives integrated view of how a particular organization is working and also helps to keep a track on how one segment of the company affects other segment.

4. **Minimized Data Inconsistency:**
   Data inconsistency occurs between files when different versions of the same data appear in different places.
   For Example, data inconsistency occurs when a student name is saved as “John Wayne” on a main computer of school but on teacher registered system same student name is “William J. Wayne”, or when the price of a product is $86.95 in local system of company and its National sales office system shows the same product price as $84.95.
   So if a database is properly designed then Data inconsistency can be greatly reduced hence minimizing data inconsistency.

5. **Faster data Access:**
   The Data base management system (DBMS) helps to produce quick answers to database queries thus making data accessing faster and more accurate. For example, to read or update the data. For example, end users, when dealing with large amounts of sale data, will have enhanced access to the data, enabling faster sales cycle.
   Some queries may be like:
   - What is the increase of the sale in last three months?
   - What is the bonus given to each of the salespeople in last five months?
   - How many customers have credit score of 850 or more?

6. **Better decision making:**
   Due to DBMS now we have Better managed data and Improved data accessing because of which we can generate better quality information hence on this basis better decisions can be made.
   Better Data quality improves accuracy, validity and time it takes to read data.
   DBMS does not guarantee data quality, it provides a framework to make it is easy to improve data quality .

7. **Increased end-user productivity:**
   The data which is available with the help of combination of tools which transform data into useful information, helps end user to make quick, informative and better decisions that can make difference between success and failure in the global economy.

8. **Simple:**
   Data base management system (DBMS) gives simple and clear logical view of

	data. Many operations like insertion, deletion or creation of file or data are easy to implement.
b) Ans:	What are functions of DBA. • **Schema definition**.The DBA creates the original database schema by executing a set of data definition statements in the DDL. • **Storage structure and access-method definition.** • **Schema and physical-organization modification**.The 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. • **Granting of authorization for data access.** By granting different types of authorization, the database administrator can regulate which parts of the database various users can access. The authorization information is kept in a special system structure that the database system consults when ever someone attempts to access the data in the system. • **Routine maintenance**. Examples of the database administrator's routine maintenance activities are: 1. Periodically backing up the database, either onto tapes or onto remote servers, to prevent loss of data in case of disasters such as flooding. 2. Ensuring that enough free disk space is available for normal operations, and upgrading disk space as required. 3. Monitoring jobs running on the database and ensuring that performance is not degraded by very expensive tasks submitted by some users.
c) Ans:	Explain data independence. • Data independence is a form of database management that keeps data separated from all programs that make use of it. • As a cornerstone for the idea of a DBMS or database management system, this independence ensures that the data cannot be redefined or reorganized by any of the programs that make use of it. • In this manner, the data remains accessible, but it is also stable and cannot be corrupted by the applications. • Within the environment of a centralized DBMS, database management relies on the process of data independence. • While data transparency still exists as far as the ability of different applications to access and use the data for completing tasks, no program or application can read and then begin to make changes to the data itself. • The consistency of the information makes the overall process of maintaining and managing a single database or multiple databases within a single environment much easier. • One of the functions of data independence is to restrict access to the storage structure of the data by the user applications. • By effectively hiding the specifics of the structure from the applications, the potential for any one application to alter the nature of the data becomes impossible. As a result, the essential data retains its integrity and remains consistent no matter how many databases or database applications access

	it.

. **Q6. Answer the following questions in brief (50 to 70 words)**

a) Ans: Differentiate File system v/s Database system

Basis	File System	DBMS
Structure	The file system is software that manages and organizes the files in a storage medium within a computer.	DBMS is software for managing the database.
Data Redundancy	Redundant data can be present in a file system.	In DBMS there is no redundant data.
Backup and Recovery	It doesn't provide backup and recovery of data if it is lost.	It provides backup and recovery of data even if it is lost.
Query processing	There is no efficient query processing in the file system.	Efficient query processing is there in DBMS.
Consistency	There is less data consistency in the file system.	There is more data consistency because of the process of normalization.
Complexity	It is less complex as compared to DBMS.	It has more complexity in handling as compared to the file system.
Security Constraints	File systems provide less security in comparison to DBMS.	DBMS has more security mechanisms as compared to file systems.
Cost	It is less expensive than DBMS.	It has a comparatively higher cost than a file system.
Data Independence	There is no data independence.	In DBMS data independence exists.

