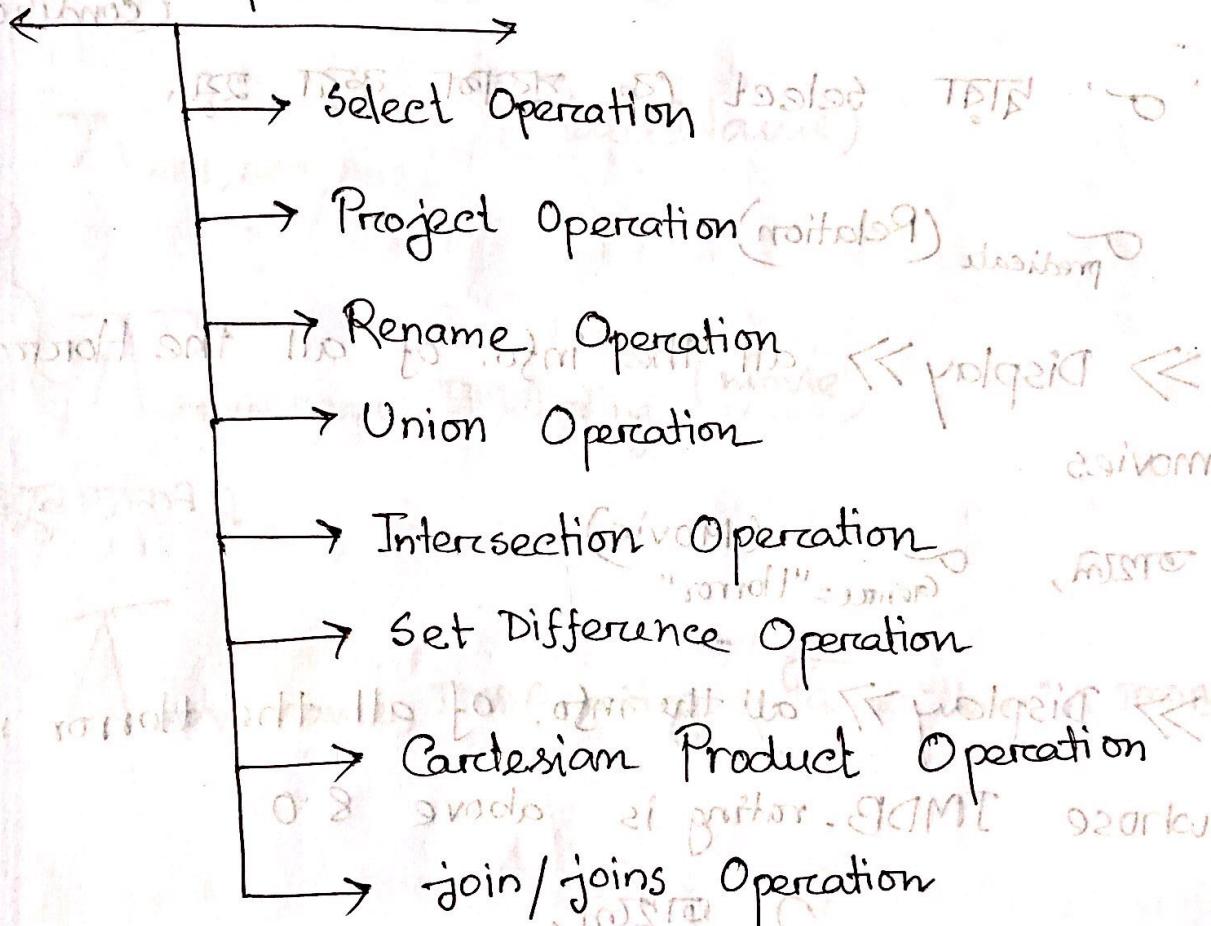


## Chapter - 6

## Relational Algebra

Set of Operations:



1. Select Operation:

Selects tuples

on the basis of  
a given predicate  
(condition)

'σ' দ্বারা Select কো প্রকার করা হয়:

$\sigma_{\text{predicate}}$  (Relation)

⇒ Display ⇒ all the info. of all the Horror movies

অর্থাৎ,  $\sigma_{\text{Genre} = \text{"Horror"}}$  (Movie)

⇒ Display ⇒ all the info. of all the Horror movies whose IMDB-rating is above 8.0.

$\wedge \rightarrow \text{AND}$

$\vee \rightarrow \text{OR}$

$\neg \rightarrow \text{NOT}$

অর্থাৎ,

$\sigma_{\text{Genre} = \text{"Horror"} \wedge \text{IMDB-Rating} > 8.0}$  (Movie)

এখন,  $\wedge, \vee, \neg, \neq$  Use কোটি দিয়ে as 16T  
খণ্ড 2005, Machine → আগবংশ নাম

BS

'E' Day

~~Boys~~ Dues:  $\rightarrow$  Relational Algebra (येत्कू बोला कराये राखिए) Query  
Sub: (1) ट्रेन से जुड़ने वाले या ट्रेन से जुड़े बोला

Time: / /

Date: / /

2. Project Operation: (Original Table एवं Projection Show करें)

→ List of Attributes

→ अपने द्वारा चिह्नित

(marked)

→ इसका नाम क्या है?

(TableName)

AH1, AH2, AH3 ...

→ इसकी विवरणीय जानकारी क्या है?

→ इस बारे में जानकारी क्या है?

moviename, IMDBrating

(movie)

ज्ञान अभियान

→ इसकी विवरणीय जानकारी क्या है?

Sub: \_\_\_\_\_

Day:	1	2	3	4	5	6
Time:	10:00	10:30	11:00	11:30	12:00	12:30
Date:	1/1/2023	1/1/2023	1/1/2023	1/1/2023	1/1/2023	1/1/2023

### 3. Rename Operation: (১০/১২০২৩ Rename কৰা)

$\rho_{\text{Name}}(\text{Expression})$

এই expression টিৰে কোনো-

কুকুর কৰা এই expression টিৰে

(বিনায়ক)

কোনো নতুন নাম দেওয়া

কৰা হৈলো

এখন এই expression টাৰে কোনো-

নতুন Table Created হৈলো কো-

নো নথিবলৈ শুভ হৈলো এই নাম

দেওয়া,

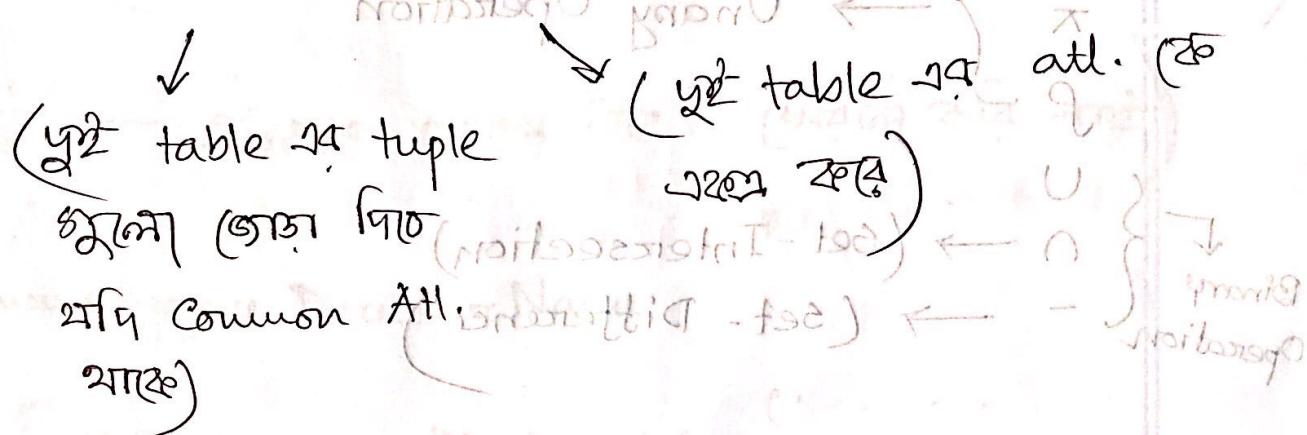
$\rho_{\text{Movie}}(\text{MovieName}, \text{BoxinBDT})$  ( $\lambda_{\text{MovieName}, \text{BoxinBDT}}$ )

