

Linnaeus University
2DV513 – Database Theory
Assignment 1

Group members:

Student: Rashed Qazizada “rq222ah”



Tasks

You are free to make additional assumptions if you feel that some information is missing. Make sure to document all assumptions that you make. Please justify each answer!

All answers should be your own.

1. MovieDB

Given the constraints shown in the ER schema, respond to the following statements with True, False, or Maybe.

- a) There are no actors in this database that have been in no movies.**

True because an Actor has full participation in Performs In relationship with movies.

- b) There are some actors who have acted in more than ten movies.**

Maybe because the max cardinality on Actor-Performs In-Movie is N, so this is neither required nor ruled out.

- c) Some actors have done a lead role in multiple movies.**

Maybe because the max cardinality on Actor-Lead Role-Movie is N, so this is neither required nor ruled out

- d) A movie can have only a maximum of two lead actors.**

True because the max cardinality on Movie-has_Lead_Role-Actor by reading the relationship backwards is 2.

- e) Every director has been an actor in some movie.**

Maybe because this can't be false because the relationship Also A Director exists, but it can't be true because Director doesn't have total participation in it.

- f) No producer has ever been an actor.**

False because the relationship between Actor Producer negates this statement.

g) A producer cannot be an actor in some other movie.

False because the relationship between Actor Producer negates this statement.

h) There are movies with more than a dozen actors.

Maybe because the max cardinality on Movie-Is Performed in By-Actor (reading backwards) is M, so this is possible but not required.

i) Some producers have been a director as well.

False because there is no relationship exist between Producer and Director.

j) Most movies have one director and one producer.

Maybe because the min and max cardinality bounds are just that, min/max bounds. They can say nothing about average, typical, or “most” cases. Not that they are not important for examining the performance of a design.

k) Some movies have one director but several producers.

False because the max cardinality on Movie-Director is 1 while Movie-Producer is N so this is neither required nor ruled out.

l) There are some actors who have done a lead role, directed a movie, and produced a movie.

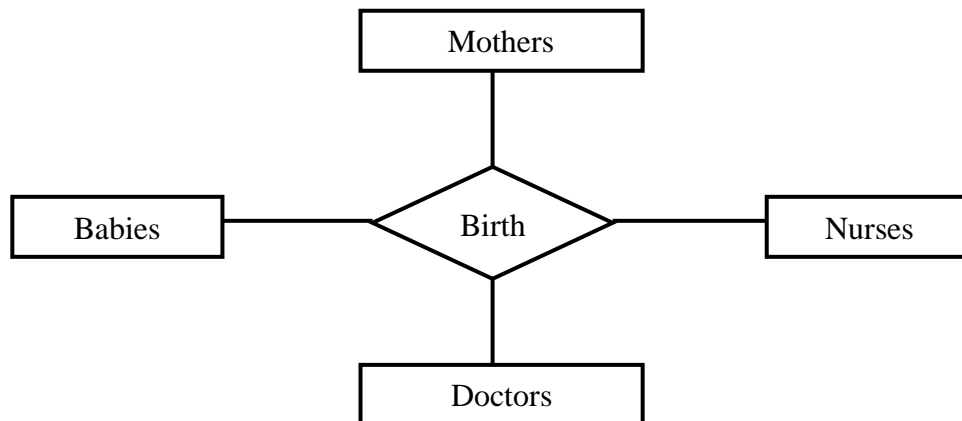
True because relationship between these three entities exist.

m) No movie has a director who also acted in that movie.

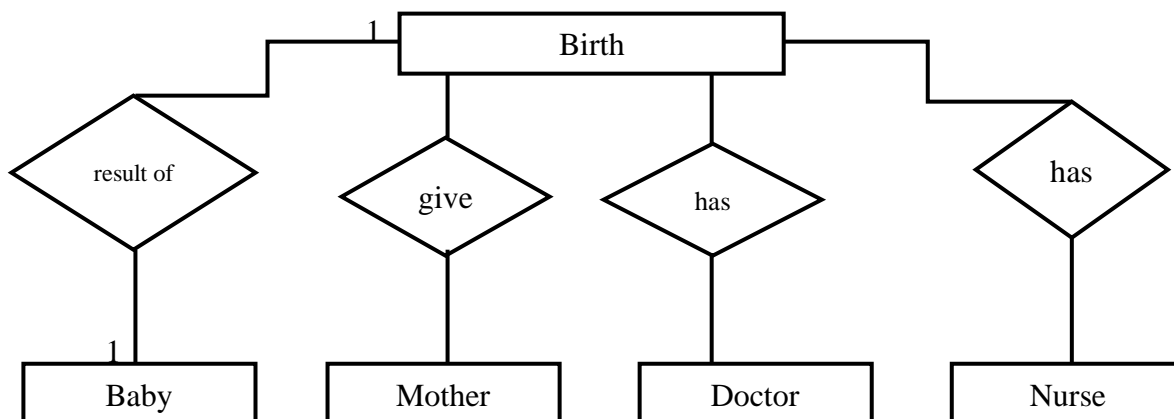
Maybe, because as mentioned previously, nothing about these constraints either mandates or prohibits this.