	User Access	Only one user can access data at a time.	Multiple users can access data at a time.

b) Ans: Explain DBMS System Architecture.

- The DBMS design depends upon its architecture. The basic client/server architecture is used to deal with a large number of PCs, web servers, database servers and other components that are connected with networks.
- The client/server architecture consists of many PCs and a workstation which are connected via the network.
- DBMS architecture depends upon how users are connected to the database to get their request done.

c) Ans: Explain entity types with example.

1. Entity : An entity is a thing in a real-world with independent existence. An entity can exist independently and is distinguishable from other objects. It can be identified uniquely.
An entity can be of two types :

- **Tangible Entity :** Entities that exist in the real world physically. Example: Person, car, etc.
- **Intangible Entity :** Entities that exist only logically and have no physical existence. Example: Bank Account, etc.

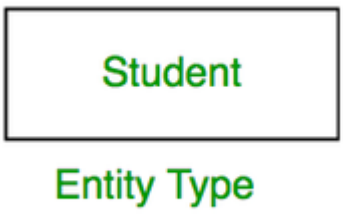
Example :

- A student with a particular roll number is an entity.
- A company with a particular registration number is an entity.

Note :

- An entity may be concrete like a student, a book, or abstract like a holiday or a particular concept.
- An entity is represented by a set of attributes.
- In a particular relation in RDBMS, a particular record is called an entity.

2. Entity Type : It refers to the category that a particular entity belongs to.



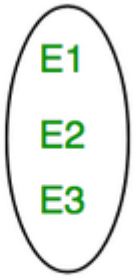
Example :

- A table named student in a university database.
- A table named employee in a company database.

Note :

- The category of a particular entity in the relation in RDBMS is called the entity type.
- It is represented by the name of the table and its schema.

3. Entity Set : An entity set is a collection or set of all entities of a particular entity type at any point in time. The type of all the entities should be the same.



Entity Set

Example :

- The collection of all the students from the student table at a particular instant of time is an example of an entity set.
- The collection of all the employees from the employee table at a particular instant of time is an example of an entity set.

Note :

- Entity sets need not be disjoint. For example, the entity set of Article Writer (all content creators for GeeksforGeeks) and the entity set of Article Reader (all students who read the article of GeeksforGeeks) may have members in common.
- The collection of all the entities in the relation of RDBMS is called an entity set.

Relation With Table :

Consider a table student as follows :

Table Name : Student

Student_ID	Student_Name	Student_Age	Student_Gender
1	Avi	19	M
2	Ayush	23	M
3	Nikhil	21	M
4	Riya	16	F

Entity : Each row is an entity.

Example :

1 Avi 19 M

Entity Type : Each entity belongs to the student type. Hence, the type of entity here is a

student.

Entity Set : The complete data set of all entities is called entity set. For the above table, the records with student id 1, 2, 3, 4 are the entity set.

Difference Table :

Entity	Entity Type	Entity Set
A thing in the real world with independent existence	A category of a particular entity	Set of all entities of a particular entity type.
Any particular row (a record) in a relation(table) is known as an entity.	The name of a relation (table) in RDBMS is an entity type	All rows of a relation (table) in RDBMS is entity set

Q7. Think and Answer

a) Ans:

Explain keys used in DBMS in detail.

KEYS in DBMS is an attribute or set of attributes which helps you to identify a row(tuple) in a relation(table). They allow you to find the relation between two tables. Keys help you uniquely identify a row in a table by a combination of one or more columns in that table. Key is also helpful for finding unique record or row from the table. Database key is also helpful for finding unique record or row from the table.

Example:

Employee ID	FirstName	LastName
11	Andrew	Johnson
22	Tom	Wood
33	Alex	Hale

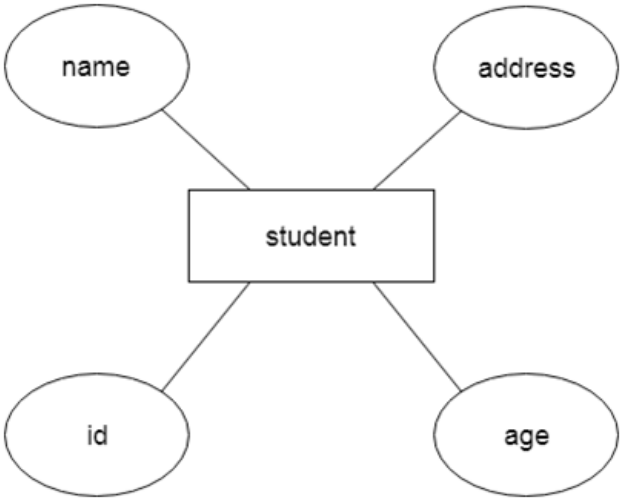
In the above-given example, employee ID is a primary key because it uniquely identifies an employee record. In this table, no other employee can have the same employee ID.

b) Ans:

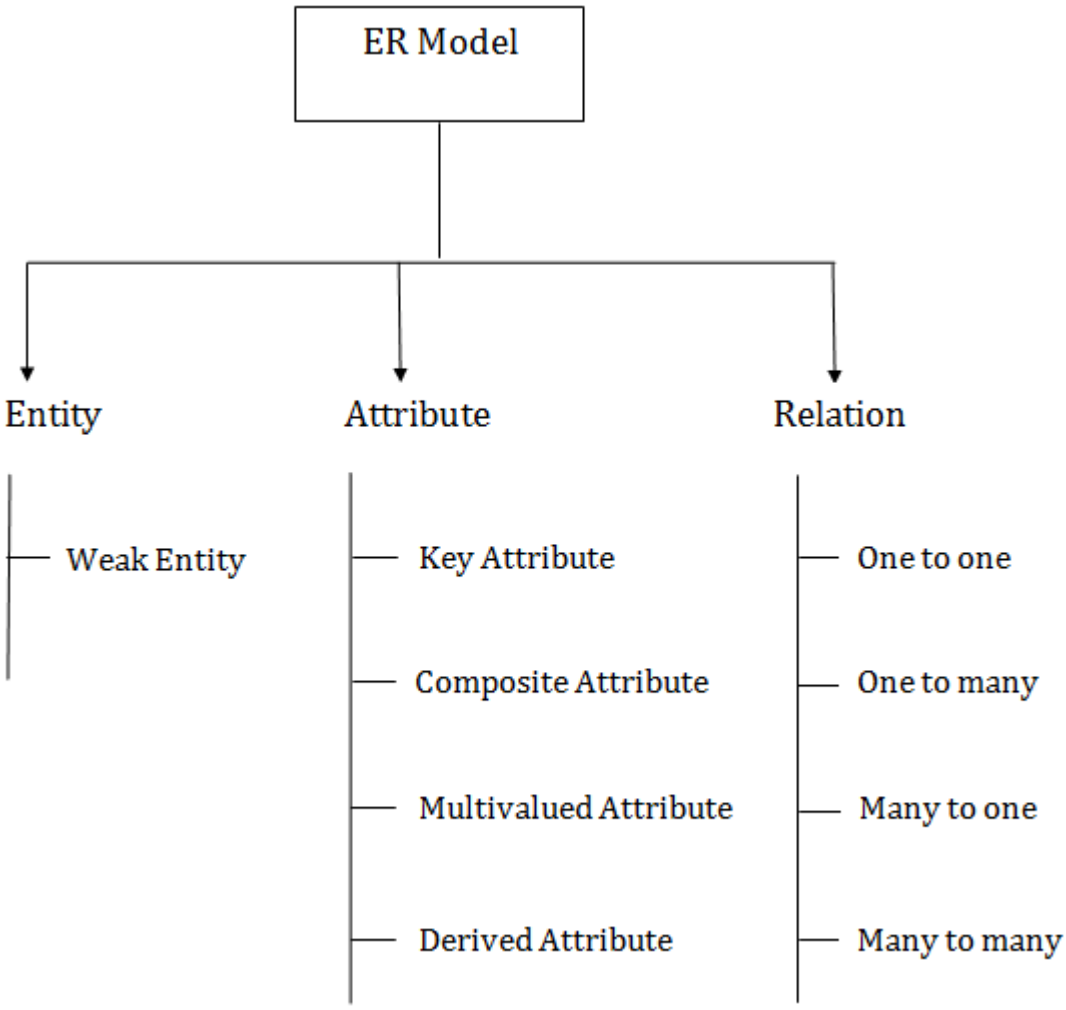
Explain EER model in detail

- ER model stands for an Entity-Relationship model. It is a high-level data model. This model is used to define the data elements and relationship for a specified system.
- It develops a conceptual design for the database. It also develops a very simple and easy to design view of data.
- In ER modeling, the database structure is portrayed as a diagram called an entity-relationship diagram.

