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

(Autonomous College Affiliated to University of Mumbai)

# Batch: B-1 Roll No.: 16010122104

**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 and Navathe, “Fundamentals *of Database 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.

1

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

(Autonomous College Affiliated to University of Mumbai)

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:

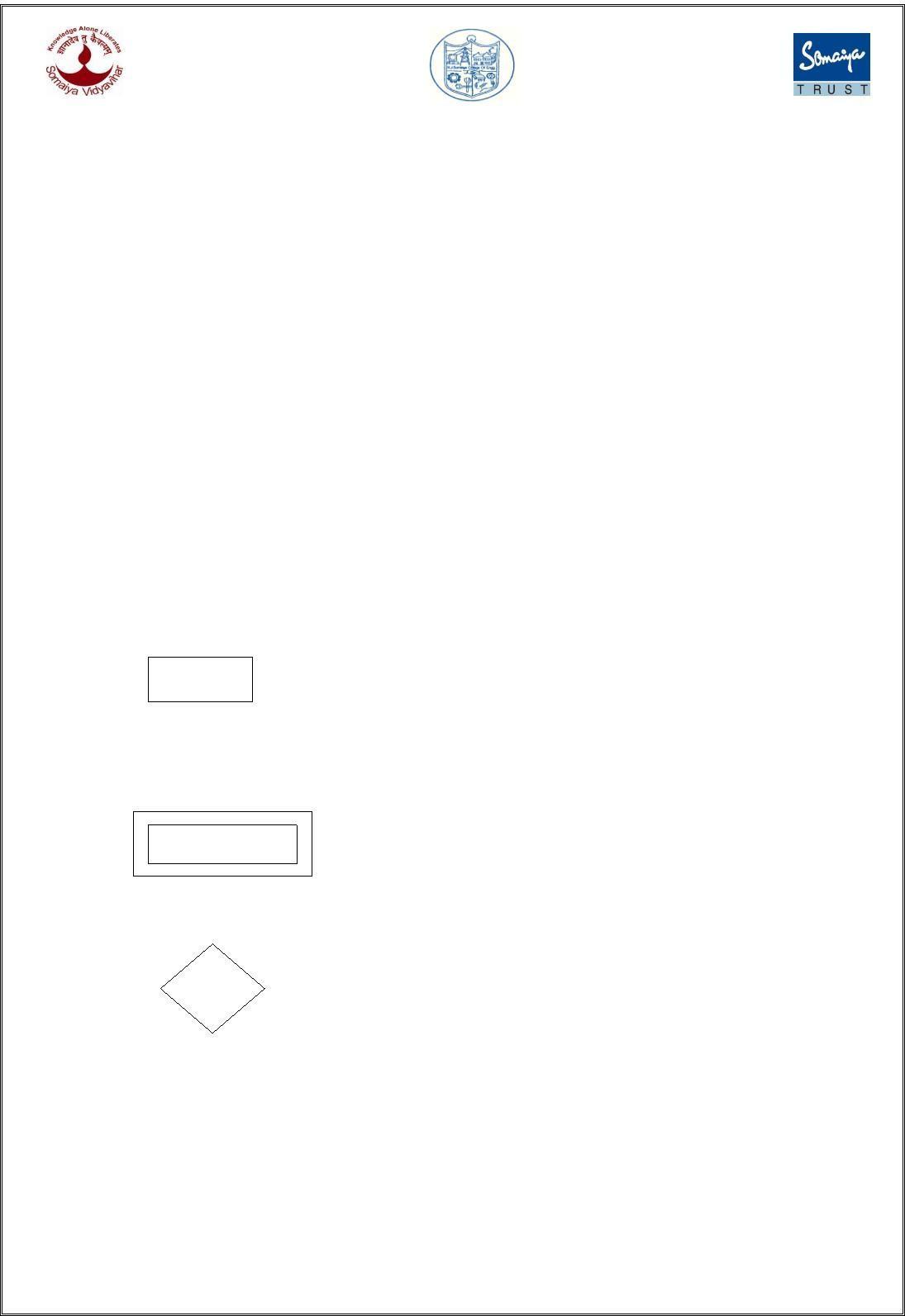
The ER data model was developed to facilitate the database design by allowing specification of an enterprise schema that represents the overall logical structure of the database. The ER model is one of the several data models. The semantic aspect of the model lies in its representation of the meaning 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.

