

Final
29/03/2021

CSE302

Create view Ins-details As
(Select ID, Name
from Instructor)

Instructors

ID	Name	Salary
I1	A	70K
I2	B	90K
I3	C	110K

automatic update হলে থাবো,

virtual Relation / View

Commit = Save , Rollback = Undo

Final
29/03/2021

CSE302

Materialized view → Not updated table

Create table course

on delete cascade set default '0' /set NULL;
on update cascade
)

Create assertion < > check < >;

blob (video, picture, audio), clob (character large obj)

Users defined type (create type)

Create domain (similalr with create type)

create index <name> on <relation-name>.

Authorization - Read, Insert, Update, Delete
Index, Resources, Alteration, Drop, privilege

grant <privilege> on <relation or view> to <userlist>

revoke select on student from A,B,C; [grant নিয়ে
নেওয়া]

revoke select on Department FROM A,B cascade;

create ROLE Instructor;

grant Instructor to <users>;

restrict →

31/03/2024

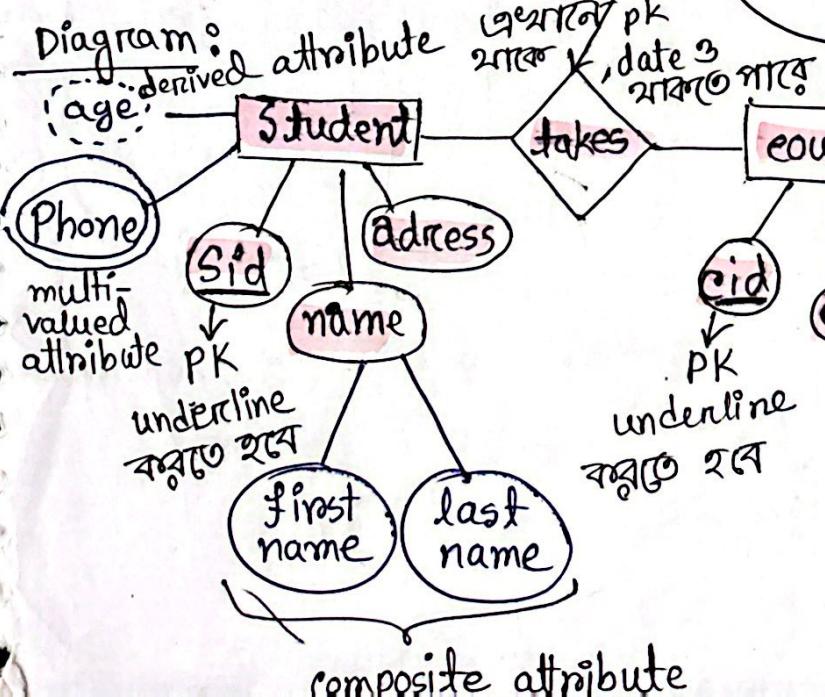
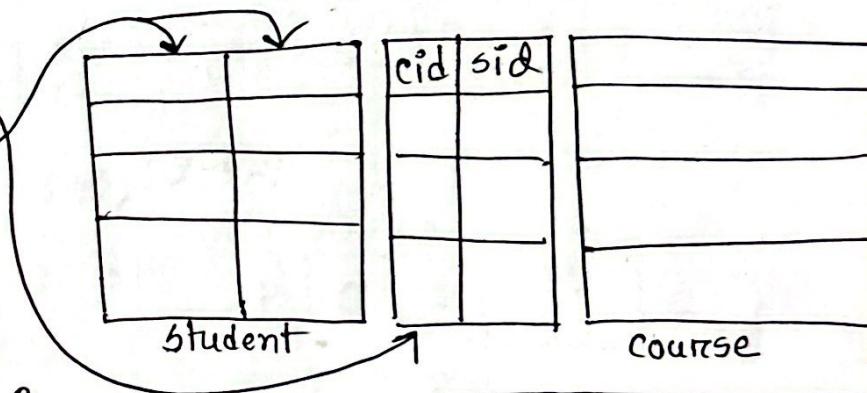
Chapter - 6

Design Phases

ER Diagram (Entity Relationship)

(not Redundant or not incomplete data is required)

