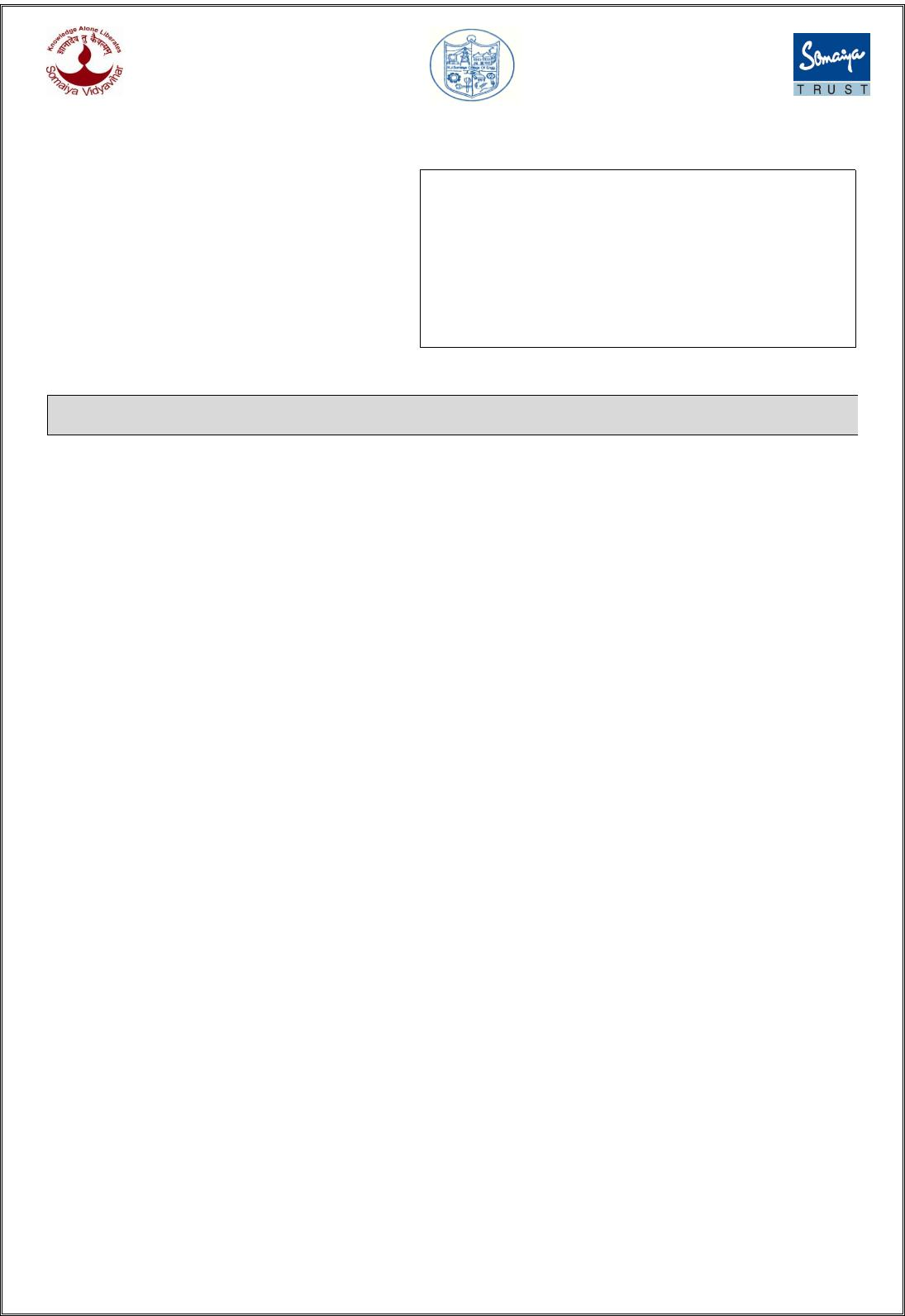
# K. J. Somaiya College of Engineering, Mumbai-77



(Autonomous College Affiliated to University of Mumbai)

