

DBD & ER Diagram

It can be divided into 6 steps-

- 1) Requirement analysis
- 2) Conceptual database design
- 3) Logical database design
- 4) Schema refinement
- 5) Physical database
- 6) Security design.

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Basic Building Block

(1) Entity: fundamental component of Model

(2) Attribute: properties that describes the entity

Attributes

Types

(can't be divided)

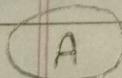
(i) Simple attribute: having atomic or invisible value

(ii) Composite attribute: having several components in
the value, e.g. Qualification

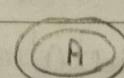
(iii) Derived attribute: attribute value dependent on
some other attributes e.g. DOB → Age

(iv) Single valued attribute: having only one value
rather than set of values.

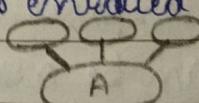
(v) Multi-valued attribute: having a set of values e.g. P.O.B.
rather than a single value
e.g. courses enrolled



Attribute



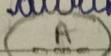
Multivalued
attribute



Composite
attribute



Key attribute



Partial attribute



Derived attribute

→ Each attribute takes values from a set called its domain.

→ Domain of composite attributes is the cross product
of domain of component attribute.

Domain of multivalued attribute is subset of values
of basic domain

(3) Relationship: it is a association among several entities.

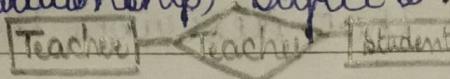
Types

- (i) one to one
- (ii) one to many
- (iii) many to many

(4) Degree: The degree of relationship type is the no. of participating entity types in a particular relation.

Types

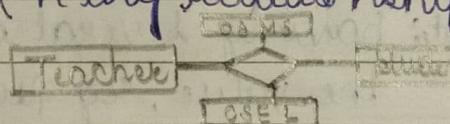
(i) (Binary relationship) Degree 2 : Relationship having 2 entities attached



(ii) Degree 3 (Ternary relationship) : having 3 entities attached



(iii) Degree n (n-ary relationship) : having n entities attached

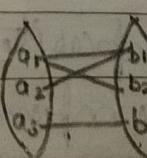
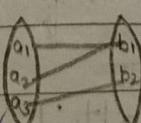
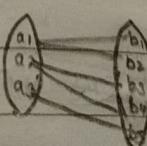
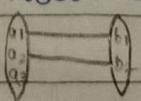


(5) Constraint: An ER schema define certain constraint to which the contents of a database must conform mapping cardinalities and participation constraint are the two important type of constraint

Mapping Cardinalities

- It express the no. of entities to which another entity can be associated via relationship set.
- Useful in describing binary relationship
- For binary relationship between entity sets, the mapping cardinalities must be one of the following

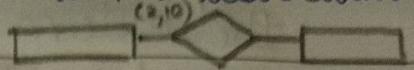
- 1) one to one
- 2) one to many
- 3) many to one
- 4) many to many
- 5) one to many



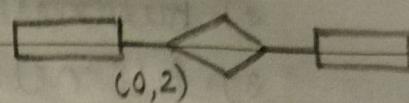
Participation constraints

An entity set ^{may} participate in a relation ^{in two forms-}

1) Total Participation : Every entity in this set is involved in some association of the relationship.



2) Partial Participation : Not all the entities in the set are involved in association of the relationship.



(5) Keys:

- The column value that uniquely identifies a single record in the table is called as key of the table.
- An attribute or set of attributes whose values uniquely identify each entity in an entity set is called Key for that entity set.
- Any key consisting of single attributes is called a simple Key while that consisting of a combo of attributes is called Composite Key.
- A Super Key is any combination of fields within a table that uniquely identifies each record within that table.
- A Candidate Key is a subset of Super Key. It is a single field or atleast combo of field that uniquely identifies each record in the table.
- The least combo of fields distinguishes a candidate key from a super key.
- A Puimary Key is a Candidate key that is most appropriate to be the main reference key for the table.

(7) Business Rules

It defines Actors and Prescribe how they should behave by setting constraints and help to manage how business change in the system.

Characteristics

- 1) Atomicity
- 2) Business format (ER Diagram)
- 3) Business ownership.
- 4) Classification Rules
- 5) Business formalisation Rules

Types of Business Rules define some business terms that are incorporated in system data dictionary

- 1) Facts
- 2) Constraints
- 3) Derivation

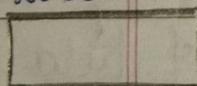
IMP

ER Diagram

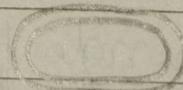
It expresses the overall logical structure of a database graphically

They are simple and clear.