( $\alpha_{\text{Genre} = "Horror"} \wedge \text{IMDB} > 8.3$ )

(Movie)

## 1. Union Operation:

Union vs Join



Union  $\rightarrow$   $\cup$

Union এর Conditions:

to be selected

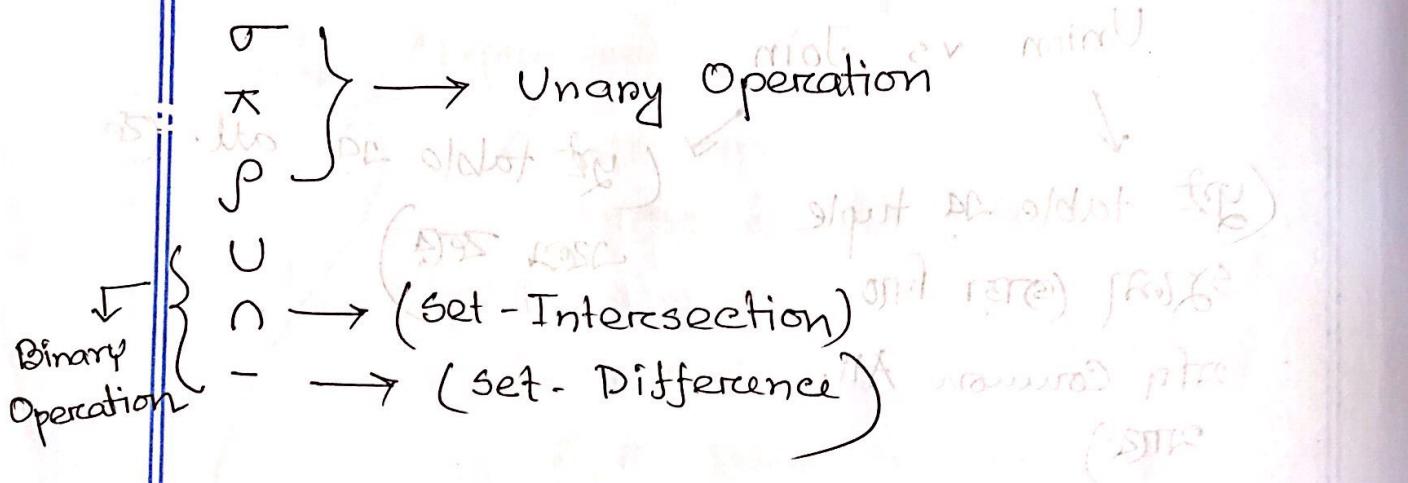
- (\*) Same no. of Attributes of the selected tables (X) : কুলো মুকুলো
- (\*) Attribute এর Domain একই হবে। Domains of i<sup>th</sup> attribute of both relation must be same.

B5  
Sir

'E' Day  
Sub: \_\_\_\_\_  
Cycle-07  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Day \_\_\_\_\_ E  
Time: 9:10 Date: 30/7/19

### Relational Algebra:



\* Rename নামকরণ করেন নিচের পদ্ধতি নিজের  
সমর্থন করুন করুবে, আর নিচের পদ্ধতি নিজের  
সমর্থন করুতে পারেন - Cartesian  
Product.

### Cartesian Product: ( $\times$ )

All possible combination  
 $\rightarrow$  Display MovieName, IMDB-Rating &  
Director Name of all Thriller Movies.

Sub:

Day

Time :

Date : / /

Way

movie, genre, DirectorName

$$( \text{movie} \cdot \text{DirectorID} = \text{Director} \cdot \text{DirectorID} \wedge \text{Genre} = "Thriller" )$$

(Movie x Director)

Way 2:

movie, genre, DirectorName

$$( \text{movie} \cdot \text{DirectorID} = \text{Director} \cdot \text{DirectorID} \wedge \text{Genre} = "Thriller" )$$

emp (EmpID, Name, Contact, ManagerID)

1	Abul		
2	Bulbul		1
3	Chulbul		2

Day

--	--	--	--	--

Time :

Date : / /

Sub :

→ Display Name & Corresponding Manager

Name of all the employees.

X  
EMName,  
empName

( $\exists$  EM) (P( $\exists$  EM)) ————— (Emp)

EM. ManagerID = EMP. EmpID

( $\exists$  EM) (P( $\exists$  EM)) ————— (Emp)

( $\exists$  EM) (P( $\exists$  EM)) ————— (Emp)

( $\exists$  EM) (P( $\exists$  EM)) ————— (Emp)

Product

Category Product

All products

Display Movie name

Display Name of all The

Sub:

'C' Day

Cycle-08

Day

Time: 11:40 Date: 4/8/19

## Relational Algebra:

### X (Cartesian Product)



⇒ এন্য প্রক্রিয়া হাতি একটি ফর্মেট পাবে না,



এবং অন্য প্রক্রিয়া হাতি কোথাও সুযোগ নেই।  
That means,  $\sigma$  লাগতে।

\* এখানে প্রস্তুত প্রক্রিয়া কর্তৃত নেওয়া

এবং  $\sigma$  এজেন্ট (Actor) প্রক্রিয়া পিয়ে ফরাব

অন্য এবছে Natural join  $\rightarrow (\bowtie)$  → symbol of  
join Nat. join  
combination of.

→ X Cartesian

→  $\sigma$  select

\* এমন: (Actor  $\bowtie$  Director) ফরাব

সবচেয়ে একটি নতুন বিশেষ common AH.

প্রস্তুতি হাতি লাগবে; এবং এই value

চুলে মাত্র ফরাব তাহে এটি Natural

join কৰবে।

Director

P-ID
1
3

(Actor

P-ID
2
3

ভেসে, 3 এবং 3 প্রযুক্তির tuple গুলোর Nat.

join হবে, যা নব অত. আওয়াজে প্রথম আছে

তৃতীয় আর P-ID টা একবার আওয়াজে,

Theta Joining ( $\Delta_{\theta}$ )ক্ষেত্র: Actor  $\Delta_{Age < 35}$  Director

join করা

Combination of Natural join &amp;

(Project Director  $\Delta$  Actor) : Natural

Select Operator.

