E-R Diagram

Conversion into tables

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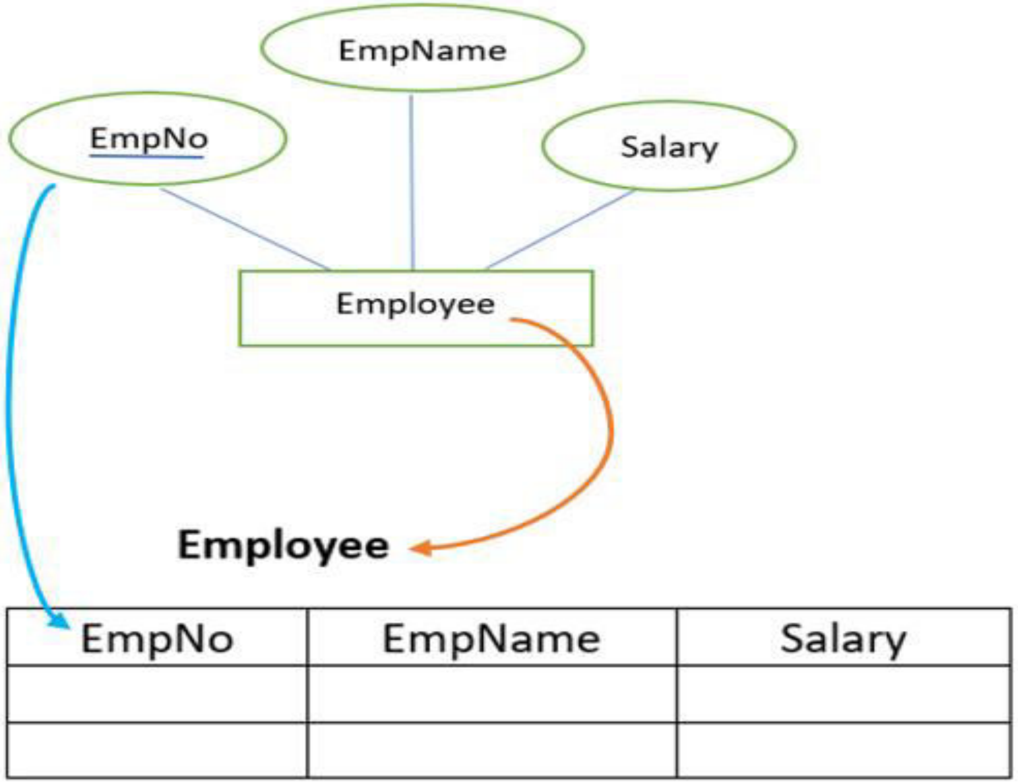
Conversion of E-R into tables

- Conversion of an E-R diagram into a relational model is required because E-R diagrams represent the conceptual level of the database design while the relational model represents the logical level.