For example, Suppose we design a school database. In this database, the student will be an entity with attributes like address, name, id, age, etc. The address can be another entity with attributes like city, street name, pin code, etc and there will be a relationship between them.



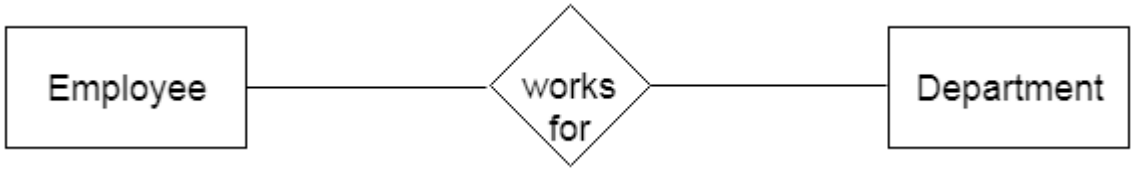
Component of ER Diagram



1. Entity:

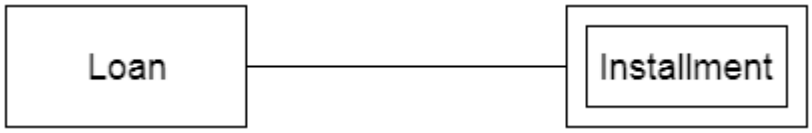
An entity may be any object, class, person or place. In the ER diagram, an entity can be represented as rectangles.

Consider an organization as an example- manager, product, employee, department etc. can be taken as an entity.



a. Weak Entity

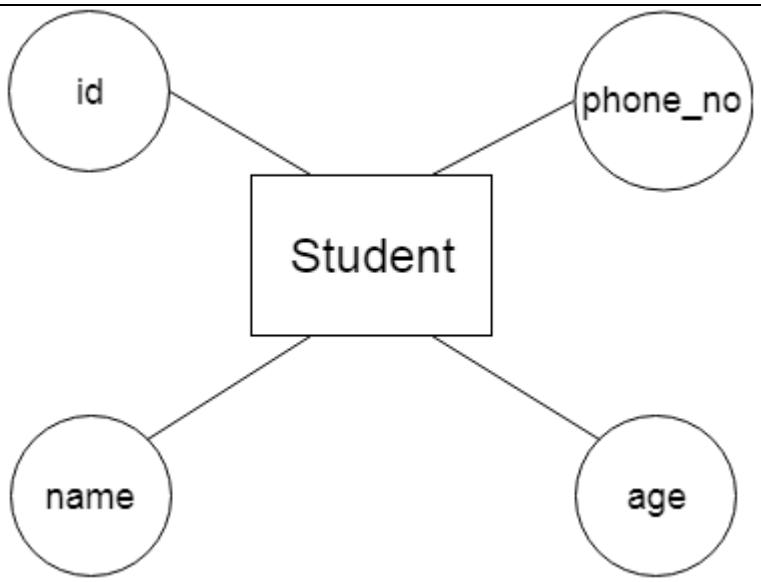
An entity that depends on another entity called a weak entity. The weak entity doesn't contain any key attribute of its own. The weak entity is represented by a double rectangle.