. HAVING

. low BY 2nd , 3rd

. max WITH 2nd , 3rd

. sum WITH 2nd , 3rd

## Outer Join:

Inner Join / Natural Join এর ফলে যেকোনো কিছু Value হারিয়ে যায়, তার বিরুদ্ধে Outer Join গুলোকে সাধারণভাবে অন্যের মতোই।

Left - Outer Join ( $\Delta X$ )

Right - Outer Join ( $X \Delta$ )

Full - Outer Join ( $\Delta \Delta$ )

↳ Union of Left - Outer Join, Right - Outer Join

(P)

## \* Assignment Operation: ( $\leftarrow$ ) অ্যাসিগ্নমেন্ট

যোগান: Join করাৰ পৰি এই Table এৰ মতুন

শৰীৰ assign কৰলাম, তাৰ জন্ম assign  
কৰলাব। এটোৱে DDL ক্ষেত্ৰৰ  
Operation .

Relation Variable  $\leftarrow$  (Actor  $\bowtie$  Director)

$V2 \leftarrow \sigma_{Age < 35}$  (Relation Variable)

## \* Aggregate Function:

takes a set of values (কোনো একটা  
gives a single value নির্দিষ্ট আল.

এণ্ড একলৈ

values)

Group of values নিয়ে কোনো কোনো

জন্ম এভো কো ইয়ে Group function

(G) দুবা একতা কৰা ইয়ে,

Sub: \_\_\_\_\_

Day: \_\_\_\_\_  
Time: / / Date: / /

such as -



Gaverage()

↳ first example (1)

G

(Movie)

Gaverage(IMDB-Rating)

Query 5,

Select \* from Movie  
where IMDB-Rating = (Max(IMDB-Rating)).

.....) from Movie;

G

(Movie) [counting movie no.]

G

(Movie)

Count-Distinct(Genre)

[distinct genre  
movie]

Sub: \_\_\_\_\_

Day \_\_\_\_\_  
Time: / / Date: / /

## Database Design:

- ⇒ Redundant Data is the biggest problem of DB.
- ⇒ So, DB design করা ব্যবহার এটাকে মাঝায় দেখা করতে হবে।

[fore known entities] (Sivam)

territories  
[Sivam]

(Sivam) territories - trees

## Data base Design:

### E-R Model:

#### Entity-Relationship Model:

E-R Diagram: (Graphical representation of E-R model)

→ Logical structure of DB.

#### Entity: (Tuple)

→ Object  
has a set of properties  
of attributes

Attributes

#### Entity set: (Table / Relation)

→ a set of entities of same type  
with fields  
with objects  
share some properties

Sub: \_\_\_\_\_

Page No.  
30 - Chap 09

Day

Time: / /

Date: / /

Relation  
~~~~~  
Tuple with Tuple

Relationship  
~~~~~  
Table with Table

- # Entity Set (having ID) : Composite R-E
- # Relationship Set
- # Attribute : Composite Attribute

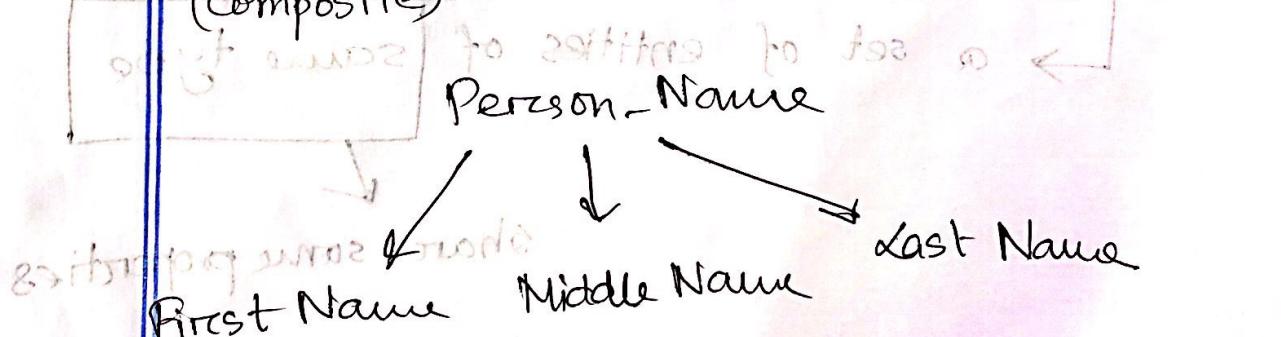
Simple  
एक  
पार्ट  
नमूदा  
দোধুর  
স্বতন্ত্র  
স্বতন্ত্র

← Single  
Attribute

vs

Composite  
एকটি  
Attribute  
↓  
can be divided  
into subparts.

(Composite)



BS

'E' Day  
Pulse - 12

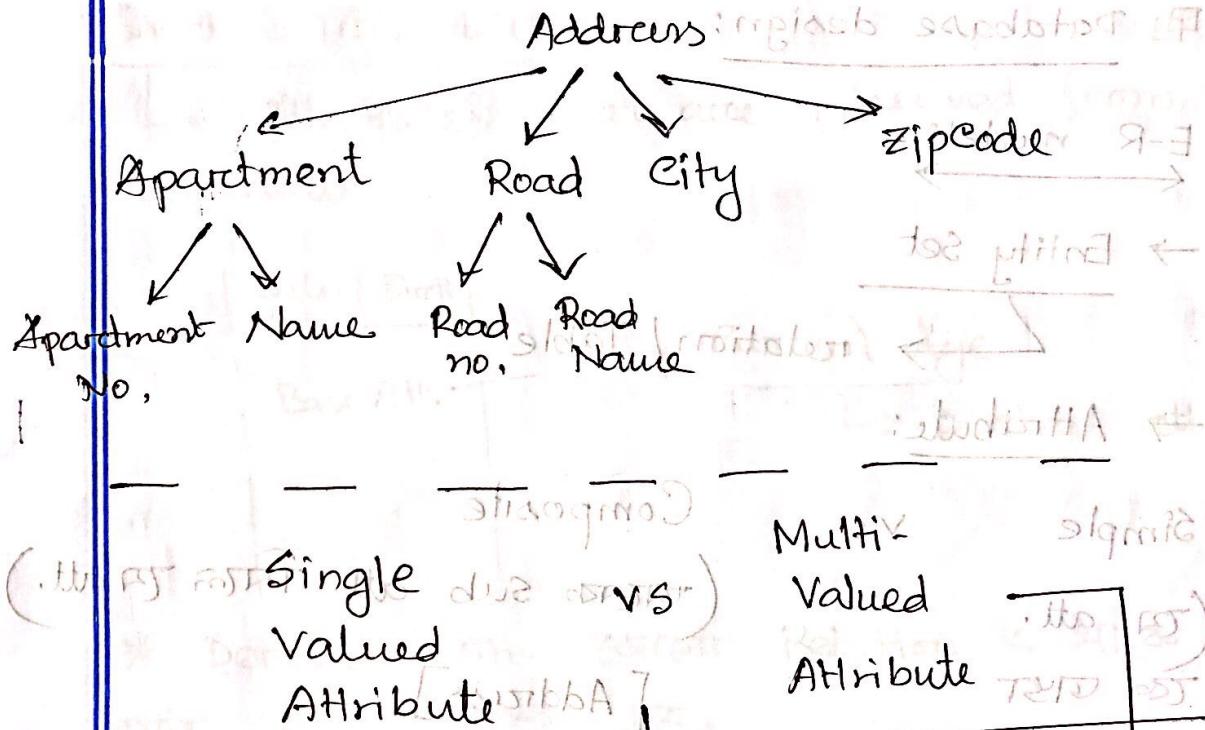
23.9.19

Sub:

Day

Time :

Date :



Roll No.

