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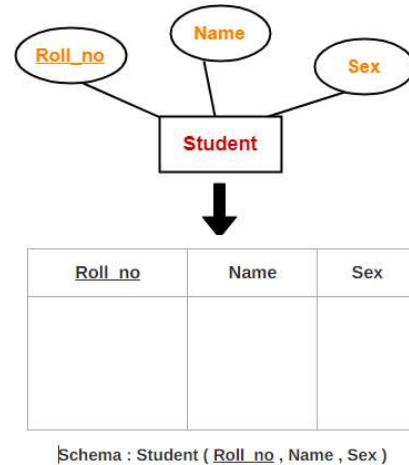
How to Convert ER Diagram into Relation or Table?

Introduction: 1-2

2

Rule 1: Strong Entity Set With Only Simple Attributes

- ❑ A strong entity set with only simple attributes will require only one table or relation in relation model.
- ❑ Attributes of table will be the attributes of the entity set.
- ❑ The primary key of the table will be the key attribute of the entity set.

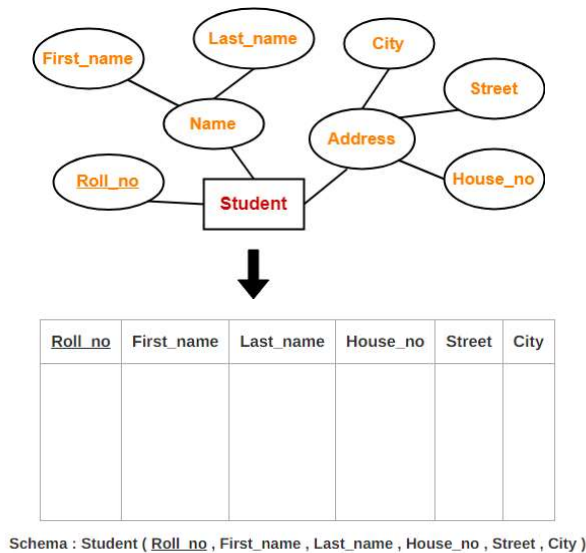


Introduction: 1-3

3

Rule 2: Strong Entity Set With Composite Attributes

- ❑ A strong entity set with any number of composite attributes will require only one table or relation in relation model.
- ❑ While conversion, simple attributes of the composite attributes are taken into account and not the composite attribute itself.

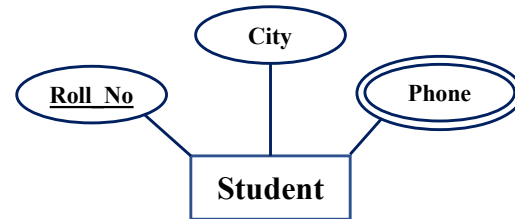


Introduction: 1-4

4

Rule 3: Strong Entity Set With Multi-Valued Attributes

- ❑ A strong entity set with any number of **multi-valued attributes** will require **two tables or relations in relation model**.
- ❑ One table or relation will contain all the **simple attributes** with the **primary key**.
- ❑ Other table will contain the **primary key** and all the **multi-valued attributes**.



Roll_No	City

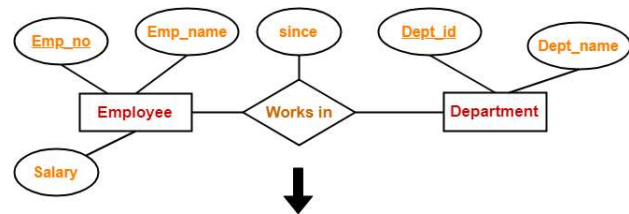
Roll_No	Phone

Introduction: 1-5

5

Rule 4: Relationship Set into a Table

- ❑ A relationship set require **one table or relation in relational model**.
- ❑ Attributes of the table are:
 - Primary key attributes of the participating entity set.
 - Its own descriptive attributes if any.
- ❑ Set of non-descriptive attributes will be the primary key.
- ❑ Given ER diagram requires three tables or relations in relational model.



