DataBase(1DV503)
Assignment 1
Mustafa Habeb

- MoviesDB:
  1. maybe because the movies and stars are connected by many to many relationships and it can be but we don't know any things about the data but we know how it connected.

  2. Maybe we don't know how many movies but we know that many actors have acted in many movies and that because of “many to many” relation (performs in)between actors and movies

  3. True we know that because its “many to one” relation (lead role) where entity set “actors” is the one and entity set “movies” is the many and we know which one is the one because of the arrow which pokes to actors entity set.

  4. False because the relationship “lead role” is many to one and the arrow is pointing to the stars entity set wich men every movie has only one star as a lead role.

  5. maybe because the diagram shows at a director can be one actor and this actor can perform at moves if we considered at there is no zero relation in a relationship “also actor” it will be true.

  6. false in case we considered all entities in both entity sets are connected to each other by one-one relationships which mean there is no zero relation in this relationship

  7. false

  8. maybe but the E/R diagram shows how data is stored and relations between the data and it doesn't give us any information about the data.

  10. false. the diagram shows that a movie can have at most one directer but a movie can have many producers.

  11. true

  12. true

  13. Maybe because the diagram shows how data are connected but we don't have information about the data to decide.

- Births:

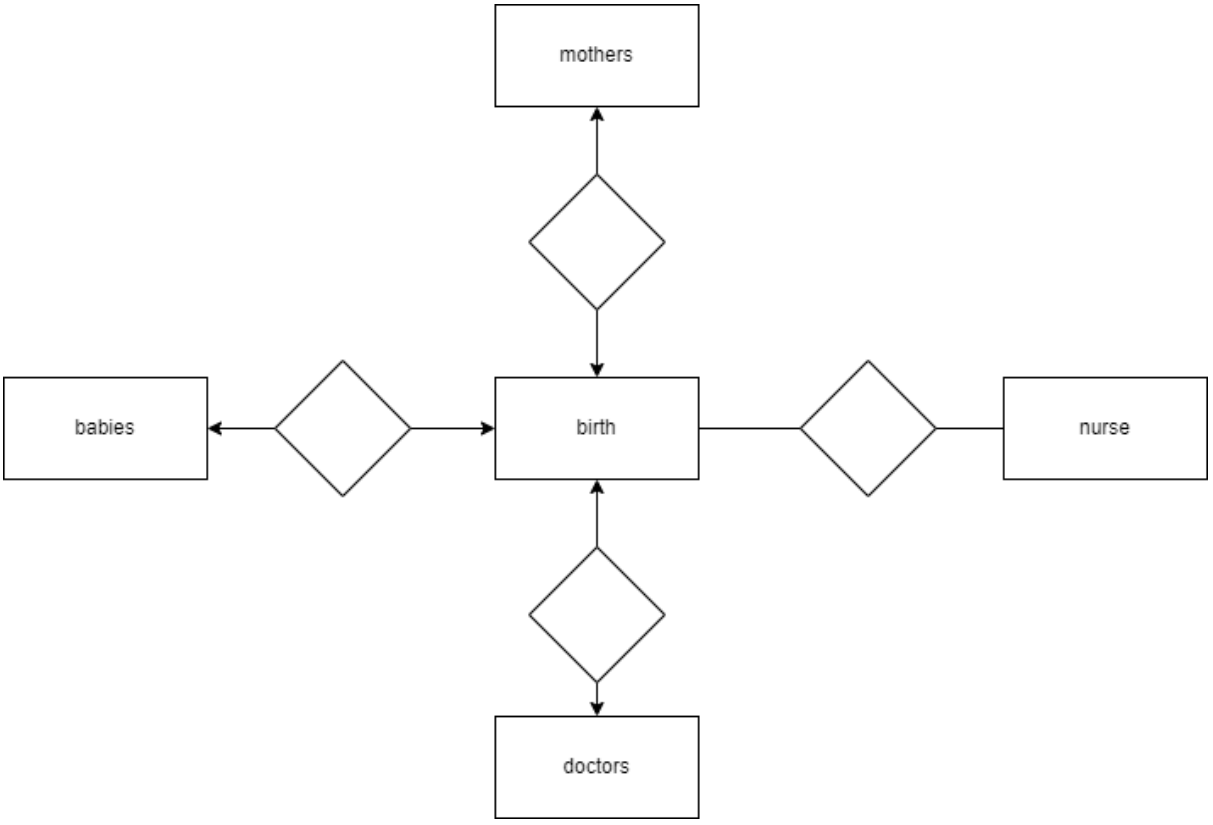
  1. Every baby is the result of a unique birth, and every birth is of a unique baby.
  its relationship one -one between entity set “babies” and entity “birth”
  flaws: first we missing the attribute of both entity sets which will help to determine babies and births we can't know which baby came from which birth or bitch birth was for which baby. and it will be a flaw in the case of twins because of one-one relationship