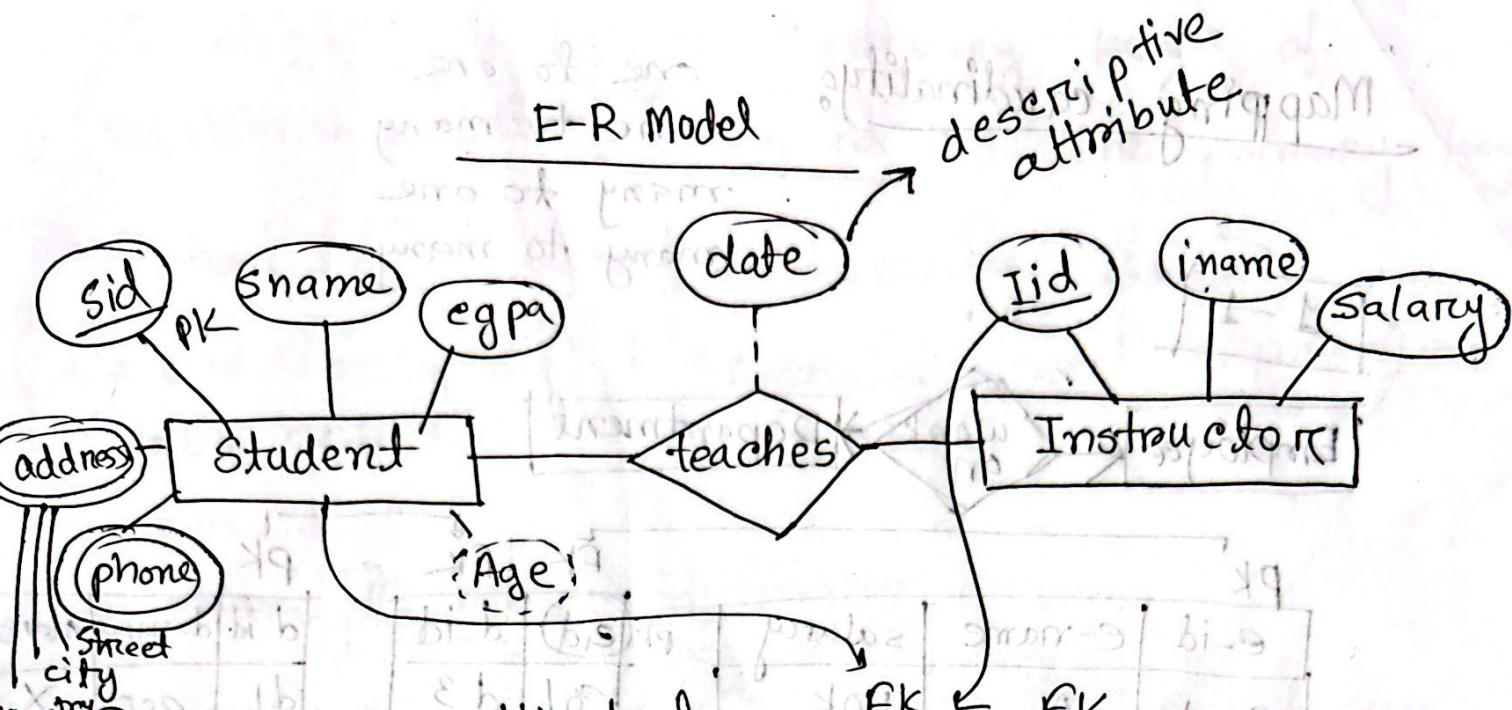
- Entity set (table)
- relationship set
- attribute



অবচেষ্ট্যে ফলন ইম
Binary Relationship

যদি একটা
relationship
set দুইটার
মেশি entity
connect করে করে
তাকে ternary
Relationship set
বলা। (rare)

E-R Model



descriptive attribute

① single vs multivalued

② simple vs composite

③ derived attribute

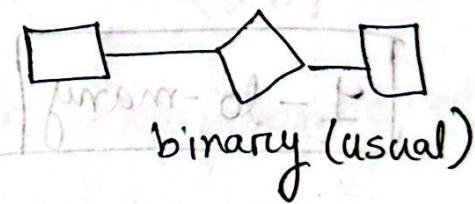
④ complex (multivalued + composite)

sid	iId
s01	I02
s02	I03
s03	I04

(bi-directional association, bi-b)
(uni-directional association, bi-b)

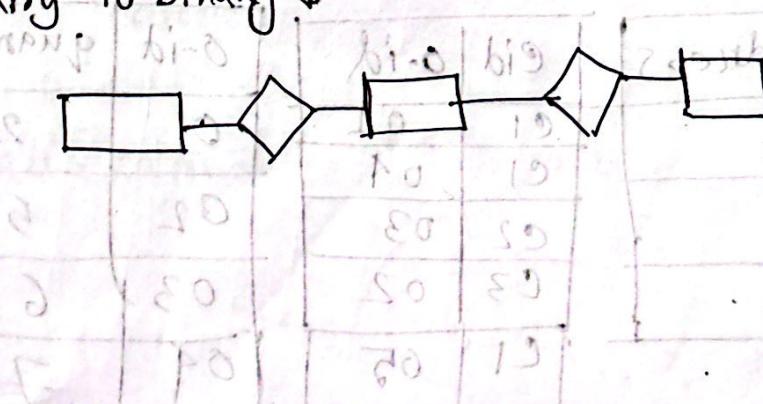


ternary (near)



binary (usual)

ternary to binary



Mapping cardinality

- one to one
- one to many
- many to one
- many to many

1-1



Employee			Department		
PK	PK	FK	PK	FK	PK
e-id	e-name	salary	PK	d-id	PK
e-01	A	50k	eid	d3	d1
e-02	B	60k	e02	d1	d2
e-03	C	70k	e03	d2	d3

কোর্ক primary key কীভুলো? তেটা কী reduce কোর্ক
মাঝে কিনা। (One-to-one) can we reduce the table
into two?