Scenario-1

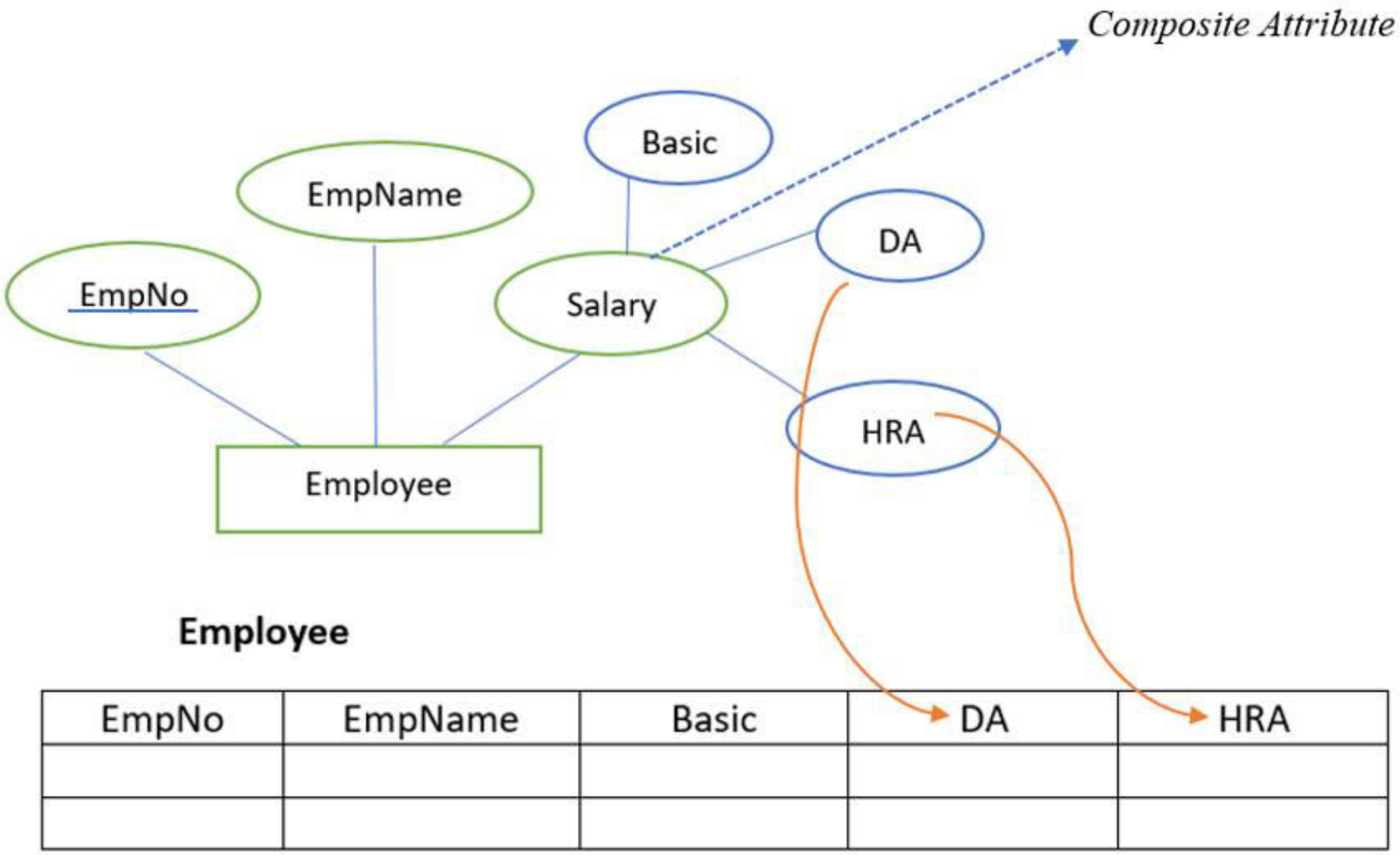
- Consider the following E-R diagram in the figure below. The E-R diagram consists of *Employee* as an entity set and *EmpNo*, *EmpName*, and *Salary* as its attributes.