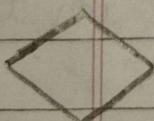
Symbols used for representation of ER Diagram are



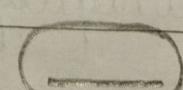
Entity



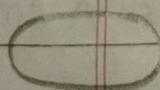
Multivalued
Attribute



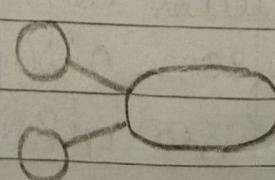
Relationship



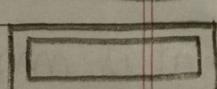
Key
Attribute



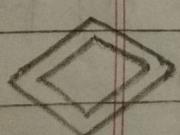
Attribute



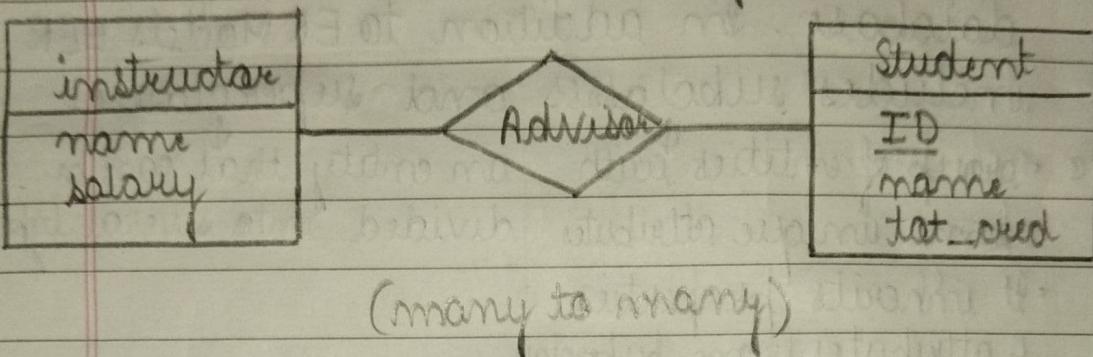
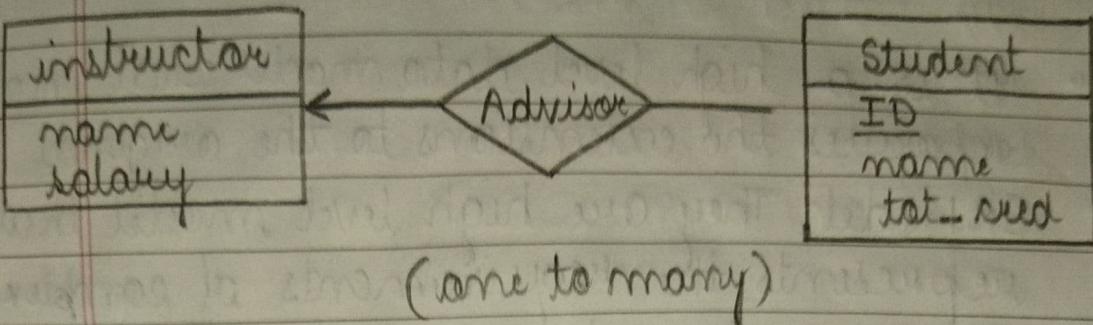
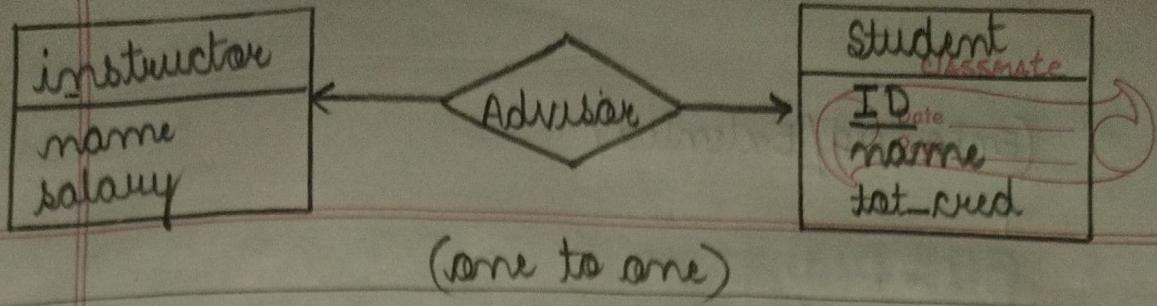
Composite
Attribute



Weak Entity



Weak Entity Relationship



Strong Entity sets: It contains sufficient attributes to form its primary key (represented by a single rectangle)

- Diamond symbol is used for representation of relationship b/w two strong entity sets (single line)
- Total participation may or may not exist in the relationship.

Weak Entity sets: It does not contain sufficient attributes to form its primary key.

- Double Diamond symbol and Double line is used for representation of relationship.
- Total participation always exist in identifying relationships.