Series

{Mobile No,} (একজনের  
ক্ষমতাক) [AG-10, 1169]

{e-mail, ID}

বিল্ডিং স্ট্রিট  
(102, ১৮)  
১য়, ৭<sup>th</sup>  
উপর  
→ ফার্মিলু বেলু  
বুকালাৰ গৱা,

35  
5/2

'C' Day  
Cycle - 09

Day  
Time: ✓  
Date: 20/8/19

Sub:

## Database design:

E-R model:

→ Entity Set

→ Attribute:

Simple

(যে att. বিলুপ্ত  
কো অঙ্গ)

যাপ্ত না)

[Roll, CGPA]

Single Valued

(NID, Roll)

vs:

Composite

(অনেক sub att. এমনলৈ এক att.)

[Address]

vs

Multi Valued

(Mobile No., E-mail)



একই যানুষের একাধিক

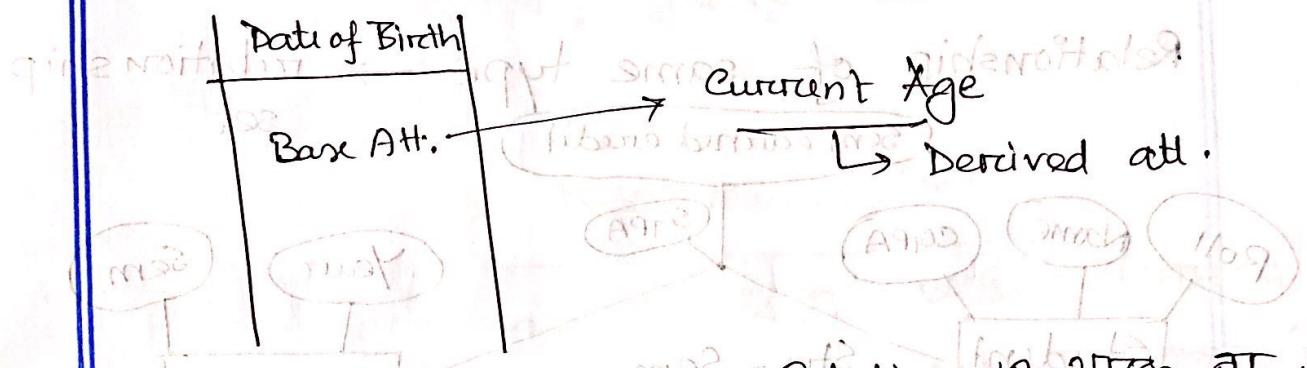
Attributes.

Sub: \_\_\_\_\_

Day					
Time:	/ /	Date:	/ /		

## Derived Attribute:

Attributes that are derived from other attribute.

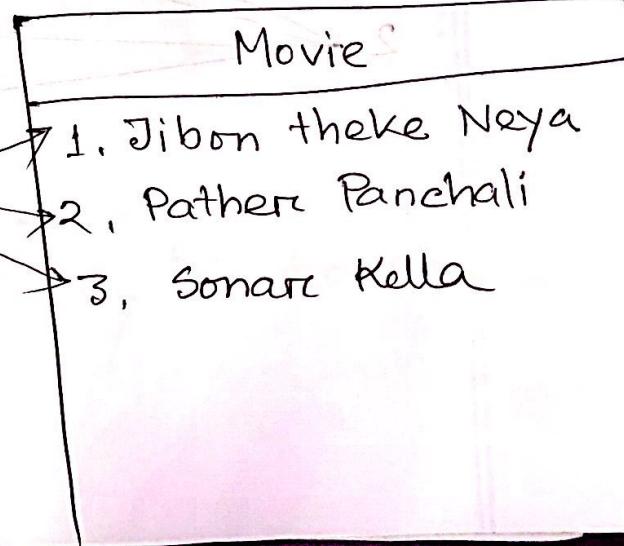
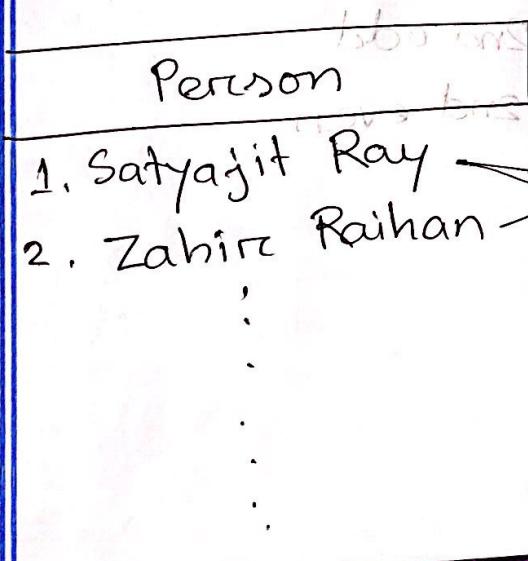