# Batch: A1 Roll No.: 1911004

**Experiment / assignment / tutorial No. 1**

**Grade: AA / AB / BB / BC / CC / CD /DD**

**Signature of the Staff In-charge with date**

**Title:** Problem Definition and Design of Extended-Entity-Relationship diagram

**Objective:** To define a Database Problem and Design an EER diagram for a business domain.

# Expected Outcome of Experiment:

**CO 1:** Design entity-relationship diagrams to represent different database application scenarios.

# Books/ Journals/ Websites referred:

1. G. K. Gupta :”*Database Management Systems*”, McGraw – Hill
2. Korth, Slberchatz, Sudarshan : “Database Systems Concept”, 6th Edition , McGraw Hill
3. Elmasri &Navathe, “Fundamentals *ofDatabase Systems*”5thEdition, PEARSON Education.

**Dia Software: A software to Design ER Model**

Dia is one of the convenient open source tool which runs on multiple platforms including Linux, Windows and MacOS. Dia has a number of "sheets" each of which includes diagram objects for different modeling tools, such as UML, ER diagrams, flowcharts, etc.

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The ER tool has objects for entities, relationships, attributes (using the oval notation), edges, and so on. The properties boxes for each of these elements allow you to specify cardinality constraints, total participation, identifying relationship, etc.

It supports many common formats to store diagrams such as jpeg, png, eps, etc.

# Pre Lab/ Prior Concepts:

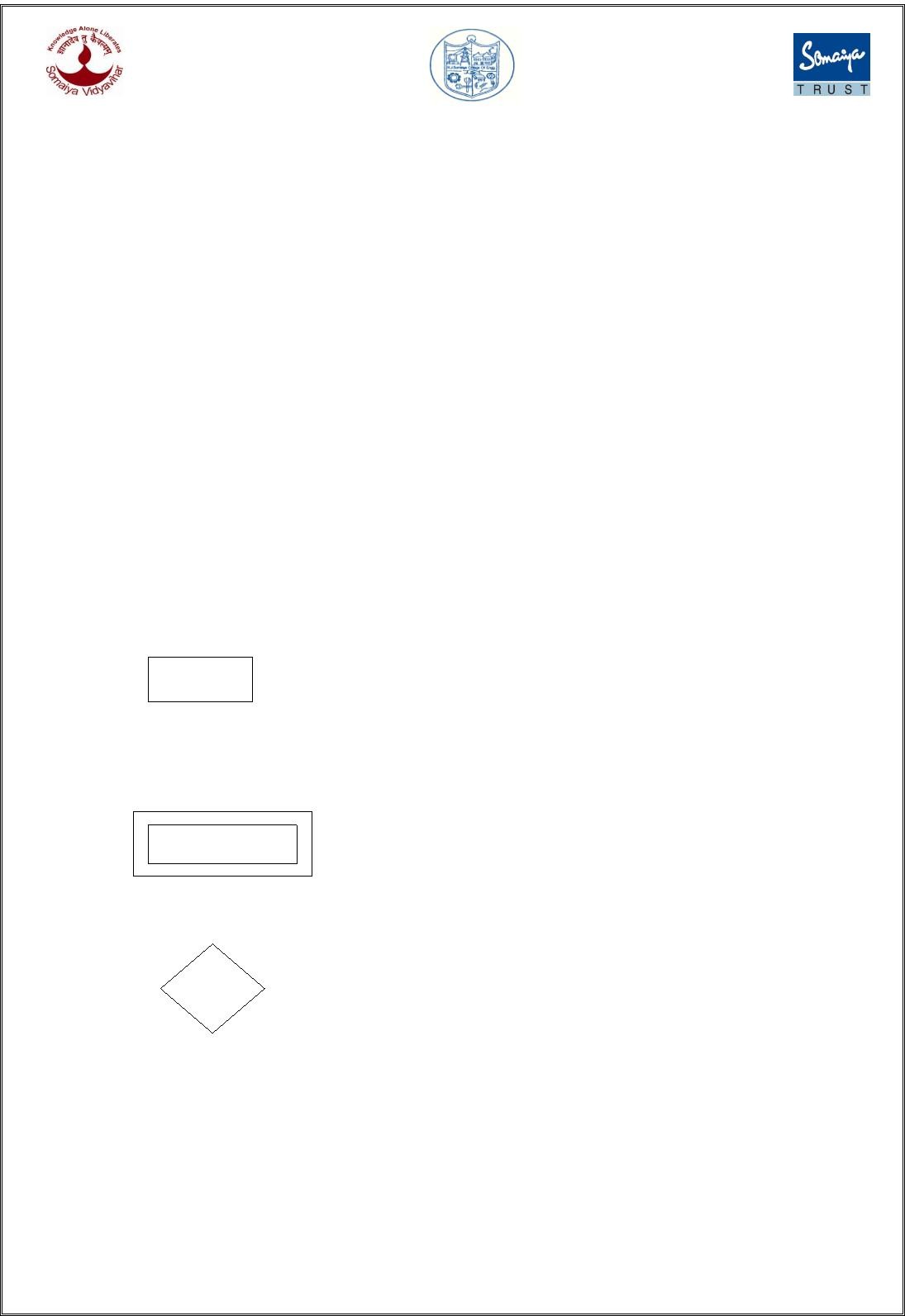
The ER data model was developed to facilitate the database design by allowing specification of an enterprise schema that represents the overall logical structure of the database. The ER model is one of the several data models. The semantic aspect of the model lies in its representation of the meaning of the data. The ER model is very useful many database design tools drawn on concepts from the ER model. The ER model employs 3 basic notations: entity set, relationship set and attributes.

