Tutorial 2
Functional Dependencies

Classroom Exercise

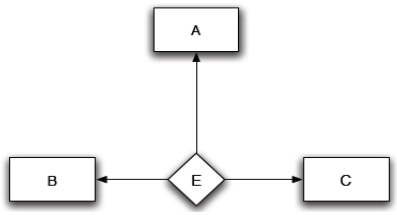
1. Translate the ER Diagram of Q1 in Tutorial 1 into a set of relations.

2. Consider the following relational schema:

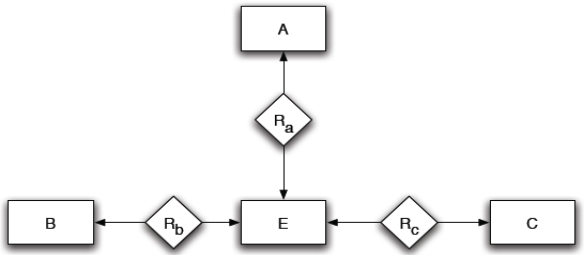
   USER(uid, name)
   SINGER(id, name)
   ALBUM(id, title, singerid)
   SONG(id, title, albumid)
   SING(singerid, songid)
   FOLLOW_USER(followeruid, followeeuid)
   RATE_SONG(uid, songid, rating)
   RATE_SINGER(uid, singerid, rating)
   PLAY_SONG(uid, songid, datetime)

   Construct an ER diagram that leads to the above schema.

3. The figure shows an attempt to represent a ternary relationship between three entities using 3 binary relationships (and one made-up entity). Show through an example why the 3 binary relationship representation is more general than the one ternary relationship representation.

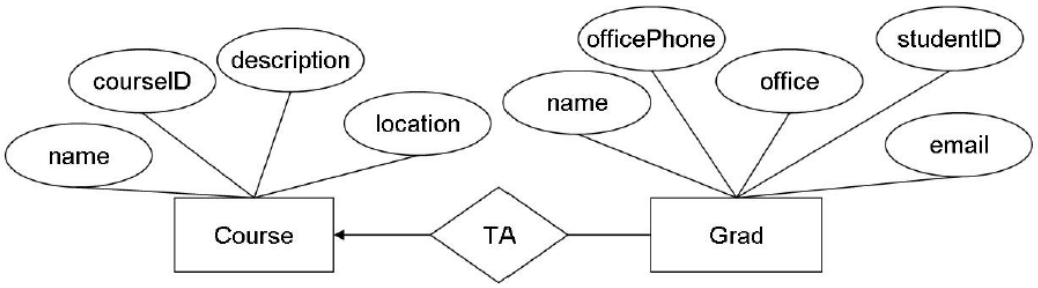


A ternary relationship



An attempt to represent it using 3 binary relationships

4. Consider the following ER diagram thath describes graduate students (Grad) and courses (Course) they serve as Teaching Assistants (TA).



(a) For each of the following statements, write a functional dependency (FD) that best captures the statement.

- The studentID of each graduate student uniquely identifies the student.
- No two offices have the same phone number (officePhone).
- No two courses have the same courseID.
- If two courses have the same course name, their course descriptions are the same.

(b) From the ER diagram and the set of FDs you listed above, can you derive new FDs? If no, explain why not. If yes, derive two non-trivial FDs.

Critical Thinking Exercise

5. Translate the ER Diagram of Q2 in Tutorial 1 into a set of relations.