2

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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

3

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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**)**

4

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# ER- Diagram for company Case Study Database:

5

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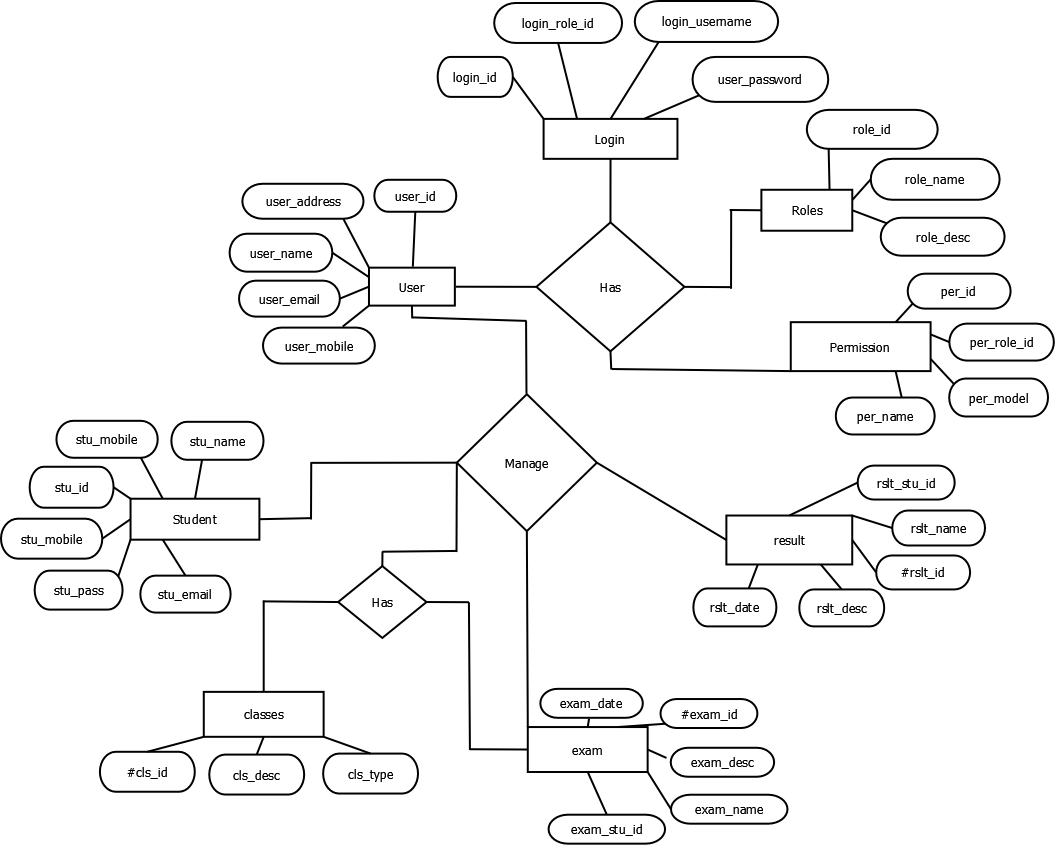
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**Problem Definition:**

The project’s primary goal is to give the student’s exam results in a quick and understandable manner. Students and universities can benefit from this project by receiving results in an easy-to-understand manner. The student is the system’s intended user, and students are given the ability to read and execute their results by entering login details. For brand-new students, registration is also an option. The guest user is viewing.