\* Derived Att. কোনো Relation দ্বাৰা উৎপন্ন।  
এবং Compute কৰা হয়।

\* Base Att. স্বাধীনভাবে Stored হয়।

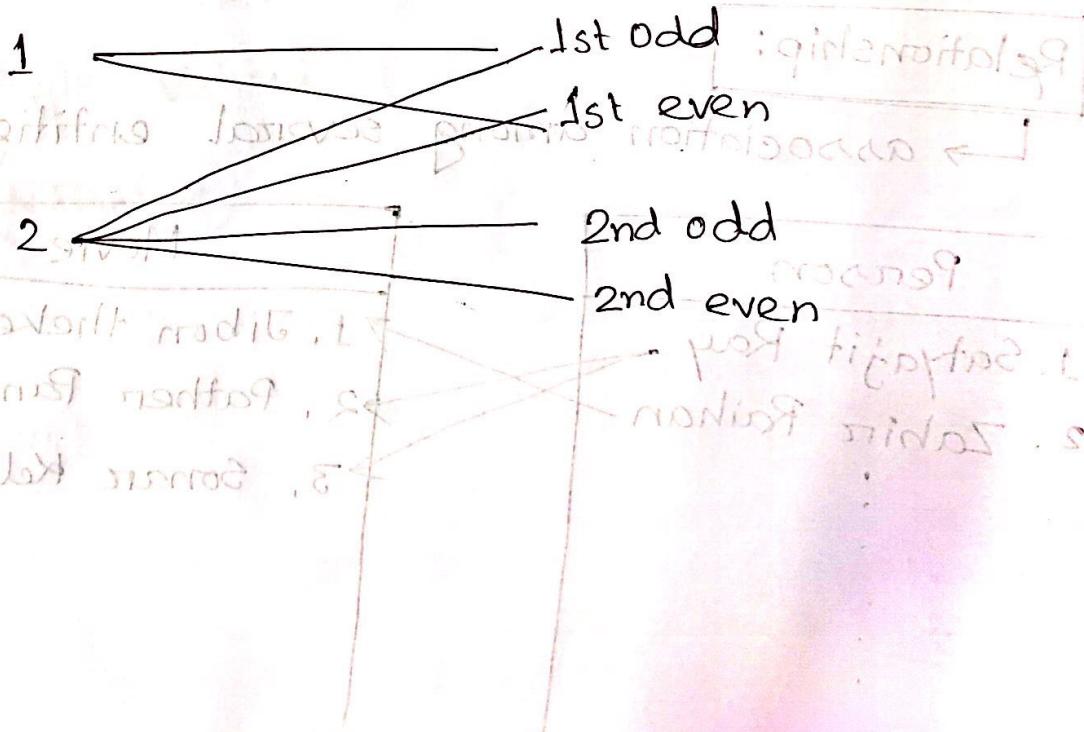
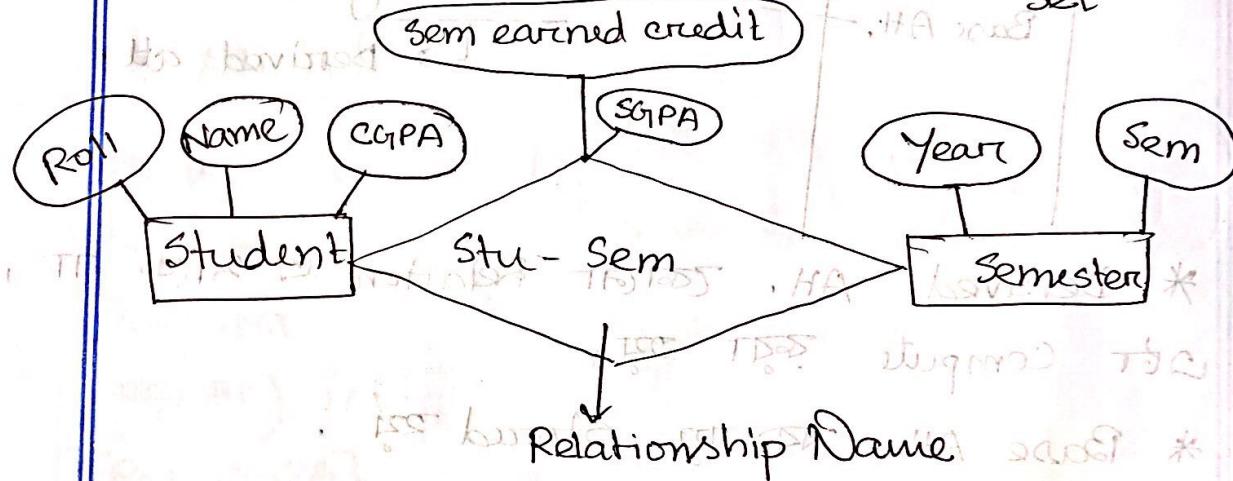
## Relationship:

association among several entities.



\* এক Table এর Relationship Name হবে  
 Director. কাবুল গুরুত্ব Person: Movie  
 এর relation কোনো

Relationship of same type → relationship set



Sub:

Day	_____
Time:	Date: / /

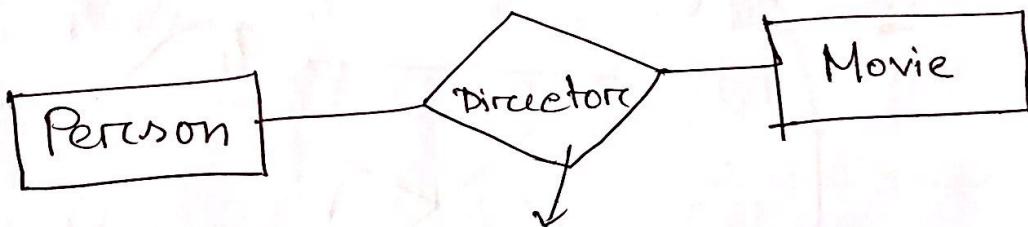
Descriptive Attribute:

Attributes of a Relationship Set.

Such as - ഡാസ്യ സൂഷ്ഠായ് Sem-earned credit,  
SGPA.Degree of Relationship Set:

- Relationship set ദ്വാരാ അഭ്യർത്ഥിക്കുന്നത്
- Number of entity set participate in a relationship set.

Such as -



Degree 2

\* Degree 2 ലെ Binary Relationship

മലി രാജ്,

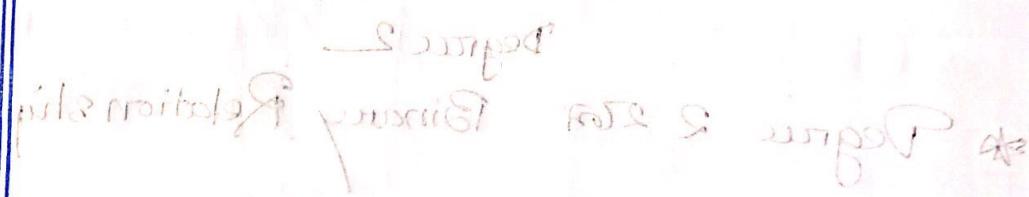
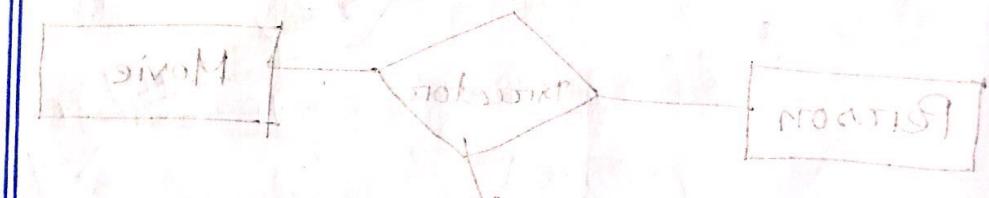
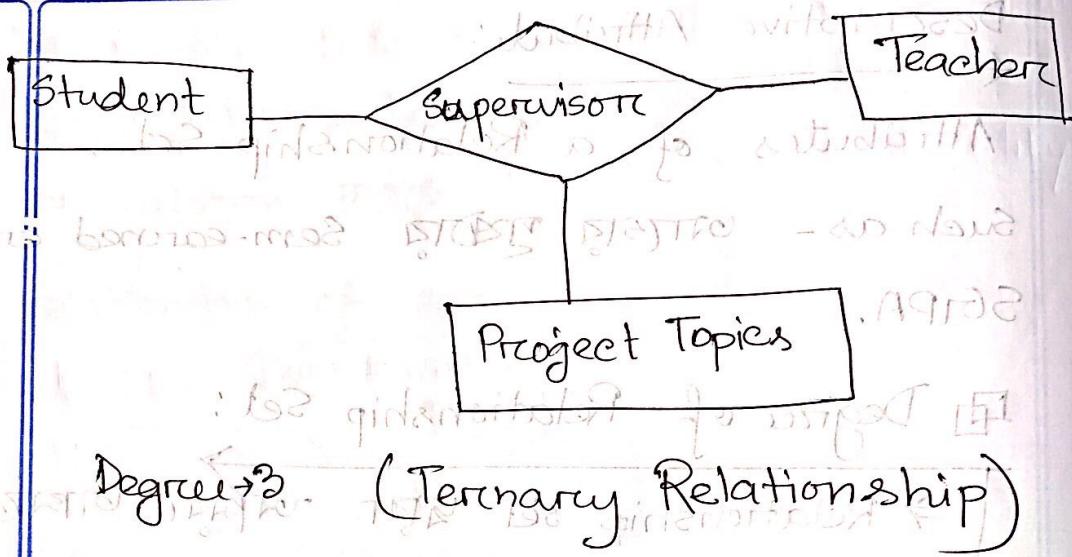
Sub :

