

UNIT -> 2

Data Models

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In a Database Management System (DBMS), a group of similar information or data, which is of interest to an organisation, is called an **Entity**.

E-R-Model :- A model that represent system data by entity & relationships sets is called E-R (Entity-Relationship) Model.

The overall logical structure of a database can be expressed graphically by an E-R Diagram. It is introduced by P.P. Chen.

Components of E-R Model :-

- 1) Entity.
- 2) Attributes
- 3) Relationships
- 4) Key.

1) Concepts of Entity :- An entity is a class of persons, places, object, event, or concepts about which we need to collect & store data.

• Categories of different entity :-

- i) Persons: Employee, Customer, Students, suppliers etc.
- ii) Places: Branch office, Building, Room etc.
- iii) Objects: Book, Machine, Vehicle etc.
- iv) Events: Sale, Reservation, Registration, Order etc.
- v) Concepts: Qualification, Account, Course, Stocks etc.

The instance of an entity is a single occurrence of that entity.

For example :-

The entity EMPLOYEE may have multiple instances such as:- Jyoti, Jayanti, Khushi etc.

2) Attributes :-

Each entity can have a no. of characteristics. The characteristics of an entity are called Attributes.

For example, :-

An entity student have no. of attributes
ex:- Roll, Name, Address, ph.no, Balance.

Relationships :-

An entity is a thing which can be identified. It may be an object, place, person, pt or activity for which data need to be recorded.

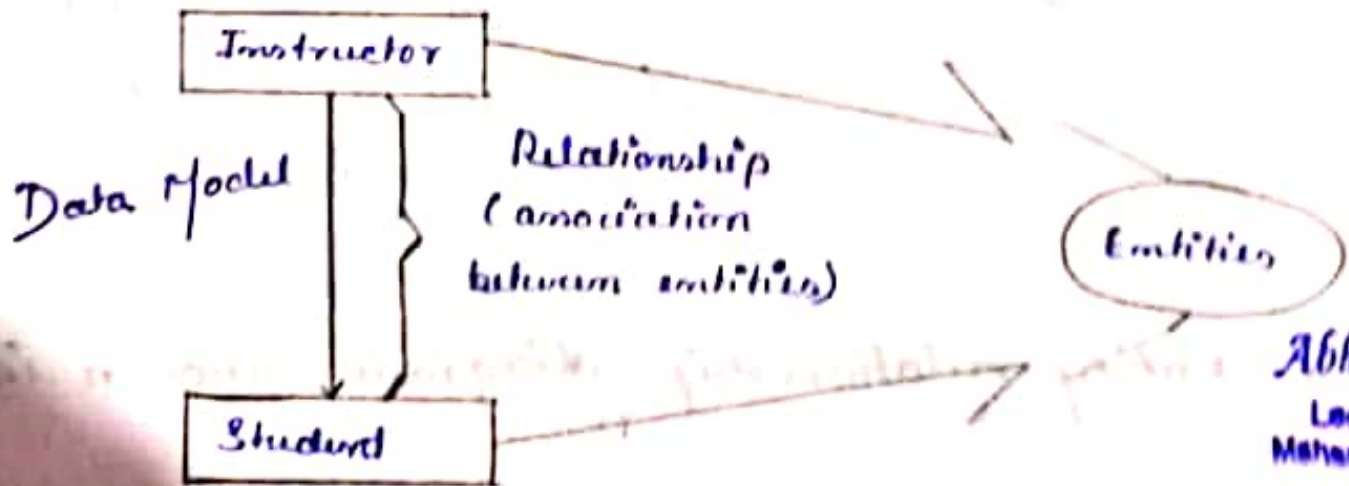
In Diagramming technique, entities are normally represented inside a box.



(Entities Instructor & Student).

An association among entities leads to relationship.

For ex:- There is a relationship between instructor & student.



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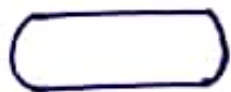


Key Attribute :-> The key attribute is an attribute uniquely identifies an entity in the entity set.

For ex: -> Roll-No, Employee-Code.

The entity set employee because it uniquely identifies each employee entity.

Drawing E-R Diagram

E-R Diagram uses symbols:-

<u>Name</u>	<u>Symbol</u>	<u>Meaning</u>
Rectangle		Representing entity sets.
Oval		Representing attributes.
Diamond		Represents relationships among entity sets.
Line		Represent Link attribute to entity set & entity to relationships.