Employee

EmpNo	EmpName	Salary

Scenario-2



Employee

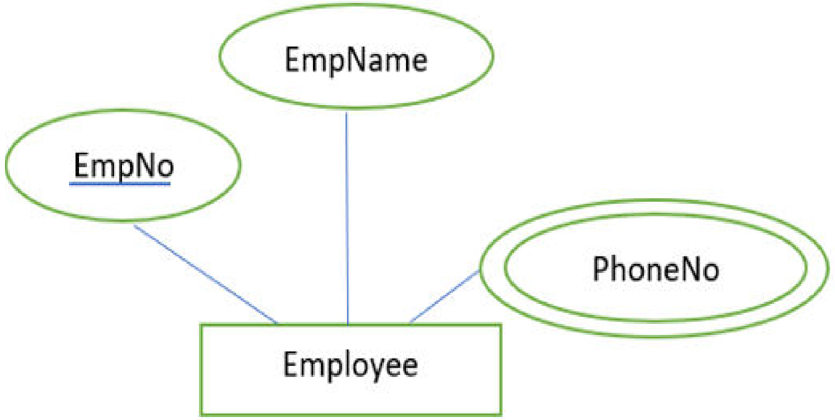
EmpNo	EmpName	Basic	DA	HRA

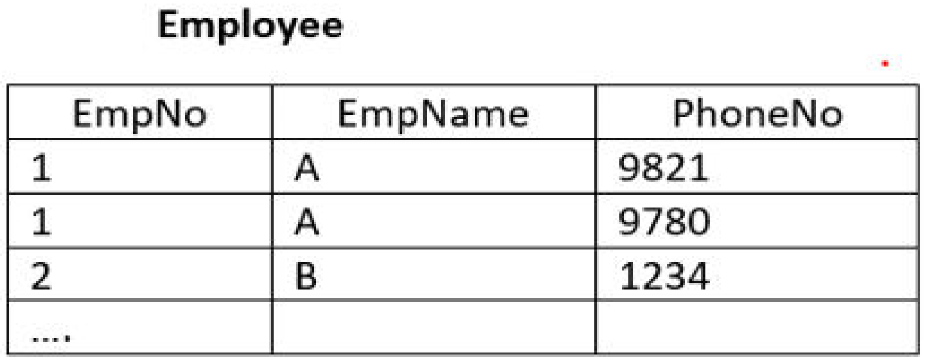
For example in the figure given below, *Salary* is the composite attribute, and *Basic*, *DA*, and *HRA* are its compositions.

While converting an E-R diagram consisting of a composite attribute we do not include the composite attribute in the relational model. The compositions of the composite attribute will become the attributes in the relational model.

Scneario-3

- If an entity contains a multivalued attribute, we split the attributes into two relations in the relational model. One with key attribute and all simple attributes and other with key attribute and all multivalued attributes. For example, in the figure given below, ***PhoneNo*** is the multivalued attribute.

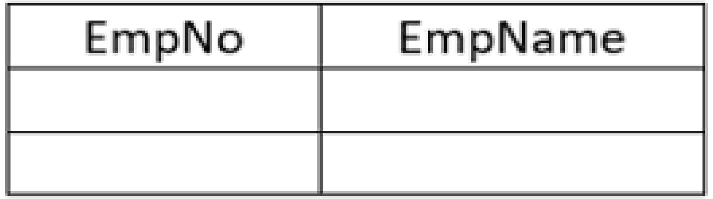




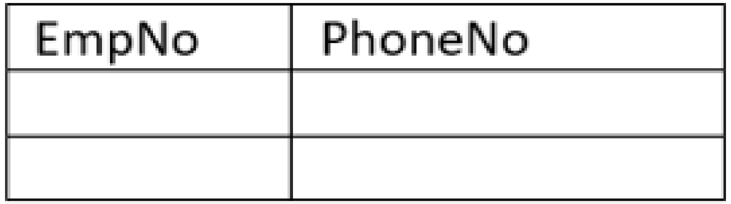
Employee

EmpNo	EmpName	PhoneNo
1	A	9821
1	A	9780
2	B	1234
….		

- However, to avoid duplicate values in the table, we split the attributes into two different relations as shown in the figure below