Day \_\_\_\_\_  
Time : / / Date : / /

BS

BS  
SIS

Sub :



BS  
SIT

'E' Day  
min  
Point in  
'D' Day  
Cycle - 09

23/9/19

Sub:

Day:     
Time: 9:40 Date: 21/8/19

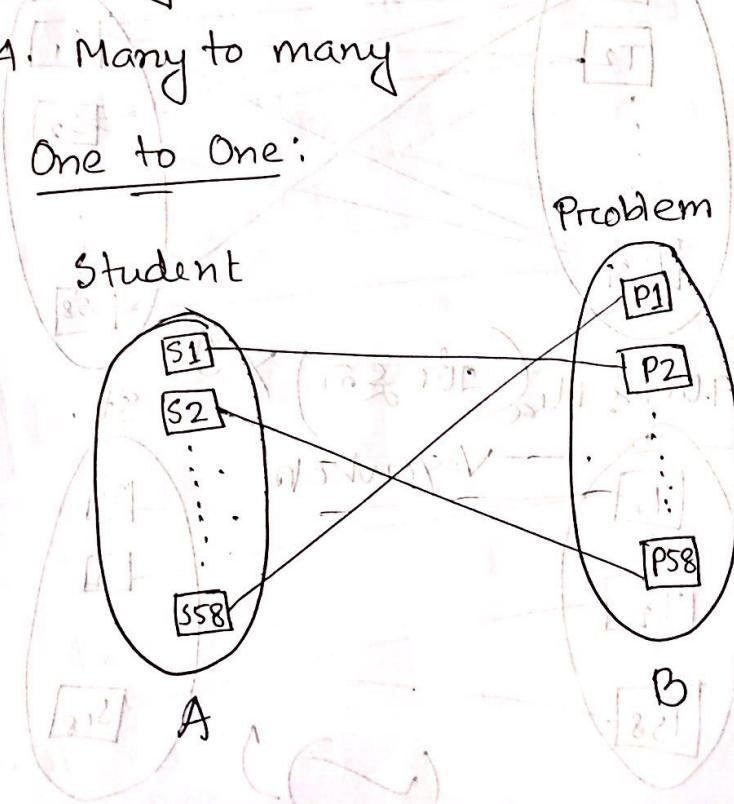
Relationship:

Cardinality - Ratio / Mapping Cardinalities:

the number of entities to which another entity is associated.

1. One to one
2. One to many
3. Many to one
4. Many to many

One to One:



# LAB Final example

Sub:

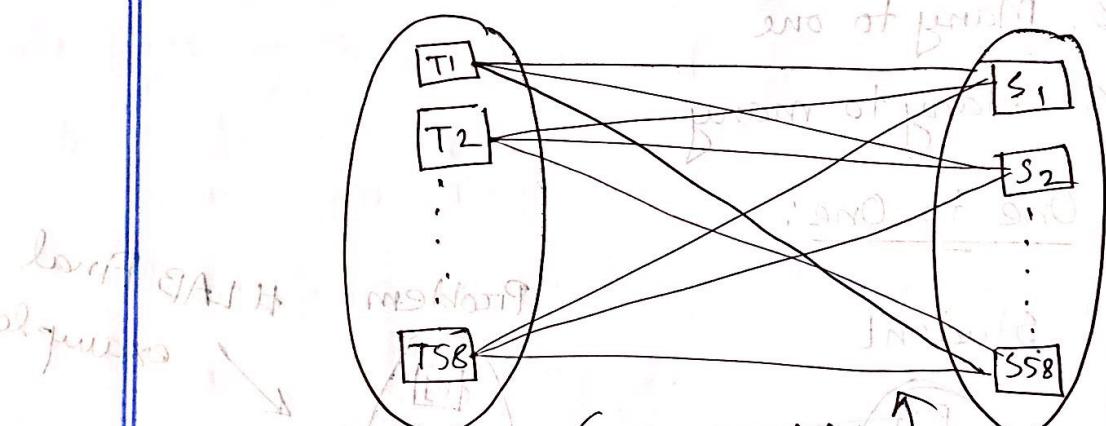
Date: 20  
Day: 1  
Time: 11:00 AM

→ An entity in A is associated with at most 1 entity in B and an entity in B is associated with at most 1 entity in A.

### One to Many:

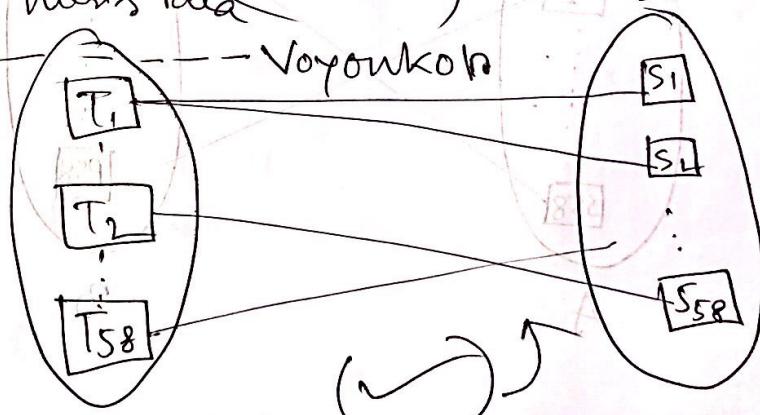
Thesis Idea

Student



Thesis Idea (ब्रह्म) X

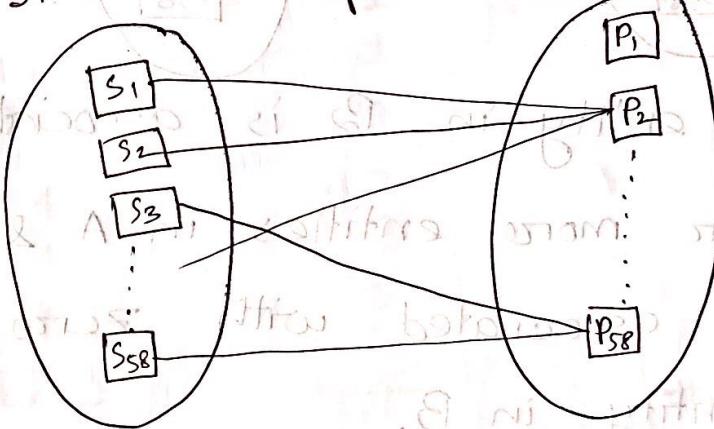
Relationship Set ← -



⇒ An entity in A is associated with zero or more entities in B & an entity in B is associated with at most 1 entity in A.