(Enhanced/ Extended)



EER Diagram

- It is a high level data model that incorporates the extensions to the original ER Model. They are high level model that represents the requirements of complex database. In addition to ER Models EER includes **subclasses** and **superclasses**.
- (i)
 - group of entities with some unique attributes
 - It inherits properties & attributes from Superclass.

(Superclass)

Shape

(Subclass) Square

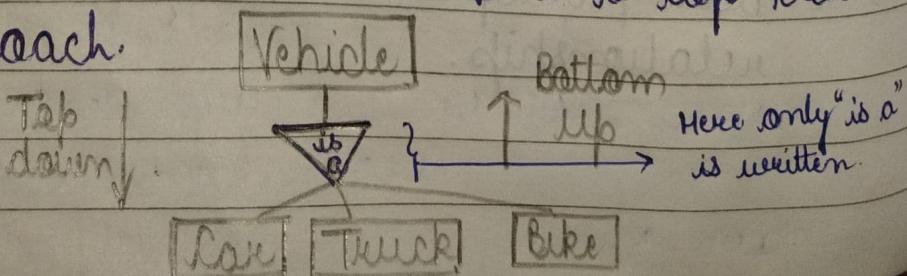
Triangle

Rectangle

Specialisation and Generalisation

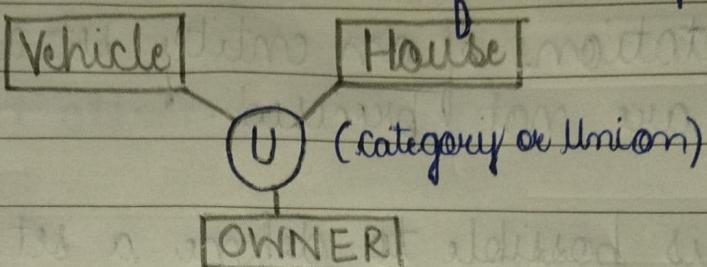
Generalisation is a process of an entity which contains generalised attributes or properties of generalised entities. It is a bottom up process.

Specialisation is a process of identifying subsets of an entity that share some different characteristic. It is a top down approach.



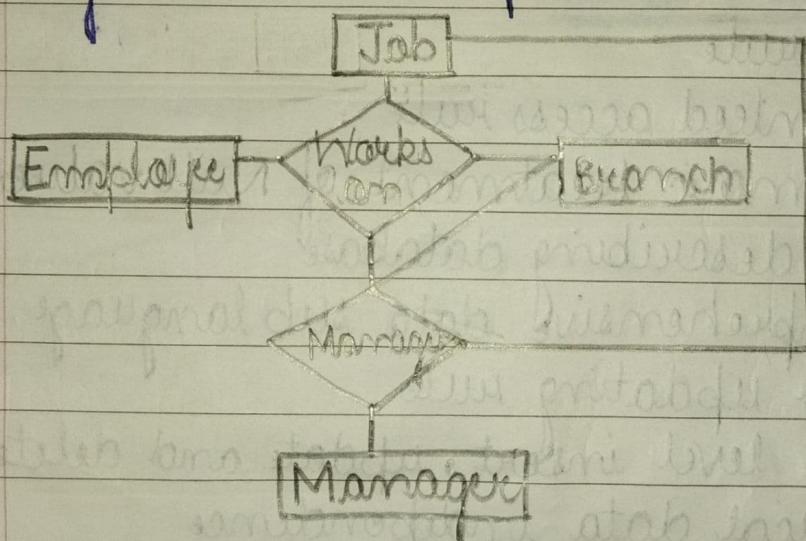
(3) Category or Union

Relationship of one super or sub classes with more than one superclass while owner is the subset of two superclass.



(4) Aggregation

It represents relationship between a whole object and its component.



ERD issues

- c A common mistake is to use the primary key of an entity set as an attribute of another entity set instead of using a relationship.
- c It is not always clear whether an object is best expressed by an entity set or relationship.

- Relationships in databases are often binary but could be represented by several other ways.
- Notations of an entity set and a relation set are not precisely defined.
- It is possible to define a set of entities & relationship among them in no. of different ways.

