UNIT 1

Lecture 27 & 28

E R Model to Relational Mapping

ER Model to Relational Mapping

Step 1: Mapping of Regular Entity Types

Step 2: Mapping of Weak Entity Types

Step 3: Mapping of Binary 1:1 Relation Types

Step 4: Mapping of Binary 1:N Relationship Types.

Step 5: Mapping of Binary M:N Relationship Types.

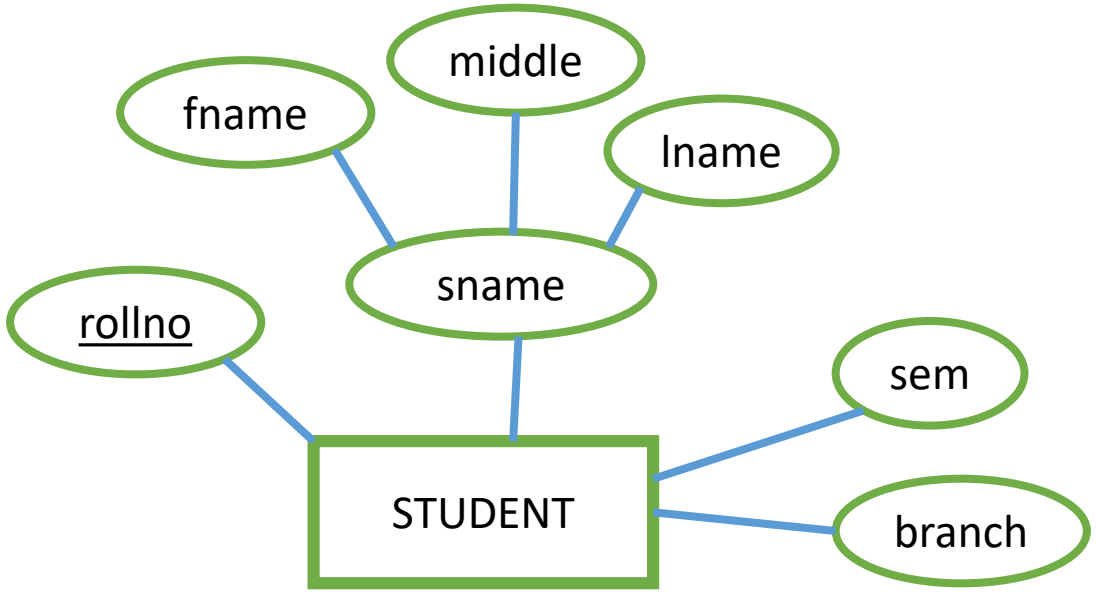
Step 6: Mapping of Multivalued attributes.

Step 7: Mapping of N-ary Relationship Types.

Step 1: Mapping of Regular Entity Types.

1. For each regular (strong) entity type E in the ER schema, create a relation R that includes all the simple attributes of E.

2. Choose one of the key attributes of E as the primary key for R. If the chosen key of E is composite, the set of simple attributes that form it will together form the primary key of R.



STUDENT (rollno, fname, middle, lname, sem, branch)

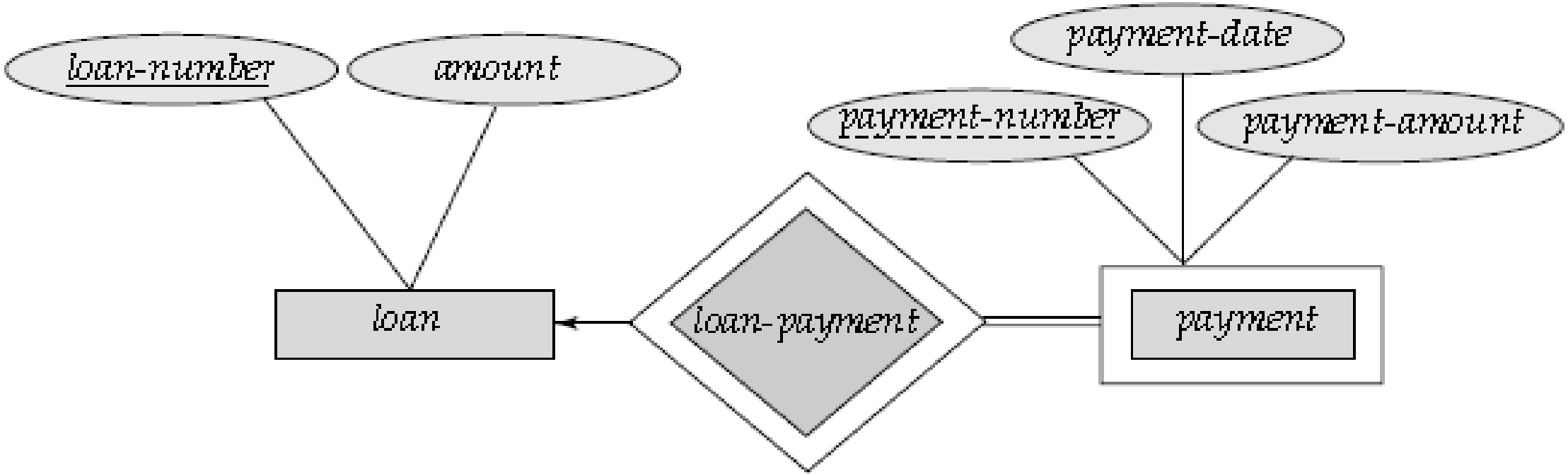
Step 2: Mapping of Weak Entity Types

1. For each weak entity type W in the ER schema with owner entity type E, create a relation R and include all simple attributes (or simple components of composite attributes) of W as attributes of R.

2. In addition, include as foreign key attributes of R the primary key attribute(s) of the relation(s) that correspond to the owner entity type(s).

3. The primary key of R is the combination of the primary key(s) of the owner(s) and the partial key of the weak entity type W, if any.

Mapping of Weak Entity Sets



loan (loan-number, amount)

payment (loan-number, payment-number, payment-date, payment-amount)

Step 3: Mapping of Binary 1:1 Relation Types

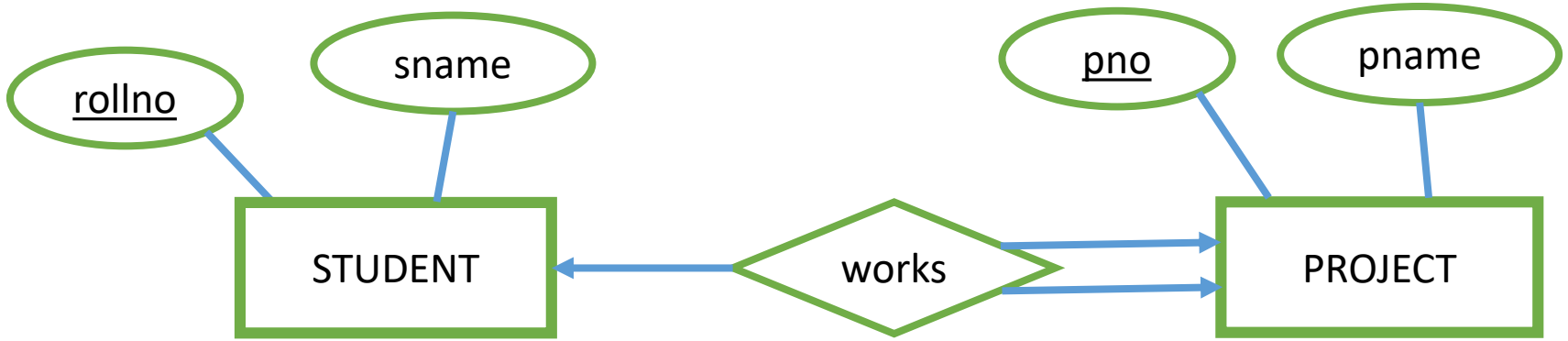
For each binary 1:1 relationship type R in the ER schema, identify the relations S and T that correspond to the entity types participating in R. There are three possible approaches :

(1) Foreign Key approach: Choose one of the relations-S, say-and include a foreign key in S the primary key of T. It is better to choose an entity type with total participation in R in the role of S.

(2) Merged relation option: An alternate mapping of a 1:1 relationship type is possible by merging the two entity types and the relationship into a single relation. This may be appropriate when both participations are total.

(3) Cross-reference or relationship relation option: The third alternative is to set up a third relation R for the purpose of cross-referencing the primary keys of the two relations S and T representing the entity types.

Step 3: Mapping of Binary 1:1 Relation Types



STUDENT

rollno	sname
1	RAM
2	SHYAM
3	MOHAN
4	GOPAL

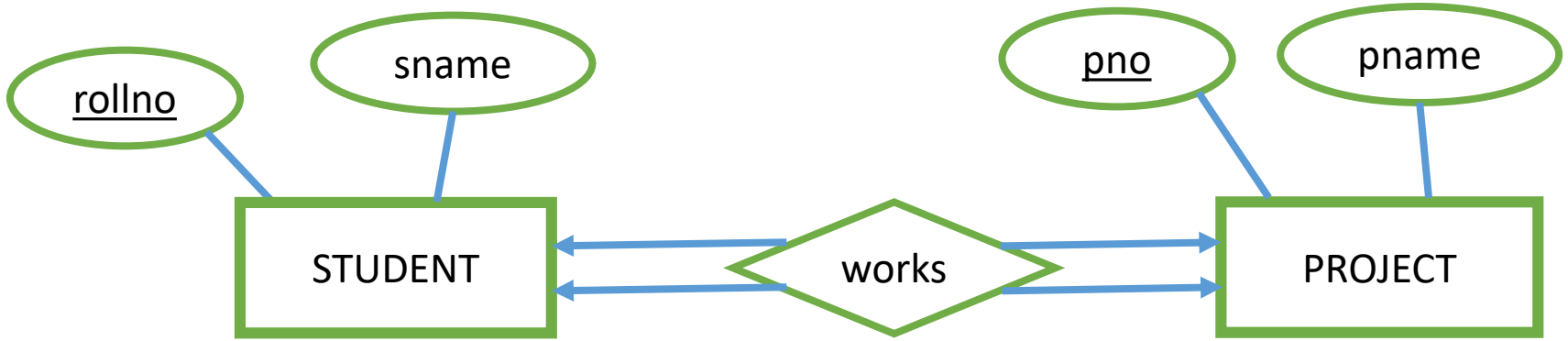
PROJECT

pno	pname	rollno
121	P1	1
122	P2	2

STUDENT (rollno, sname)

PROJECT (pno, pname, rollno)

Step 3: Mapping of Binary 1:1 Relation Types



STUDENT

rollno	sname	pno
1	RAM	121
2	SHYAM	122
3	MOHAN	123
4	GOPAL	124

PROJECT

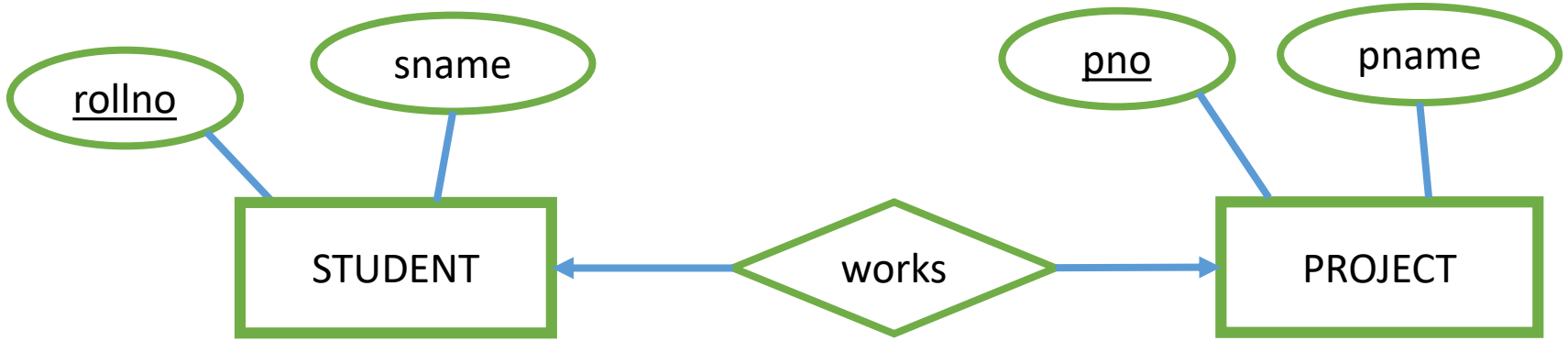
pno	pname	rollno
121	P1	1
122	P2	2
123	P3	3
124	P4	4

STUDENTPROJECT

rollno	sname	pno	pname
1	RAM	121	P1
2	SHYAM	122	P2
3	MOHAN	123	P3
4	GOPAL	124	P4

STUDENTPROJECT (rollno, sname, pno, pname)

Step 3: Mapping of Binary 1:1 Relation Types



STUDENT

rollno	sname
1	RAM
2	SHYAM
3	MOHAN
4	GOPAL

WORKS

rollno	pno
1	121
2	122

PROJECT

pno	pname
121	P1
122	P2
123	P3
124	P4

STUDENT (rollno, sname)

WORKS (rollno, pno)

PROJECT (pno, pname)

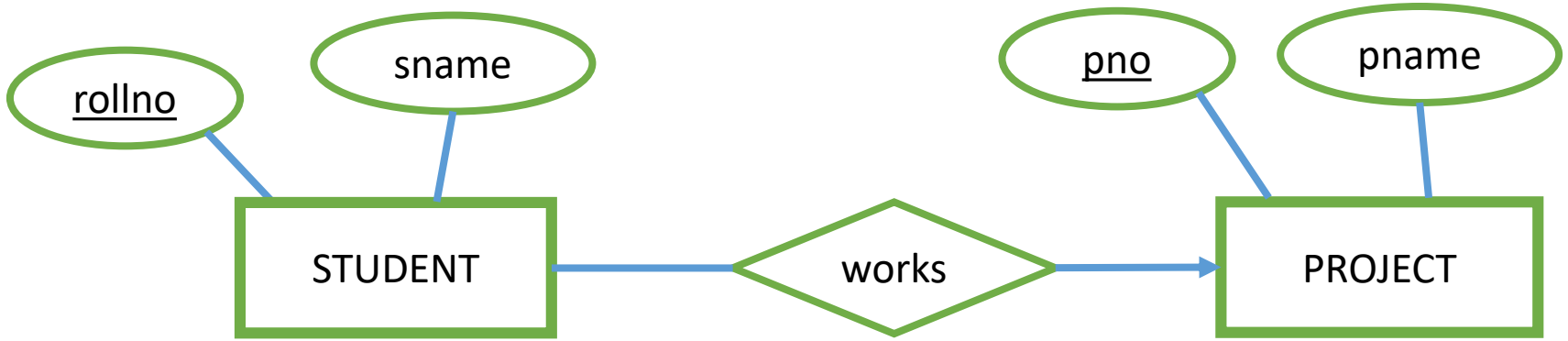
Step 4: Mapping of Binary 1:N Relationship Types.

1. For each regular binary 1:N relationship type R, identify the relation S that represent the participating entity type at the N-side of the relationship type.

2. Include as foreign key in S the primary key of the relation T that represents the other entity type participating in R.

3. Include any simple attributes of the 1:N relation type as attributes of S.

Step 4: Mapping of Binary 1:N Relationship Types.



STUDENT

rollno	sname	pno
1	RAM	121
2	SHYAM	122
3	MOHAN	
4	GOPAL	

PROJECT

pno	pname
121	P1
122	P2
123	P3
124	P4

STUDENT (rollno, sname, pno)

PROJECT (pno, pname)

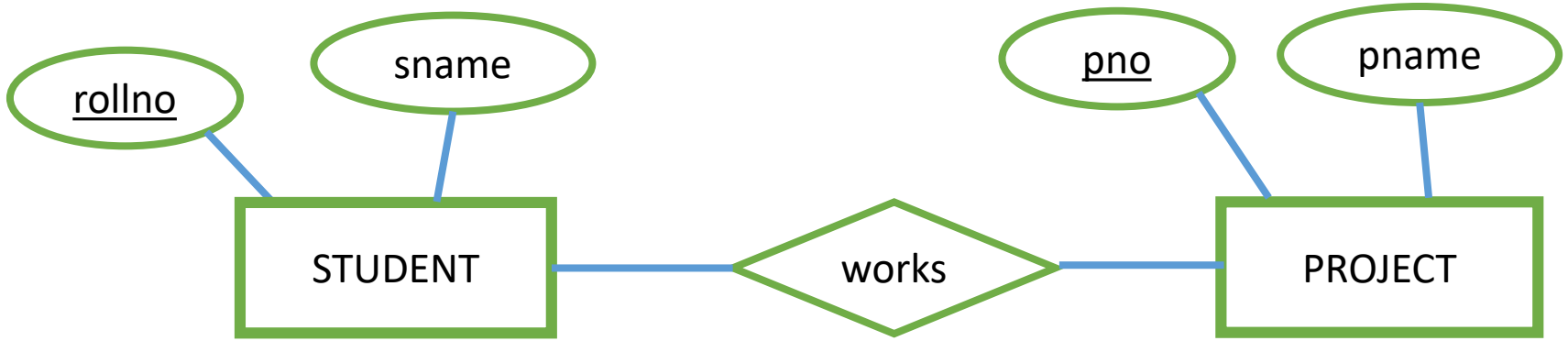
Step 5: Mapping of Binary M:N Relationship Types.

1. For each regular binary M:N relationship type R, create a new relation S to represent R.

2. Include as foreign key attributes in S the primary keys of the relations that represent the participating entity types; their combination will form the primary key of S.

3. Also include any simple attributes of the M:N relationship type (or simple components of composite attributes) as attributes of S.

Step 5: Mapping of Binary M:N Relationship Types.



STUDENT

rollno	sname
1	RAM
2	SHYAM
3	MOHAN
4	GOPAL

STUDENT (rollno, sname)

WORKS (rollno, pno)

PROJECT (pno, pname)

WORKS

rollno	pno
1	121
1	122
2	121
2	122
2	123

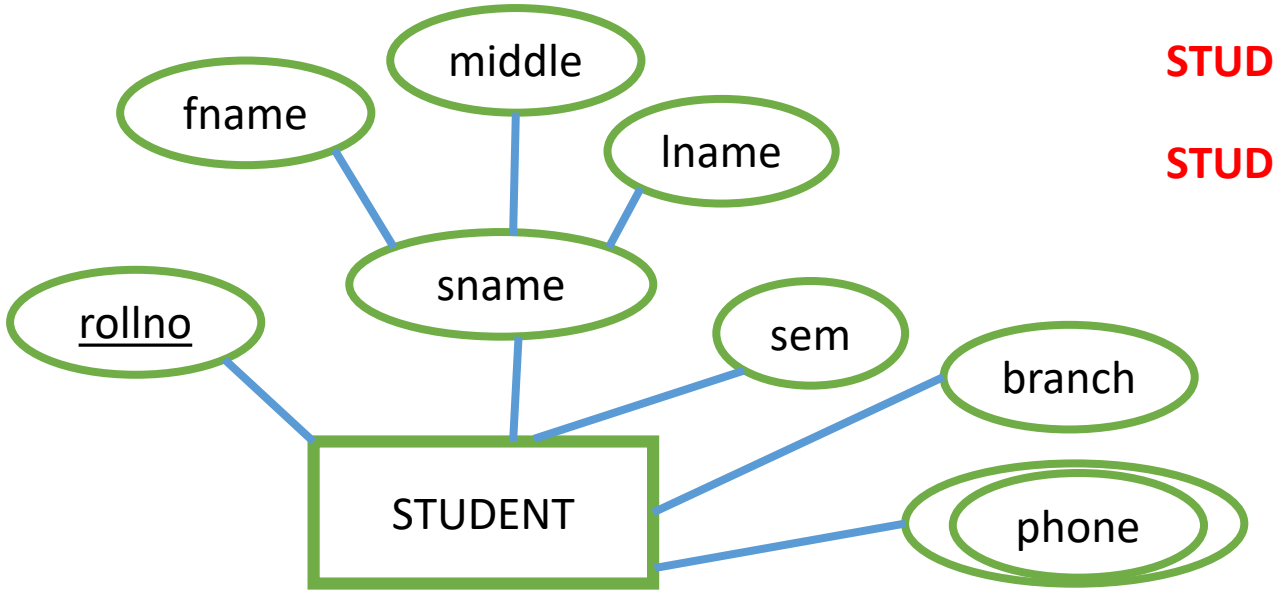
PROJECT

pno	pname
121	P1
122	P2
123	P3
124	P4

Step 6: Mapping of Multivalued attributes

1. For each multivalued attribute A, create a new relation R. This relation R will include an attribute corresponding to A, plus the primary key attribute K-as a foreign key in R-of the relation that represents the entity type of relationship type that has A as an attribute.

2. The primary key of R is the combination of A and K. If the multivalued attribute is composite, we include its simple components.



STUDENT (rollno, fname, middle, lname, sem, branch)

STUDPHONE (rollno, phone)