# Symbols Used in ER Notation

1.

Entity

**Entity set:** An entity is a set of entities of the same type that share the properties or attributes.



2.

Entity Name **Weak entity set:** An entity set may not have sufficient attributes to form a primary key. Such an entity set is termed as weak entity set.

3.

R **Realtionship Set:** A relationship is an association among several entities. A relationship set is a set of relationship

of the same type.

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1. **Identification relationship set for weak entity set:** The relationship associating the weak entity set with the

R

identifying entity set is called the identifying relationship.

5.

**Primary key:** The primary key is used to denote a

**A** candidate key that is chosen by the database designers as the principal means of identifying entities within an entity set.

# 6. Many to Many relationship

R

7.

R

# One to One relationship

1. **Attribute**

**A**

9.

# . A Multi valued Attribute

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**Extended Entity Relationship Diagram:**

The EER model includes all of the concepts introduced by the ER model. Additionally it includes the concepts of a [subclass](https://en.wikipedia.org/wiki/Subclass_(computer_science)) and [superclass](https://en.wikipedia.org/wiki/Superclass_(computer_science)) ([Is-a](https://en.wikipedia.org/wiki/Is-a)), along with the concepts of [specialization](https://en.wikipedia.org/wiki/Inheritance_(computer_science)#Specialization) and [generalization](https://en.wikipedia.org/wiki/Generalization). Furthermore, it introduces the concept of a [union](https://en.wikipedia.org/wiki/Union_(computer_science)) type or category, which is used to represent a collection of objects that is the union of objects of different [entity](https://en.wikipedia.org/wiki/Entity) types. EER model also includes EER diagrams that are conceptual models that accurately represent the requirements of complex databases.

**Example Case Study**: List the data requirements for the database of the company which keeps track of the company employee, department and projects. The database designers provide the following description

* 1. The company is organized into departments. Each department has unique name, unique number, and particular employee to manage the department. We keep track of the start date and the employee begins managing the department. The department has several locations.
  2. The department controls a number of projects each of which has a unique name, unique number and a single location.
  3. We store each employee names social security number, address, salary, sex and dob. An employee is assigned one department but may work on several projects which are not necessarily controlled by the same department. We keep track of the department of each employee works on each project and for insurance purpose. We keep each dependents first name, sex, dob and relation.