2. Attribute

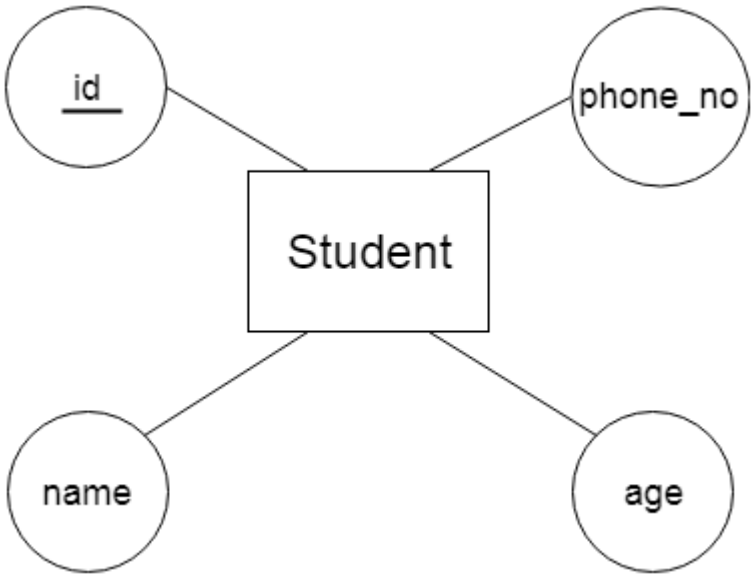
The attribute is used to describe the property of an entity. Eclipse is used to represent an attribute.

For example, id, age, contact number, name, etc. can be attributes of a student.



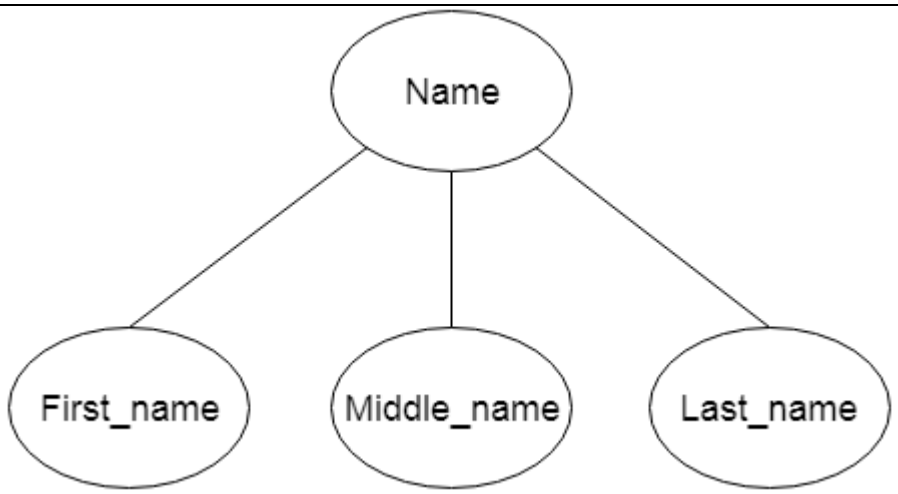
a. Key Attribute

The key attribute is used to represent the main characteristics of an entity. It represents a primary key. The key attribute is represented by an ellipse with the text underlined.



b. Composite Attribute

An attribute that composed of many other attributes is known as a composite attribute. The composite attribute is represented by an ellipse, and those ellipses are connected with an ellipse.



c. Multivalued Attribute

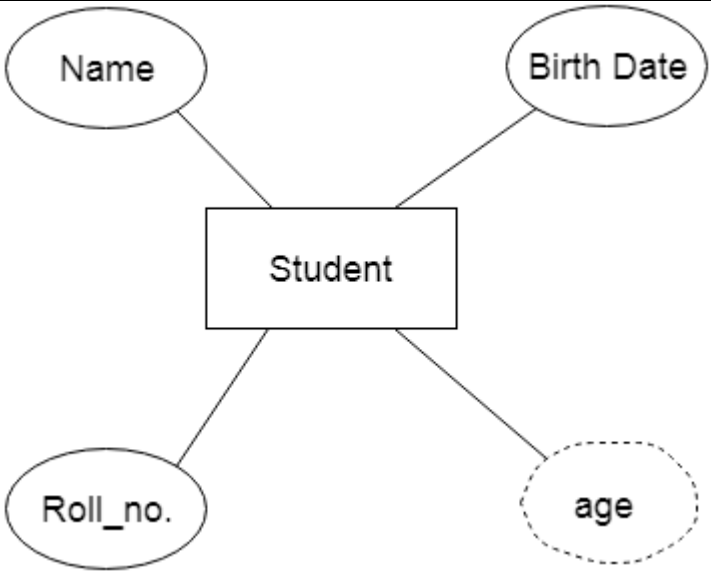
An attribute can have more than one value. These attributes are known as a multivalued attribute. The double oval is used to represent multivalued attribute.

For example, a student can have more than one phone number.

d. Derived Attribute

An attribute that can be derived from other attribute is known as a derived attribute. It can be represented by a dashed ellipse.

