

DBMS Assignment-2

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ER Diagrams, Database Design

- 1) Name the main steps in database design
what is the goal of each step?
which step is the ER model is mainly used in?
- (20) The database design process can be divided into six steps. The ER model is mainly used in the database design process, can be divided into six steps. The ER model is most relevant to first three steps.

1. Requirement Analysis

The very first step is designing a database application is to understand what data is to be stored in the database, what applications must be built on top of it, and what operations are most frequent and subject to performance requirements.

2. Conceptual database design

The information gathered in the requirements analysis step is used to develop a

a high-level description of the data to be stored in the database, along with the constraints known to hold over this data. This step is carried out using ER model.

3. Logical Database design

We must choose a DBMS to implement our database design, and convert the conceptual database design into a database schema in the data model of the database chosen DBMS.

The remaining three steps of database design are:

4. Schema Refinement

fourth step is to analyse the collection of relations in our relational database schema to identify potential problems to refine it.

5. Physical Database Design

In this step we involve building indexes on some tables and clustering some tables, or it may involve a substantial redesign of parts of database schema.

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obtained from the earlier design steps

6. Application and Security designs

Any software project that involves a DBMS must consider aspects of the application that go beyond the database itself. we must identify entities and processes involved in the application.

1) Define the following terms

① Entity, Entity set, Attribute, Key, domain

② Relationship, relationship set, descriptive attribute

③ one to one relationship, one to many relationship, many to many relationship

Ans)

① Entity: an entity is an object in the real world that is distinguished from other objects.

→ Entity set: A collection of similar entities is called an entity set.

→ Attribute: An entity is described using a set of attributes.

* Key: An key is a minimal set of attributes whose values uniquely identify an entity in the set.

* Domain: Each attribute is associated with an entity set with a possible values collect domain.

(b)

* Relationships: A relationship is an association among two or more entities.

* Relationship sets: A collection of a similar relationships called relationship set.

* Descriptive Attributes: Descriptive attributes are used to record information about the relationship.

(c)

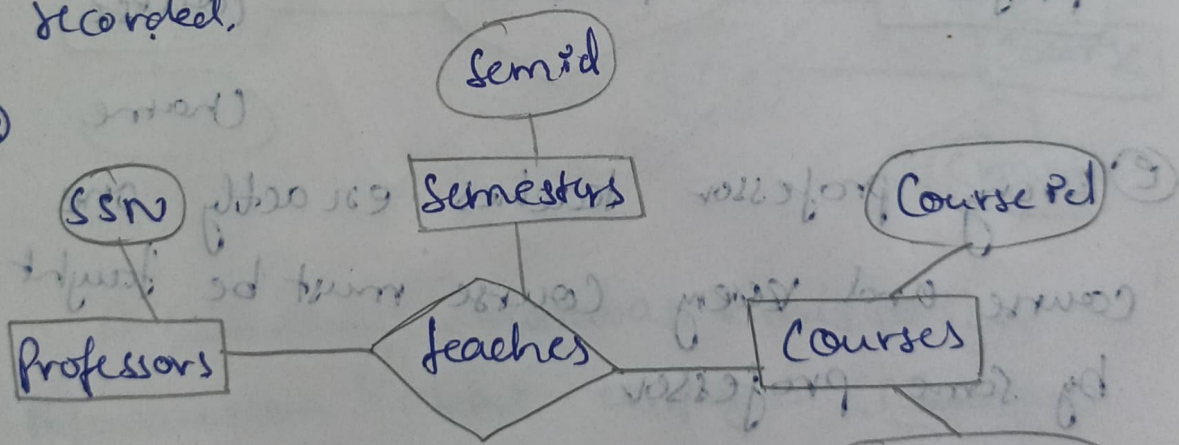
* one to many relationships: A key constraint that indicates that one entity can be associated with many of another entity.

* Many to many relationships: a key constraint that indicates that many of one entity can be associated with many of another entity.

