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ROLL NO. : 31258

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Assignment NO.A1

DOP :-

DOS :- 30-11-2021

Title :- ER Modeling and Normalization -

Problem statement :-

Decide a case study related to real time application in group of 2-3 students and formulate a problem statement for application to be developed. Propose a conceptual design using ER features using tools like ERD plus, ER Win etc. (Identifying entities, relationships between entities, attributes, keys, cardinalities, generalization, specialization etc.). Convert the ER diagram into relational tables and normalize Relational data model.

Objectives :-

(i) Understand Data Modelling.
(ii) To understand conversion of ERD to table.
(iii) Explore an ERD tools.

Learning Outcomes :-

After completion of assignment, students will be able to -
(i) Understand Data Modelling.
(ii) Understand conversion of ERD to table.

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THEORY :-

ER Diagram :-

An Entity Relationship (ER) Diagram is a type of flowchart that illustrates how "entities" such as people, object or concept relate to each other within a system. ER Diagrams are most often used to design or debug relational databases in the fields of software engineering, business information systems, education and research. Also known as ERD or ER models, they use a defined set of symbol such as rectangle, diamonds, ovals and connecting lines to depict the interconnectedness of entities, relationships and their attributes.

The components and features of an ER diagram

ER Diagrams are composed of entities, relationships and attributes. They also depict cardinality which defines relationships in terms of numbers.

Entity :-

A definable thing - such as a person, object, concept or event that can have data stored about it. Think of entities as nouns.

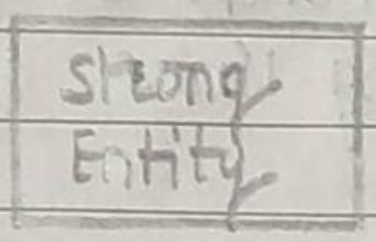
Eg. customer, student, car, product.

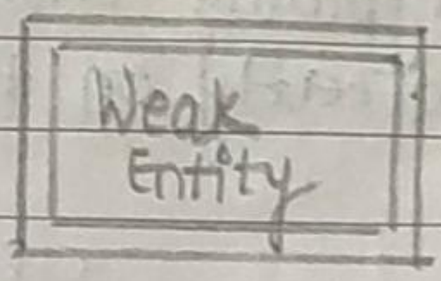
Typically shown as a rectangle -

Entity

Entity categories :-

Entities are categorized as strong, weak or associative. A strong entity can be defined solely by its own attributes while a weak entity cannot. An associative entity associates entities within an entity set.





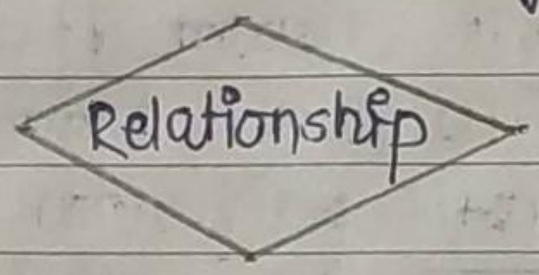
Entity Keys :-

Refers to an attribute that uniquely defines an entity in an entity set. Entity keys can be super,

- candidate or primary
- **Super key :** A set of attributes that together define an entity in an entity set.
- **Candidate key :** A minimal super key, meaning it has the least possible number of attributes to still be a super key. An entity set may have more than one candidate key.
- **Primary key :** A candidate key chosen by the database designee to uniquely identify the entity set.
- **Foreign key :** Identifies the relationship between the entities.