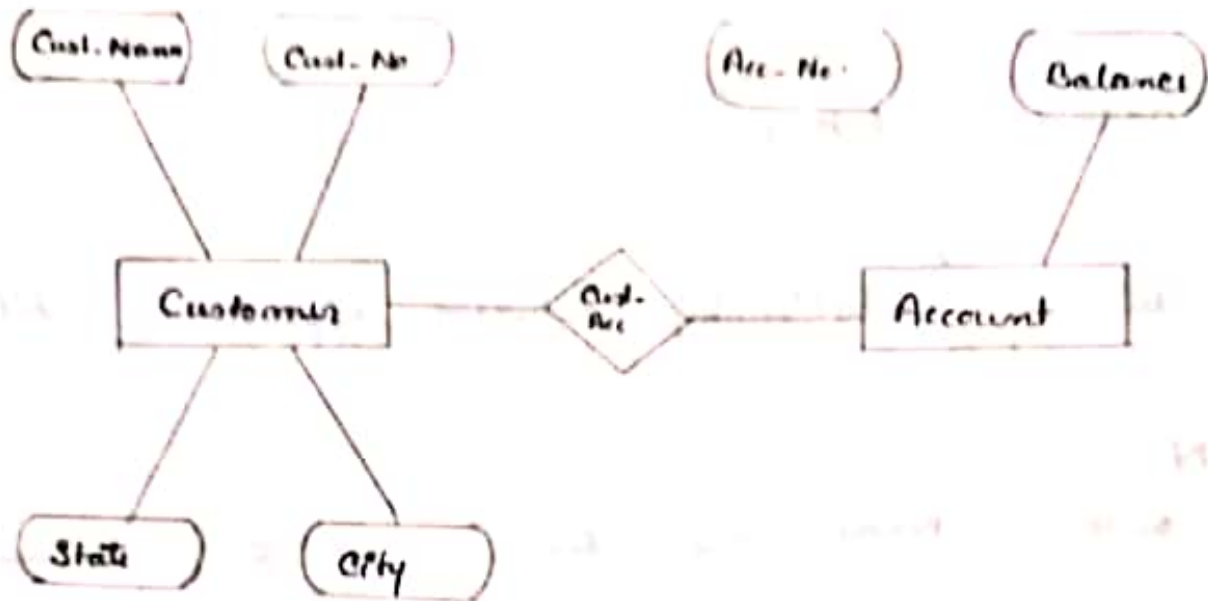
Ex:-

Consider the entity relationship diagram shown below.

Two entity set customer & Account relates through a relation set cust-acc.

Customer (Cust-Name, Cust-No, & City)

Account (Acc-No, & Balance)



Teacher

T.No	Name	Address	Salary

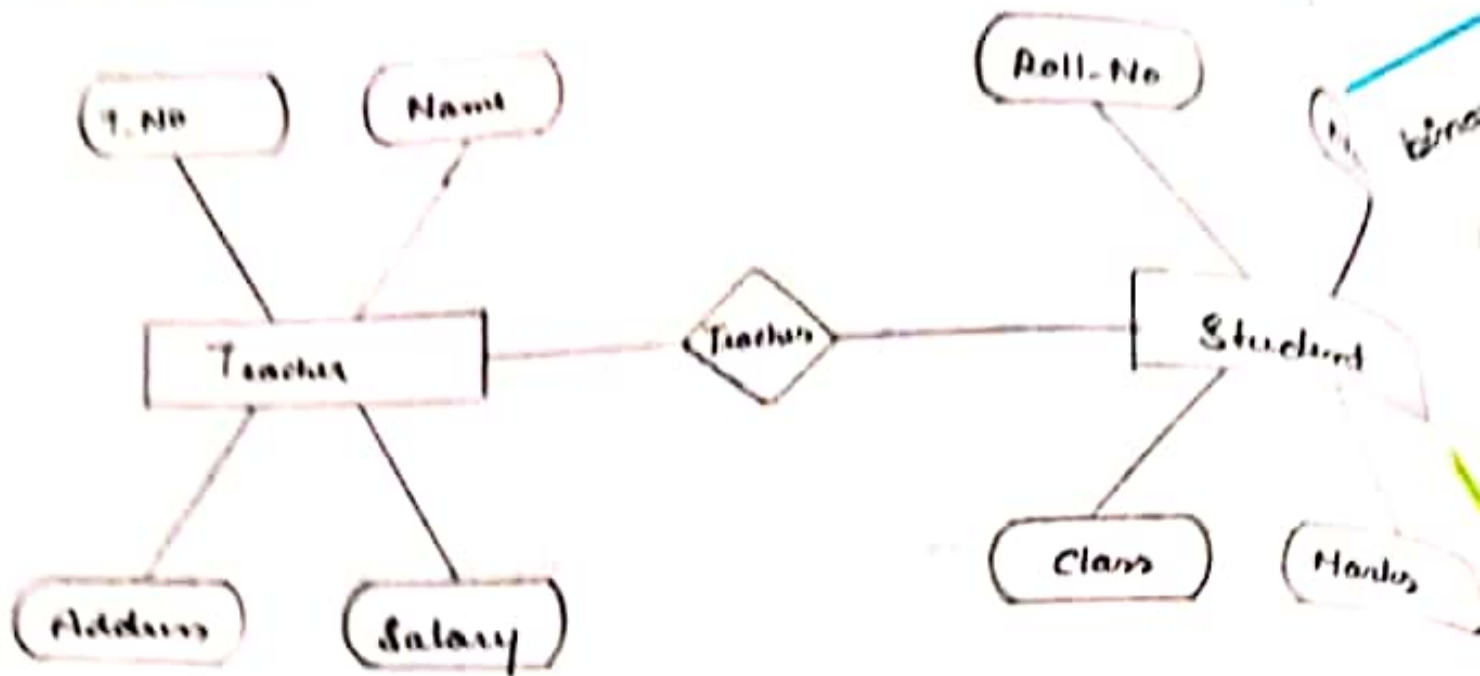
Student

Roll	Name	Class	Grade

Note:- T.No & Roll.No attributes are underlined because they are the key attributes.