EmpNo	EmpName

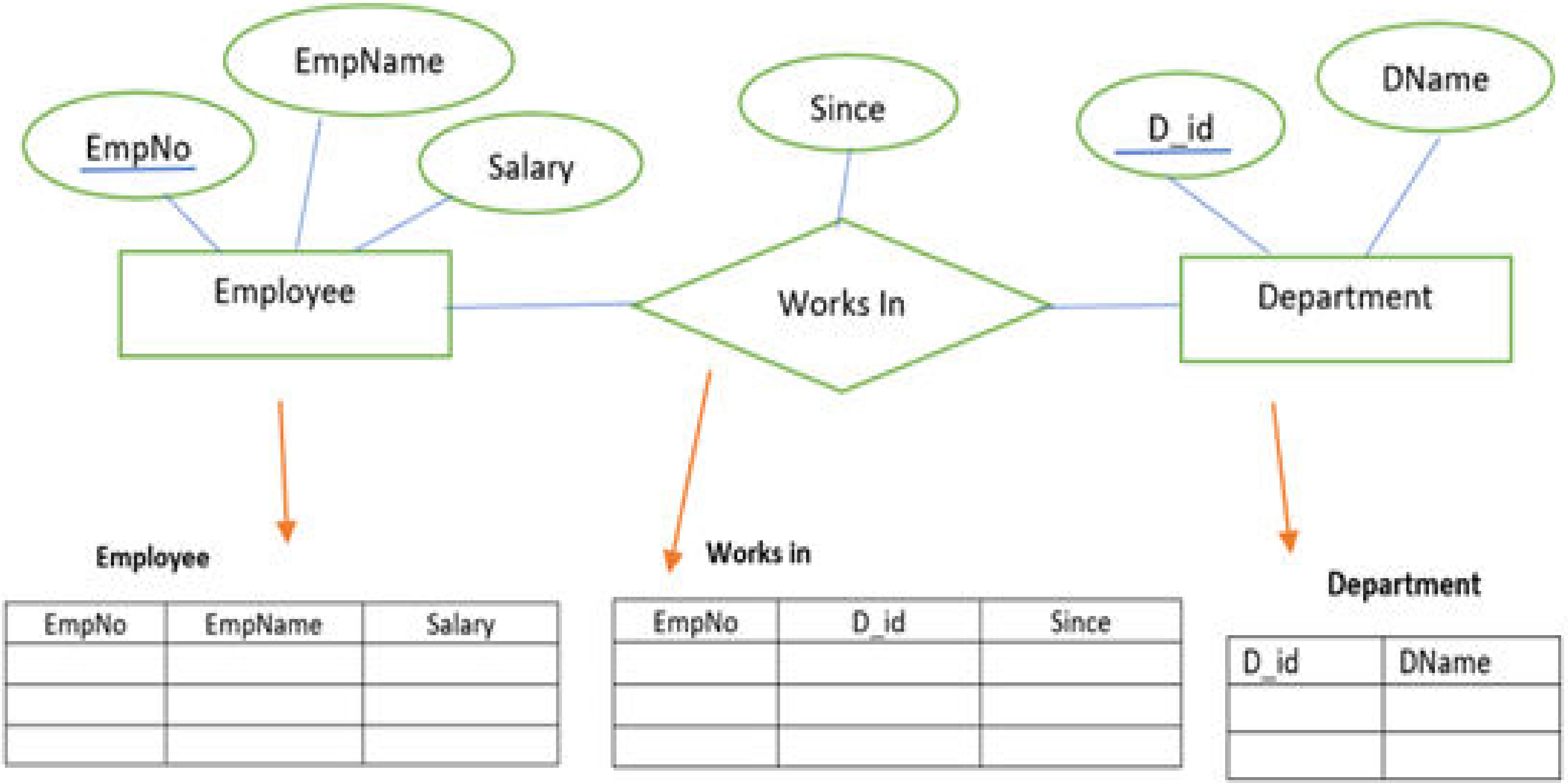


EmpNo	PhoneNo

How relationship are translated in a table

- Likewise, we map the entity set into the relation in a relational model, we can also map a relationship set into a relation. The attribute of such a relation includes key attributes of the participating relations. The attributes will become a foreign key.
- For example, in the figure given below, there are two entity sets *Employee* and *Department*. These entity sets are participating in a relationship *works in.* The relationship set is converted into relation with attributes EmpNo from *Employee* relation, D_id from *Department* relation and *Since*, the attribute of the relationship set itself.

How relationship are translated in a table



Employee

EmpNo	EmpName	Salary

Works in

EmpNo	D_id	Since

Department

D_id	DName

Binary relationships with Cardinality Ratio

- 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 ration m : n , separate and individual tables will be drawn for each entity set and relationship.
  - 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.
  - 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.

Binary relationships with Cardinality Ratio and participation constraint

- Because of the total participation constraint, foreign key acquires **NOT NULL** constraint i.e. now foreign key can not be null.
- If there is no total participation then foreign key can be null.