(e-id, e-name, salary, d-id)
(d-id, d-name, address)

1-to-many

Customer

Order

cid	c-name	address
c1	X	A
c2	Y	B
c3	Z	C

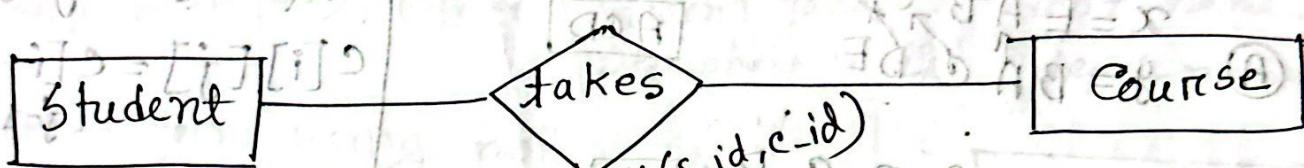
cid	o-id
c1	o1
c1	o4
c2	o3
c3	o2
c1	o5

o-id	quantity	price
o1	2	105
o2	5	306
o3	6	900
o4	7	501

Q. Which will be the primary key of relationship set? ✓ orden-id is the primary key.

Q. how to reduce? (cid, cname, address)
 (add e-id to orden table) \rightarrow orden(o-id, quantity, price, e-id)
 1 table reduce.

many \rightarrow many to many



sid	sname	cgpa
S1	A	3.5
S2	B	2.5
S3	C	4

sid	cid
S1	c2
S1	c3
S2	c1
S2	c2
S3	c3

c-id	cname	credit
c1	DB	4.5
c2	Algo	4
c3	DS	3

□ one side (arrow) \rightarrow many side \rightarrow দ্বিতীয়া,

□ Total Participation

অর্থাৎ এর শোধ, participate
 করবে

□ Partial Participation

lab exam \rightarrow 29 April.

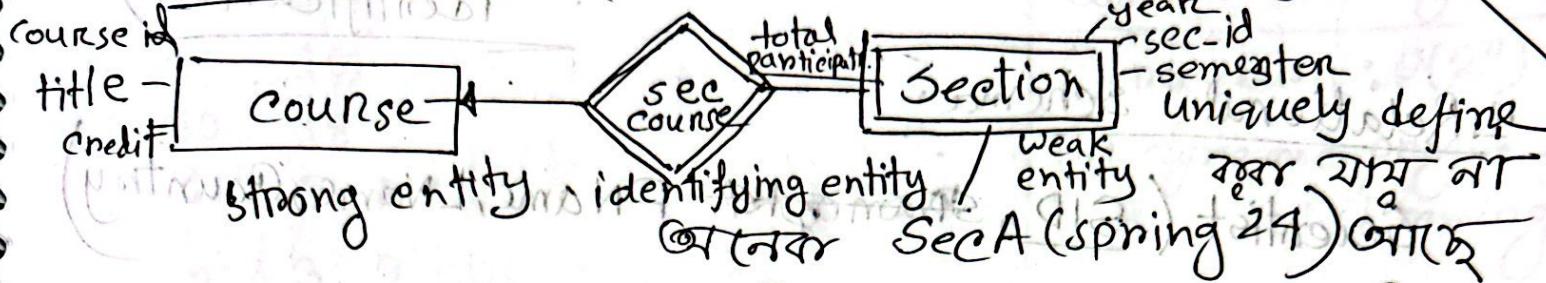
R	O	2
O	O	0
O	O	9

Quiz

= chapter - view , nested query

CS302

~~* A *~~ Weak entity (depends on another entity)



□ Redundant Attribute (অবাধি পরিচয় দ্রুত) table (একটি attribute
যাথের জান নেই) 예মন: Student table (Dept-name
Department II Dept-name

□ self join using roll.

{ } → multivalued attribute.

Page 287
ER Model

Reduction of Relational Schemas

ER → Schema

Student (id, name, cgpa).

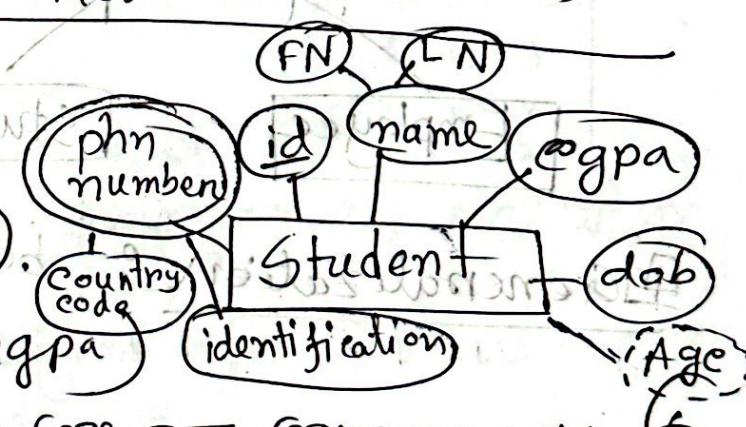
Student (id, FN, LN, cgpa)