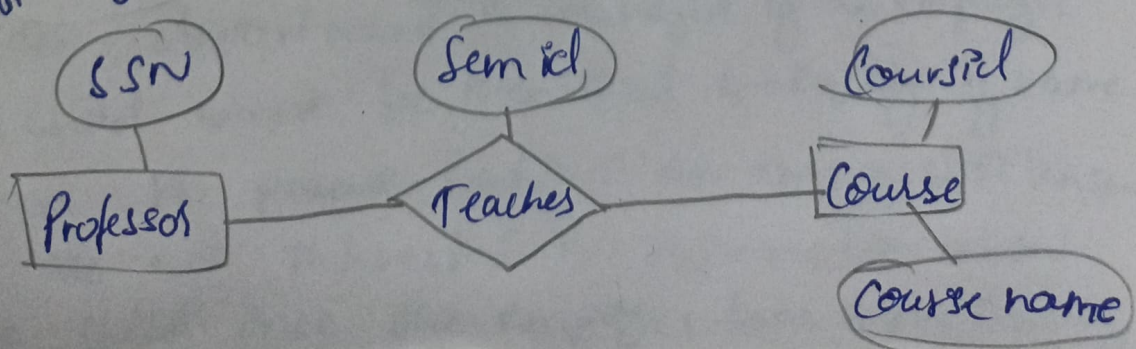
* one to one relationship: a key constraint that indicates that one entity can be associated with one of another entity

1) A university database contains information about the professors teach courses, each of the following situations concerns the teaches relationship set, for each situation draw an ER diagram that describes it.

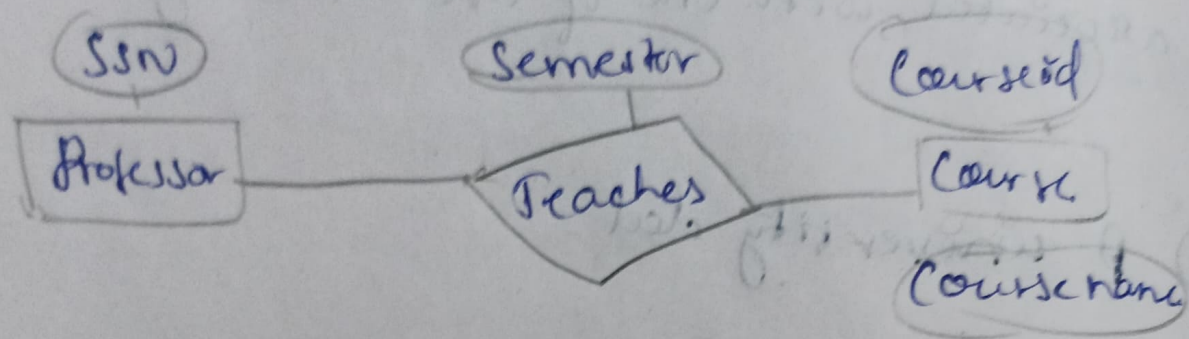
a) Professors can teach the same course in several semesters, and each offering must be recorded.



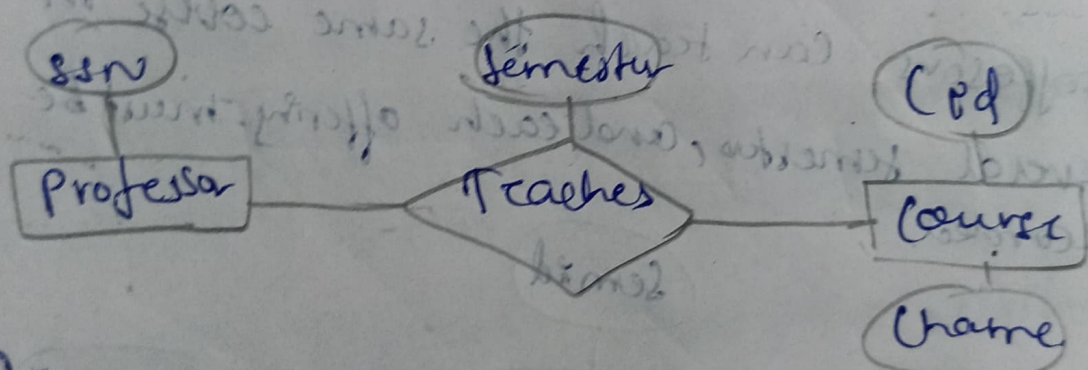
b) Professors can teach the same course in several semesters and only the most recent such offerings needs to be recorded.



