



Report

Assignment 1

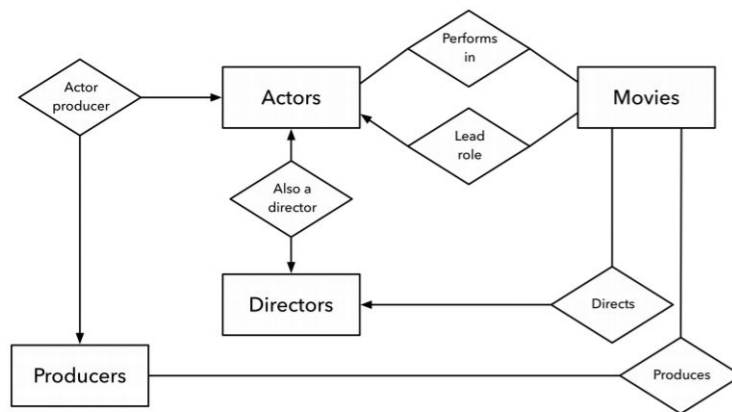


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1 Task 1 - MoviesDB



Assume that MoviesDB is a populated database. Given the constraints shown in the E/R diagram, respond to the following statements with True, False, or Maybe. Assign a response of Maybe to statements that, although not explicitly shown to be True, cannot be proven False based on the schema as shown.

1. There are no actors in this database that have been in no movies.
2. There are some actors who have acted in more than ten movies.
3. Some actors have done a lead role in multiple movies.
4. A movie can have only a maximum of two lead actors.
5. Every director has been an actor in some movie.
6. No producer has ever been an actor.
7. A producer cannot be an actor in some other movie.
8. There are movies with more than a dozen actors.
9. Some producers have been a director as well.
10. Most movies have one director and one producer.
11. Some movies have one director but several producers.
12. There are some actors who have done a lead role, directed a movie, and produced a movie.
13. No movie has a director who also acted in that movie.

1.1 Discussion

1. False. The “performs in” is a many-to-many relationship, which means that there can be 0 or many multiplicities. Therefore, we may have an actor that did not participate in any movie.
2. True. This E/R Diagram does not specify its multiplicity limit, so we can assume through the many-to-many that some actors may have participated in more than 10 movies.
3. True. The relationship between “actor” and “lead role” has multiplicity that does not have a limit, so we assume its many-to-many kind. Thus an actor can have a lead role in many movies.
4. False. The multiplicity for “lead role” per movie is one or zero as is shown by the arrow.
5. False. The “also director” is a one-to-one relationship, that means that an actor can be a director only if there is an “also director” relationship, so there can be a case where the actor is not the director.
6. False. Like the statement before (5), here it also can happen that a producer is an actor.
7. False. The producer of a movie can also be an actor who performs in multiple movies since the multiplicity of “perform in” is many-to-many.
8. True. Since this E/R Diagram does not provide us with the multiplicity limit, and we can assume by the arrows that we have a many-to-many relationship. There can be a case where more than a dozen actor participate in a movie.
9. True. Since the producer can be an actor, and an actor can be a director, we know its possible that a producer is an actor, which makes him the director too.
10. Maybe. According to this E/R Diagram, we can’t really prove it’s true but it might be since we cannot assume what most movies have.
11. True. The “movies” have a many-to-one relationship with “directors” and a many-to-many relationship with “producers” so we conclude that we can have one director and multiple producers in one movie.
12. True, Since in this E/R Diagram we know that an actor can be a director, a producer and be in a leading role we say it’s true.
13. False, A director can be an actor, so it makes it possible to perform both roles.