Relationship :-

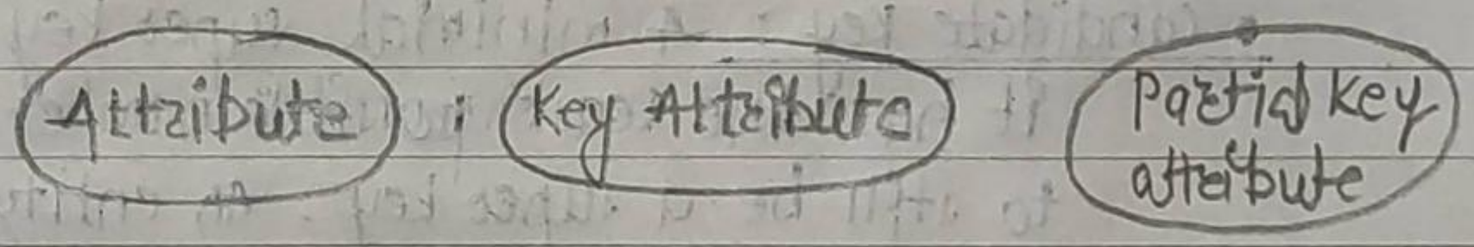
How entities act upon each other or are associated with each other. think of relationship as verbs. For example the named student might register for a course. the two entities would be the student and the course, and the relationship depicted is the act of enrolling, connecting the two entities in that way. Relationships are typically shown as diamonds or labels directly on the connecting lines.



Recursive Relationship :- The same entity participates more than once in the relationship.

Attribute :-

A property or characteristic of an entity often shown as an oval or circle.



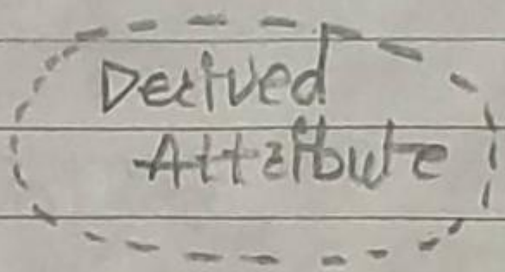
Attribute Categories :-

Attributes are categorized as simple, composite, derived as well as single-value or multi-value.

- **Simple :-** Means the attribute value is atomic and can't be further divided, such as a

phone number -

- Composite :- sub-attributes spring from an attribute _
- Derived :- Attributed is calculated or otherwise derived from another attribute such as age from a birthdate _