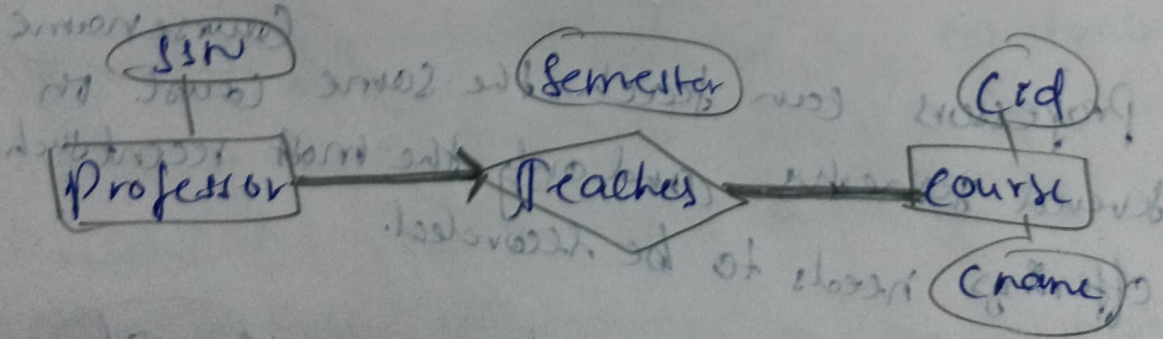
© Every Professor must teach some course



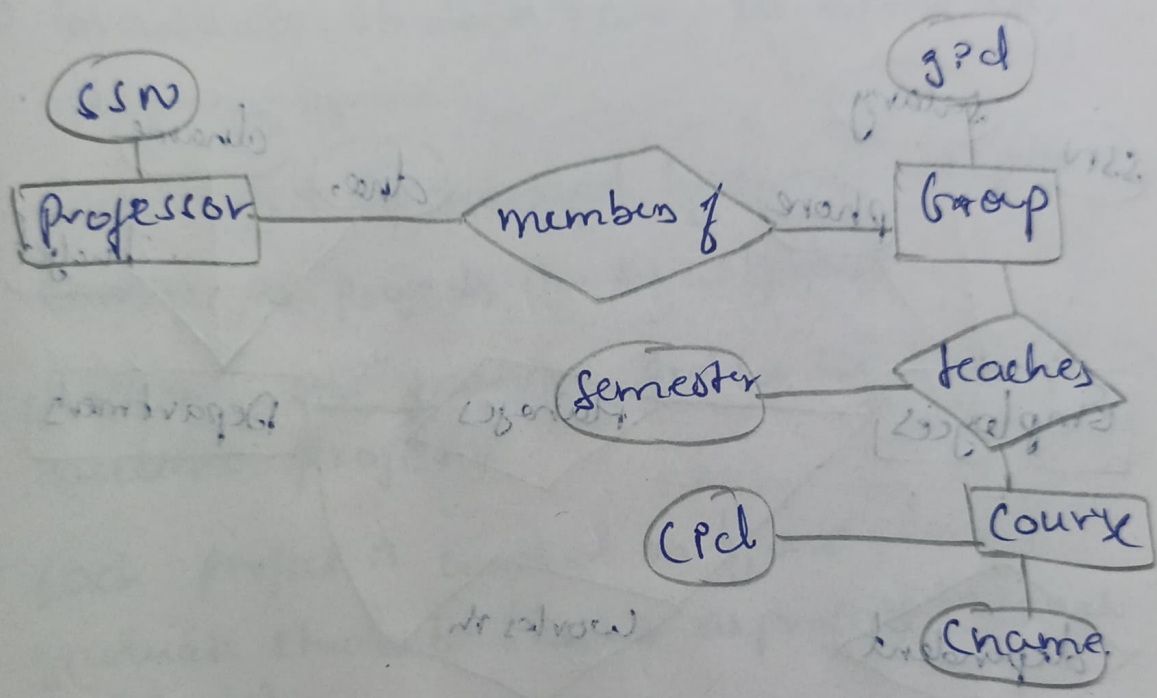
© Every professor teaches exactly one course



© Every professor teaches exactly one course and every course must be taught by some professor