2 Task 2 - Births

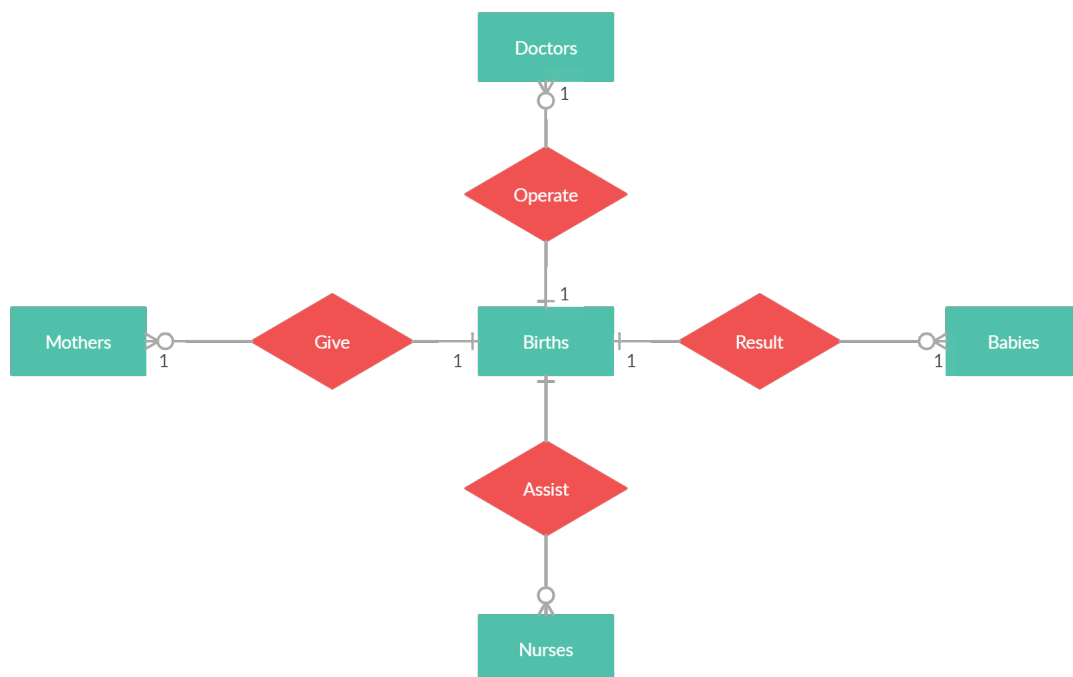
Consider a model where an entity set Births is related to Babies, Mothers, Doctors, and Nurses by four binary relationships. How can you use multiplicity to represent the following conditions?

1. Every baby is the result of a unique birth, and every birth is of a unique baby.
2. In addition to (1), every baby has a unique mother.
3. In addition to (1) and (2), for every birth there is a unique doctor.

In each case, what design flaws do you see? 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?

2.1 Discussion

This ER Diagram was created according to the 3 requirement conditions above and is considering the entity Births related to the four binary relationships Babies, Mothers, Doctors and Nurses.



Multiplicity

1. Since every baby is the result of a unique birth, and every birth is unique of a baby the multiplicity will be one-to-one.
2. Birth does not involve multiple babies to one mother, therefore the one-to-one relation between Birth and Mother.
3. There is only one doctor operating each birth, so multiplicity between Birth and Doctor is also one-to-one.

Design flaws

This ER Diagram was created according to the 3 requirement conditions above and is considering the entity Births related to the four binary relationships Babies, Mothers, Doctors and Nurses. In this model, there are some big design flaws, since this model should follow the real-world problems in order to find reliable solutions. For example, the given model does not address the twins situation, completely ignores the fact that doctors can participate in multiple births and gives 0 information about how nurses affect birth.

Three main flaws:

1. Babies - Births

The given diagram sets the relationship between babies and births to one-to-one and that causes a big problem since it does not address all the twins, triplets, etc cases where a birth can have more than one baby.