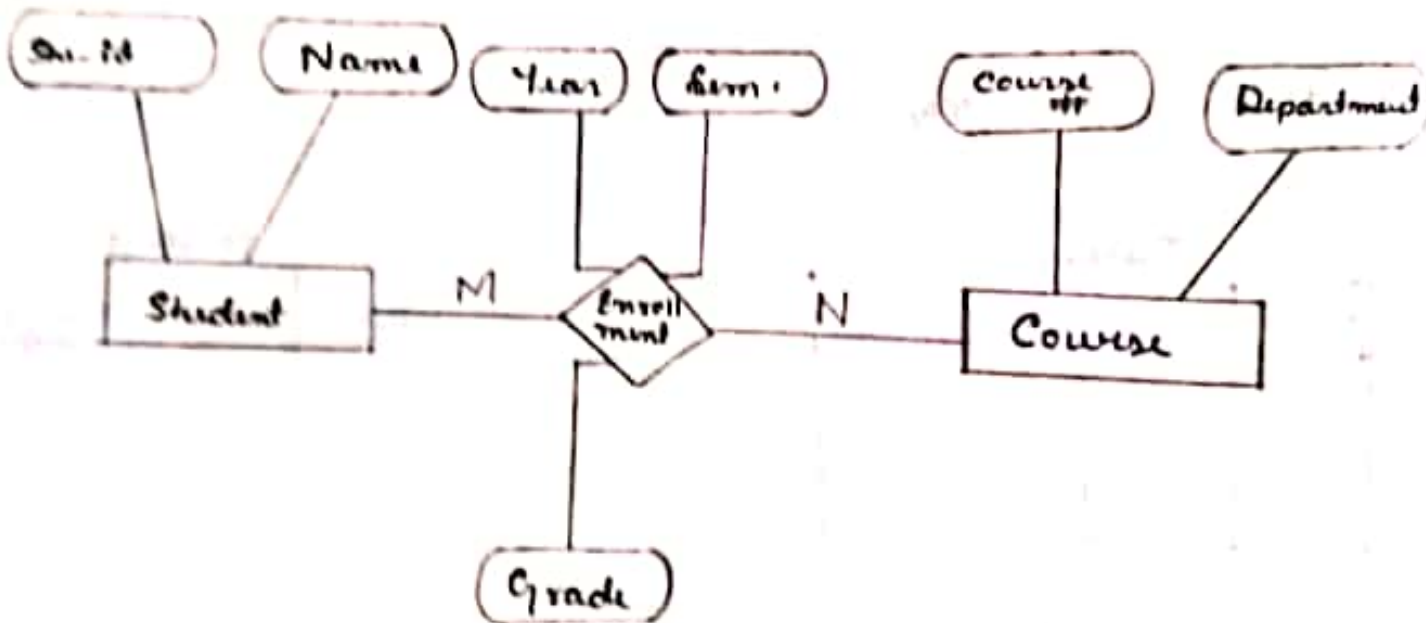
Key Attributes :- Unique value for each student.

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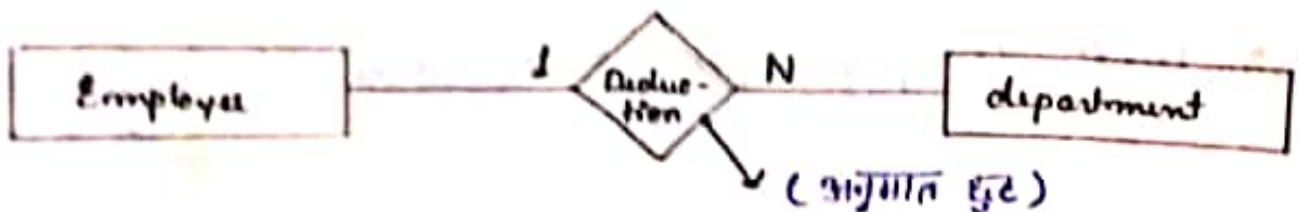


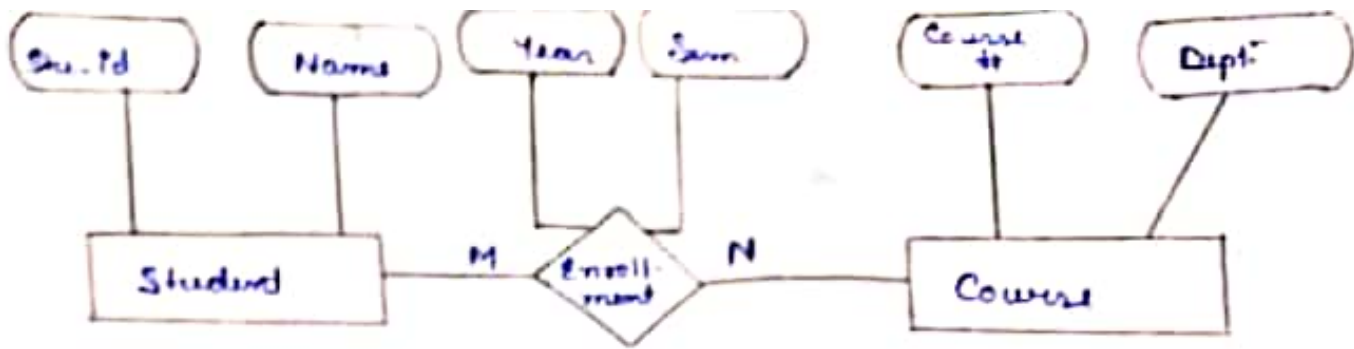
A binary relationship between different entity.

