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Q1

"1"on the line means that for an instance of one entity, there can be at most one instance of the related entity. "N" on the line means that for an instance of one entity, there can be any number of instances of the related entity.

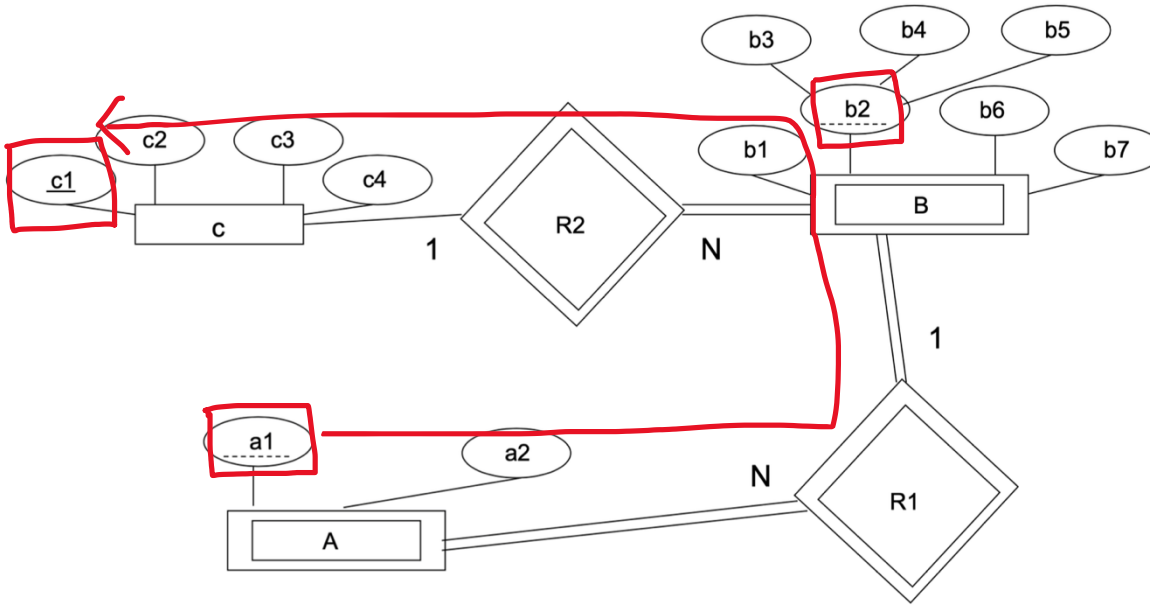
(i) There is a one-to-one relationship between instances of X and instances of Y. This means that each instance of X can be related to only one instance of Y, and vice versa. This matches the assumption that only specific pairs of instances are related by R, such as Y2 being R'ed by X1 and Y3 being R'ed by X2.
Therefore, ER diagram (i) is consistent with the given assumptions.

(ii) This is 1 to N relation. One instance of X can be related to multiple instances of Y. This means that there can be multiple instances of Y that are R'ed by the same instance of X. Specifically, Y2 is R'ed by X1 and Y3 is R'ed by X2, but no other pairs of instances of X and Y are related by R. Therefore, ER diagram (ii) is consistent with the given assumptions.

(iii)This is N to 1 relation. Multiple instances of X can be related to one instance of Y. This means that there can be multiple instances of X that are R'ed to the same instance of Y. Specifically, Y2 is R'ed by X1 and Y3 is R'ed by X2, but no other pairs of instances of X and Y are related by R. Therefore, ER diagram (iii) is consistent with the given assumptions.

(iv) This is N to M relation. Multiple instances of both X and Y can be related by R. This means that there can be multiple pairs of instances where an instance from set X is related to an instance from set Y through relation R. Specifically, Y2 is R'ed by X1 and Y3 is R'ed by X2, but no other pairs of instances are related by R. Therefore, ER diagram (iv) is consistent with the given assumptions.

Q2
A: {c1,b2,a1}
A is a weak entity so its key is its dotted underlined attribute and the key of entity of identifier relationship. The dotted underlined attribute is a1. The prime key of the entity of identifier relationship is b2 & c1. Hence the key of entity A is {c1,b2,a1}



B: {c1,b2}
B is a weak entity so its key is its dotted underlined attribute and the key of entity of identifier relationship. So it is {c1,b2}.

C: c1
C is a entity but not weak entity, and a3 is underlined.

Q3:
R is a N-M relationship, which means that one A instance can R at least 0 B instance, at most N B instance and one B instance can be R`ed by at least 0 A instance, at most M A instance (N can be not equal to M).

A:

a1	a2	a3	a4

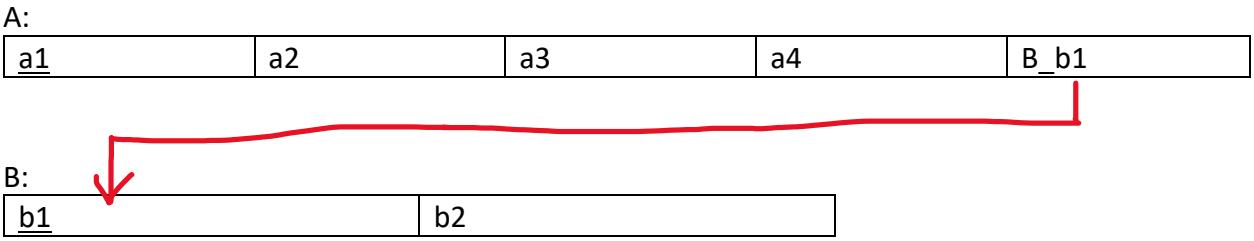
B:

b1	b2

R:

A_a1	B_b1

Q4:
It’s a one-to-one relationship R between entity sets A and B. Entity A has attributes a1 (key attribute, as indicated by underlining), a2, a3, and a4. Entity B has attributes b1 (key attribute, as indicated by underlining) and b2. we can create two tables - one for A and one for B. However, since it's a one-to-one relationship, we could incorporate the relationship R into either the A or B table by adding the primary key of the other entity as a foreign key. This design is considered minimal storage because we've managed to represent the entities and their relationship using the least number of tables and attributes. By adding b1 to table A, we avoid creating an extra table for the relationship R, thus saving storage space.



Q5:
Each entity is represented as an individual table. Then, we incorporate a table named R. This table will contain columns corresponding to all the keys from the other entities. Furthermore, this table will establish foreign key relationships pointing towards all the other tables, as illustrated below: