Final

object ← Entity Relationship Model (ER Model)

↳ Conceptual or logical modeling

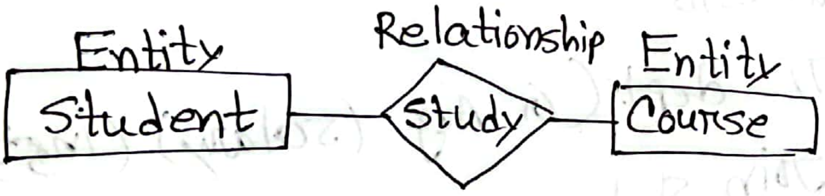
↳ graphically represent the requirments.

Student (Rollno, address) → Schema

Entity Attributes

↓

Physical existance



Attribute → describes characteristics of Entity.

Entity ~~Int~~ Instance

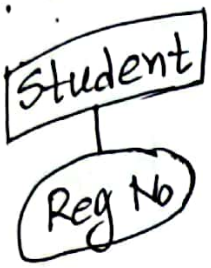
↓

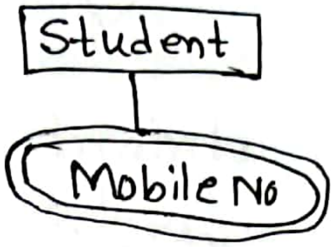
Student → Chini

Entity Entity Instance

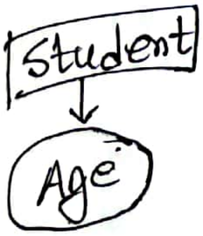
Types of Attributes

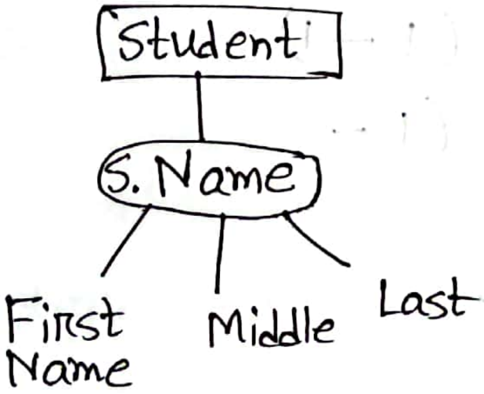
1. simple vs Multivalued Attri



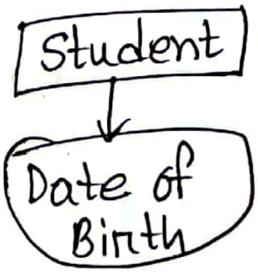


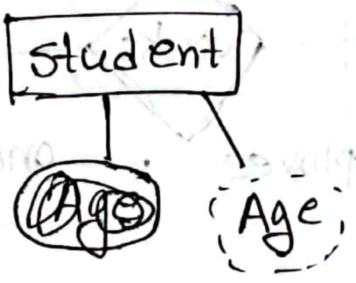
2. Simple vs Composite





3. stored vs Derived Attribute

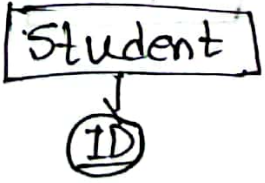


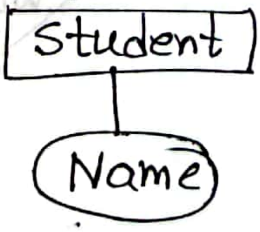


4. ***Key vs Non-Key

↳ Can not be repeated → Non unique

unique





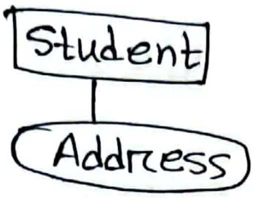
5. Required vs optional

↓

Mandatory → Name

~~Not~~ can be Skiped → Mobile

6. Complex (composite + Multivalued)



* Types of Relationship

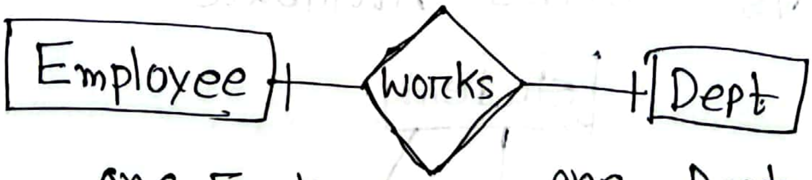
(I) One to one (1 — 1)