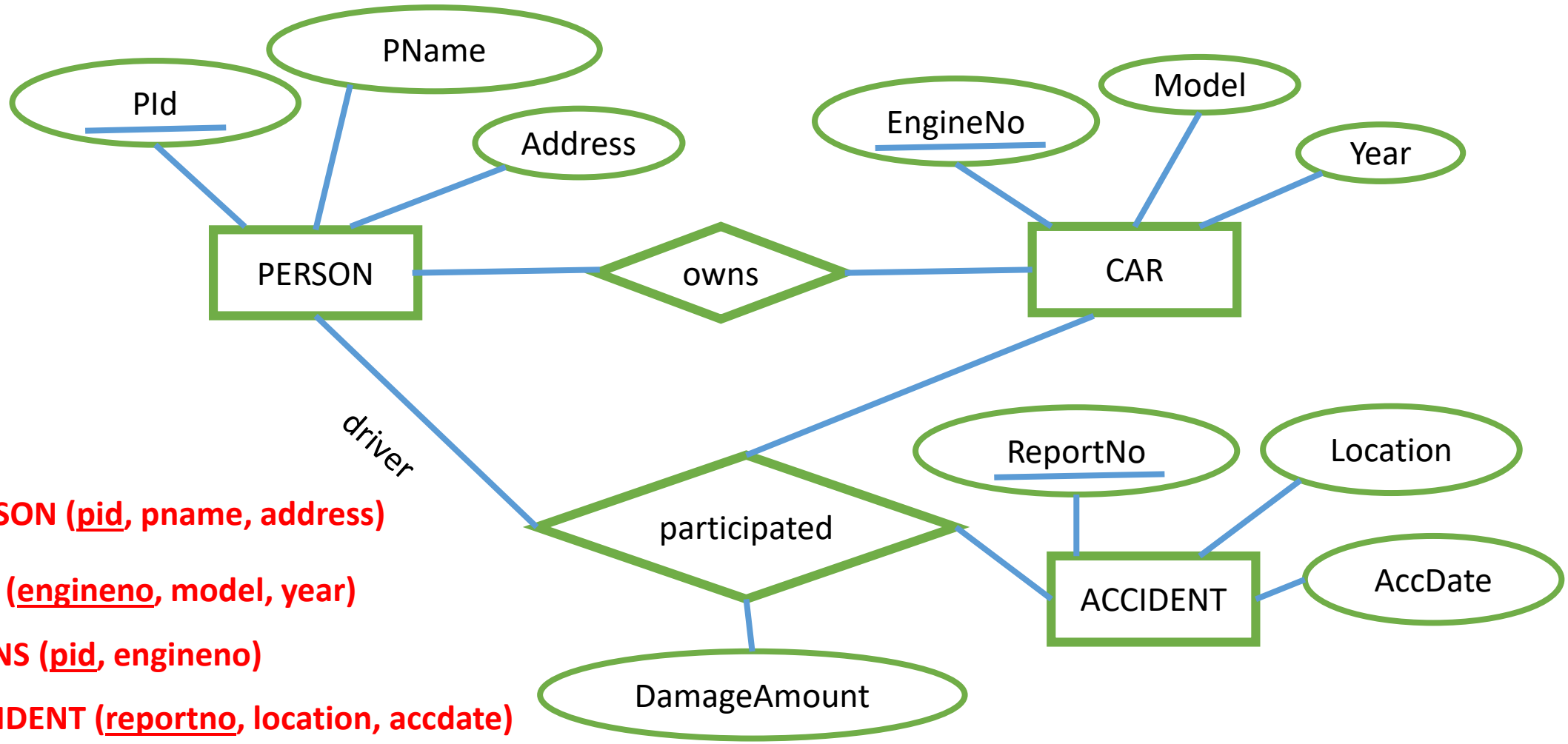
Step 7: Mapping of N-ary Relationship Types

1. For each n-ary relationship type R, where n>2, create a new relation S to represent R.

2. Include as foreign key attributes in S the primary keys of the relations that represent the participating entity types.

3. Also include any simple attributes of the n-ary relationship type (or simple components of composite attributes) as attributes of S.