Emp_no	Dept_id	since

Schema : Works in (Emp_no , Dept_id , since)

Introduction: 1-6

6

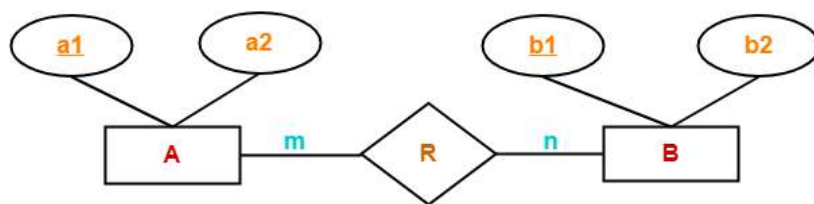
Rule 5: For Binary Relationships With Cardinality Ratios

- ❑ The following four cases are possible-
 - Case-01: Binary relationship with cardinality ratio m:n
 - Case-02: Binary relationship with cardinality ratio 1:n
 - Case-03: Binary relationship with cardinality ratio m:1
 - Case-04: Binary relationship with cardinality ratio 1:1

Introduction: 1-7

7

Case-01: Binary Relationship with Cardinality Ratio m:n

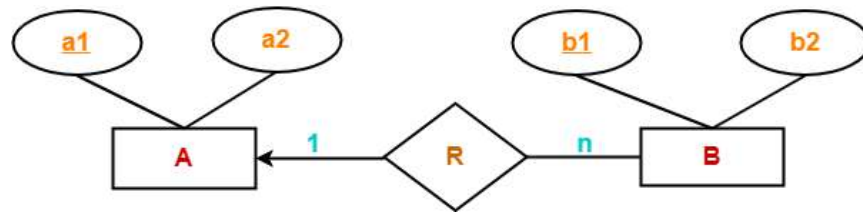


- ❑ In Many-to-Many, three tables will be required-
 - A (a1 , a2)
 - R (a1 , b1)
 - B (b1 , b2)

Introduction: 1-8

8

Case-02: Binary Relationship with Cardinality Ratio 1:n



❑ In One-to-Many, two tables will be required-

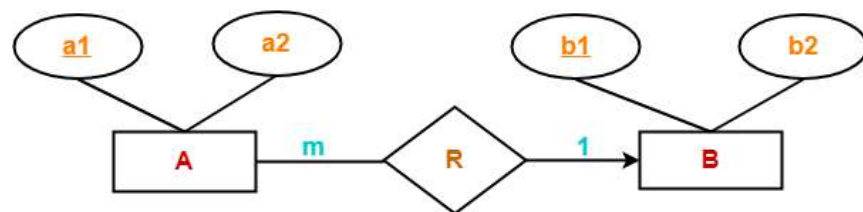
- A (a1 , a2)
- BR (a1 , b1 , b2)

NOTE- Here, combined table will be drawn for the entity set B and relationship set R.

Introduction: 1-9

9

Case-03: Binary Relationship with Cardinality Ratio m:1



❑ In Many-to-One, two tables will be required-

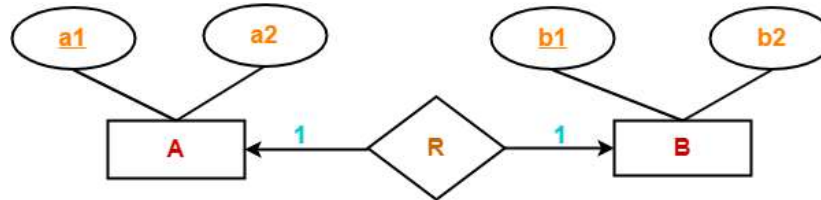
- AR (a1 , a2, b1)
- B (b1 , b2)

NOTE- Here, combined table will be drawn for the entity set A and relationship set R.

Introduction: 1-10

10

Case-04: Binary Relationship with Cardinality Ratio 1:1



❑ In One-to-One, two tables will be required-

❑ Way-01:

- AR (a1 , a2 , b1)
- B (b1 , b2)

❑ Way-02:

- A (a1 , a2)
- BR (a1 , b1 , b2)

Introduction: 1-11

11

Thumb Rules to Remember

- ❑ While determining the minimum number of tables required for binary relationships with given cardinality ratios, following thumb rules must be kept in mind-
 - For binary relationship with cardinality ratio $m : n$,
 - ❖ *Separate and individual tables* will be drawn for each entity set and relationship. (**Three tables** will be required).
 - For binary relationship with cardinality ratio either $m : 1$ or $1 : n$,
 - ❖ Always remember “*many side will consume the relationship*” i.e. a combined table will be drawn for many side entity set and relationship set. (**Two tables** will be required).
 - For binary relationship with cardinality ratio $1 : 1$,
 - ❖ Two tables will be required. You can *combine the relationship set with any one of the entity sets*. (**Two tables** will be required).