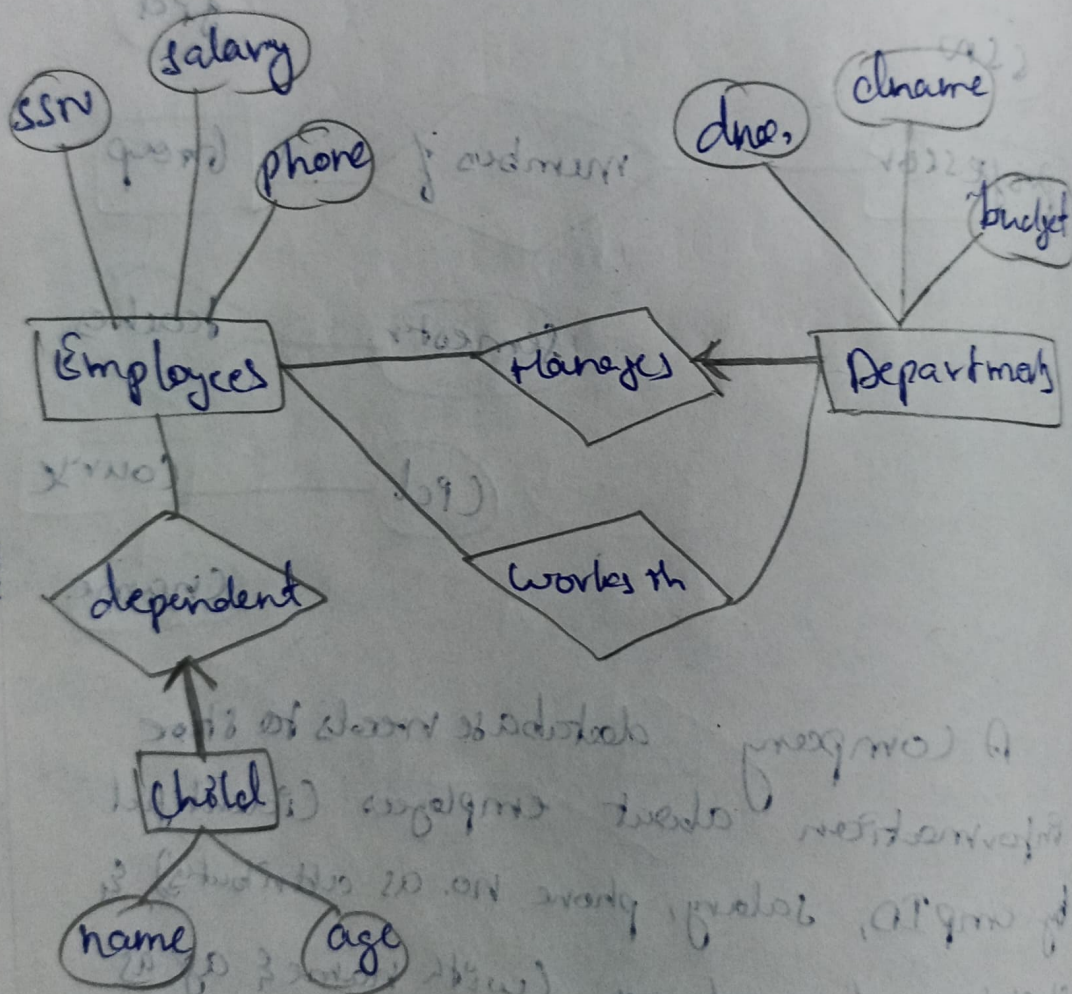


① Suppose that certain courses can be taught by a team of professors jointly, but it is possible that no one professor in a team can teach the course. Model this situation, introducing additional entity sets, and relationship sets if necessary.



4) A company database needs to store information about employees (identified by empID, salary, phone no. as attributes) & children of employees, (with name & age as attributes). Employees work in departments each. department is managed by an employee. a child must be identified uniquely by name when the parent (who is an employee) is known. we are not interested in information about the child once the employee leaves the company.

Draw an ER diagram that captures the information.



- 5) Consider the following information:
- (a) Professor has Pid, Pname, P age, designation
 - (b) Projects have project id, sponsor name, starting date, ending date & budget
 - (c) Graduate students have, ID, name, age, degree program
 - (d) Each project is managed by one or more professors (known as projects co-investigator)
 - (e) Professors can manage and/or work on multiple projects
 - (f) Each project is worked on by one or more graduate students (known as project's research assistants)
 - (g) When graduate students work on a project, a professor must supervise their work on the project. Graduate students can work on multiple projects, in which case they will have to supervise for each project.
 - (h) Departments have id, name, main office
 - (i) Departments have professor, Chairman ^{head}
 - (j) Professors work in one or more departments and for each department that they work

On a time percentage is associated with their job

- ① graduate students have one major department for which they are working their degree
- ② each graduate student has another more sr. graduate student, advisor, who advises him/her on what courses to take,

Design an ER diagram that captures the information about the university. Use only basic ER model