2. Doctor - Births

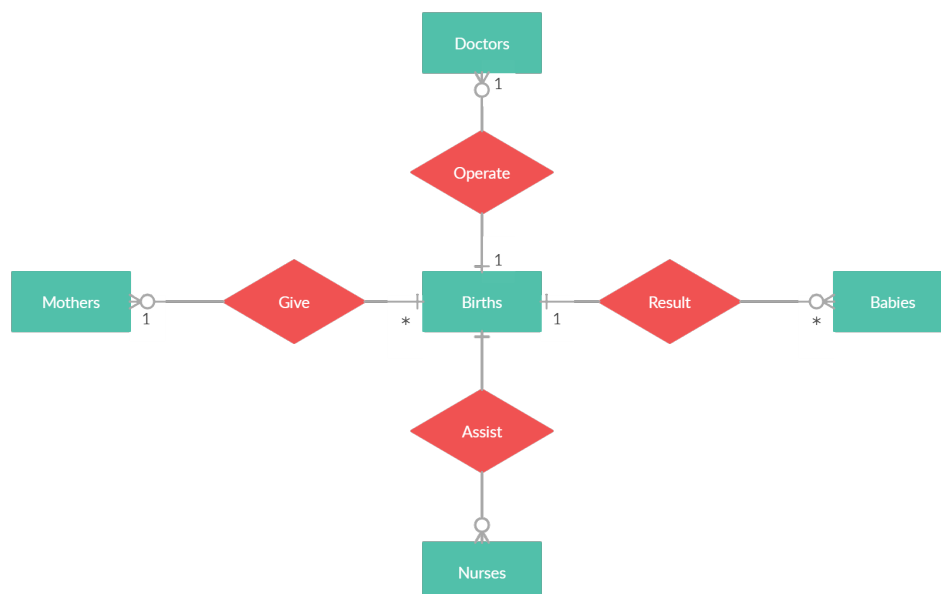
This ER Diagram should represent the real world, where some doctors can operate multiple births and even help other doctors in operating a birth, there are also special cases where the birth needs to be monitored and assisted by more than one doctor and with the one-to-one relationship is not possible.

3. Nurses - Births

In this model this is the biggest flaw of all since there is not information provided when it comes to their relationship with Birth, the main entity, so it all rest in our assumptions for this ER Diagram.

Approaching with a new point of view

Suppose we change our viewpoint and tackle the flaws from the old diagram, this new ER Diagram fixes the multiplicity problems from the first version of the model. We tackle those flaws by changing the relationship Babies-Births-Results from one-to-one, to many-to-one where it allows multiple babies to be born from a unique mother.