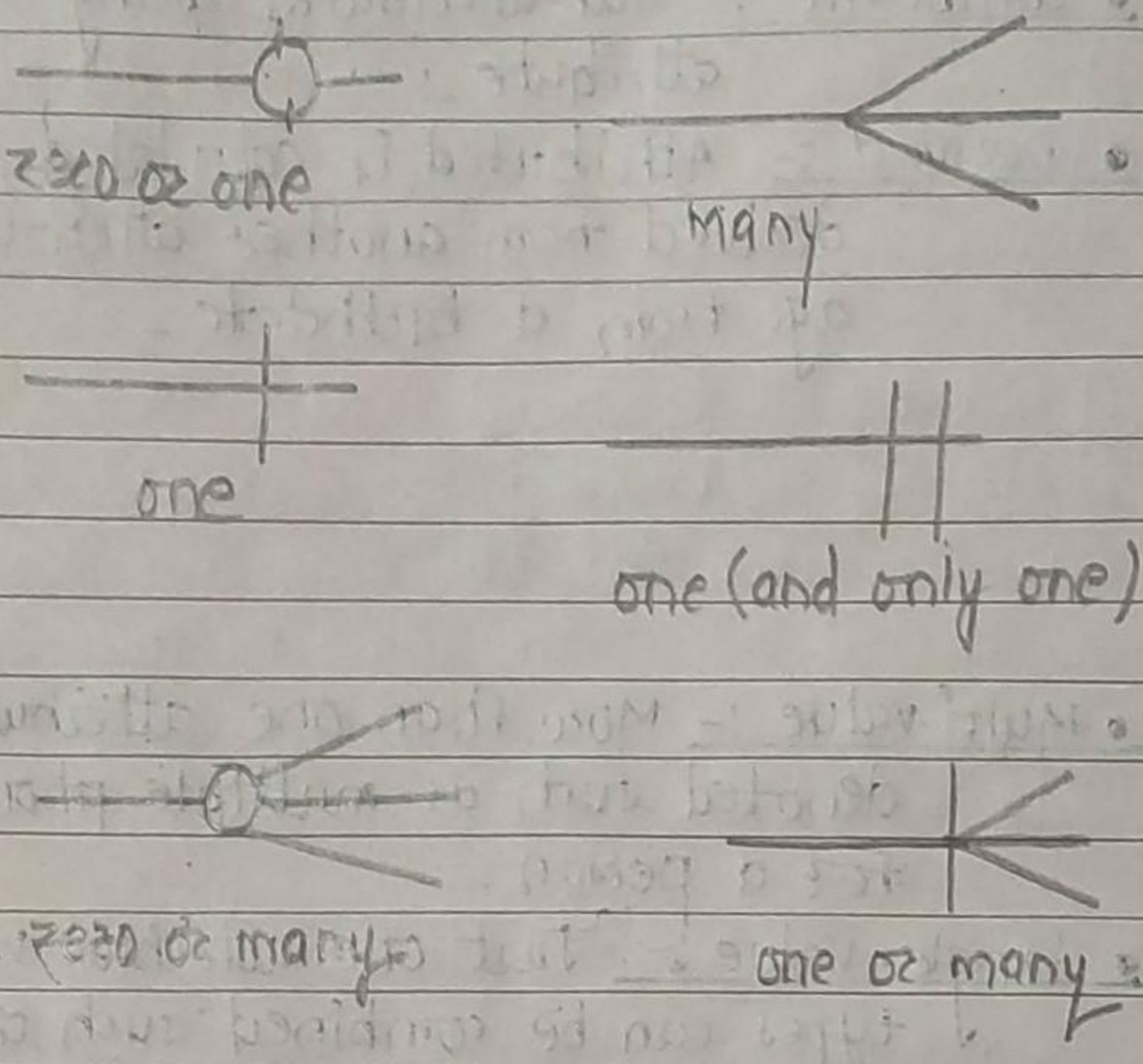


- Multi-value :- More than one attribute value is denoted such as multiple phone numbers for a person -
- Single-value :- Just one attribute value. The types can be combined such as : simple single-valued attribute or composite multi-value attribute _

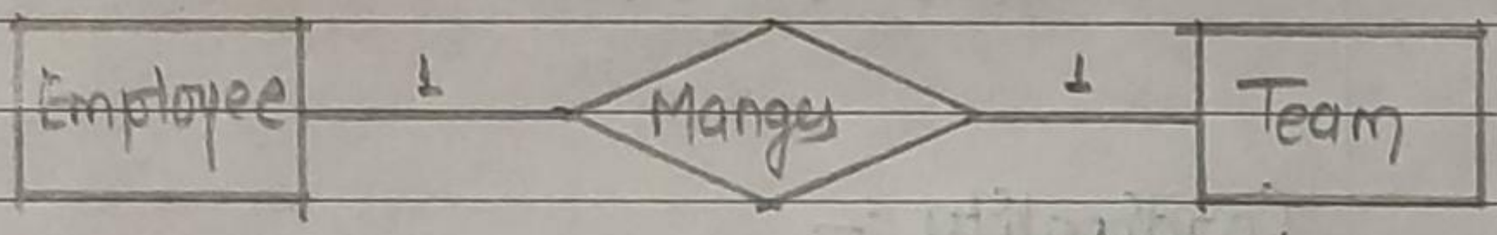
Cardinality :-

Defines the numerical attribute of the relationship between two entities or entity sets. The three main cardinal relationship are one-to-one, one-to-many and many-many. A one-to-one example would be one student associated with one mailing address. A one-to-many example one student registers for multiple courses but all those courses have a single line back to that one student. Many-to many example, students as a group are associated with multiple faculty members and faculty members in turn are

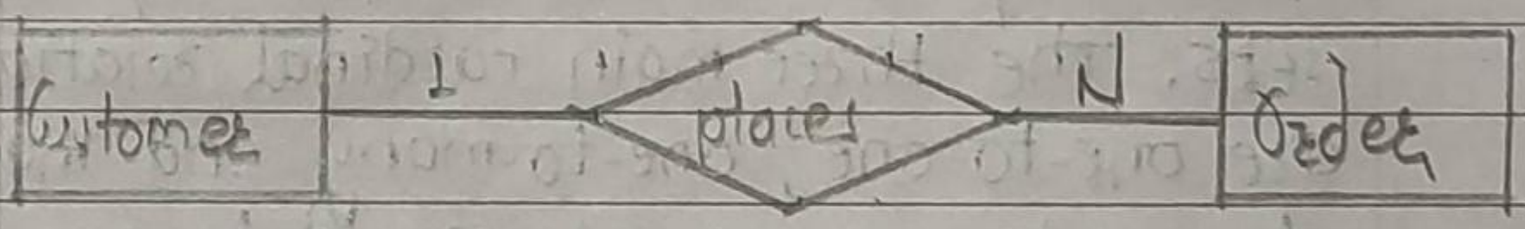
associated with multiple students.