Many to One:

student      supervisor



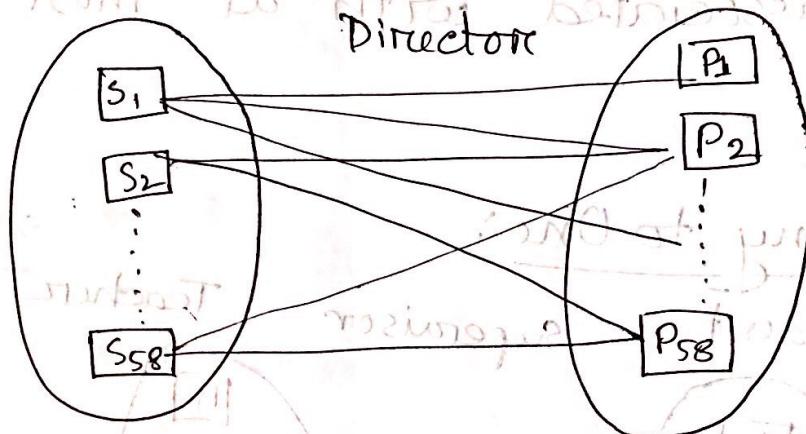
An entity in B is associated with zero or more entities in A and an entity in A is associated with at most 1 entity in B.

Many to Many: sei A ni phitter ja

ai vilito no & A ni assittos mani no

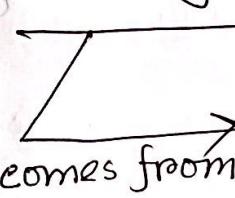
Person

Movie



⇒ An entity in B is associated with zero or more entities in A & an entity in A is associated with zero or more entities in B.

Primary key in a Relationship Set :

 primary keys of A & B entity set.

comes from

Such as - for  
Many - to Many → primary key is the  
combination of  
A, B entity  
set.

Movie ID	Director ID
1	1
2	1
3	1
4	2
4	3
5	2
5	3

For many to many one - Teacher

Student	Teacher
1	1
2	1
3	1
4	2
5	2

# Many to One Relationship Set

Primary key

One A entity set has Prim. Key.

Sub: \_\_\_\_\_

Day \_\_\_\_\_  
 Time: / / Date: / /

# One to Many  $\rightarrow$  Primary  
entity  
 key for  $\rightarrow$  set  $\rightarrow$

Idea of Thesis	Student
1	1
2	2
3	3
4	4
5	5

# One to One

Student	Prob
1	5
2	3
3	4
4	1
5	2

# In case of  
One to one.

Primary key  
will be either  
the primary key  
of A or of B.  
That means,  
A, B are  
candidate  
key.

Redundant Attribute

冗余 Relationship -

Many to many

One to many

Redundant attr. Problems

Create

One to one many

To one

Redundant

attr. It's not good.

Relationship among the entities are

recorded in a separate table

such as - a separate table.

Movie-Director Relationship

M-ID	D-ID
1	3
2	3
3	3
6	4
6	5
7	4
7	5

Sub:

Day

Time

Date

(\*) Many to many relation

create separate table

22,

entity

(\*) One-to-one

Redundant

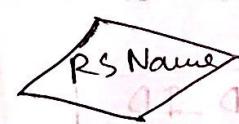
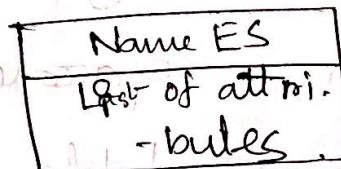
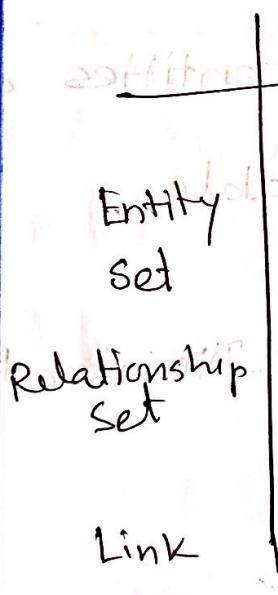
entity

E-R diagram

Graphical representation of overall logical

structure of a DB.

symbol



0	1	2	3	4	5	6	7	8	9
E									
E									
C									
P									
Z									
F									
Z									
F									
Z									

Sub: \_\_\_\_\_

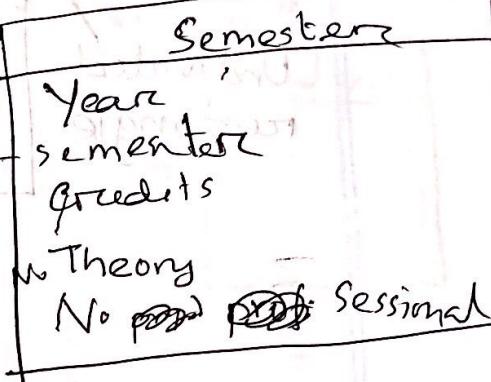
Day: \_\_\_\_\_

Time: \_\_\_\_\_ Date: / /

Composite  
Att.  
Simple



std sem  
Relation



(স্টেডি ব্রেক্স) হিঁজ এমুলেভড.

> to be continued

Date of Birth → Simple

Age() → Derived Att.

→

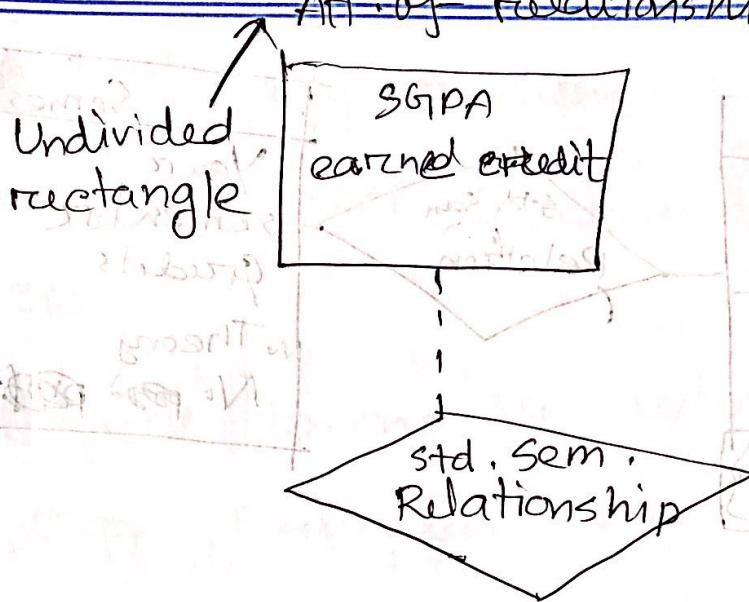
Sub : \_\_\_\_\_

Day

Time :

Date : / /

## All of relationship set



Ques :

~~What is E-R diagram?~~

⇒ ~~What is E-R diagram?~~

~~Relationship cardinality~~ → ~~Relationship cardinality~~

\* Cardinality of relationship are represented by directed/ undirected edge.