- multivalued attribute হচ্ছে এক মোলাদুর table
create-করে হবে,

Student-phone (id, phone-number)

derived করবেনও schema (এ হচ্ছে না, যেমন

age করবেনও schema (এ হচ্ছে না,



• Complex Num Attribute

Student-phone (id, countrycode,
identification)

■ Relational Schema:

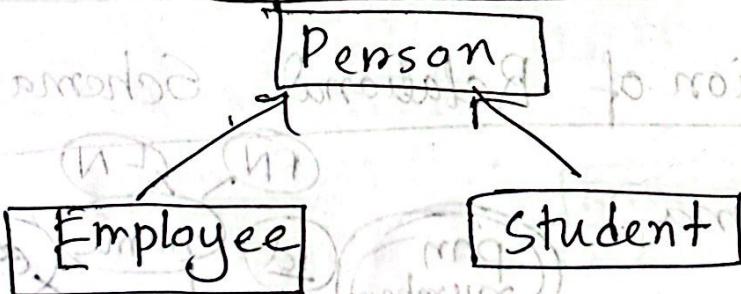
Scientist (SID, ~~Area~~ FName, LName, Country)

Invention (IID, IName, Year)

Scientist ~~Area~~ - Area (SID, RArea)

Invents (SID, IID)

***** ■ Specialization: (Top থেকে অন্ত হল)

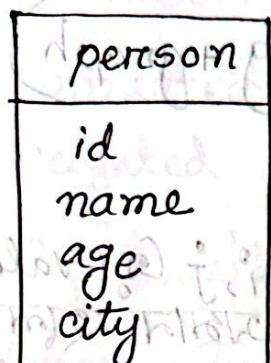


■ Generalization: bottom up design (নিচে থেকে উপর)

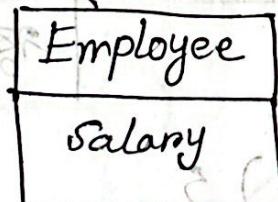
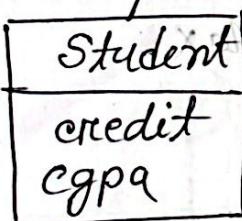
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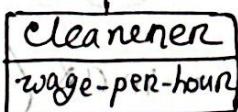
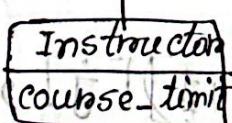
specialization (top to bottom) [is a relationship]
generalization (bottom to up)



generalization



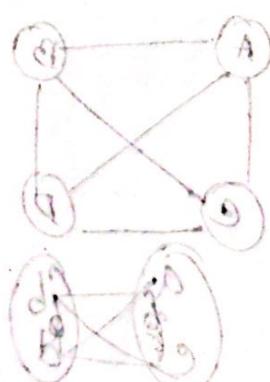
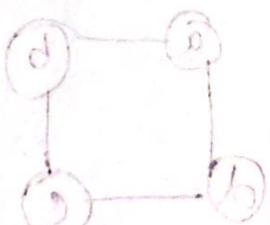
overlapping



disjoint

298 & disjoint

cycle



= strong connections.

disjoint structures.

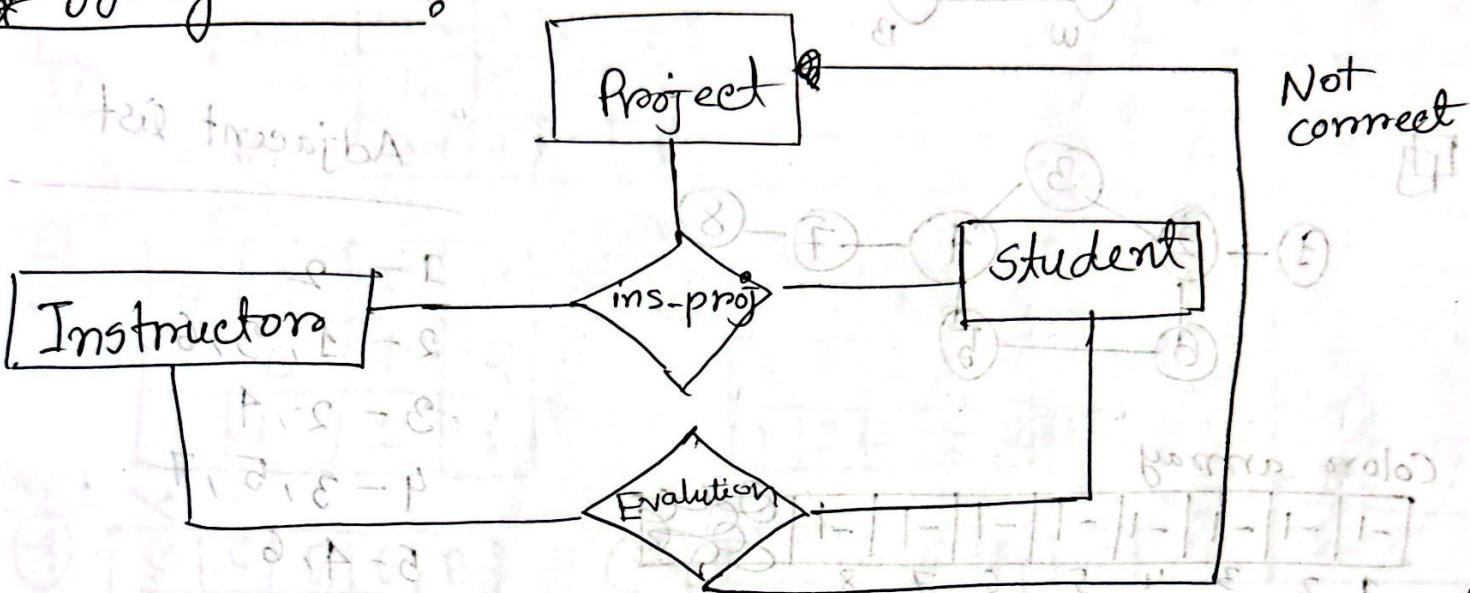
(no overlapping between them)