Question

- Consider the following tables:

Course (Course_id,Course_name)

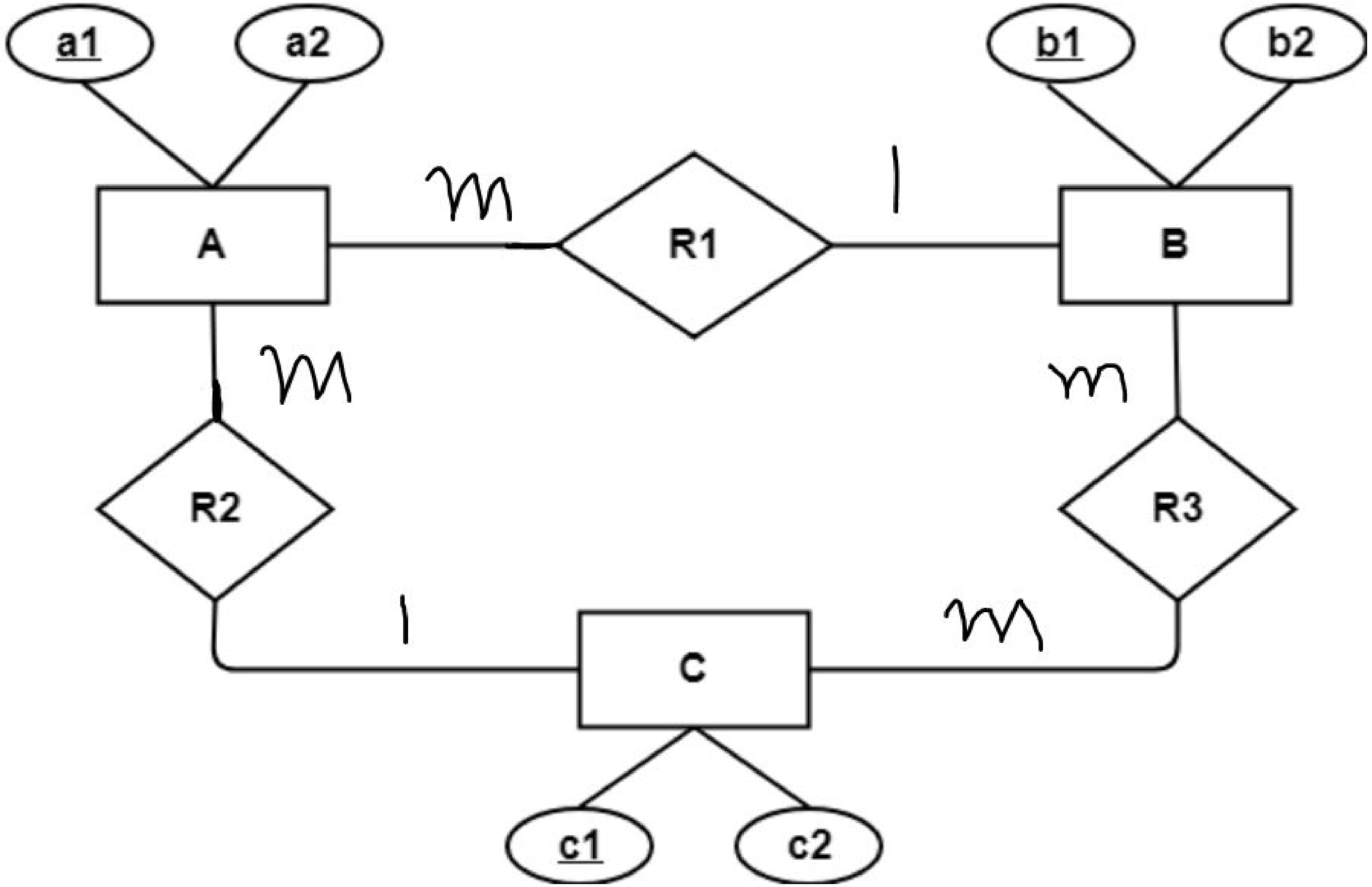
Teacher (Teacher_id,Teacher_name)

Assigned_to (Teacher_id, Course_id)

a) How many tables will be created using the above scenario?