(II) One to Many (1 —

(III) Many to one

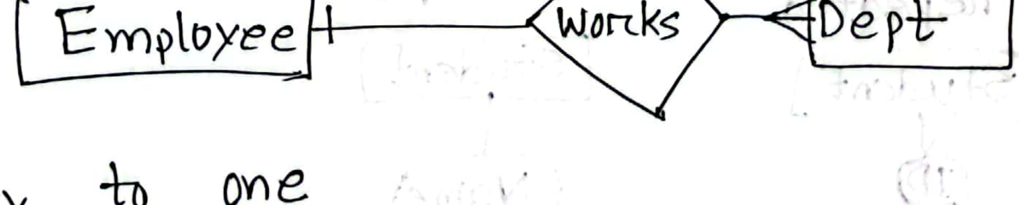
(IV) Many to Many

1. One to one

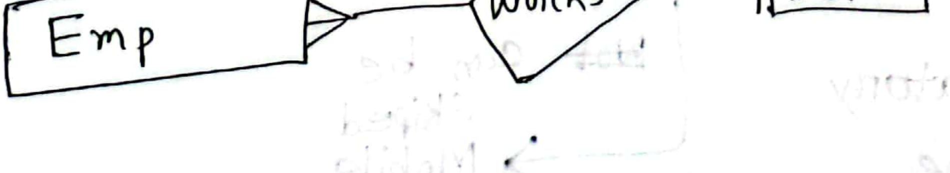


one Employee " one Dept

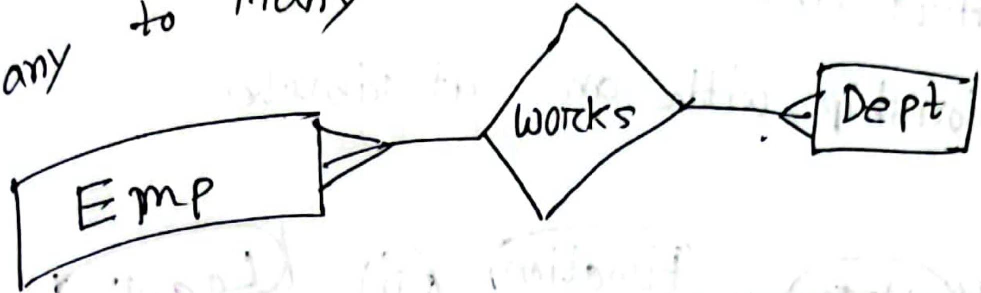
2. One to Many



3. Many to one



(IV) Many to Many

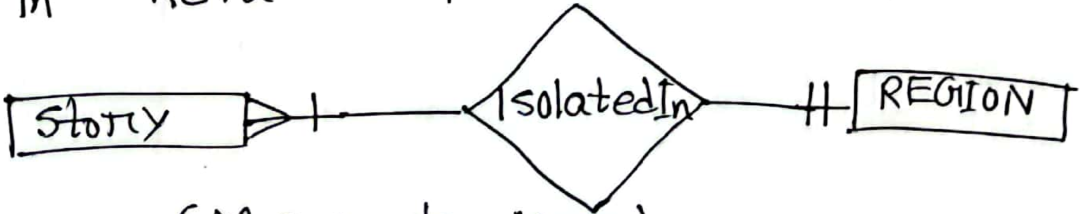


* Cardinality Constraints

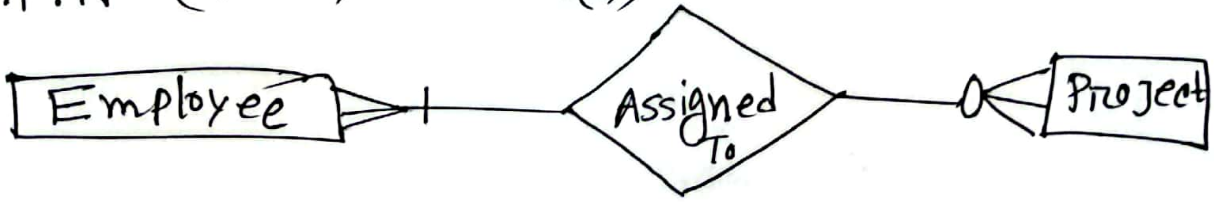
- Maximum cardinality
  - → One (1)
  - → Many (>)
- Minimum
  - → Optional (0)
  - → mandatory (1)

| → one
> → Many
0 → optional
0+ → Mandatory Many
>0 → Many + optional
|| → Mandatory + One

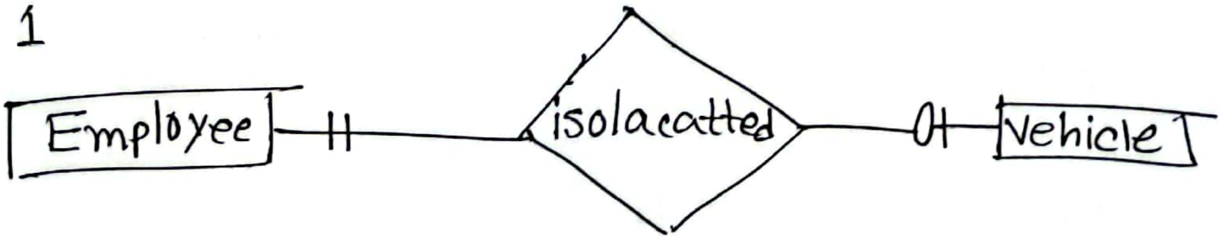
(*) 1 : M Relationship



(*) M:N (Many to Many)