C.W.
09-05-2024

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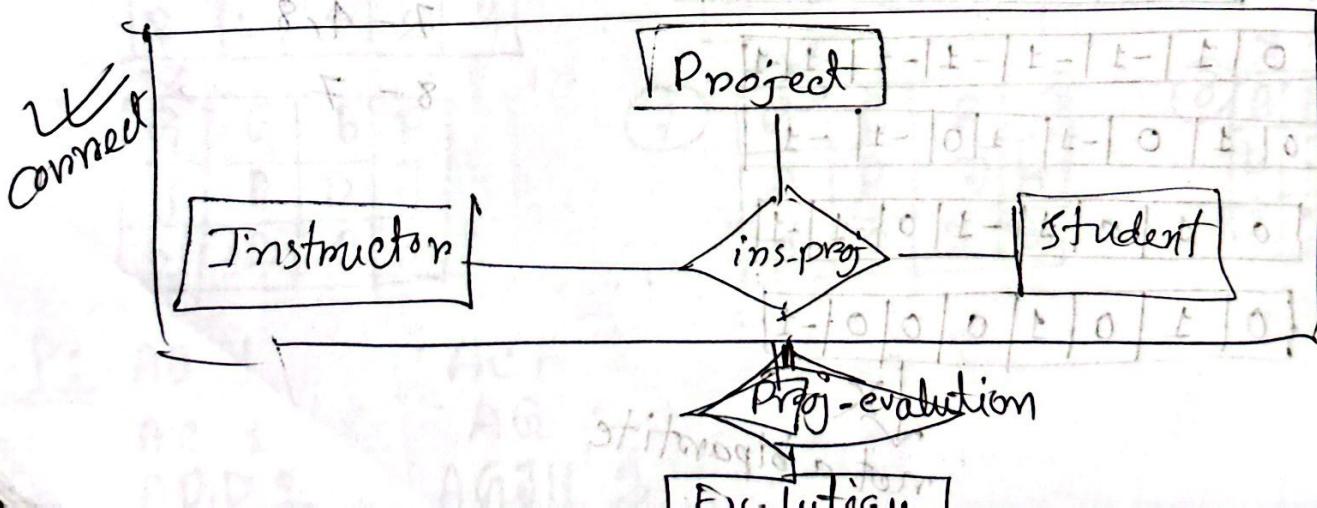
* weak entity, specialization, generalization,