Step 5 : Complete E R Diagram



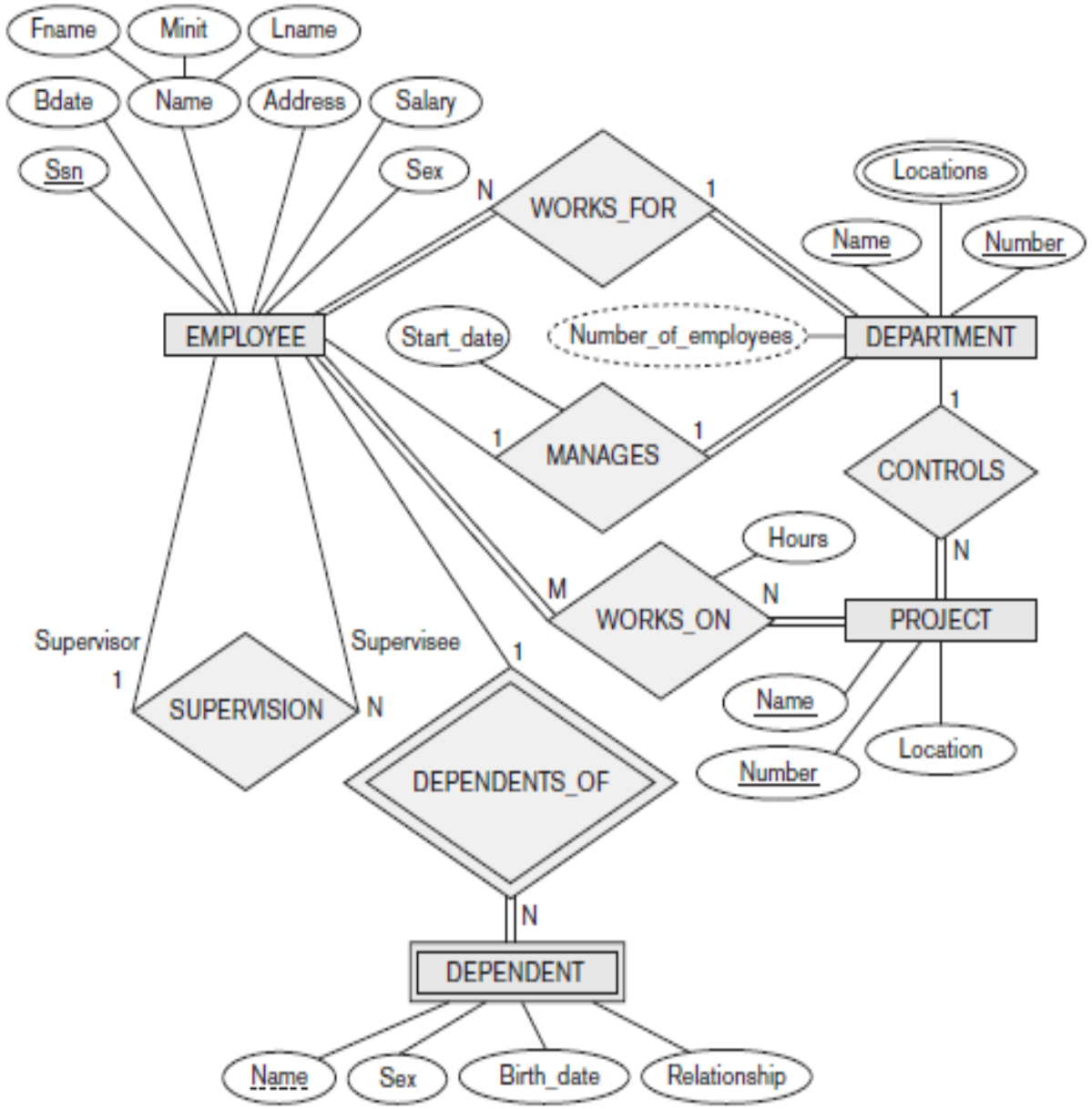
PERSON (<u>pid</u>, pname, address)

CAR (<u>engineno</u>, model, year)

OWNS (<u>pid</u>, engineno)

ACCIDENT (<u>reportno</u>, location, accdate)

PARTICIPATED (<u>pid, engineno, reportno</u>, damageamount)



EMPLOYEE

FNAME	MINIT	LNAME	SSN	BDATE	ADDRESS	SEX	SALARY	SUPERSSN	DNO

DEPARTMENT

DNAME	DNUMBER	MGRSSN	MGRSTARTDATE

DEPT_LOCATIONS

DNUMBER	DLOCATION

PROJECT

PNAME	PNUMBER	PLOCATION	DNUM

WORKS_ON

ESSN	PNO	HOURS

DEPENDENT

ESSN	DEPENDENT_NAME	SEX	BDATE	RELATIONSHIP

GATE Questions

In an Entity-Relationship (ER) model, suppose R is a many-to-one relationship from entity set E1 to entity set E2. Assume that E1 and E2 participate totally in R and that the cardinality of E1 is greater than the cardinality of E2. Which one of the following is true about R?

(A) Every entity in E1 is associated with exactly one entity in E2.

(B) Some entity in E1 is associated with more than one entity in E2.

(C) Every entity in E2 is associated with exactly one entity in E1.

(D) Every entity in E2 is associated with at most one entity in E1.

[GATE 2018]

GATE Questions

An ER model of a database consists of entity types A and B. These are connected by a relationship R which dose not have its own attribute. Under which one of the following conditions, can the relational table for R be merged with that of A?

(A) Relationship R is one-to-many and the participation of A in R is total.

(B) Relationship R is one-to-many and the participation of A in R is partial.

(C) Relationship R is many-to-one and the participation of A in R is total.

(D) Relationship R is many-to-one and the participation of A in R is partial.

[GATE 2017]

GATE Questions

Consider an Entity-Relationship(ER) model in which entity sets E1 and E2 are connected by an m:n relationship R12. E1 and E3 are connected by a 1: n (1 on the side of E1 and n on the side of E3) relationship R13.