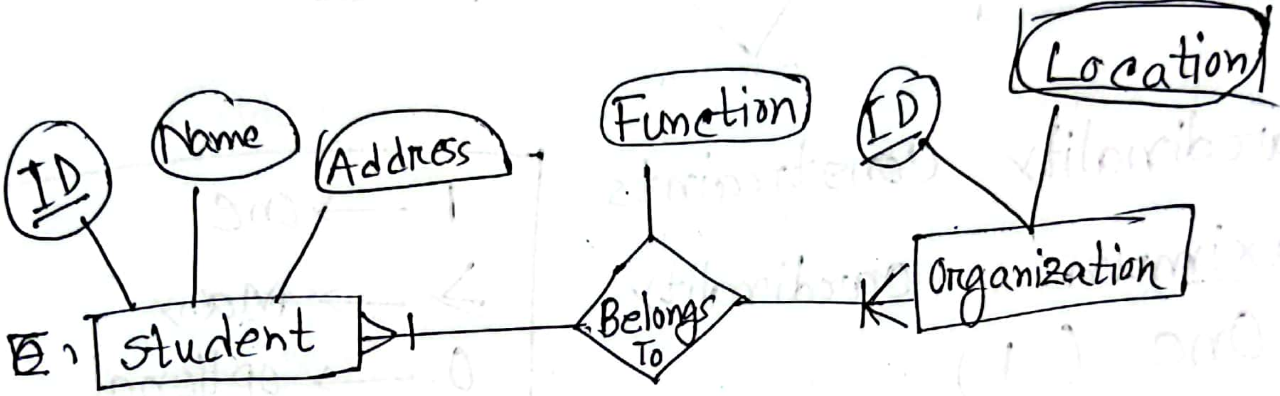
(*) 1 : 1



* Relationship instances – it occurrs when an instance of one entity is related to an " " another " via a relationship

#Relationship Attributes

M:N relationship with an attribute

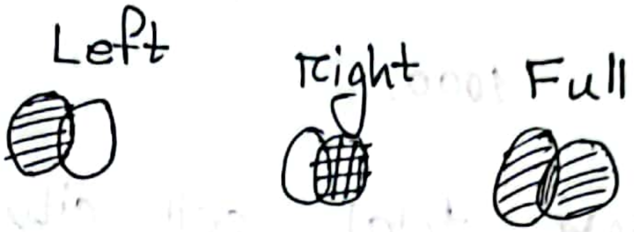


Lab-2

Joins

Inner Join
↓
common

Outer Join



DB shop

Customer

C-ID	Name	Phone	City
1	A	017--	Dha
2	AB	019--	Raj
3	ABC	018--	Dha

Order

O-ID	C-ID	Date	Ammount
101	1	2023-1023	700
102	3	2023-10 23	1250
103	1	2023-10 24	370
104	1	2023-10 - 24	1300

Select customer.Name, Order.Date

from ~~Customer~~ Order join ~~Ordere~~ Customer

On Order.C-ID = Customer.C-ID

(1) Perform inner join

(ii) " left "

(iii) " Right "

(iv) " full "

(I) Print invoice num which sell on 23 Oct.

(II) Print the GP Users info. like Phone varchan

(III) Show the C_ Name who buy more than 1000.

(IV) Show total sell city wise

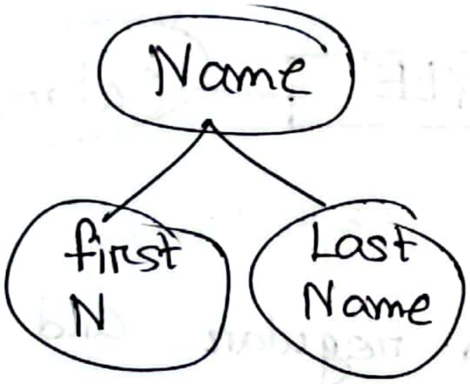
(V) Show the customer who spend maximum taka in the store.

(V)
```
Select customer. Name
From ordeer Join customer
on ordeer. C_ID = customer. C_ID
where Ammount = (Select MAX(Ammount) From ordeer);
```