Aggregation



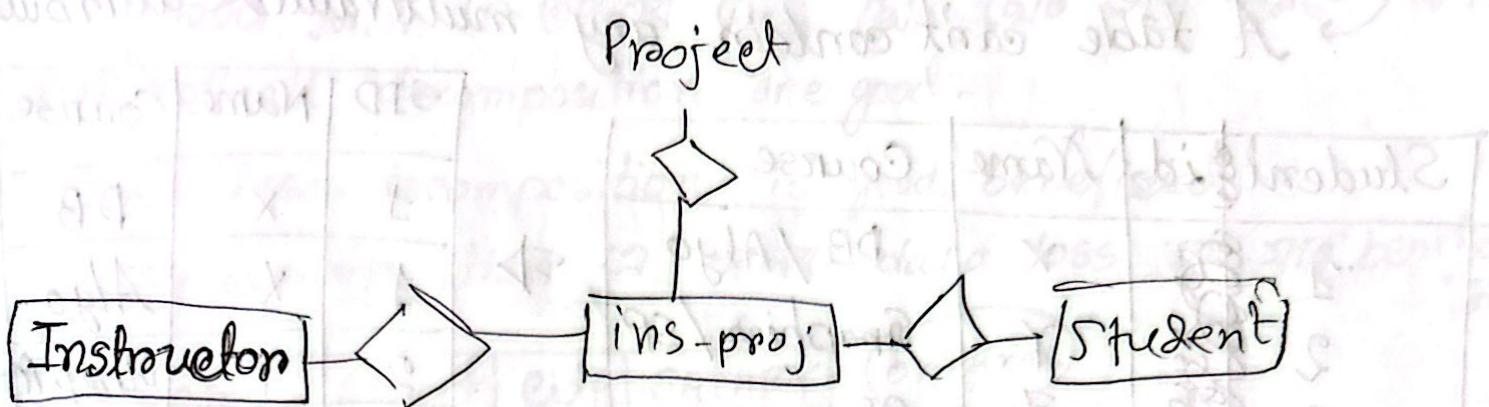
Not connect

⇒ relation, relation রেখাগুলি connect করে ER Diagram



Correct

Converting Non-Binary Relationships



UML Diagram 1—

+,- => protected

Normalization @ Chapter - 7

→ is a process to remove/reduce redundancy of relation

• UMR

- ① Row-level redundancy

Primary Key unique not null	SID	Name	Credit
	1	X	3.5
	2	Y	3.3
	1	X	3.5

- ② Column-level redundancy

stdid	S-name	co-id	course name	fac-id	faculty name
1	X	C1	DB	f1	MR
2	Y	C2	Algo	f2	DSU
3	Z	C3	DM	f2	DSU

Solution
Optimizing
relation

- ① Insertion anomaly
- ② Deletion anomaly
- ③ Update anomaly

1st Normal Form : (1NF)

→ A table can't contain any multivalued attribute.

Student id	Name	Course
1	X	DB / Algo
2	Y	Graphics / SP
3	Z	OS

✗ Not 1NF

SID	Name	Course
1	X	DB
1	X	Algo
2	Y	Graphics
2	Y	SP
3	Z	OS

1NF → PK (SID, course)
1st option

2nd option :

SID	Name	C1	C2
1	X	DB	Algo
2	Y	Grap	SP
3	Z	OS	Null

(Not a good option
বেশি অঞ্চল / space রকম লাগবে)

3rd option (Best)

student (id, name)

stu-course (id, course)

12/05/2024

Decomposition

Good form এ আন্তর জেন্স ছোট ছোট অংগ কাটতে হবে,
But not all decomposition are good.

loss less decomposition is good, beneficial.

lossy decomposition এ অনেক data loss হবে যা beneficial না।

ID	NAME	Street	City	SALARY
1	A	S1	C1	50K
2	A	S2	C2	10K
3	C	S3	C3	90K

original

(decomposed)

ID	Name	NAME	Street	City	SALARY
1	A	A	S1	C1	50K
2	A	A	S2	C2	10K
3	C	C	S3	C3	90K

decomposed

Natural join করলে decomposed table = original table হবে না, So, এটা lossy decomposition.

দুইবয়ে কোথা বয়ে যাবে :

- ① Functional dependency ✓
- ② Multivalued

Functional Dependency :

Table R(ABC)

$A \rightarrow B$ (A column এর value দিয়ে B গুরুত্বে data identify কৰা যাবে)

$A \rightarrow C$

Student (ID, Name, CGPA)

ID → NAME

ID → CGPA

(ID holds NAME/CGPA)

Function dependency ফিল্ড primary key, candidate key হুলে কোর করা যাব। এটা Table good form আসে কিনা ৩NF কোর যাব।

Closure F^+ :

R(ABCD)

$$F = \{ A \rightarrow B \}$$

$$B \rightarrow C$$

$$C \rightarrow D$$

f

$$CK = \{ A \}$$

A^+ (A এর closure) $\rightarrow A$.

$\rightarrow AB$

$\rightarrow ABC$

$\rightarrow ABCD$

$B^+ \rightarrow B$

$\rightarrow BC$

$\rightarrow BCD$

$C^+ \rightarrow C$
 $\rightarrow CD$

$D^+ \rightarrow D$

$\therefore A$ is the candidate key.

$\square R(ABCD)$

$$CK \rightarrow \{A, B, C, D\}$$

$$F = \begin{cases} A \rightarrow B \\ B \rightarrow C \\ C \rightarrow D \\ D \rightarrow A \end{cases}$$

functional dependency set

$$\begin{array}{l} A^+ \rightarrow A \\ \rightarrow ABCD \end{array}$$

$$\begin{array}{l} C^+ \rightarrow C \\ \rightarrow CDAB \end{array}$$

$$\begin{array}{l} B^+ \rightarrow B \\ \rightarrow BCDA \end{array}$$

$$\begin{array}{l} D^+ \rightarrow D \\ \rightarrow DABC \end{array}$$

\therefore অবশ্যিক কандেট কেয়।

$$\begin{array}{l} (AB)^+ \rightarrow AB \\ \rightarrow ABCD \end{array} \} \text{ Super key } AB.$$

$\square R(ABCDE)$

$$CK \rightarrow \{AE, BE, DE\}$$

$$\begin{array}{l} A^+ \rightarrow A \\ \rightarrow AB \\ \rightarrow ABC \\ \rightarrow ABCD \end{array} \quad \begin{array}{l} BC^+ \rightarrow BC \\ \rightarrow BCD \\ \rightarrow BCDA \end{array}$$

$$B^+ \rightarrow B$$

$$C^+ \rightarrow C$$

$$F = \begin{cases} A \rightarrow B \\ BC \rightarrow D \\ E \rightarrow C \\ D \rightarrow A \end{cases}$$

$$\begin{array}{l} D^+ \rightarrow D \\ \rightarrow DA \\ \rightarrow DAB \\ \rightarrow DCDA \end{array} \quad \begin{array}{l} E^+ \rightarrow E \\ \rightarrow EC \\ \rightarrow DEC \\ \rightarrow DECA \\ \rightarrow DE CAB \end{array}$$

\therefore No candidate key.

$$\begin{array}{l} (AE)^+ \rightarrow AE \\ \rightarrow ABE \\ \rightarrow ABEC \\ \rightarrow ABED \end{array}$$

$$\begin{array}{l} (BE)^+ \rightarrow BE \\ \rightarrow BEC \\ \rightarrow BECD \\ \rightarrow BECDA \end{array}$$

$$\begin{array}{l} (CE)^+ \rightarrow CE \\ \rightarrow CEC \\ (DE)^+ \rightarrow DE \\ \rightarrow DEC \\ \rightarrow DECA \\ \rightarrow DE CAB \end{array}$$

So, the minimal candidate key $\{AE, BE, DE\}$

Trivial Functional Dependency

$$(1, 2) \subseteq (1, 2, 3)$$

$ID, Name \rightarrow ID$

$name \rightarrow name$

decomposition যের ক্ষয় উপায় : — data না দেওয়া মাঝে

① $R_1 \cap R_2$

② $R_1 \cap R_2$ এর মধ্যে মদি R_1 / R_2 এর Closure পাওয়া যায়।
তবে অ Lossless decomposition.

$$\square (A, C) \cap (B, C) = C$$

$R_1 \quad R_2$

$C^+ \rightarrow C$

$$\{A \rightarrow B, B \rightarrow C\}$$

\therefore Lossy decomposition.

Intersection করে মদি Answer Table এর
superkey হস্ত তৈরি preserving (join ছাড়া
check করা যায় নির্বাচন)

$E \leftarrow (C)$
$D \leftarrow (D)$
$AB \leftarrow (E)$
$AC \leftarrow (DE)$
$AD \leftarrow (F)$
$AF \leftarrow (G)$

$B \leftarrow (E)$
$EF \leftarrow (C)$
$CE \leftarrow (B)$
$AC \leftarrow (B, E)$

$A \leftarrow (A)$
$ABE \leftarrow (E)$
$ABC \leftarrow (E)$
$ABECD \leftarrow (E)$

16/05/2024

CSE 302

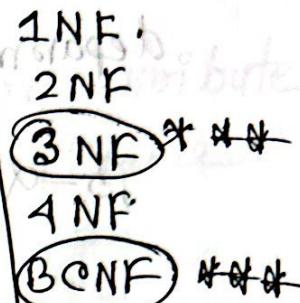
Normal Form

$$(a \cup x) = 19$$

goal: table good form এ আছে কিন্তু check করা,

- good form এ আন্তর্ভুক্ত এন্ট্রি decompose
কর্তৃতে হবে।

BCNF = Boyce - Codd Normal Form



- Functional dependency $\alpha \rightarrow \beta$

ID \rightarrow Name ✓

cgpa \rightarrow ID X

ID, Name \rightarrow ID (Trivial dependency)

- BCNF condition: ① $\alpha - \beta$ is trivial ($\beta \subseteq \alpha$)

(any 1) \rightarrow ② α is superkey for R

ID \rightarrow Name, Salary ✓

dept name \rightarrow building, budget X does not satisfy condition

\therefore This \notin in-dep building in BCNF.

Formula: $R_1 (\alpha \cup \beta)$

$R_2 (R - (\beta - \alpha))$

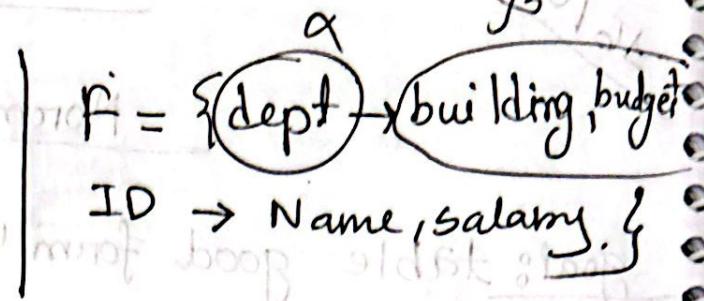
In-dep (ID, Name, salary, dept-name, building, budget)

$f = \{ \text{dept} \rightarrow \text{building, budget}$
 $ID \rightarrow \text{Name, salary} \}$