M:N



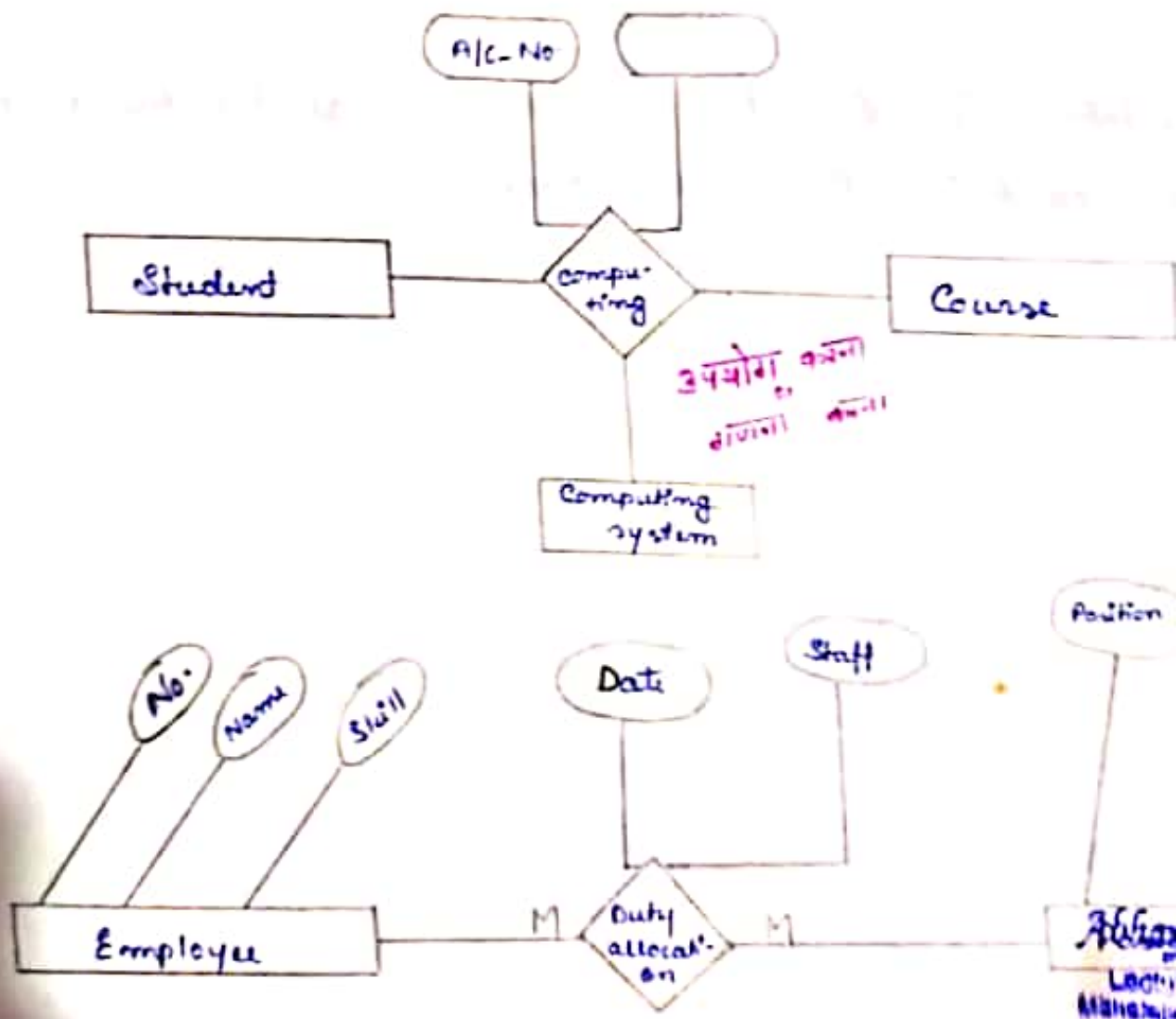
1:N





A relationship is a binary if the no. of entity involved is two.

2) A Ternary Relationship.



With Representation of Relation

Emp- No.	Name	Staff
123	Ram	waiter.
124	Raja	Bar tender
125	Rani	Buoy boy
126	JON	hostess
127	RON	bill boy

Position
32
33
34
35
36

Position	Emp- No	Date	Staff.
321	123	19/04	1
323	124	14/04	4
32	125	20/04	3

Abstraction :- Abstraction is the simplification mechanism which is used to hide superfluous details of a set of entities.

used to hide superfluous details

It allows one to concentrate on the entities that are interest to the application.

Ex:-

Car is an abstraction of a personal transport vehicle but does not reveal details about Model, Year, Color, & so on.

Vehicle itself is an abstraction that includes car, truck & Bus.

Abstraction Types :-

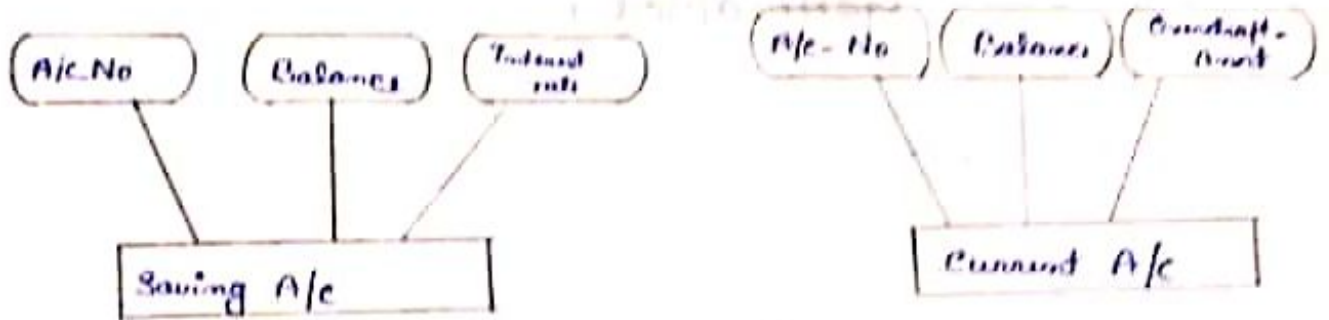
Generalisation :-

Generalization is the abstracting process used to emphasize the similarities among lower-level sets & to hide the differences. It also permits an economy of representation so that shared attributes are not repeated.