**Design of EER:**

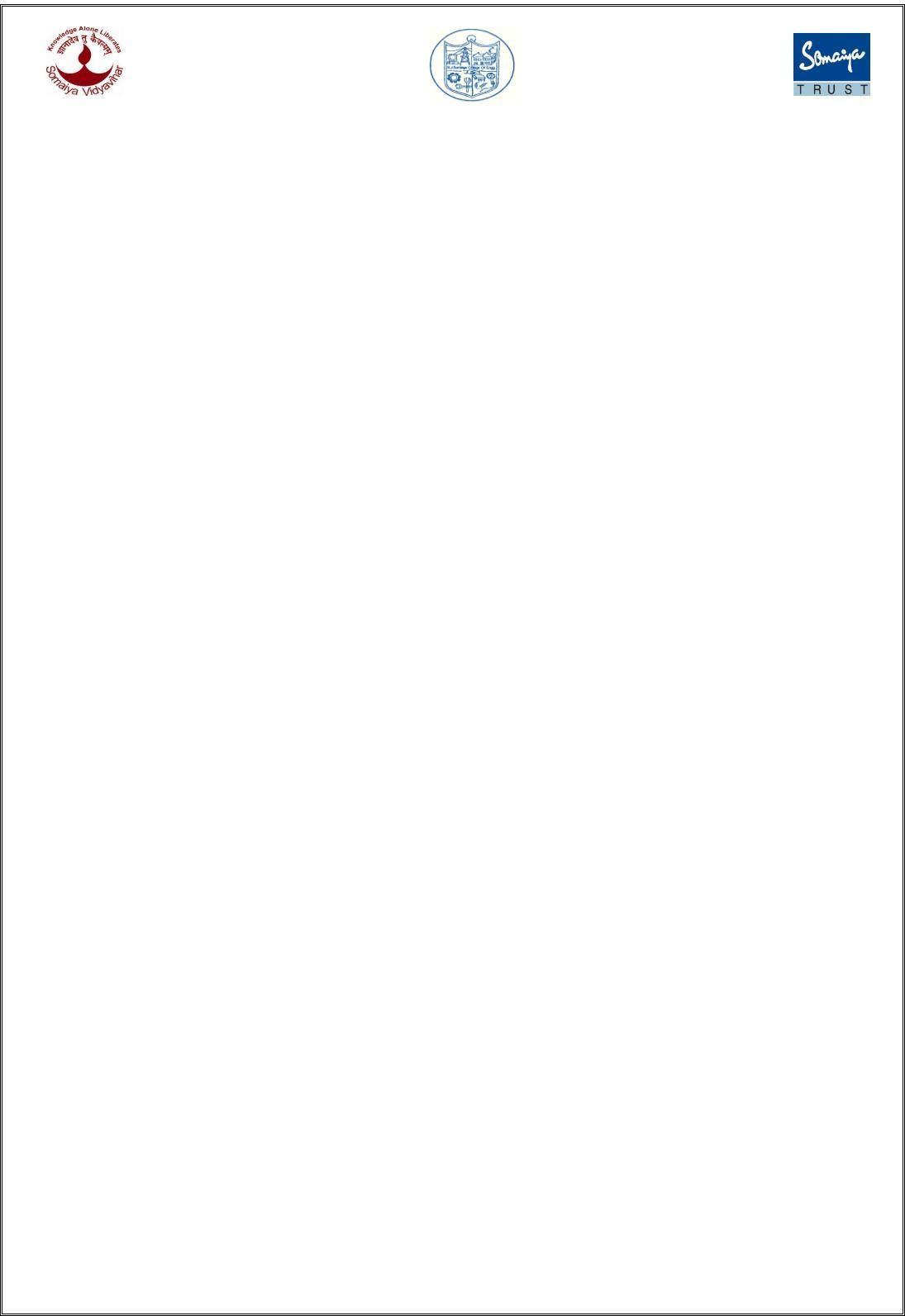


6

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# RDBMS-2019-2020

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

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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.
2. Discuss the concept of aggregation. Give an example. How to represent aggregation in ER model (if aggregation is not supported in EER diagram) .
3. 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.

Answers:

1. Branches with the Same Name:

Potential Problem:

The possibility that two original banks have branches with the same name could lead to ambiguity and identification issues. When combining databases, it's crucial to ensure that branch names are unique to avoid confusion.

Solution:

To resolve this issue, you can introduce a new attribute, such as BankID or BankName, in the Branch entity. This attribute would uniquely identify the original bank associated with each branch. This way, even if two branches have the same name, their combination would be distinguishable based on their associated banks.

2. Customers of Both Original Banks:

Potential Problem:

The possibility that some customers are customers of both original banks can lead to duplicate customer records and potential data inconsistencies.

Solution:

Introduce a new entity, such as MergedCustomer, to represent customers in the merged bank. Each MergedCustomer record should be associated with the original bank(s) of which the customer was a part. This ensures that customer data from both banks is retained without duplication.

3. Duplicate Loan or Account Numbers:

Potential Problem:

The possibility that some loan or account numbers were used at both original banks can lead to conflicts and incorrect associations.

Solution:

Introduce a new attribute, such as BankID or OriginalBank, in the Loan and Account entities to specify the bank to which the loan or account originally belonged. This ensures that even if numbers overlap, they can be uniquely identified based on their original banks.

Effect on ER Database Schema and Data:

The modifications ensure that data from the two banks can coexist without conflicts.

Queries can be modified to consider the BankID or OriginalBank attribute when retrieving or updating data.

The new attributes provide a clear distinction between records from different banks, maintaining data integrity.

By incorporating these changes into the ER database schema, you address potential issues related to merging two banks with the same database schema, ensuring a smooth integration of data from both entities.