2. Births

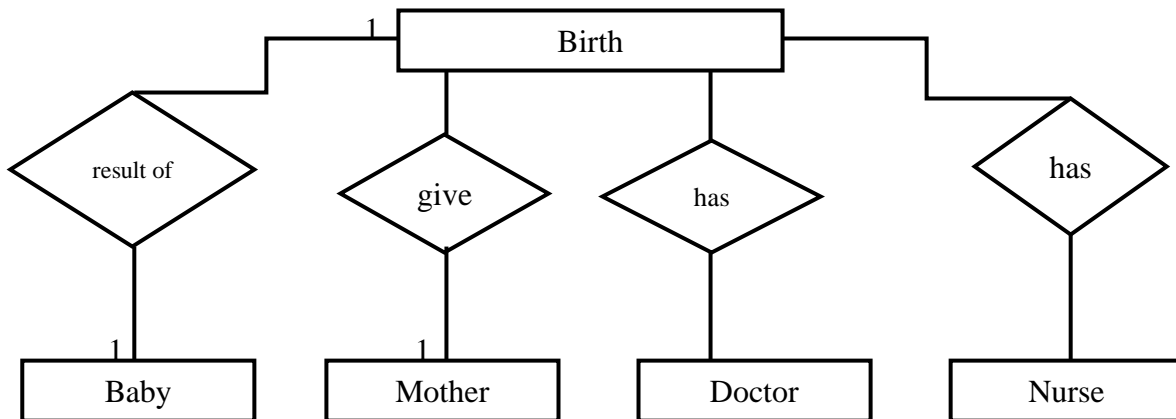
Consider a model where an entity set Births is related to Babies, Mothers, Doctors, and Nurses by four binary relationships. How can you use multiplicity to represent the following conditions?



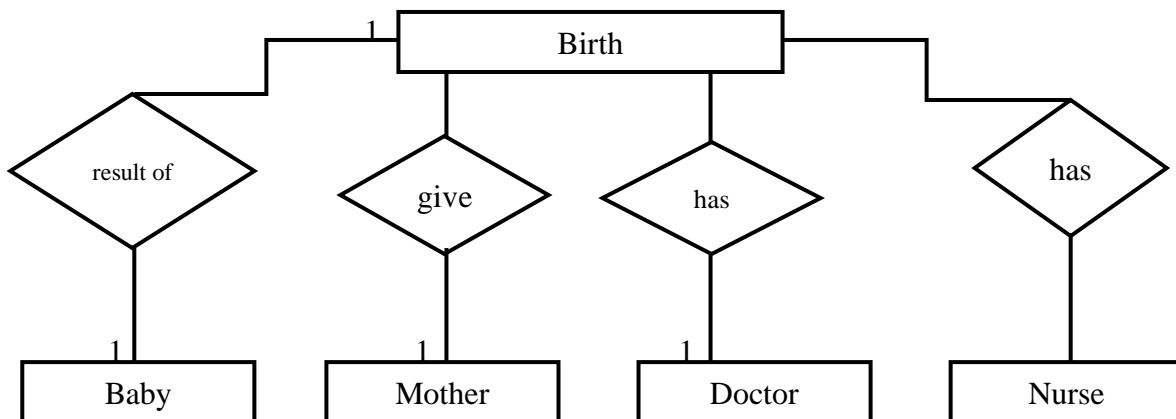
a) Every baby is the result of a unique birth, and every birth is of a unique baby.



b) In addition to (1), every baby has a unique mother.