# Procedure for doing the ER diagram experiment

1. Identifying the Entities (Strong and weak entities)
2. Identify attributes of the Entity (keys, partial key, simple, composite, multivalued, derived)
3. Identify relationship(recursive)
4. Identify the structural constraints of the relationship (cardinality ratio, participation constraints**)**

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# ER- Diagram for company Case Study Database:

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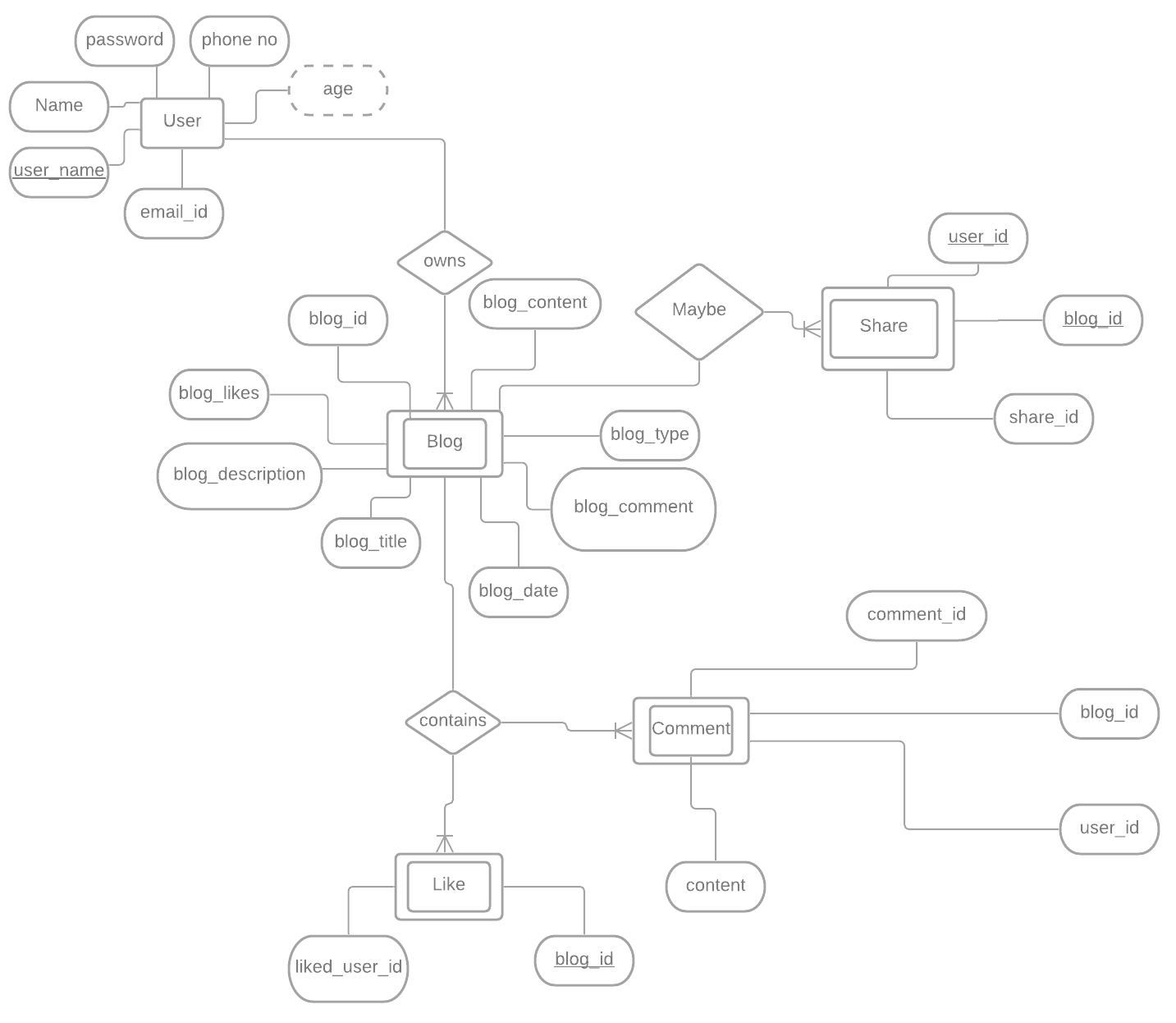
**Problem Definition:**