For example, A person's age changes over time and can be derived from another attribute like Date of birth.



3. Relationship

A relationship is used to describe the relation between entities. Diamond or rhombus is used to represent the relationship.

Types of relationship are as follows:

a. One-to-One Relationship

When only one instance of an entity is associated with the relationship, then it is known as one to one relationship.

For example, A female can marry to one male, and a male can marry to one female.

b. One-to-many relationship

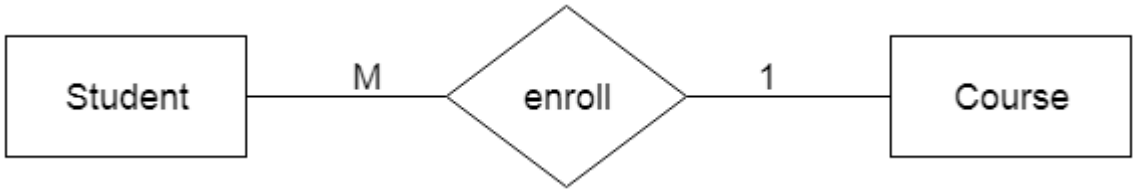
When only one instance of the entity on the left, and more than one instance of an entity on the right associates with the relationship then this is known as a one-to-many relationship.

For example, Scientist can invent many inventions, but the invention is done by the only specific scientist.

c. Many-to-one relationship

When more than one instance of the entity on the left, and only one instance of an entity on the right associates with the relationship then it is known as a many-to-one relationship.

For example, Student enrolls for only one course, but a course can have many students.



d. Many-to-many relationship

When more than one instance of the entity on the left, and more than one instance of an entity on the right associates with the relationship then it is known as a many-to-many relationship.

For example, Employee can assign by many projects and project can have many employees.

Q8. **My Ideas**

a) Draw University management system ER diagram.

Ans: Step 1 − Identifying the entity sets.

The entity set has multiple instances in a given business scenario.

As per the given constraints the entity sets are as follows −

- Department
- Course
- Student
- Instructor

Head of the Department (HOD) is not an entity set. It is a relationship between the instructor and department entities.

Step 2 − Identifying the attributes for the given entities

- Department − the relevant attributes are department Name and location.
- Course − The relevant attributes are courseNo, course Name, Duration, and prerequisite.
- Instructor − The relevant attributes are Instructor Name, Room No, and telephone number.
- Student − The relevant attributes are Student No, Student Name, and date of birth.

Step 3 − Identifying the Key attributes

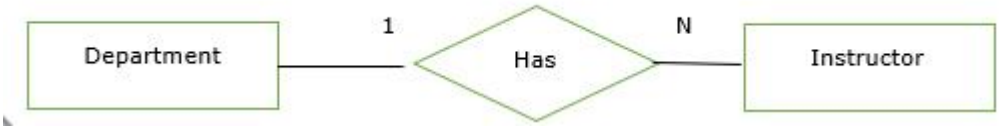
- Department Name is the key attribute for Department.
- CourseNo is the key attribute for Course entity.
- Instructor Name is the key attribute for the Instructor entity.
- StudentNo is the key attribute for Student entities.

Step 4 − Identifying the relationship between entity sets

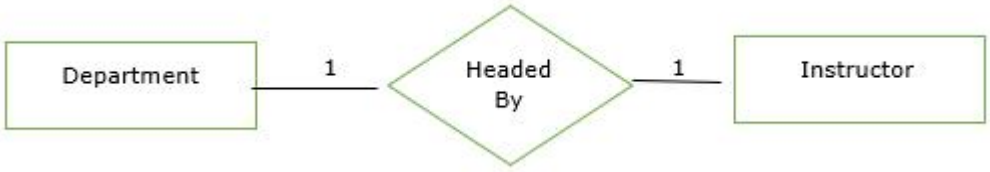
- The department offers multiple courses and each course belongs to only one department, hence cardinality between department and course if one to many.

- One course is enrolled by multiple students and one student for multiple courses. Hence, relationships are many to many.