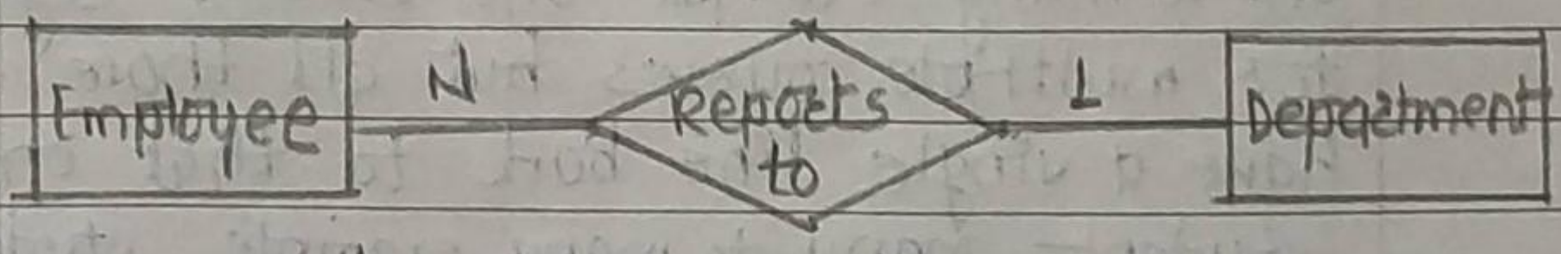
Examples of one-to-one Relationship :-



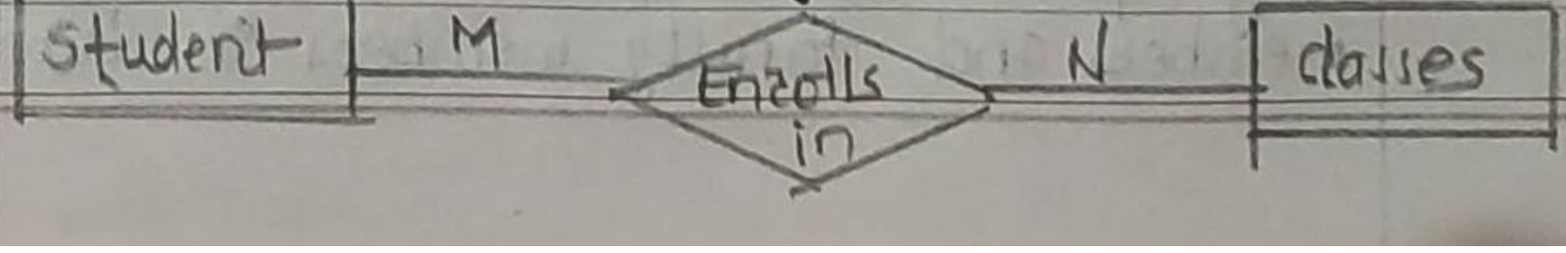
Example of one-to-many Relationship :-



Example of many-to-one Relationship :-



Example of many-to-many Relationship :-



Limitation of ER Diagrams and Models :-

(i) **Only for Relational Data :** Understand that the purpose is to show relationships. ER diagrams show only that relational structure.

(ii) **Not for Unstructured Data :** Unless the data is cleanly delineated into different fields, rows or columns. ER diagrams are probably of limited use. the same is true of semi-structured data because only some of the data will be useful.

(iii) **Difficulty in Integrating with an existing database :-** Using ER Models to integrate with an existing database can be a challenge because of the different architecture.

CONCLUSION :-

We understand the concept of ER diagram, various types of attributes and relationships present between different Entities in ER diagram.

OUTPUT :-