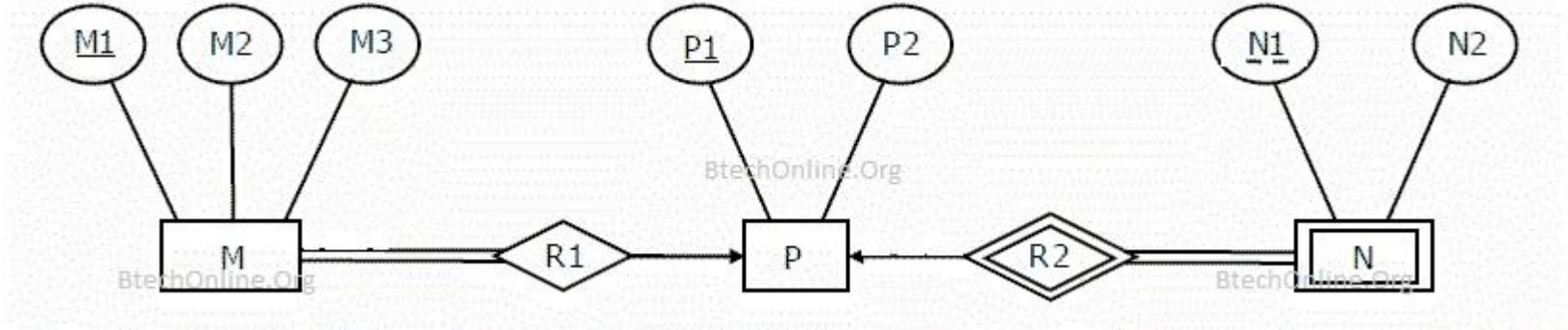
E1 has two single-valued attributes a11 and a12 of which a11 is the key attribute. E2 has two single-valued attributes a21 and a22 of which is a21 the key attribute. E3 has two single-valued attributes a31 and a32 of which a31 is the key attribute. The relationships do not have any attributes.

If a relational model is the derived from the above ER model, then the minimum number of relations that would be generated if all the relations are in 3NF is _____.

[GATE 2015]

GATE Questions

Consider the following ER diagram.

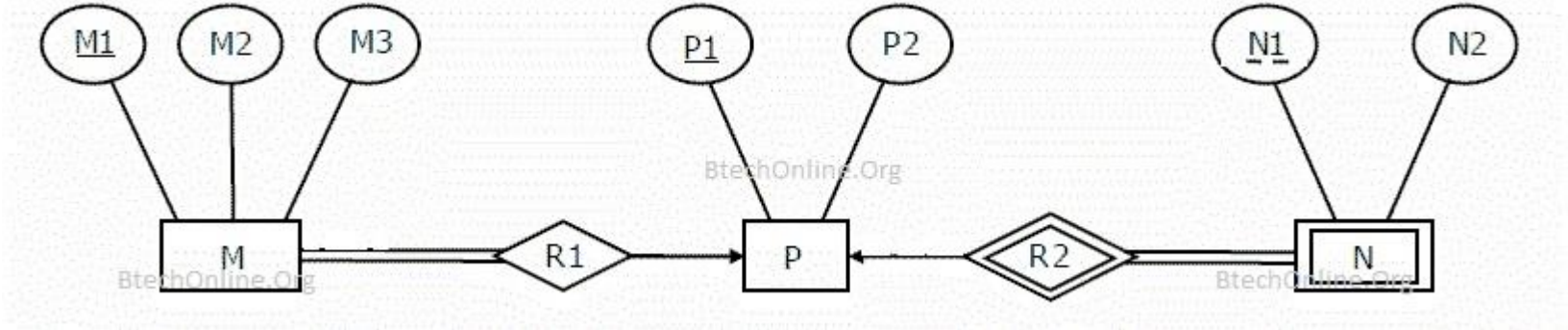


The minimum number of tables needed to represent M, N, P, R1, R2 is
(a) 2 (b) 3 (c) 4 (d) 5

[GATE 2008]

GATE Questions

Consider the following ER diagram.



Which of the following is a correct attribute set for one of the tables for the correct answer to the above question?

(a) {M1, M2, M3, P1}
(b) {M1, P1, N1, N2}
(c) {M1, P1, N1}
(d) {M1, P1}

[GATE 2008]

GATE Questions

Let E1 and E2 be two entities in an ER 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

[GATE 2005]

For Video lecture on this topic please subscribe to my youtube channel.

The link for my youtube channel is

https://www.youtube.com/channel/UCRWGtE76JlTp1iim6aOTRuw?sub_confirmation=1