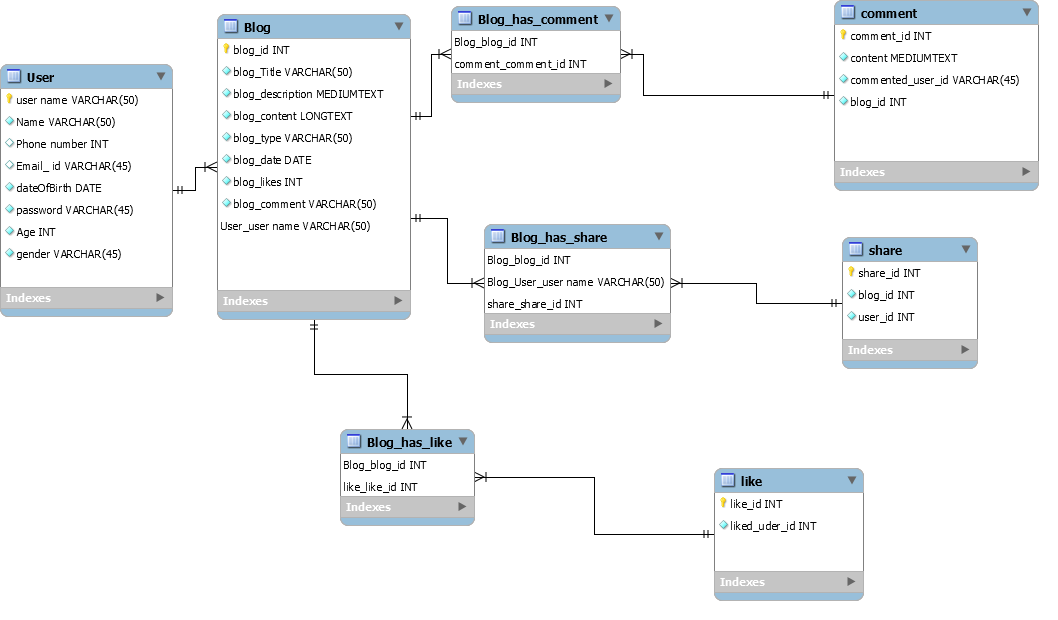
Blogging Management System **-** A user can post his blogs. User can see the blogs of other and like/share them if he likes their content. He can follow them if he wants to prioritize their content. Also the user will be able to see who has liked or shared his/her blog. The database/system will have following data

* User’s personal data
* User's All Posts like, Comments and who is sharing post
* Also who has Liked Comments of any posts
* User’s Followers and Following

User can see who follows him. He can view his following too. He can also see following followers of his friends. User can also comment on any post. User can see who follows him. Also the user will have access to information of who likes his blog and comments. The system will automatically generate the blog id for a blog. User first has to provide his/her details and a password and username while logging in for the first time. After that the login can be done using the username and password. User can enter either a phone number or email id or both during login but one of them is necessary. A blog will contain various features like title, description, type. Content, etc that can be viewed by other users. It will be saved in the database with information such as blog id, owner’s id, date on which it has been posted. The likes and comments on a blog will keep on changing in the meantime. User’s can also share the link of a particular blog among his/her followers. The owner of the blog will come to know about who has shared his blog.