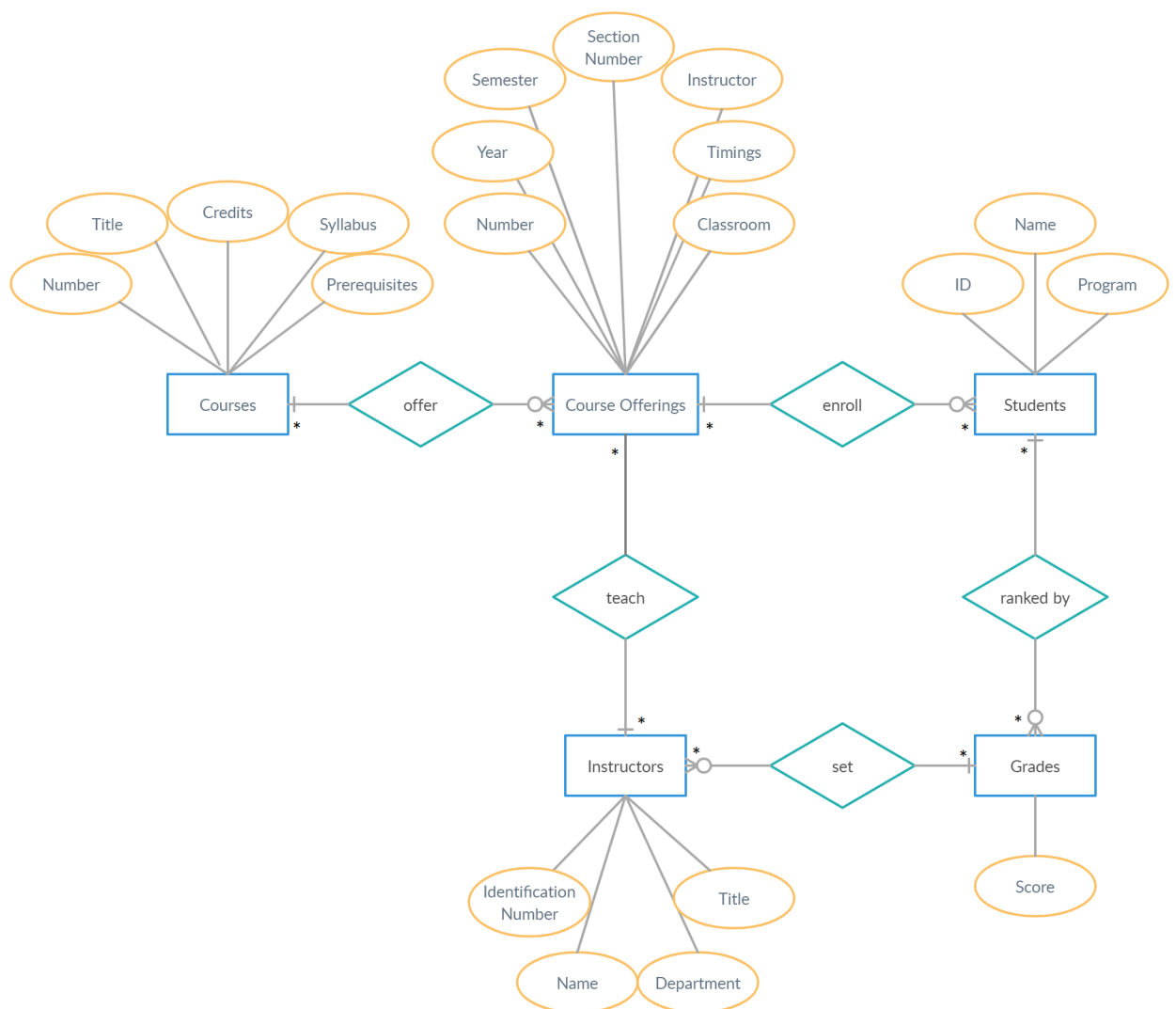
3 Task 3 - The registrar's office

A university registrar's office maintains data about the following entities: (a) courses, include number, title, credits, syllabus, and prerequisites; (b) course offerings, include course number, year, semester, section number, instructor(s), timings, and classroom; (c) students, including student-id, name, and program; and (d) instructors, including identification number, name, department, and title.

Further, the enrollment of students in courses and grades awarded to students in each course they are enrolled for must be appropriately modeled.

Construct an E/R diagram for the registrar's office.

3.1 Discussion



4 Task 4 - Classroom scheduling

Consider a university database for the scheduling of classrooms for the final exams. This database could be modeled as a single entity set exam with attributes course-Name, section-Number, room-Number, and time.