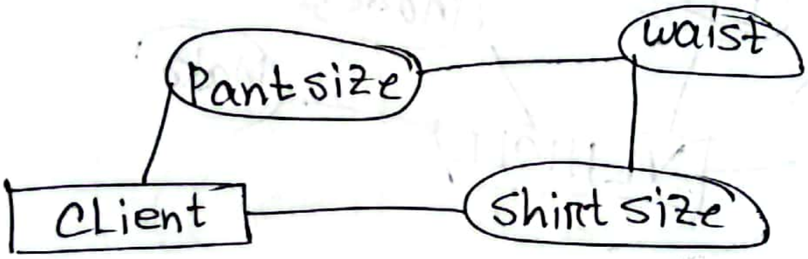
Lec

Attribute

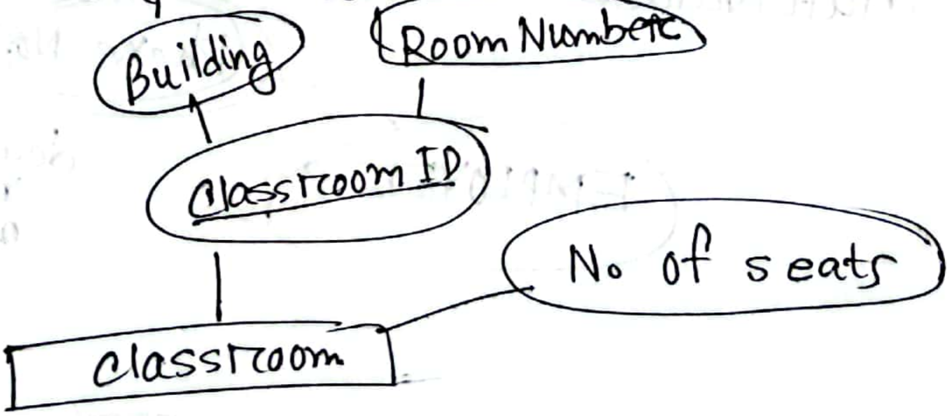
*Composite → যে attribute-কে আলাদা করা যায়



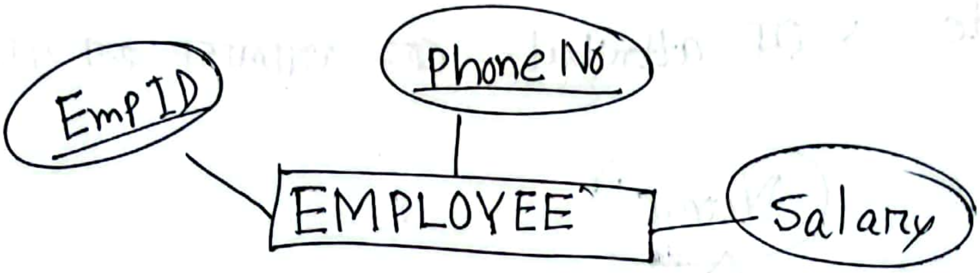
* Composite attributes sharing components.



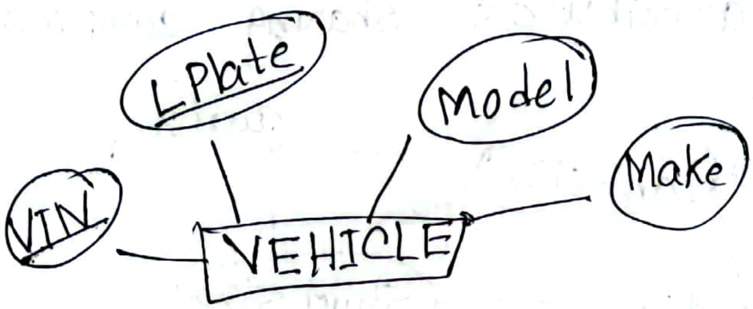
* Composite unique attribute



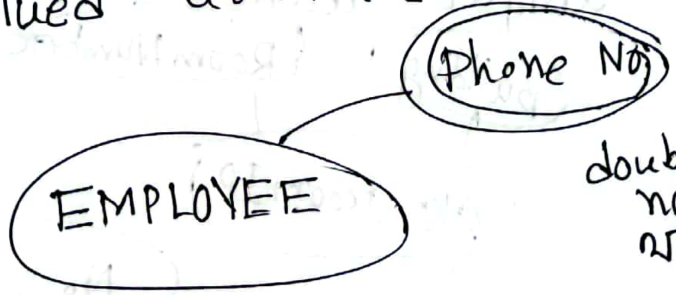
* Multiple Unique attribute–
↓
Candidate keys



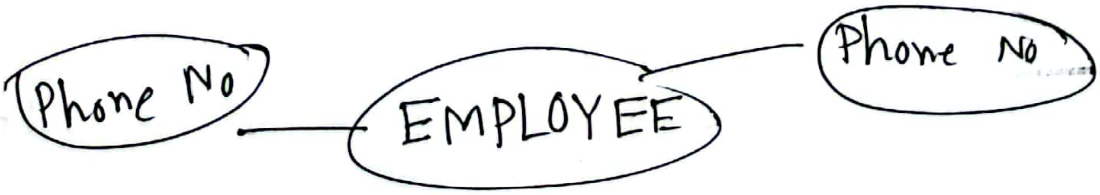
An Entity with a regular and composite candidate key



