Batch: A3   Roll No.: 1911034
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.

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.
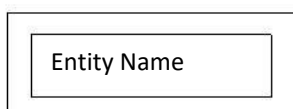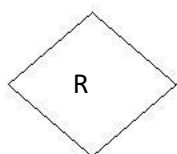
Symbols Used in ER Notation

1.
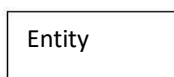
Entity

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.
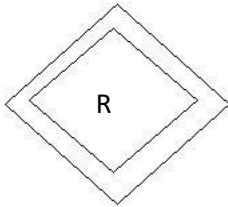
3.

R

Realtionship Set: A relationship is an association among several entities. A relationship set is a set of relationship of the same type.
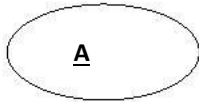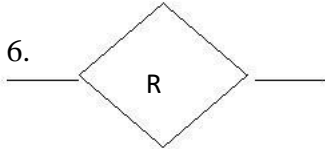
4.

Identification relationship set for weak entity set: The relationship associating the weak entity set with the identifying entity set is called the identifying relationship.
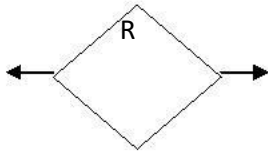
5.

Primary key: The primary key is used to denote a candidate key that is chosen by the database designers as the principal means of identifying entities within an entity set.
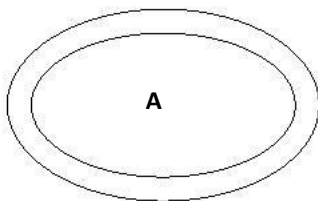
6.

Many to Many relationship

7.

One to One relationship

8. **Attribute**

9.

. **Multi valued Attribute**

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 and superclass (Is-a), along with the concepts of specialization and generalization. Furthermore, it introduces the concept of a union type or category, which is used to represent a collection of objects that is the union of objects of different 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)

ER- Diagram for company Case Study Database:
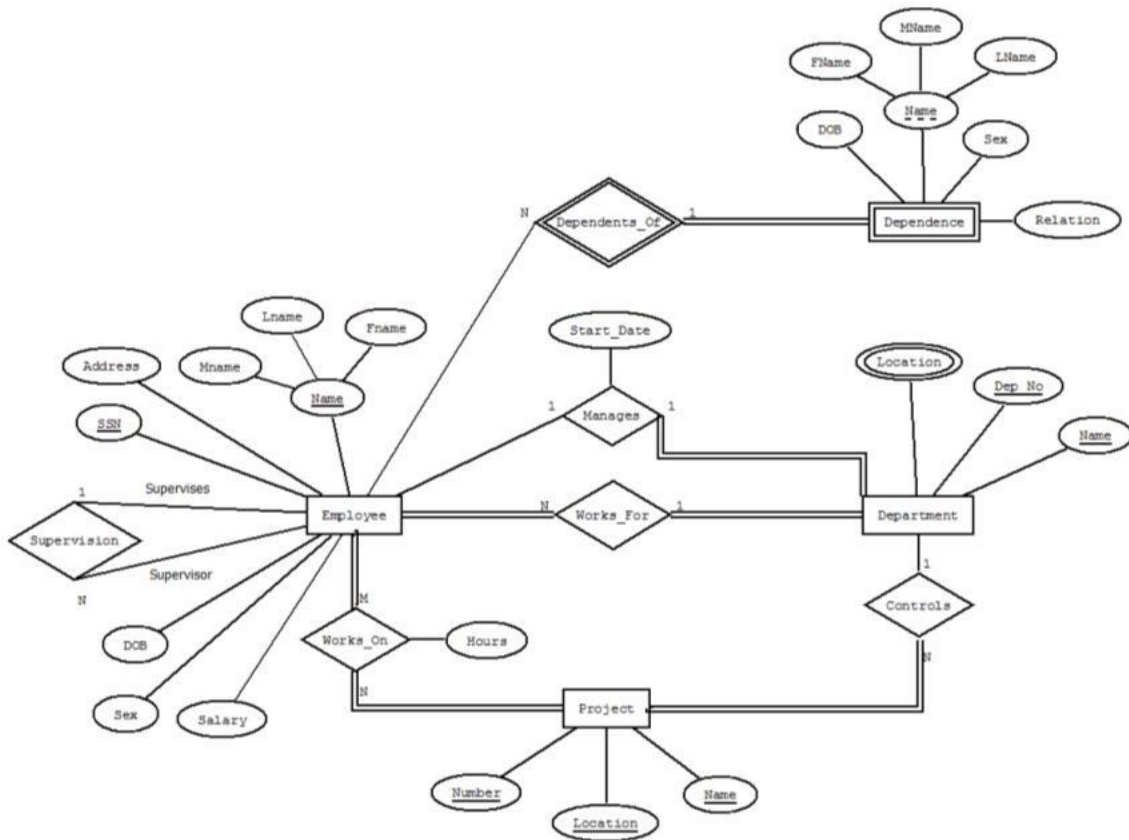
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RDBMS-2019-2020

Problem Definition:

In these days , there is a growing need for property investment brokers, customers , and builders to have a centralized property administration system , such that it provides authorized access for different users to access the different parts of the system.
This need arises due to the fact , that there is a large number of properties for sale , or for rent , and we need to list the property that is best suited to the customer's budget and housing requirements
It would help in the project planning process for both the builders , contractors and other entities involved.
It would also help in an organization to maintain the property details to help in the sale of the property , by maintaining property details like residential and commercial price limit .
In order to create such a centralized system , there is a need to list out the various entities involved in the system , along with their attributes and the relationships that they share that will facilitate the process described above.
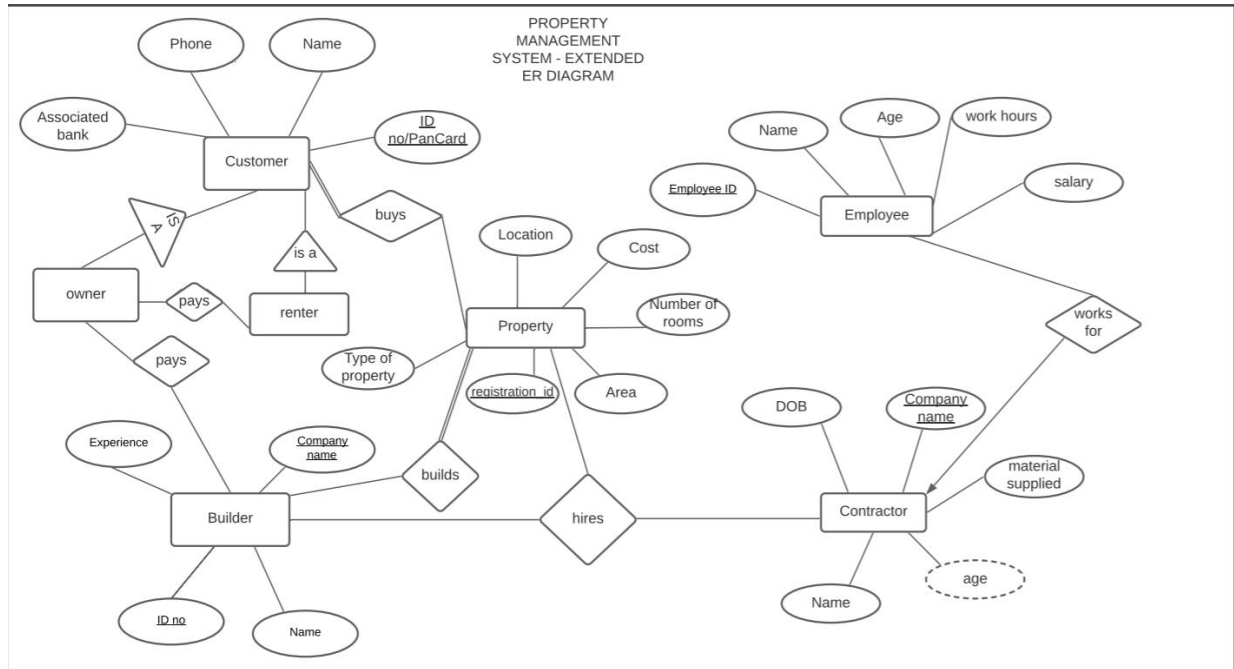
Design of EER:

Original ER diagram
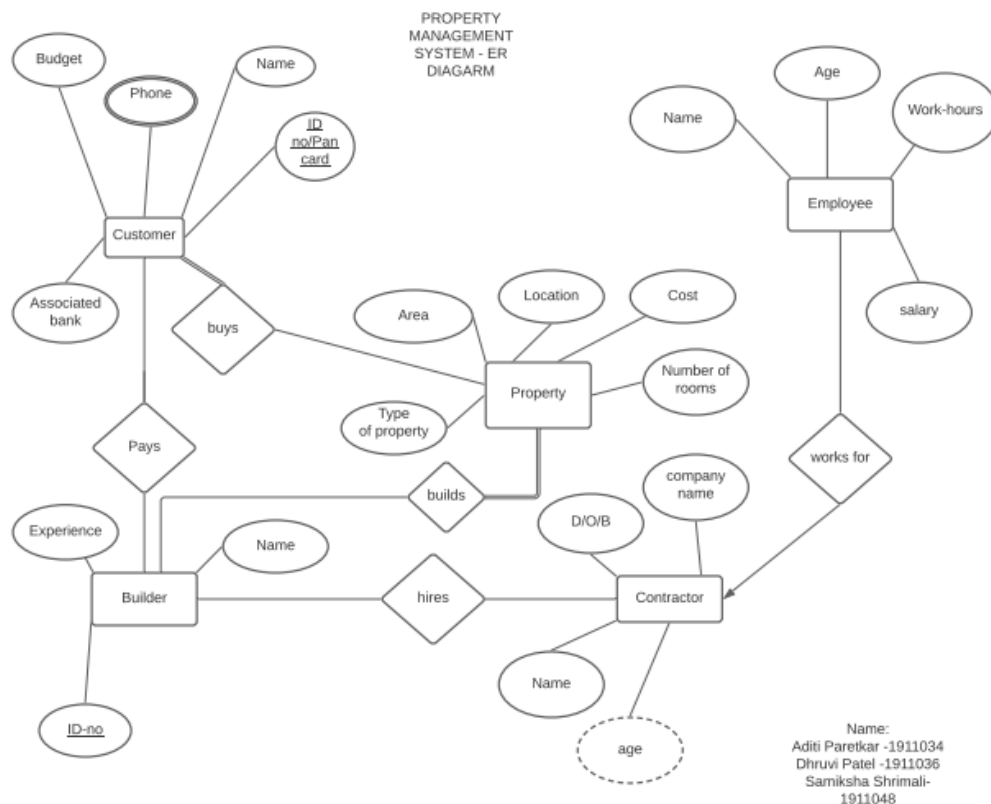
PROPERTY
MANAGEMENT
SYSTEM - EXTENDED
ER DIAGRAM