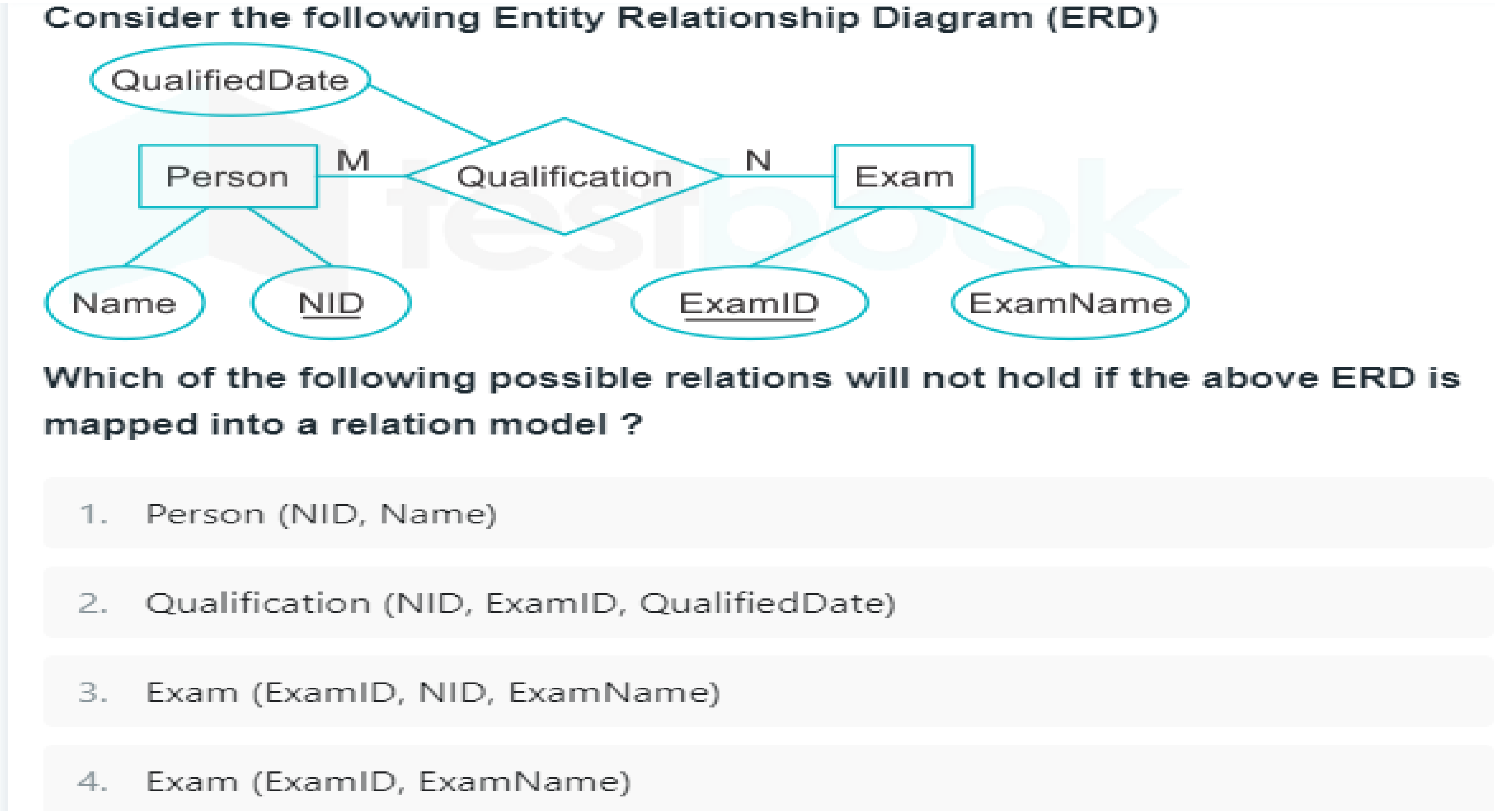
b) What will be the foreign key?

Question



Find the minimum number of tables for this scenario?

- Let E1 and E2 be two entities in an E/R diagram with simple single-valued attributes. R1 and R2 are two relationships between E1 and E2, where R1 is one-to-many and R2 is many-to-many. R1 and R2 do not have any attributes of their own. What is the minimum number of tables required to represent this situation in the relational model?
  (A) 2
  (B) 3
  (C) 4
  (D) 5



Consider the following Entity Relationship Diagram (ERD)

Which of the following possible relations will not hold if the above ERD is mapped into a relation model ?

1. Person (NID, Name)
2. Qualification (NID, ExamID, QualifiedDate)
3. Exam (ExamID, NID, ExamName)
4. Exam (ExamID, ExamName)