**Design of ER**



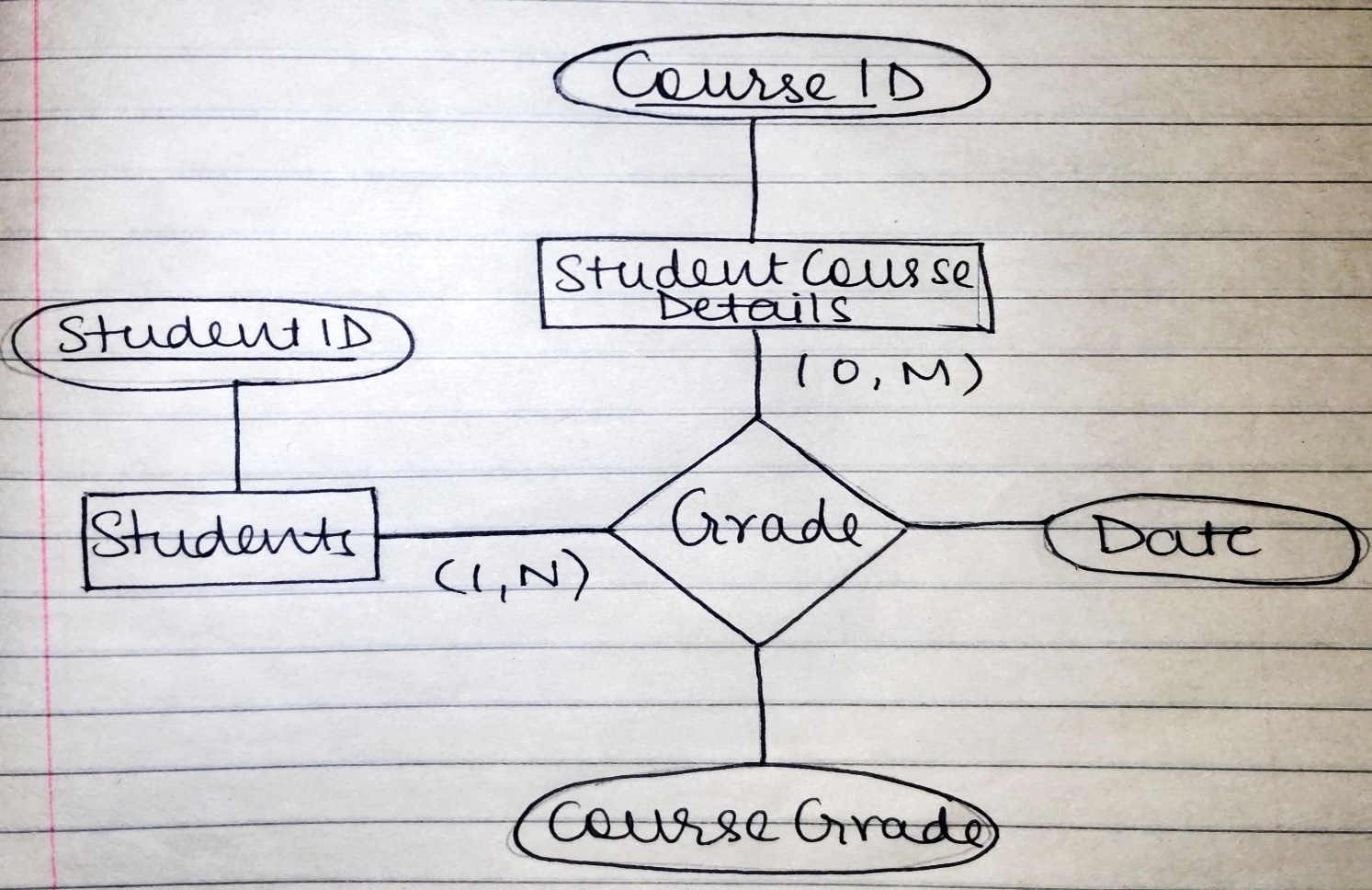
**Design of EER:** 

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# Post Lab Descriptive Questions (Add questions from examination point view)

1. **In the Academic database a Grade is issued to each STUDENT for each COURSE taken and stored in the STUDENT COURSE DETAIL entity. A STUDENT may decide to re-take a COURSE to better their GRADE. The administration would like to keep a record of the old/previous Grade as well as the new Grade. Show ER diagram to include historical Grades if the students should have them**.