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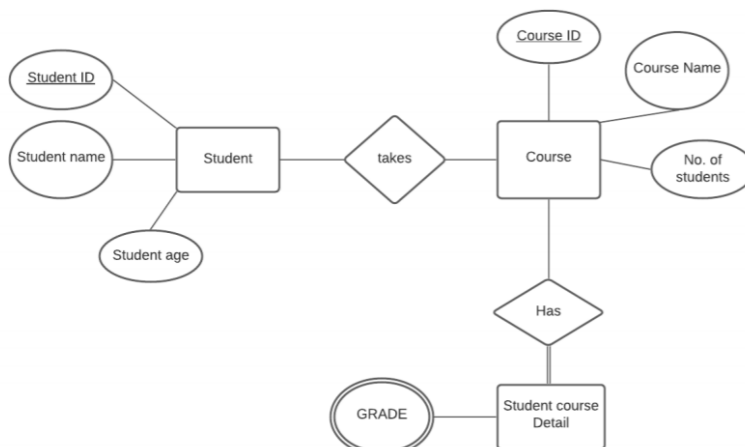
2. **Discuss the concept of aggregation. Give an example. How to represent aggregation in ER model (if aggregation is not supported in EER diagram) .**

Answer:

One limitation of the E-R model is that it cannot express relationships among relationships. To illustrate the need for such a construct, quaternary relationships are used which lead to redundancy in data storage.

The best way to mode such situations is to use aggregation.

Aggregation is an abstraction through which relationships are treated as higher-level entities.

Below is the example of aggregation relation between offer (which is binary relation between center and course) and visitor.
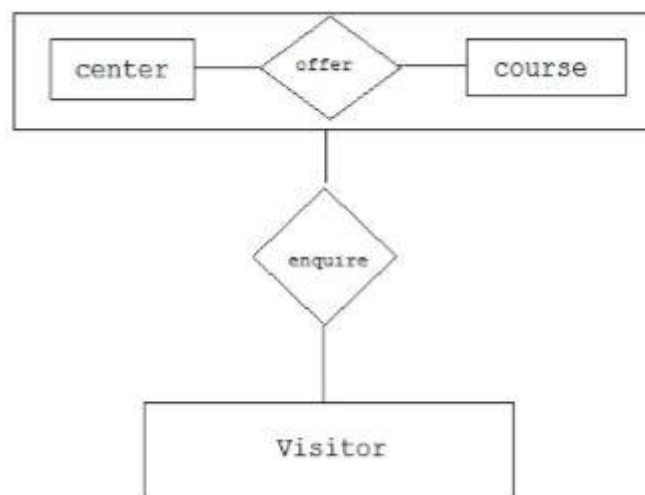
3. **Two separate banks which decide to merge. Both banks use same ER database schema(Assume the ER diagram). If the merged bank is to have a single database, there are several potential problems:**
   - **The possibility that two original banks have branches with the same name**
   - **The possibility 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.

[Type text]

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.

Some of the problems faced and the potential solutions will be as follows:
1. In case the branch name is used as the primary key , of the branch entity set, then while merging the branches , if one two of them have a branch with the same name , then one of them will be lost
2. If the same customer has accounts , in both the branches , and he/she participates in the relations customer /borrower /depositor. Then while taking the union , duplicate tuples will be deleted. Thus the database will have to be updated accordingly
3. However if the tabular relationship is obtained by taking a union of the primary keys of the participating entity sets then no modification will be required to these relationship sets
4. The Entity Branch name of the second bank should be renamed as Bank2 so there is no clash as two different entities can have similar data (Branch name)
5. We can consider the customers are identified by unique ID X so for Bank2 database add another entity named Bank2X so this will have all customer of Bank2 with unique primary key(X).

6. In the same table as of the Bank1 where loan/account is stored add another entity or column named Bank2AccountNo. to store the data.

   The above points focus on just changing the columns which is feasible but may have many blank entries so the other solution is to change all the entries (add prefix b2) , this may take some more time but there will be no blank values.

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[Type text]