Introduction: 1-12

12

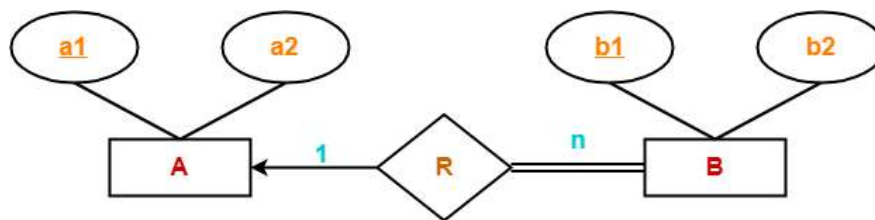
Rule-06: For Binary Relationship With Both Cardinality Constraints and Participation Constraints

- ❑ Cardinality constraints will be implemented as discussed in Rule-05.
- ❑ Because of the total participation constraint, foreign key acquires NOT NULL constraint, i.e. now foreign key can not be null.
- ❑ Two Cases:
 - Case 1: For binary relationship with cardinality constraint and total participation constraint from **one side**.
 - Case 2: For binary relationship with cardinality constraint and total participation constraint from **both side**.

Introduction: 1-13

13

Case-01: For Binary Relationship With Cardinality Constraint and Total Participation Constraint From One Side

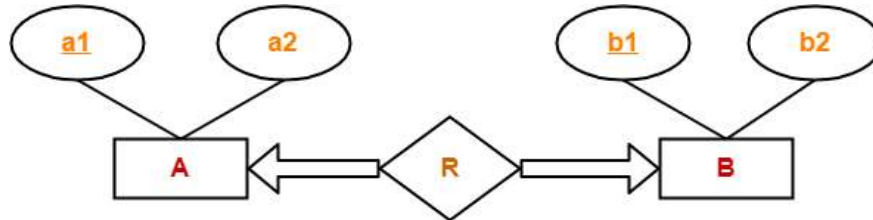


- ❑ Because cardinality ratio = 1 : n , so we will combine the entity set B and relationship set R. Then, two tables will be required-
 - A (a1 , a2)
 - BR (a1 , b1 , b2)
- ❑ Because of total participation, **foreign key a1** has acquired **NOT NULL constraint**, so it can't be null now.

Introduction: 1-14

14

Case-02: For Binary Relationship With Cardinality Constraint and Total Participation Constraint From Both Sides

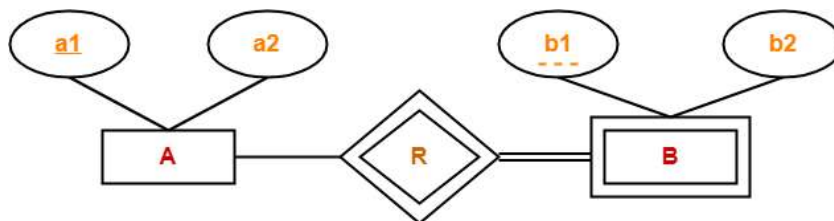


- ❑ Because cardinality ratio = 1 : 1 , so we will combine the entity set B, entity set A and relationship set R.
- ❑ Here, Only one table is required.
 - ARB (a1 , a2 , b1 , b2)