Codd's Rule

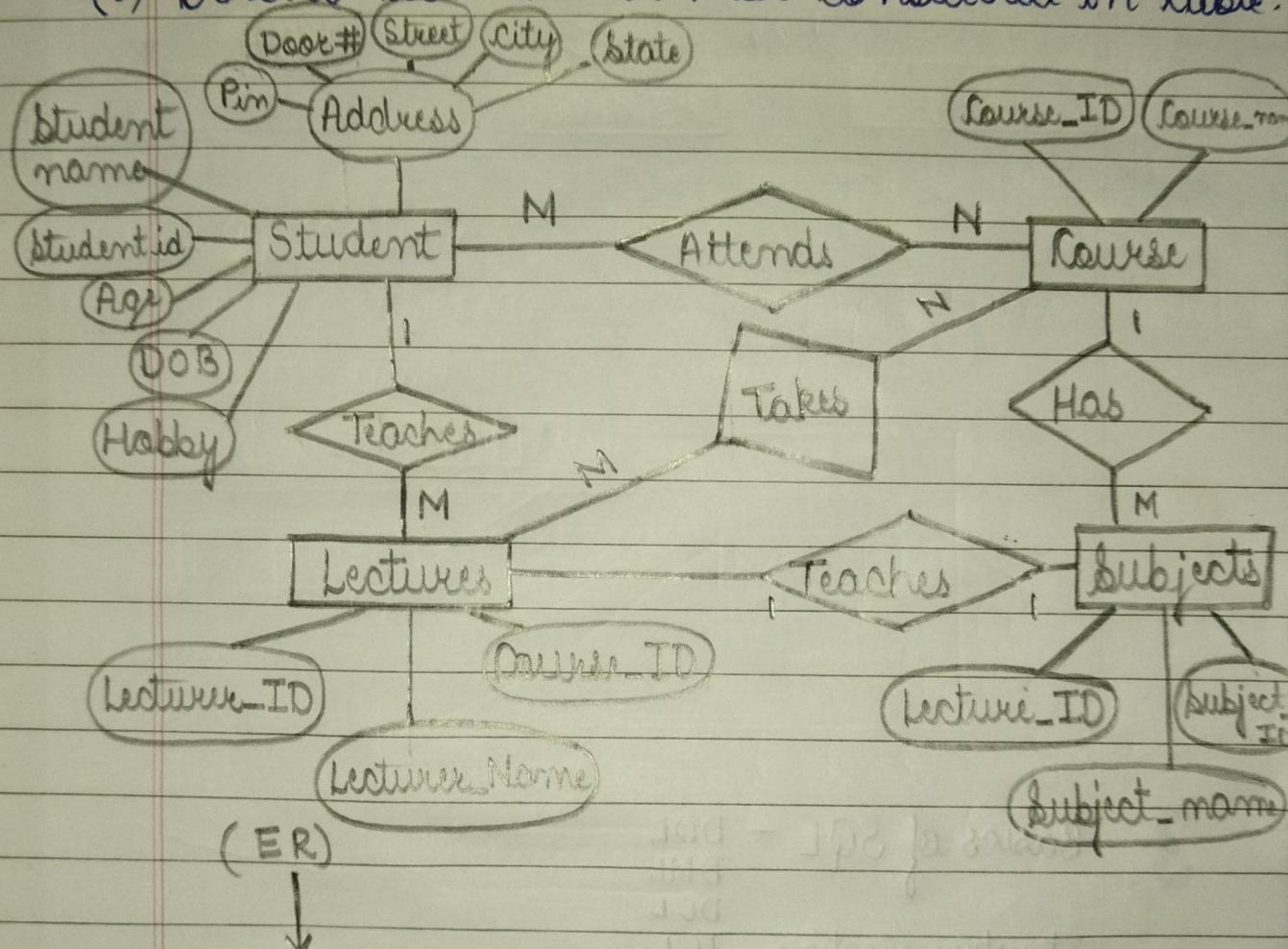
- Info. rule
- Guaranteed access rule
- Systematic treatment of Null values.
- Self describing database
- Comprehensive data sub language.
- View updating rule
- High level insert, update and delete.
- Physical data independence
- Logical " "
- Integrity independence
- Distribution "
- Non sub version rule

ER to Relational Table

- (1) Entity type becomes a table.
- (2) All single valued attributes becomes a column for the table
- (3) A Key attribute of the entity type represented

by primary key:

- (4) Multivalued attribute is represented by a separate table.
- (5) Composite attribute is represented by components
- (6) Derived attribute is not considered in table.



(Relational Table)

| student | lecturer | subject |
|------------------------|--------------------------|-------------------------|
| <code>std-id</code> | <code>Lect_id</code> | <code>sub-id</code> |
| <code>std-name</code> | <code>Lect-name</code> | <code>sub-name</code> |
| <code>DOB</code> | <code>course_id</code> | <code>Lect_id</code> |
| <code>Street</code> | | |
| <code>city</code> | | |
| <code>State</code> | | |
| <code>Pin</code> | | |
| <code>course_id</code> | | |
| | <code>course</code> | |
| | <code>course_id</code> | |
| | <code>course-name</code> | |
| | | <code>stud_Hobby</code> |
| | | <code>stud_id</code> |
| | | <code>Hobby</code> |