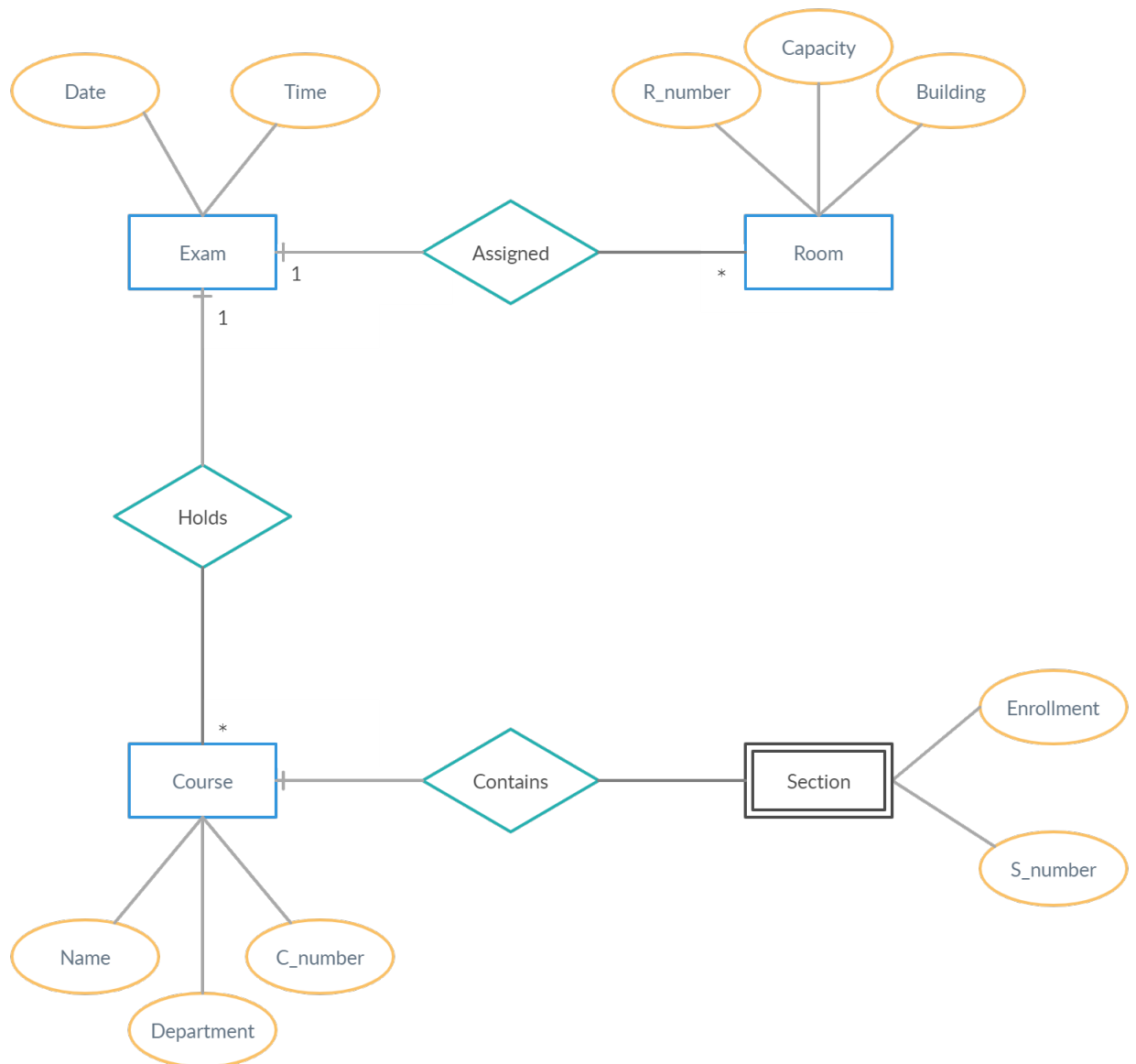
Alternatively, one or more additional entity sets could be defined, along with relationship sets to replace some of the attributes of the exam entity set, as:

1. course with attributes name, department, and c-number
2. section with attributes s-number and enrollment, and dependent as a weak entity set on course.
3. room with attributes r-number, capacity, and building

Show an E/R diagram illustrating the use of all three additional entity sets listed. Explain what application characteristics would influence a decision to include or not include each of the additional entity sets.

Note: A section is a part of course. How sections are used varies from university to university, but they could for example be used to separate multiple versions of the course (imaging that a course has so many students that there has to be parallel lectures) or if a course is given multiple times per year

4.1 Discussion



In this ER Diagram as you can see, we assumed each exam has a relation of one-to-many with "Room" and "Course" each means that a single exam can be assigned in multiple rooms depending in the number of students applying (capacity) and whatever course you take (multiple courses) you will only have one exam for each. We assumed "Section" as shifts, for example if there is a morning class and a night class, or parallel classes happening, but still the same class. So each course will contain one or multiple sections, but is dependent on some attributes and that is why "Section" is declared as "Weak entity". We decided to trim Exam attributes since they are already addressed in the other entities that are related to "Exam" and we also added one more attribute called "Date" to make the exam a bit more completed.