CS4221: Database Design

Tutorial 5: The Entity-Relationship Model

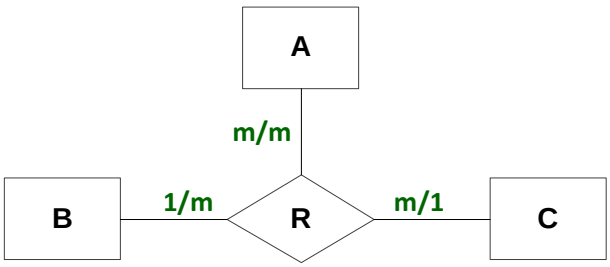
26 March 2015

Note: Due to the time constraint, we will only discuss some of the questions.

1. Describe with examples, the differences between cardinalities and participation constraints of binary relationship types and ternary relationship types in ER Approach. Give their advantages and disadvantages.

2. Describe the differences among a many-to-many relationship type in an ER diagram, a multi-valued attribute (of an entity type or a relationship type) in an ER diagram, and a multi-valued dependency in the Relational Model.

3. Consider the following ER diagram



If A has 100 entities, B has 1000 entities, and C has 10 entities, what is the maximum number of triples of entities that could be in the relationship set for R?

4. Translate the ER diagram in Figure 1 to a relational database schema.

   Is the ER diagram in ER-NF? Are the relations obtained in 3NF, BCNF, and/or 4NF?

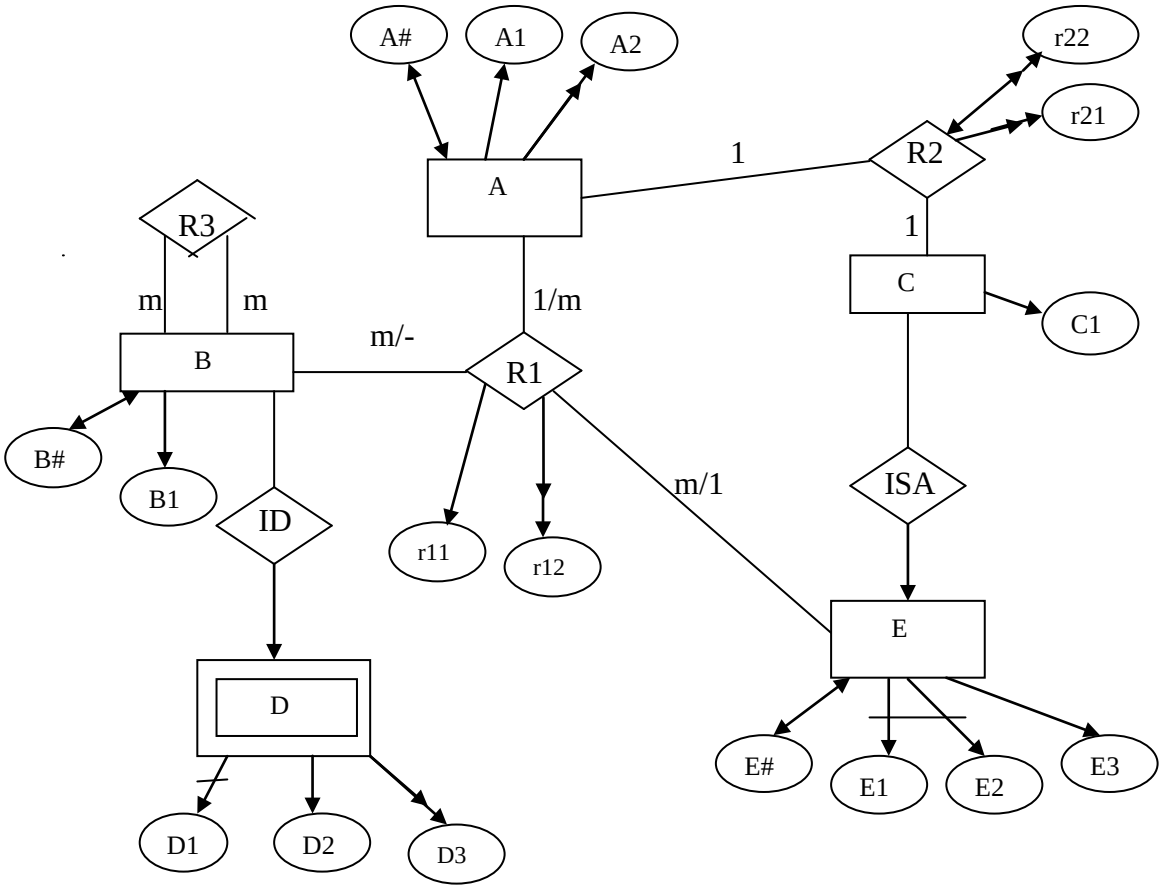


Figure 1. An ER diagram

5. Consider the ER diagram in Question 4 again, assume that we have the following additional new FDs:

   A#, E# $\rightarrow$ E3
   r22 $\rightarrow$ r21
   r11 $\rightarrow$ r12

   (a) How do you capture the new constraints in the ER diagram? Is your result ER diagram in ER-NF? Justify your answer.

   (b) Translate your result into a relational database schema. Compare the differences of that in Question 4.