* Multivalued attribute

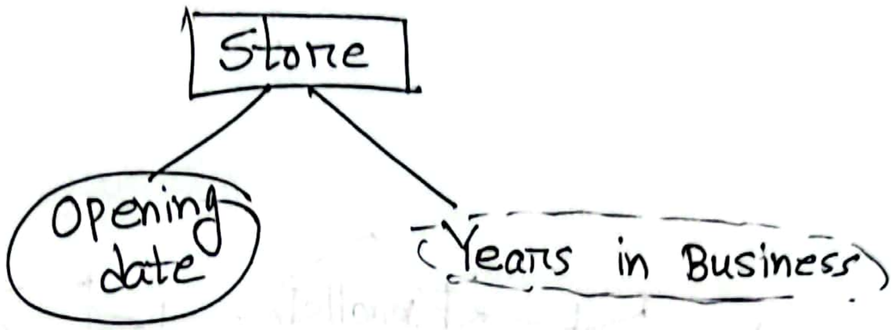


double no থাকতে পারে

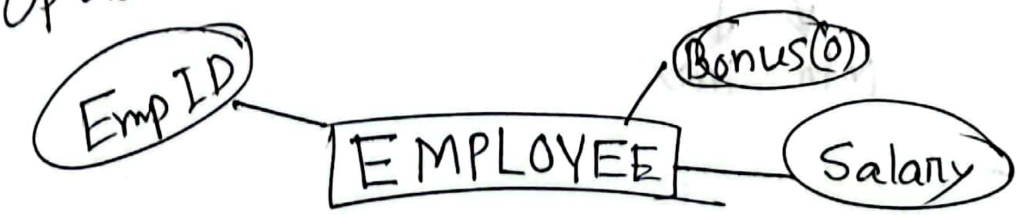


This is not Multivalued.

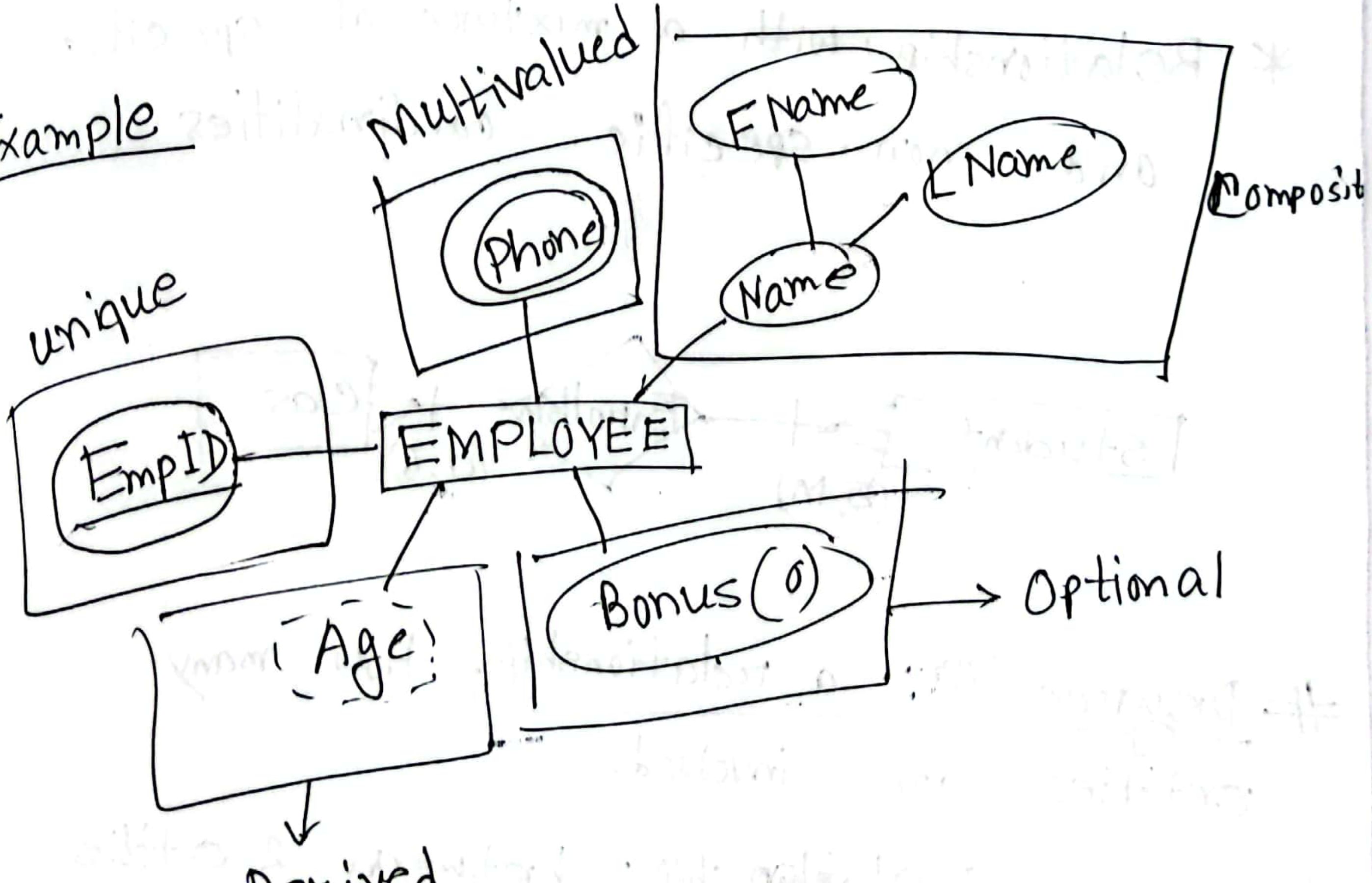
* Derived attribute: values are calculated



* Optional attribute: (0)

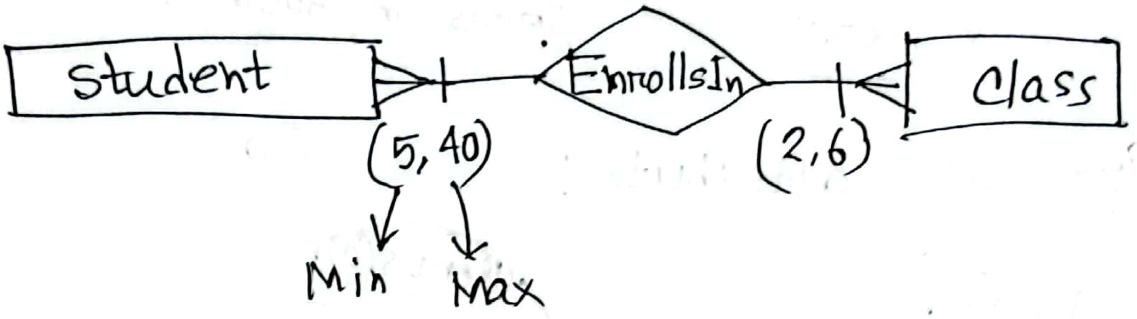


Example

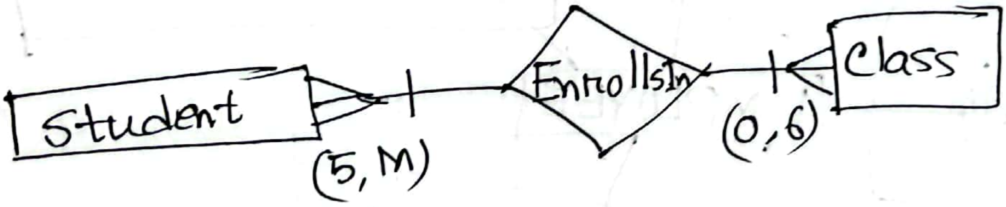


Relationships

Minimum , Maximum



* Relationship with a mixture of specific and non-specific cardinalities



Degree of a relationship: How many entities are involved.

Binary rela~~tion~~ship : between 2 entities (degree 2)

Unary ~~relash~~ relationship : an entity is involved with itself

weak entity নিয়ে পড়ে নিও

Naming Conventions For ER Diagrams:

Name → Unique, brief, meaningfull

Multiple Diagrams:

Lab-2 - University

Teacher

ID	Name	Email
1	x	x@
2	y	y@
3	z	z@
4	xy	xy@

Course

ID	Title	T_ID
122	OOP	2
131	DBMS	3
157	DS	2
166	Bangla	1

St-course

S-ID	C-ID
1	122
1	131
2	122
2	131
2	157

Student

S_ID	Name	section
1	A	49-7
2	B	45-9
3	C	49-4

(I) show all info of four tables [where matches the condition

(II) Print the course names that is taken by Student A.

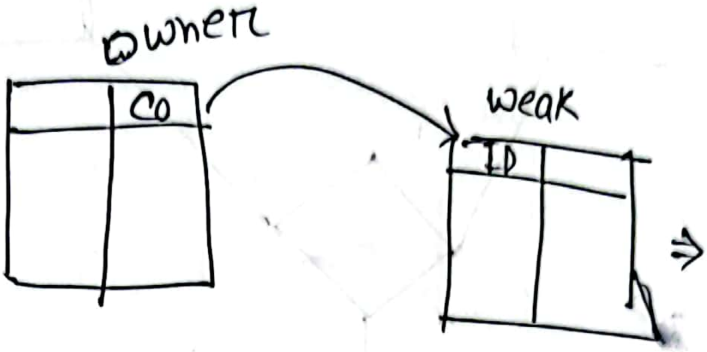
(III) Teacher 'X' teaches which course

(IV) List of students teaches by 'Y' sir

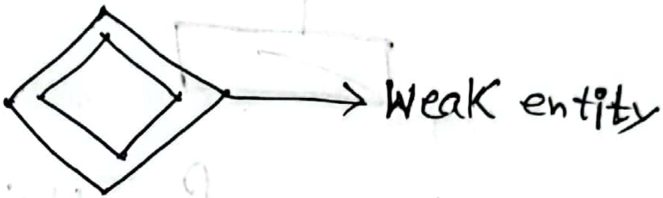
(V) Print students of section 7. Intake could be anything.

Lec

weak entity:



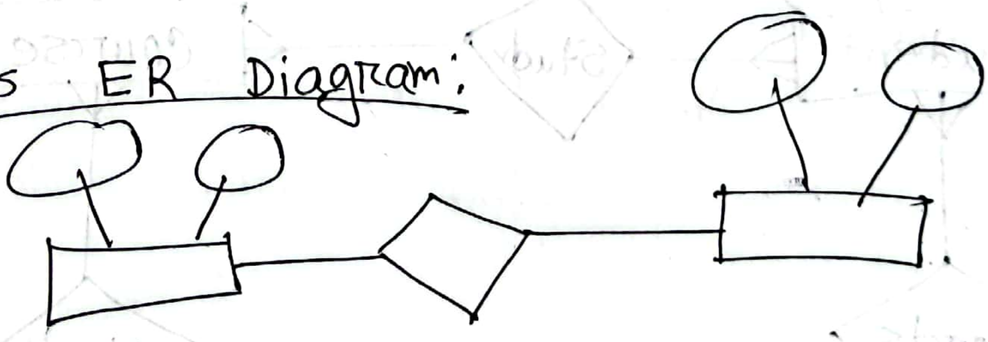
⇒ Unique key নেই

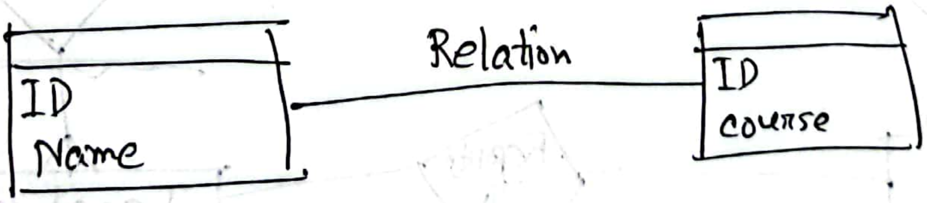


Multiple ER Diagram:

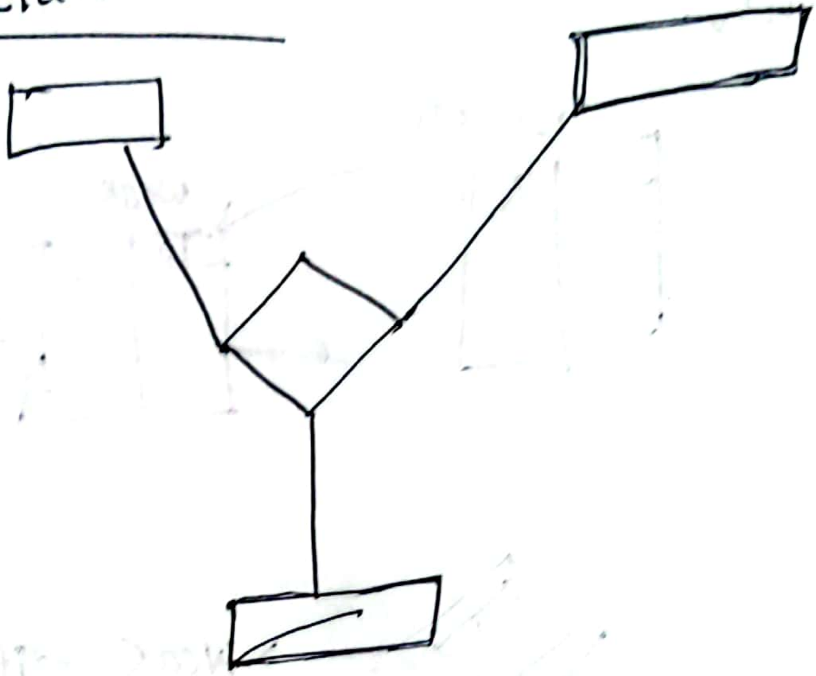
schema diagram → দুইটা separate ER Diagram

Various ER Diagram:

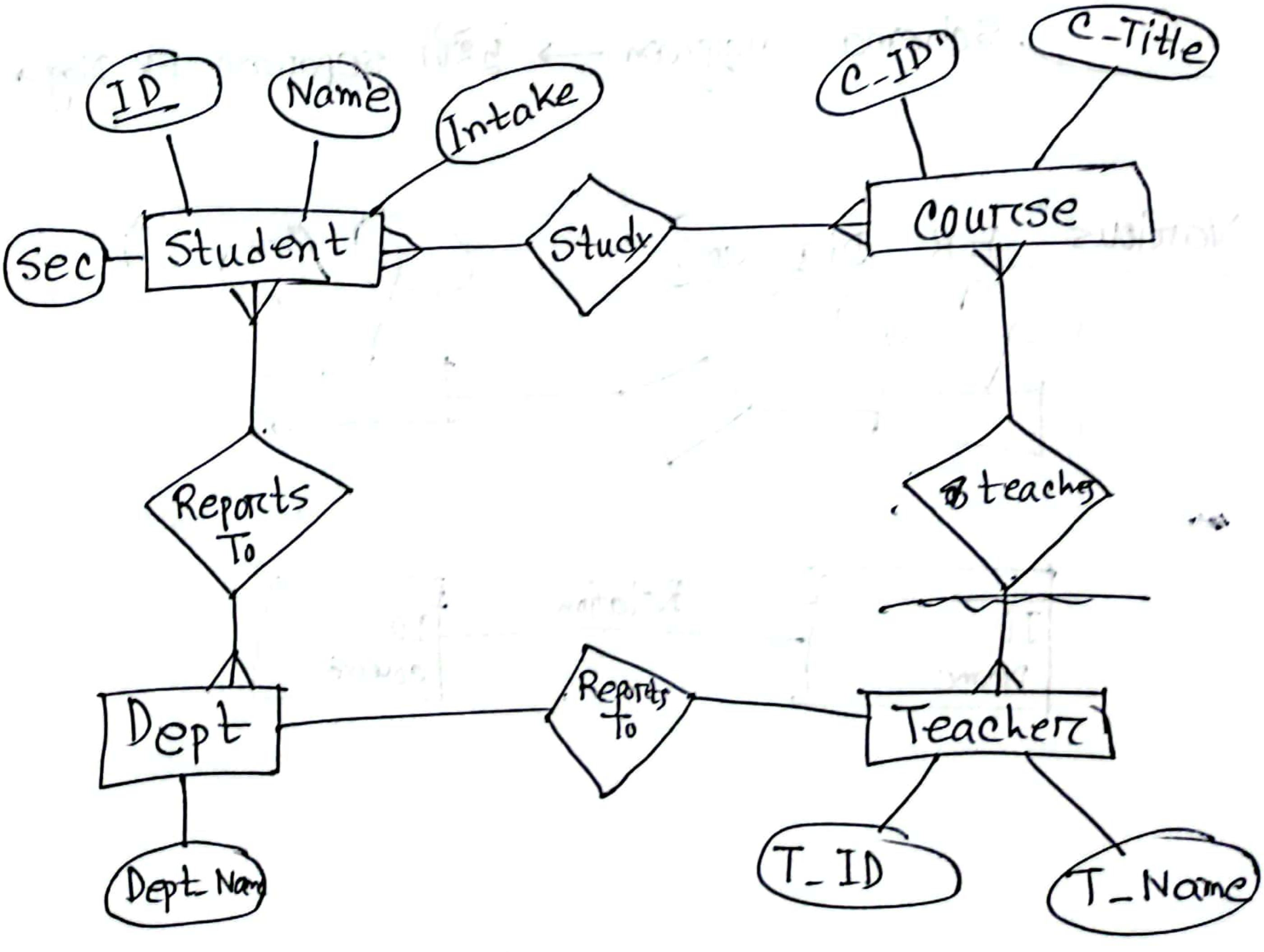




Ternary Relationship



Draw an ER Diagram for University management System (Annex)



Normalization (Chap-7)

Normalization is the process of minimizing redundancy from a relation or set of relations. Redundancy ~~may~~ in relation may cause insertion, deletiong and update anomalies. So, it helps to minimize the redundancy in relations.

Definition: In Database Management system (DBMS) normal forms are a series of guidelines that help to ensure that the design of a database is efficient organized and free ~~form~~ from data anomalies. → ভিন্নতা

There are several levels of normalization, each with its own set of guidelines, known as normal forms.

ID	Names
1	A
2	B
3	C
1	A

Primary key set করলে redundancy দূর হবে

Types

(i) First Normal form (1NF): This is the most basic level of normalization. In 1NF, each table cell contain only a single value and each column should have a unique name. The first normal form help to eliminate duplicate data and simplify ~~gue~~ queries.

(ii) Second Normal form (2NF): Should fullfill 1NF. It eliminates redundant data by requiring that each non-key attribute be dependent on the primary key. This means that each column should be directly related to the primary key and not to other columns.

ID	Name	Phone	Deg	Basic salary	Total salary
1	A	017.... 018....	Lec	30000	60000
2	B	016....	Lec	30000	60000
3	C	018....	Profe	150000	300000
4	D	017.... 016....	Profes	150000	300000

Single cell but double No.
So, 1NF ✗

* Decompsition
↳ 1 Table divided into 2 Table or more

Deg	Basic s	Total s
Lec	30000	60000
Prof	15,0000	300000

3NF : A relation will be in 3NF if it is 2NF and no

3NF :→ Need to be in 2NF

→ Has no transitive functional dependencies.

To move our 2NF table into 3NF, we again need to divide our table.

Transitive functional Dependencies: is when changing a non-key column, might came any of the other non-key columns to change.

User

ID	Name	Title	Phone	Address
1	x	Mr	017	Dha
2	y	Ms	018	Raj
3	~~xy~~ z	Dr	0166	Chg
4	xy	Prof	015	Dha

TID	Title
1	Mr
2	Mrs
3	Dr
4	Prof

BCNF (Boyce – Codd Normal Form)

Even when a DB in 3rd. NF, still there would be anomalies resulted if it has move than one candidate key sometimes BCNF is also refered as 3.5 NF

4NF: If no DB table instance contain two or more, independent and multivalued data descending the relevent entity, then it is in 4th NF. No Non-trival multivalued dependencies other than a candidate key.

5NF: A table is in 5th NF only if it is in 4NF and it can not decomposed into any number of smaller table without loss of data.

6NF: it is not standardized yet.

Decomposition: (i) loosy
(ii) lossless

* Advantage: (i) Reduce data redundency.
(ii) Improved data consistency.
(iii) Simplified DB design with flexibility.
(iv) Improve query performence.
(v) Easier DB maintence.

* Disadvantage: (i) Can not start building before knowing user total need.
(ii) Performance degrades when normalizing the relations to higher NF like 4NF, 5NF.
(iii) Time consuming.
(iv) Difficult to normalize relations of a higher degree.

(v) Careless decomposition may lead to a bad DB Design.

e Module 17

Trasactions

Transaction concept : (Set of instruction transaction