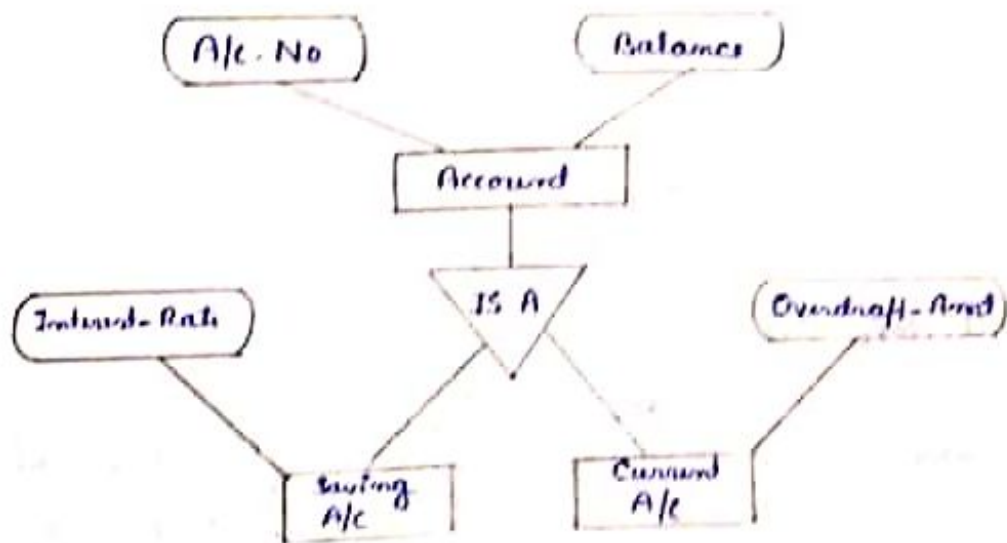
In the other word Generalization is the result of taking the union of several lower

entity sets to produce higher-level entity set.

E-R Diagram Generalization is represented through a triangle ∇ component labels ISA as seen ∇ with

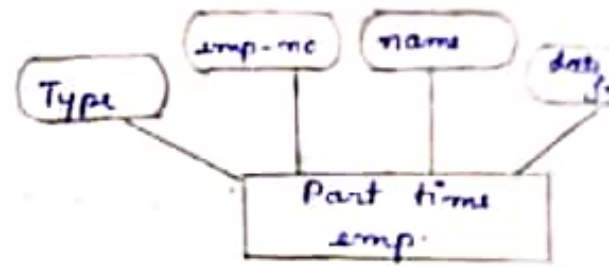
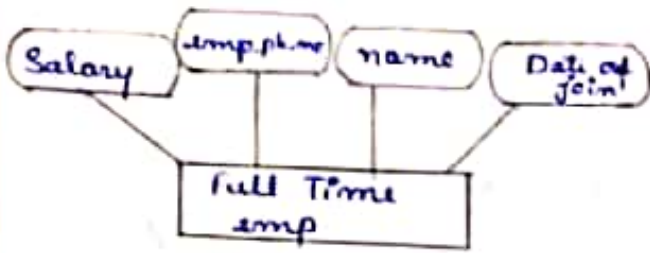


↓ Generalized as ↓

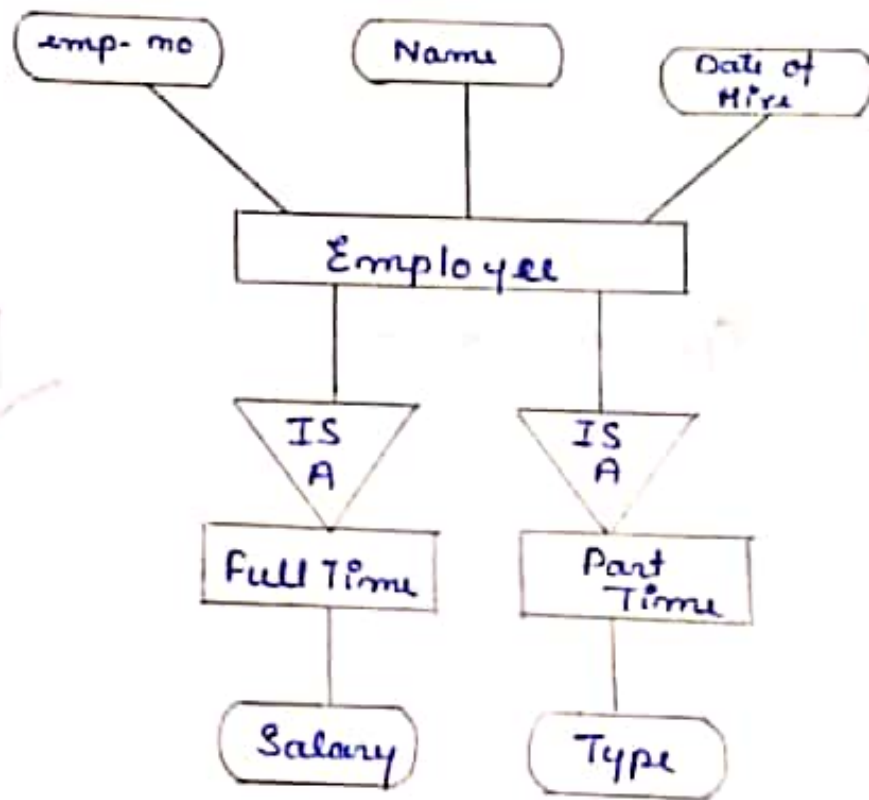


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Generalised as:-

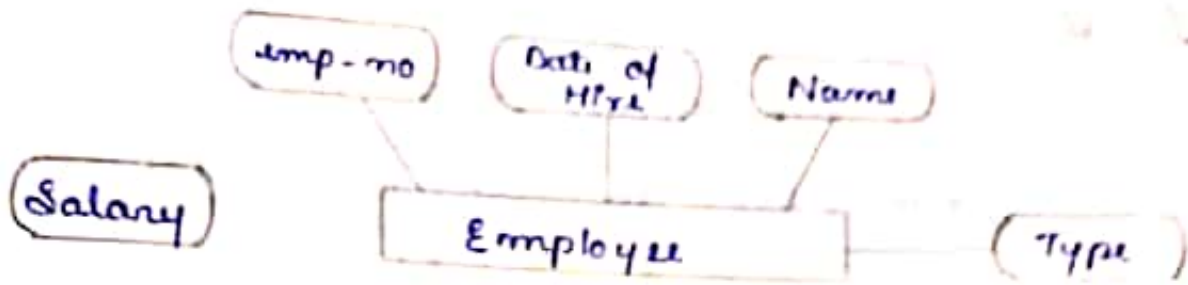


* Specialization :-

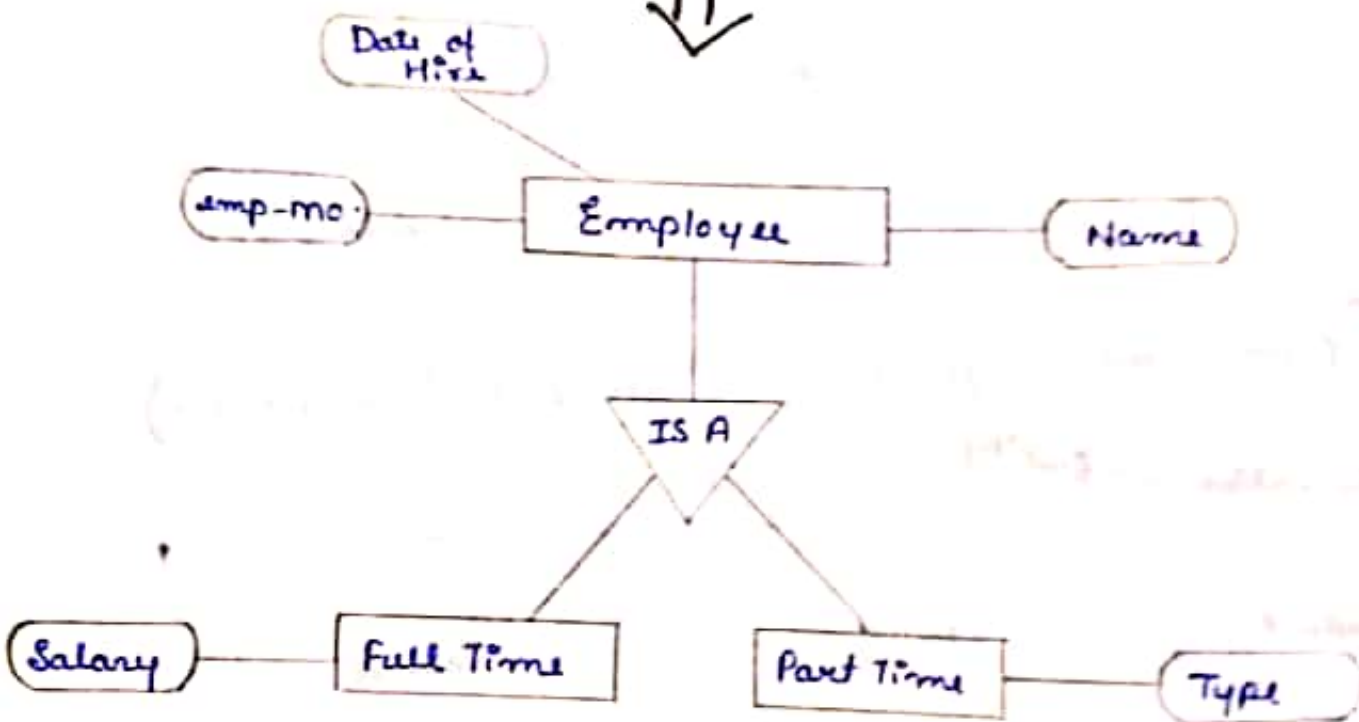
May be the reverse process of Generalization: additional specific properties are introduced at a lower-level in a hierarchy by object

Specialization is the abstraction process by introducing new characteristics.

Example

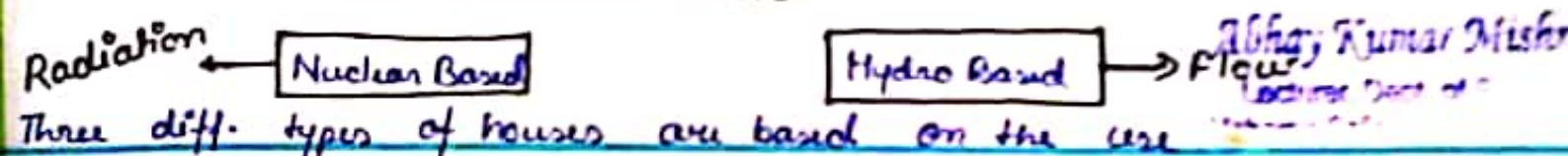


Specialized as:->



Specialization is the result of taking subsets of a higher level entity set to form lower-level entity sets.

Plant:-> (Flow, Location Radiation, Owner pressure) special as Stream based.



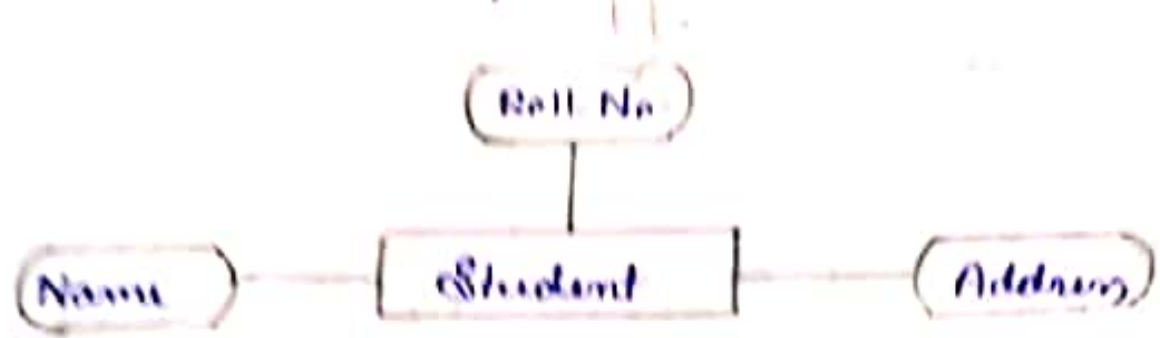
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Three diff. types of houses are based on the use