Instructors_dept is not in BCNF

$$R_1 = (\alpha \cup \beta)$$

$$R_2 = (R - (\beta - \alpha))$$



department(dept, building, budget)

$$\beta - \alpha = (\text{building, budget}) - (\text{dept})$$
$$= (\text{building, budget})$$

$$R - (\beta - \alpha) = (\text{ID, Name, Salary, dept-name, building, budget}) - (\text{building, budget})$$

$$R_2 = (\text{ID, Name, Salary, dept-name})$$

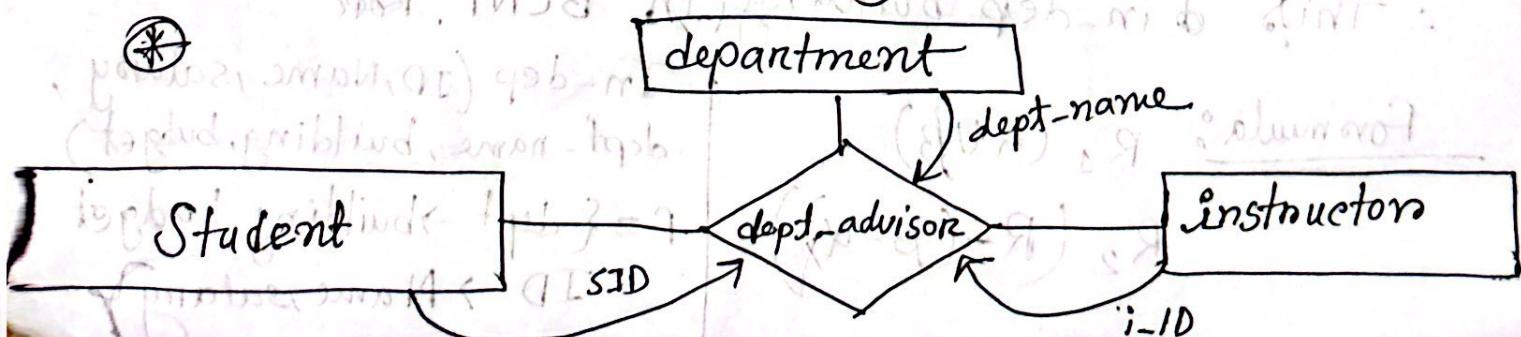
$\therefore \text{department(dept, building, budget)}$

$\therefore \text{Instructors(ID, Name, Salary, dept-name)}$

Dependency Preserving

Application: BCNF এর বেশি restricted. BCNF

সর্ববাক্য দেখুন dependency Preserving এর,



19/05/24

Chapten-6 : Quiz 3

Question

① Lossless

② BCNF, NF, 2NF, 3NF

③ Decompose

④ dependency preserving

decompose প্রেরণ হটে table এর common attribute

নিব, হটে মদি হটে table এর যেখানে গোটা table

এর superkey হলে মেরা lossless

3NF

Conditions (atleast 1)

① same as BCNF

② " " " A

③ Each attribute $\beta - \alpha$ is candidate key

present

∴ $\beta - \alpha = \text{dept_name} \rightarrow \text{ID} \cdot = (\text{ID})$

∴ 3NF

lossless

Always dependency preserving

BCNF

lossless

may or may not dependency preserving

23/05/20

Chapter 7 (No Algorithm) / (No Correctness Proof)

Canonical Order Cover

$\text{sid} \rightarrow \text{name, address}$

$\text{o1} \rightarrow x$

$\text{o1} \rightarrow y$

যখন ক্ষেত্রে ফিল্ড Update
হলু তখন functional dependency
check করতে হব্ব,

- functional dependency checking হচ্ছি time consuming.

$$F = \{ \begin{array}{l} \text{sid} \rightarrow \text{sname, address} \\ \text{sid} \rightarrow \text{sname} \end{array} \} \quad \text{extraneous attribute}$$



$$R = (ABC)$$

$$F = \{ A \rightarrow BC \}$$

$$B \rightarrow C$$

$$A \rightarrow B$$

$$AB \rightarrow C$$

Step 1: Combine

$$F = \{ A \rightarrow BC \}$$

$$B \rightarrow C$$

$$AB \rightarrow C \}$$

Step 2: Check for extraneous attribute
from left side of FD.

$$F = \{ A \rightarrow BC \}$$

$$B \rightarrow C \}$$

Step 3: Check from right
side of FD

$$F = \{ A \rightarrow B \\ B \rightarrow C \}$$

Hence C is extraneous attribute.

∴ minimal Canonical
Cover is,

$$F = \{ A \rightarrow B \\ B \rightarrow C \}$$

$$R = (ABCDE)$$

$$F = \{ A \rightarrow BC \\ CD \rightarrow E \\ B \rightarrow D \\ E \rightarrow A \}$$

From left side,

From right side,

From left side,

$$F = \{ A \rightarrow BC \\ C \rightarrow E \\ B \rightarrow D \\ E \rightarrow A \}$$

Right side

$$\begin{array}{l} A \rightarrow BC \\ D \rightarrow E \\ B \rightarrow D \\ E \rightarrow A \end{array}$$

cannonical cover

Multivalued dependency

Sid	Course	Hobby
1	DB	CRICKET
1	Algo	DANCE
2	SP	SINGING
2	Algo	SLEEPING

multivalued

$Sid \rightarrow Course$

$Sid \rightarrow Hobby$

decompose

4NF

① it must be in BCNF

② it should not have any multivalued attribute

$02 = AD$ এ ক্ষেত্রে :

$AD = A \cup B = AB$ এর জন্য

মাত্রটির সাথে BCNF

এর পুরো নাম

পুরো নাম

পুরো নাম