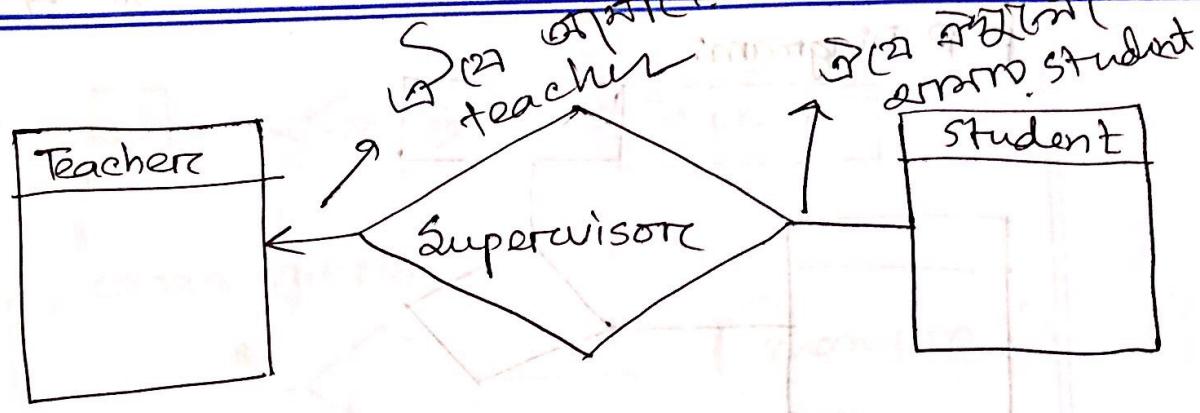
Like - —, —→

Sub:

Day

Time

Date: / /



(One to many)

Similarly -

One to one

Many to One

Many to Many

B5  
S11

'D' Day  
Cycle - 10

Day \_\_\_\_\_ D  
Time : 12:30 Date : 27/8/19

Sub : \_\_\_\_\_

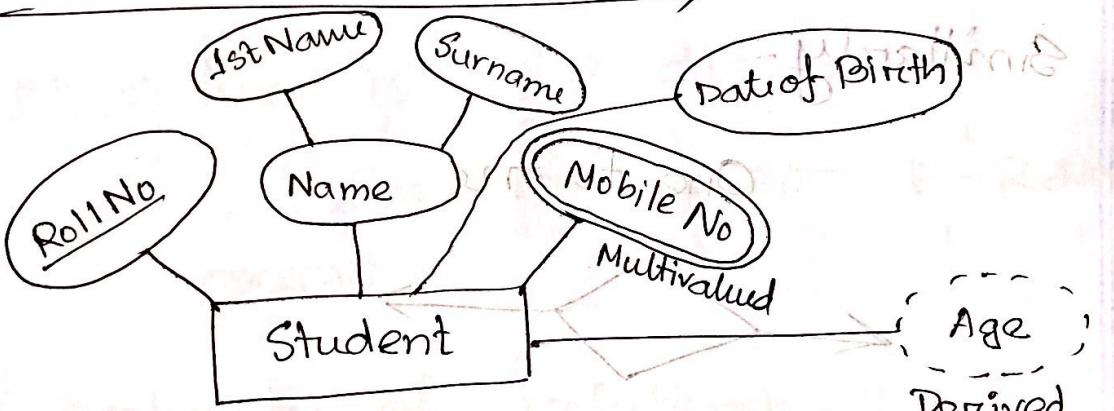
62/201

E-R Diagram:

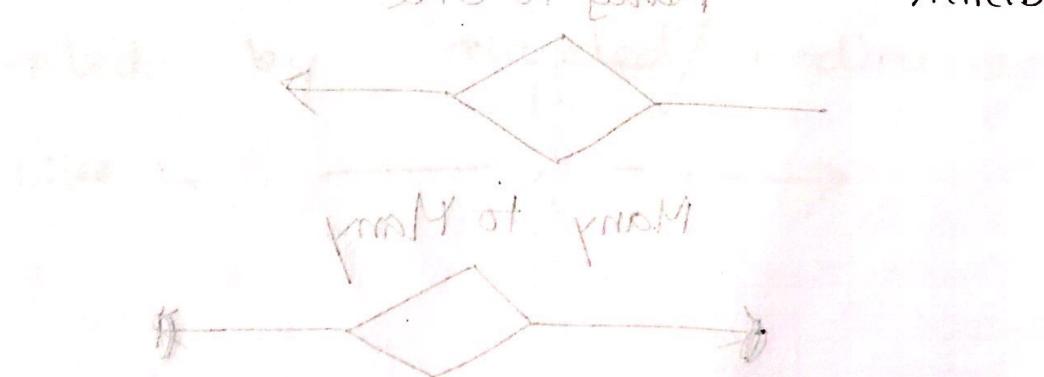


(junction of 3)

Alternative Representation:



Age  
Derived  
Attribute

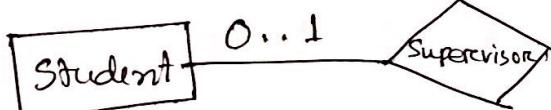
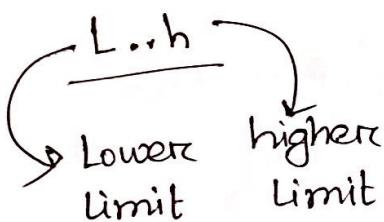




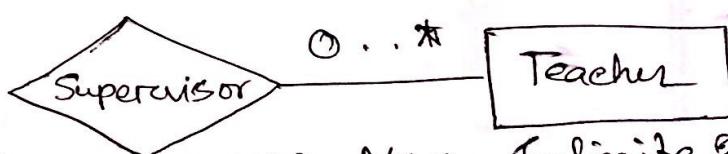
Ques (One to many) or 2nd -  
 (many to 1)

Ques (One to many) or 2nd -

Cardinality Limit:



(A student has 0 or 1 supervisor  
 0 or 1 student has 1 supervisor)



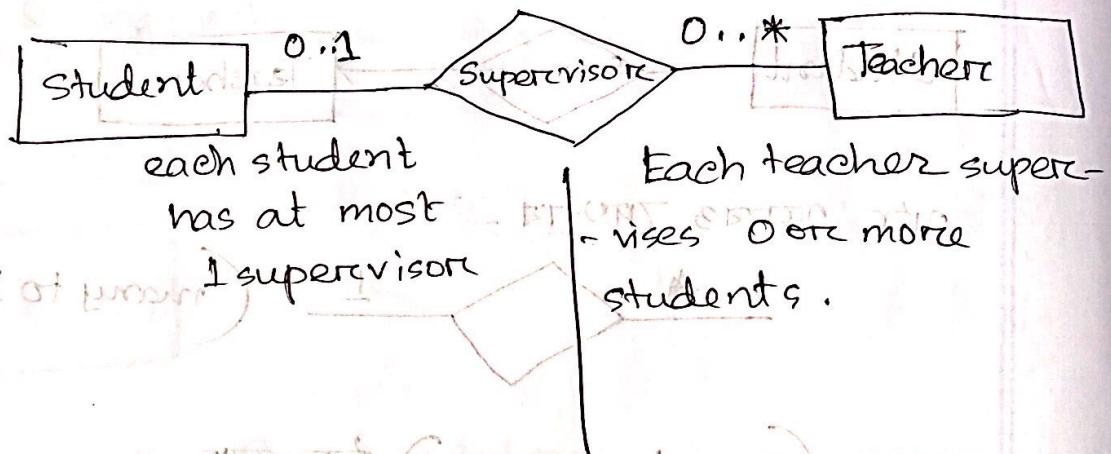
(Teacher has minimum 0 and Max. infinite number of student)

Sub: \_\_\_\_\_

Day \_\_\_\_\_

Time: \_\_\_\_\_

Date: / /



~~Many-to-one to (One to Many) transformation~~

যদের মনে হচ্ছে এটা (1 to Many) But  
really এটা (many to one). Cardinality  
limit (যদের (1 to many) লক্ষণ কোন  
ভাবে,