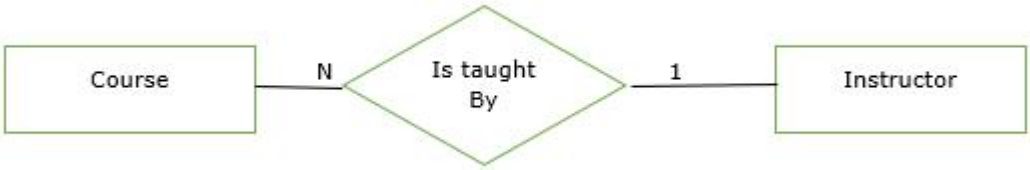
- One department has multiple instructors and one instructor belongs to one and only one department, hence the relationship is one to many.



- Each department has one “HOD” and one instructor is “HOD” for only one department, hence the relationship is one to one. Here, HOD refers to the head of the department.



- One course is taught by only one instructor but one instructor teaches many courses hence the relationship between course and instructor is many to one.

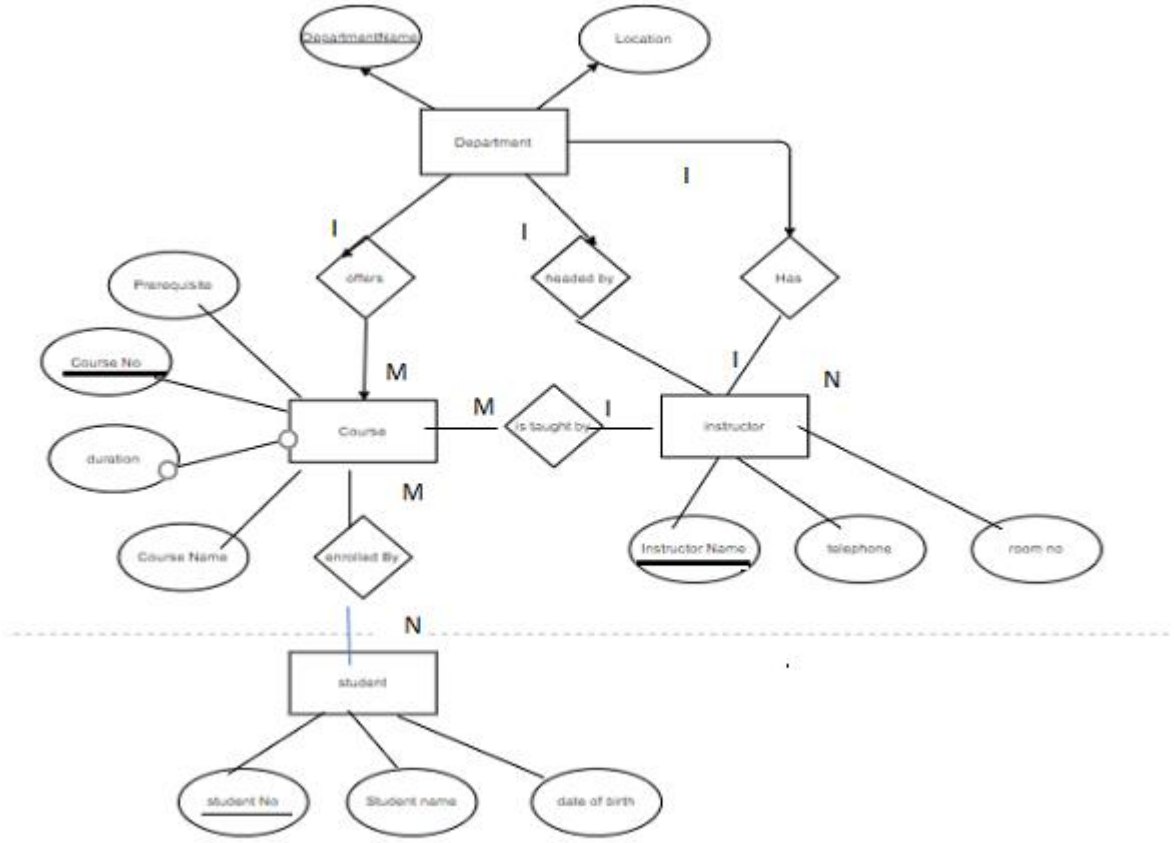


The relationship between instructor and student is not defined because of the following reasons −

- There is no significance in the relationship.
- We can always derive this relationship indirectly through course and instructors, and course and student.

Step 5 − Complete ER model

The complete ER Model is as follows −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