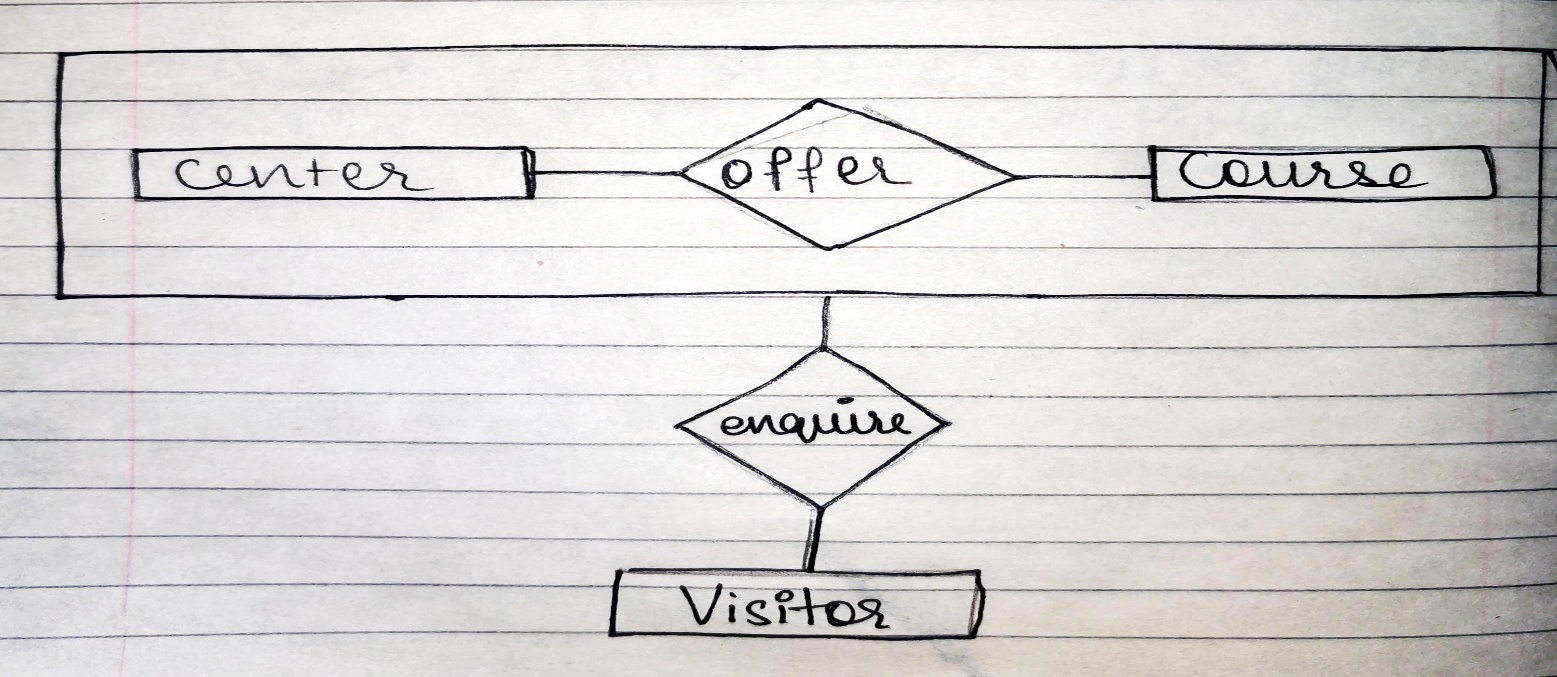
1. **Discuss the concept of aggregation. Give an example. How to represent aggregation in ER model (if aggregation is not supported in EER diagram)** .

**Aggregation** is the process where relation between 2 entities is treated as a **single entity**.

Since an ER diagram is not capable of representing relationship between an entity and a relationship which may be required in some scenarios. In those cases, a relationship with its corresponding entities is aggregated into a higher level entity.

EG: In the diagram , the relationship between **Center** and **Course** together, is acting as an **Entity**, which is in relationship with another entity **Visitor**. Now in real world, if a **Visitor or a Student** visits a **Coaching Center**, he/she will never enquire about the **Center** only or just about the **Course,** rather he/she will ask enquire about both **Course & Center .**

In ER Diagram, we use **Offer** to **Visitor**.



1. **Two separate banks which decide to merge. Both banks use same ER database schema(Assume the ER diagram). If the merged bank is to have a single database, there are several potential problems:**

* **The possibility that two original banks have branches with the same name**
* **The possibility that some customers are customers of both original banks**
* **The possibility that some loan or account numbers were used at both original banks**

**Discuss for each of these potential problems , why there is indeed potential difficulty in database based on ER model. Propose a solution to a problem. For your solution, explain any changes that would have to be made and describe what their effect would be on the ER database schema and the data**.

ANS:

* We can Rename the Entity Branch name of the second bank as B2name so that there will be no clash because 2 different entities can have similar data i.e. (Branch name)
* Assuming that the customer are identified by unique id SSN so for Bank2 database we add up another (column) entity named as B2SSN so that it would have all customer of Bank2 with unique primary key(SSN).
* In the same table as of the Bank1 with loan/account being stored, adding additional entity or column named B2AccNo. to store the data.

Above solutions are focusing on changing the columns & it is feasible , although it can have many blank (NaN/Null) entries .

Thus another solution can be changing all the entries (adding prefix B2) [ lengthy process but without NaN/Null entries.]

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