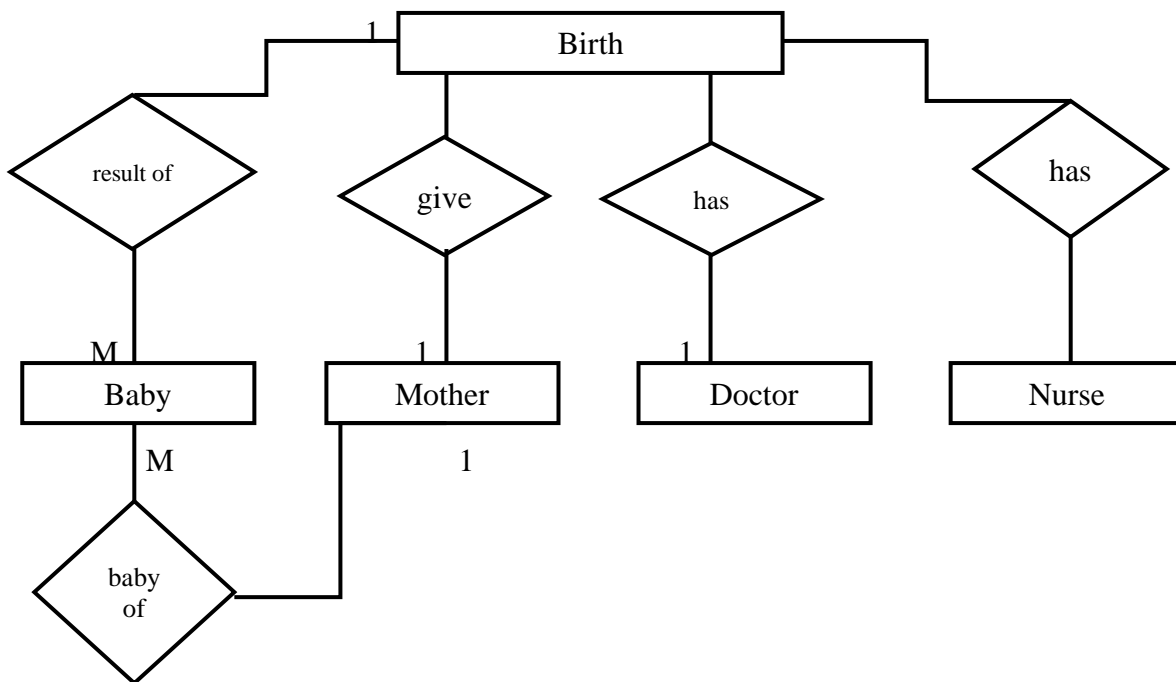
c) In addition to (1) and (2), for every birth there is a unique doctor.



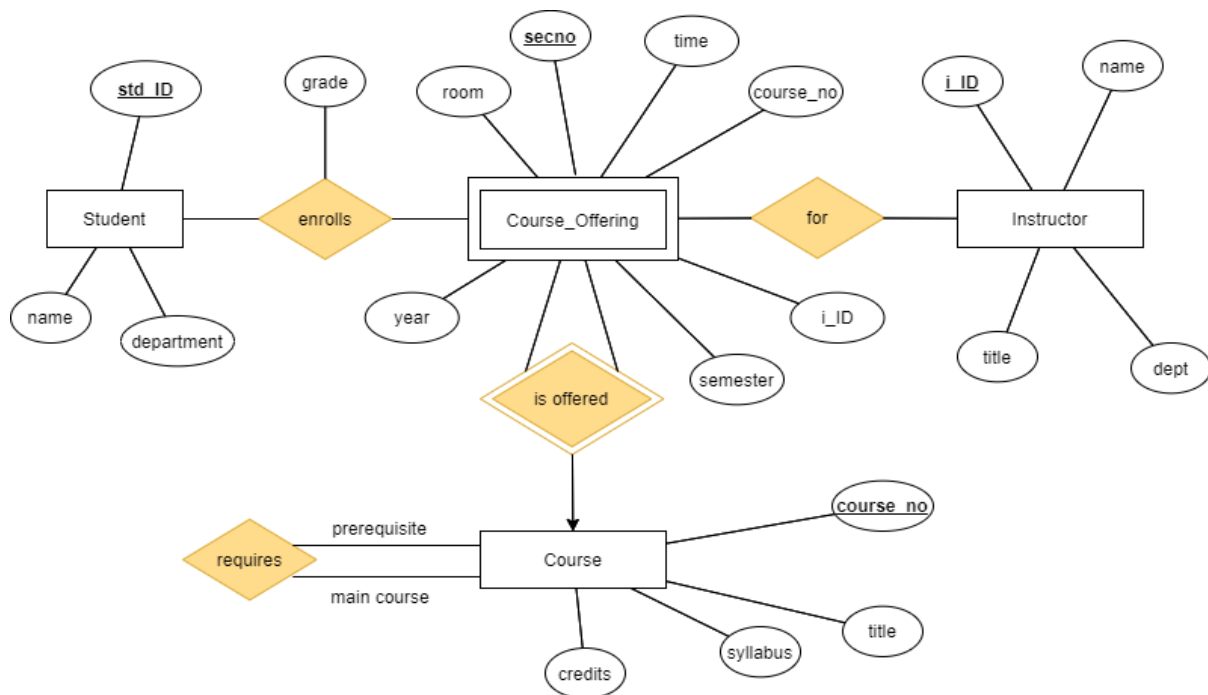
In each case, what design flaws do you see?

Answer: There is only one one-sided relationship defined. Furthermore, the design is kind of confusing because of the multi-way relationships between the four entity sets. Also, there is no defined relationship with the Nurse

Suppose we change our viewpoint to allow a birth to involve more than one baby born to one mother. How would you represent the fact that every baby still has a unique mother?