Introduction: 1-15

15

Rule-07: For Binary Relationship With Weak Entity Set

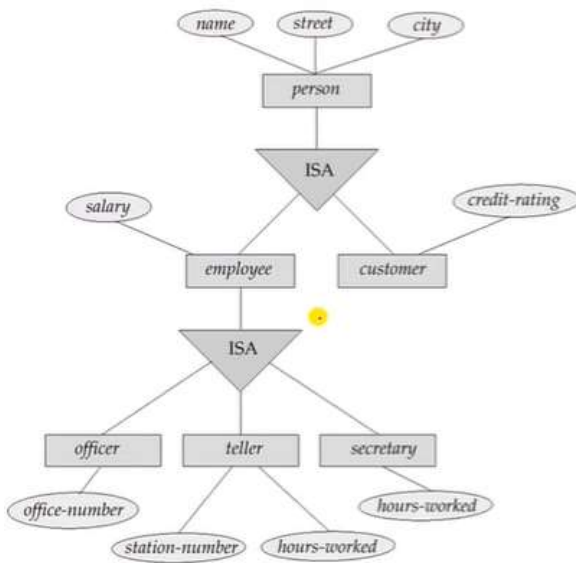


- ❑ Weak entity set always appears in association with identifying relationship with total participation constraint and there is always 1:n relationship from identifying entity set to weak entity set.
- ❑ Here, two tables will be required-
 - A (a1 , a2)
 - BR (a1 , b1 , b2)

Introduction: 1-16

16

Generalization / Specialization: How Schema or Tables can be formed?



- Tables will be created only for leaf nodes or subclasses.

Four tables can be formed:

1. **customer** (name, street, city, credit_rating)
2. **officer** (name, street, city, salary, office_number)
3. **teller** (name, street, city, salary, station_number, hours_worked)
4. **secretary** (name, street, city, salary, hours_worked)

Introduction: 1-17

17

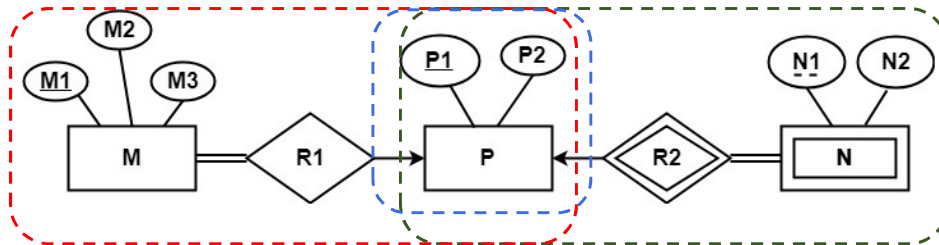
Practice Questions Based On Converting ER Diagram To Tables

Introduction: 1-18

18

Question 1

- Find the minimum number of tables required for the following ER diagram in relational model.



- Solution:

- MR1 (M1 , M2 , M3 , P1)
- P (P1 , P2)
- NR2 (P1 , N1 , N2)
- Applying the rules, minimum 3 tables will be required

Introduction: 1-19

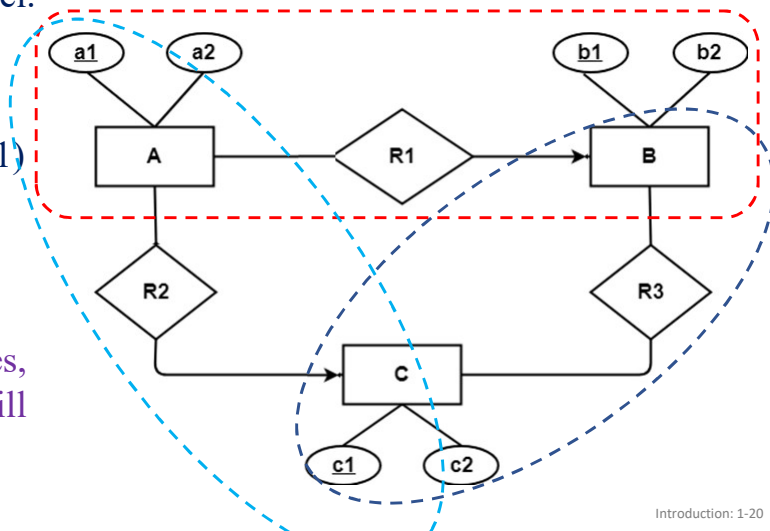
19

Question 2

- Find the minimum number of tables required for the following ER diagram in relational model.

- Solution:

- AR1R2 (a1 , a2 , b1 , c1)
- B (b1 , b2)
- C (c1 , c2)
- R3 (b1 , c1)
- Applying the rules, minimum 4 tables will be required.