Aggregation (Collection, staff, students)

Aggregation is the process of compiling information system by abstracting a higher-level

In this analogy and is derived by name, Roll-no., Address

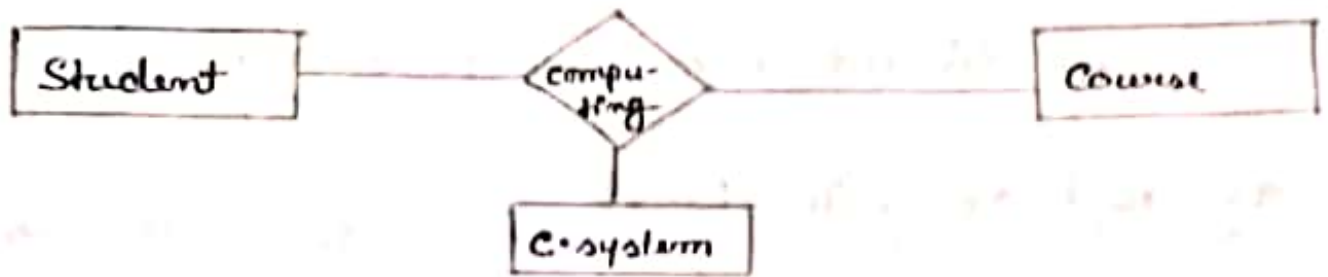


Abstraction

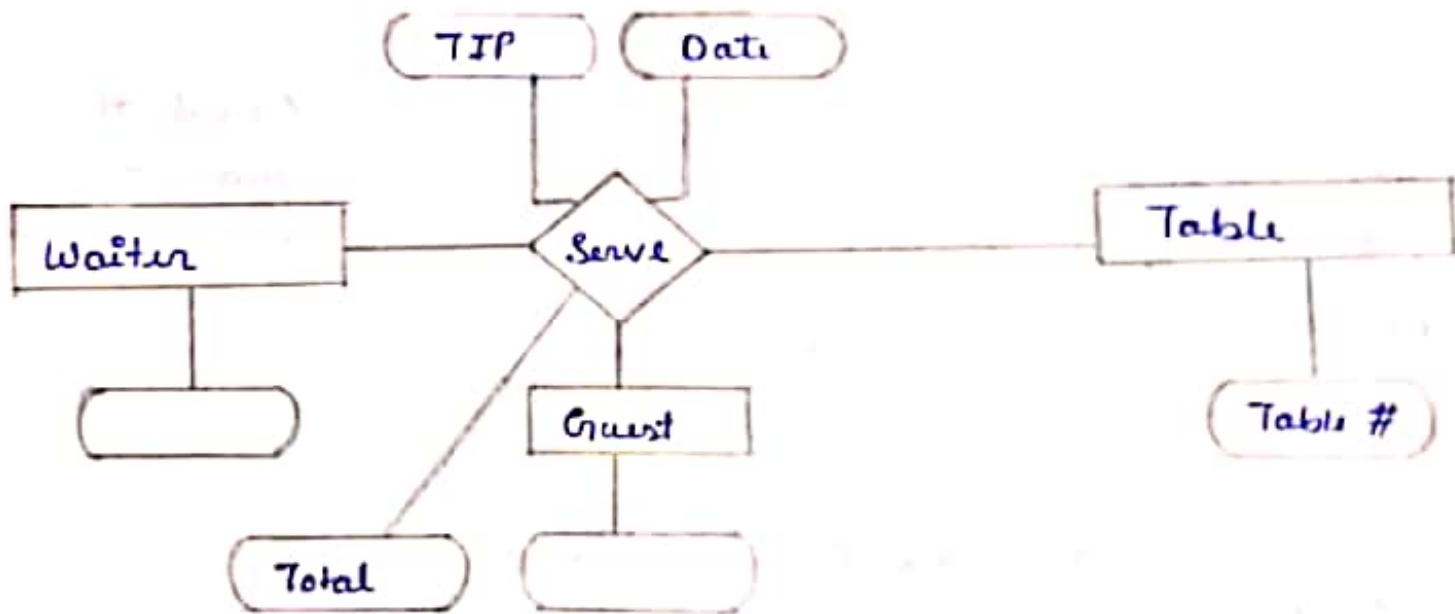
We can represent it in E-R Diagram.

Registration - Entity





Bill →



Many commercial system & research database Model fit with in this framework.

It can be divided into the following three level.

External Level or View Level

(Data diff. view i.e. A/c holder, Current A/c, Transaction etc.)

Conceptual Level

Internal Level or Physical Level.

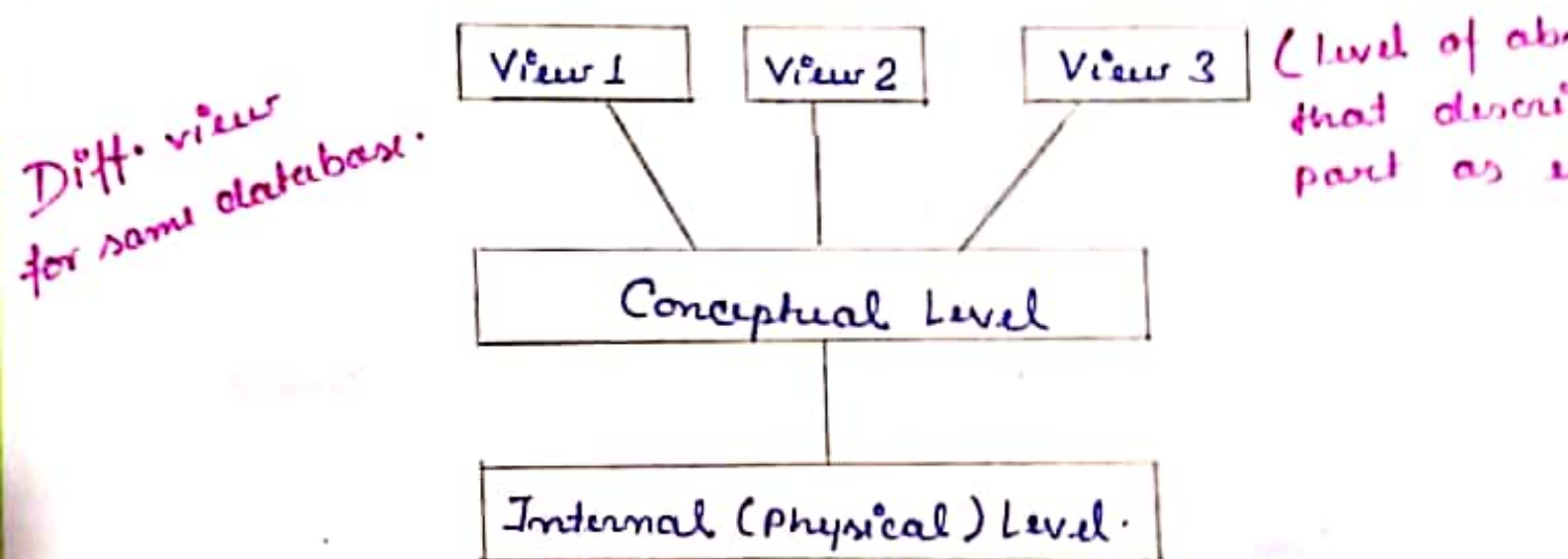


Fig. 3-level architecture as per ANSI/SPARC.

External / View Level → The external view level the architecture of database system is the closest to the users.

This level is concerned with way in which data are observed by individuals.

Even though the bank database stores a lot of information, the holder would be interested only in the details of the amount interest of the transaction made at that time. It provides different views for same database.

Conceptual Level

Conceptual level of DBMS describes the different types of data actually stored in a database.

They are concerned about what information should be kept in database.

Internal Level (Physical Level)

The lowest-level is the internal level. It is the one (from logical to physical) stored in the database.

This level is also termed as Physical level, because it describes how data are actually stored on the storage medium such as Harddisk, Magnetic tape etc.

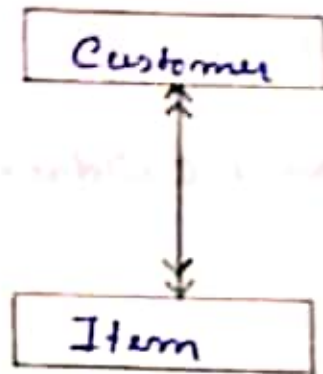
That means how data is actually stored on the storage medium.

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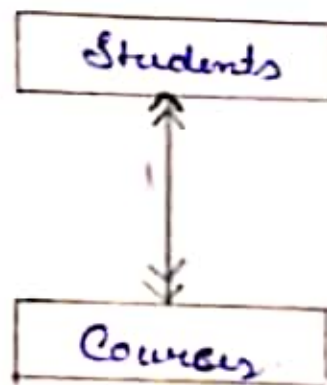
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For example:-

A customer may buy many items & one item may be bought by many customers.



Student & Course.



This relationship represent the fact that an instructor teaches several student & a student is taught by several instructor.

Three types of Relationship exist among entities.

One-to-one

One-to-many

Many-to-many.

One to Many Relationship (1:M)

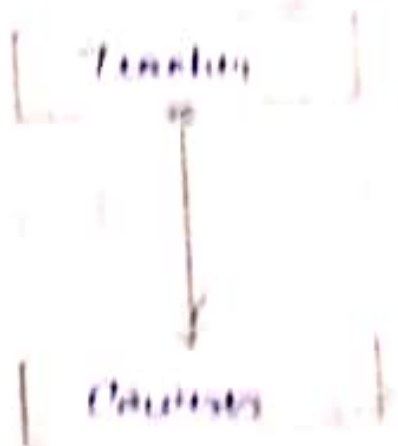
1:M relationship where one entity is related to many instances of another entity.

For example

① A father may have many children but a child has one father.



② Teacher & Course



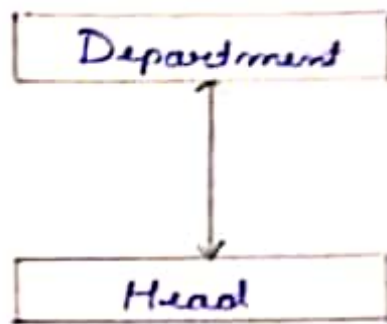
Many to Many Relationship (M:M) describes two entities that may have many-to-many relationships among themselves.

One-to-One Relationship (1:1)

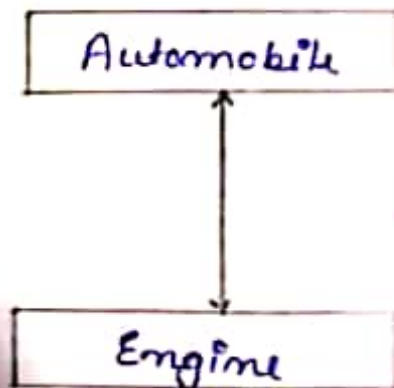
Relationship is an association only between two entities.

For example:-

In a university each department has only one head of the department & each department one have one faculty member cannot head more than one department.



Car does not have two engines & that a car must be fitted with one engine to be considered a car.



एक Automobile में एक Engine
एक Engine को Automobile में
गर्ती हो सकता.

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