3. The registrar's office



Entity sets.

- ☐ Student: sid, name, program/department
- ☐ Instructor: id, name, dept, title
- ☐ Course: Syllabus, courseno, title, credits, prerequisites
- ☐ Course-offering_ secno, year, semester, time, room
- ☐ Course offering is a weak entity set dependent on course
- ☐ Enrolls: each student can enroll in several course, grade must be kept
- ☐ Relationship attributes: grade
- ☐ Teaches: an instructor can teach several sections
- ☐ Is-offered: multiple sections of a course maybe offered
- ☐ Requires: prerequisite, maincourse

Relationship sets enrolls: each student can enroll in several courses, grade must be kept relationship attribute:
 grade teaches: an instructor can teach several sections is-offered: multiple sections of a course may be offered
 requires: prerequisite, maincourse

Reducing the E-R diagram to tables Entities, student table, course, sid, name, program/dept, courseno, title, syllabus, credits.

Instructor course-offerings iid name dept title courseno secno year semester, time, room.

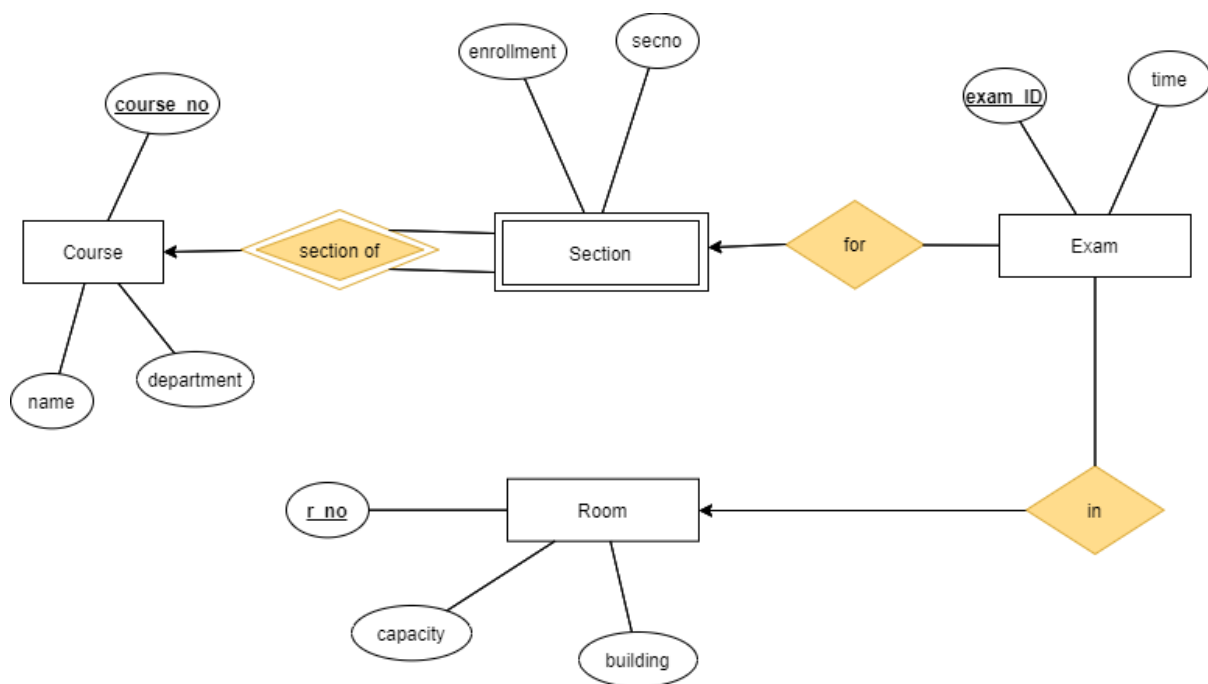
Relationships enrolls teaches requires sid courseno secno semester year grade, courseno, secno, semester, year, iid, maincourse, prerequisite

Assumptions:

The assumptions made are:

- The entity set course-offering is a weak entity set dependent on course.
- A class meets only at one particular place and time. This E-R diagram cannot model a class meeting at different places at different times.
- The model can have an additional entity Exam for recording information of grade and marks.
- There is no guarantee that the database does not have two classes meeting at the same place and time.

4. Classroom scheduling



Explain what application characteristics would influence a decision to include or not include each of the additional entity sets.

Answer: The additional entity sets are useful in case we wish to store their attributes as part of the database. For Course entity set, we chose to include three attributes. If the primary key (course_no) was included only, and if Course has only one section, then it would be appropriate to replace Course (and section) entity sets by an attribute (course_no) of Exam.

To summarize, it is undesirable to have the attributes of Course as attributes of Exam because it would make it difficult to maintain data on Courses. If a Course has no Exam or several Exams. Similar remarks apply to Room entity set.