Introduction: 1-20

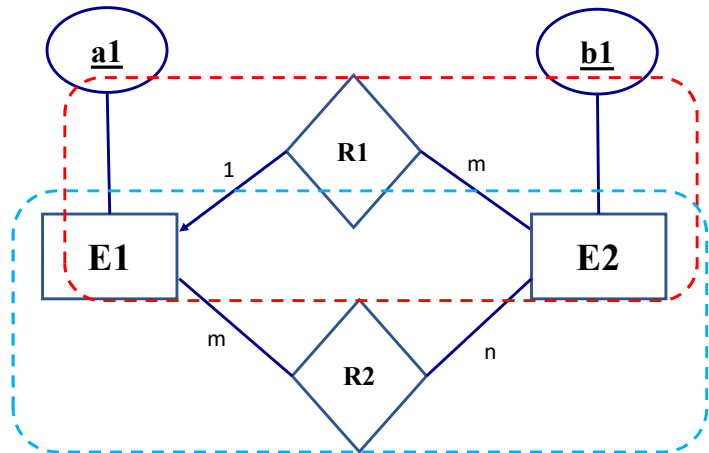
20

Question 3

- Find the minimum number of tables required for the following ER diagram in relational model.

Solution:

- E2R1 (a1 , b1)
- E1(a1)
- R2 (a1 , b1)
- Applying the rules, minimum 3 tables will be required.



Introduction: 1-21

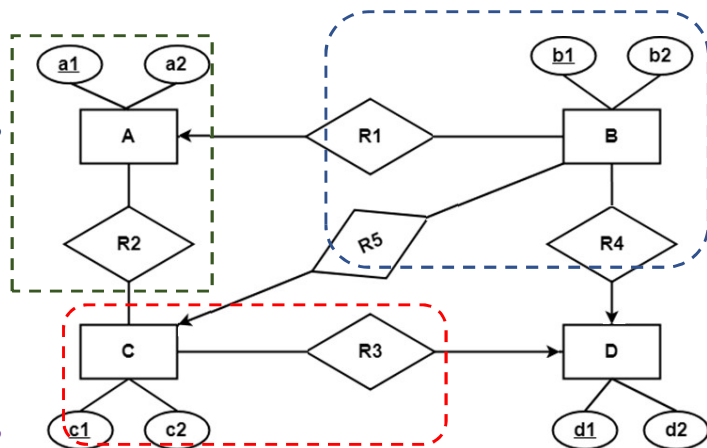
21

Question 4

- Find the minimum number of tables required for the following ER diagram in relational model.

Solution:

- BR1R4R5 (b1 , b2 , a1 , c1 , d1)
- CR3 (c1 , c2 , d1)
- D (d1 , d2)
- A (a1 , a2)
- R2 (a1 , c1)
- Applying the rules, minimum 5 tables will be required.

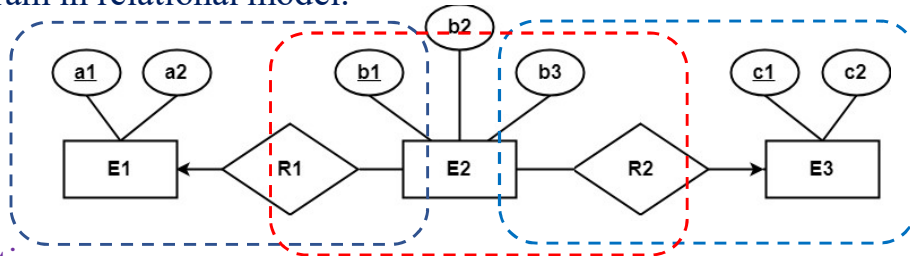


Introduction: 1-22

22

Question 5

- Find the minimum number of tables required for the following ER diagram in relational model.



Solution:

- E1 (a1 , a2)
- E2R1R2 (b1 , b2 , a1 , c1 , b3)
- E3 (c1 , c2)
- Applying the rules, minimum 3 tables will be required.

Introduction: 1-23

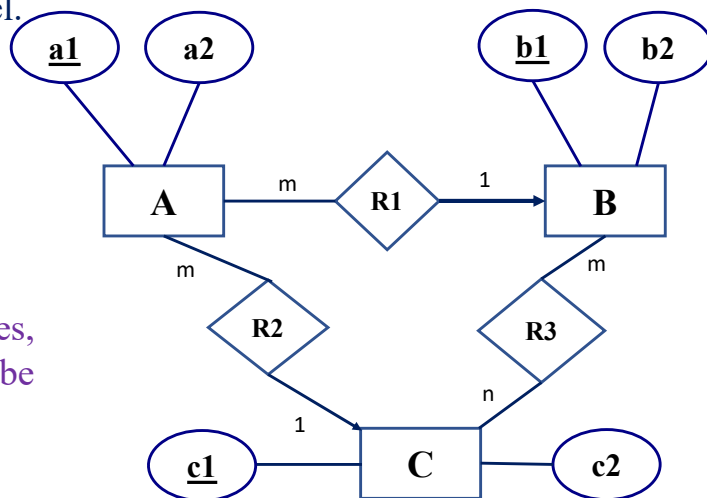
23

Question 6

- Find the minimum number of tables required for the following ER diagram in relational model.

Solution:

- AR1R2 (a1 , a2 , b1, c1)
- B (b1 , b2)
- C (c1 , c2)
- R3 (c1 , b1)
- Applying the rules, minimum 4 tables will be required.



Introduction: 1-24

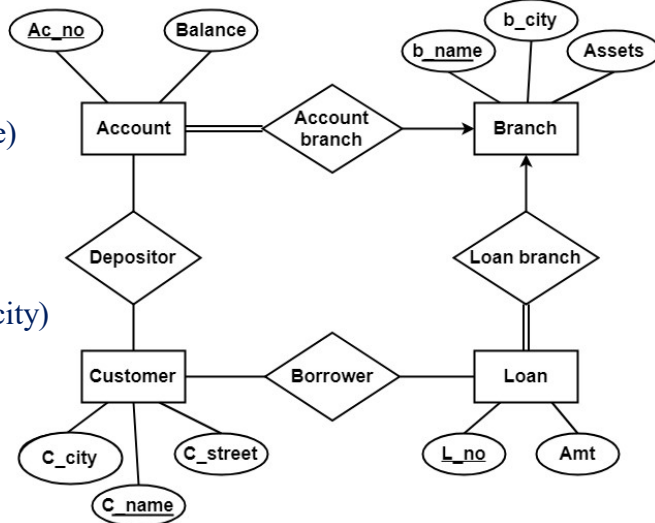
24

Question 7

- Find the minimum number of tables required for the following ER diagram in relational model.

Solution:

- Account (Ac_no, Balance, b_name)
- Branch (b_name, b_city, Assets)
- Loan (L_no, Amt, b_name)
- Borrower (C_name, L_no)
- Customer (C_name, C_street, C_city)
- Depositor (C_name, Ac_no)
- Applying the rules,
minimum 6 tables will be required.

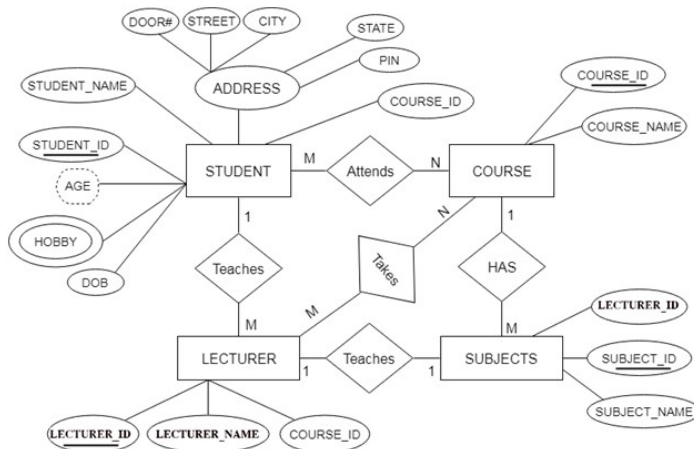


Introduction: 1-25

25

Question 8

- Find the minimum number of tables.



Introduction: 1-26

26

Solution:

Minimum 7 tables will be required:

1. **Student** (Student_Id, Student_Name, DOB, Door#, Street, City, State, Pin, Course_Id)
2. **Lecturer** (Lecturer_Id, Lecturer_Name, Course_Id, Student_Id, Subject_Id)
3. **Course** (Course_Id, Course_Name)
4. **Subjects** (Subject_Id, Subject_Name, Lecturer_Id, Course_Id)
5. **Hobby** (Subject_Id, Hobby)
6. **Attends** (Subject_Id, Course_Id)
7. **Takes** (Lecturer_Id, Course_Id)