  2. In addition to (1), every baby has a unique mother.
  it's a relationship one - one between entity set mothers and birth.
  flaws: because we are missing attributes we can't we cant relate the baby to its unique mother

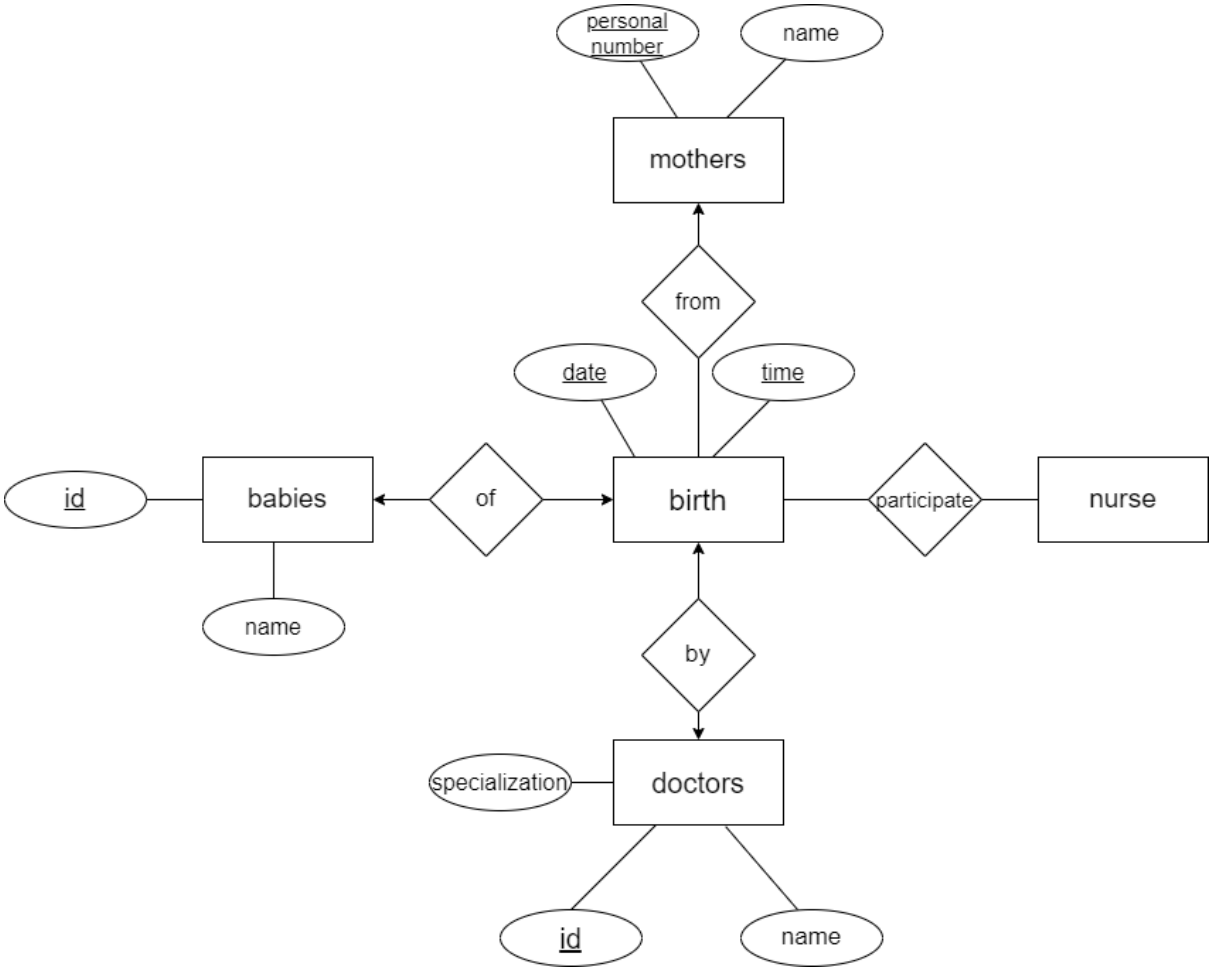
  3. In addition to (1) and (2), for every birth there is a unique doctor.
  it's a relationship one - one between entity set “doctors” and “births”
  we can't know which doctor has done the delivery the birth of the baby because we don’t have any attributes to determine the doctor.

  representing the fact that every baby still has a unique mother in case of birth can be for more than just one baby by using key “id” for the entity set “baby” and a key “personal number” for entity set mother.

  - diagram according to information we get from the question:

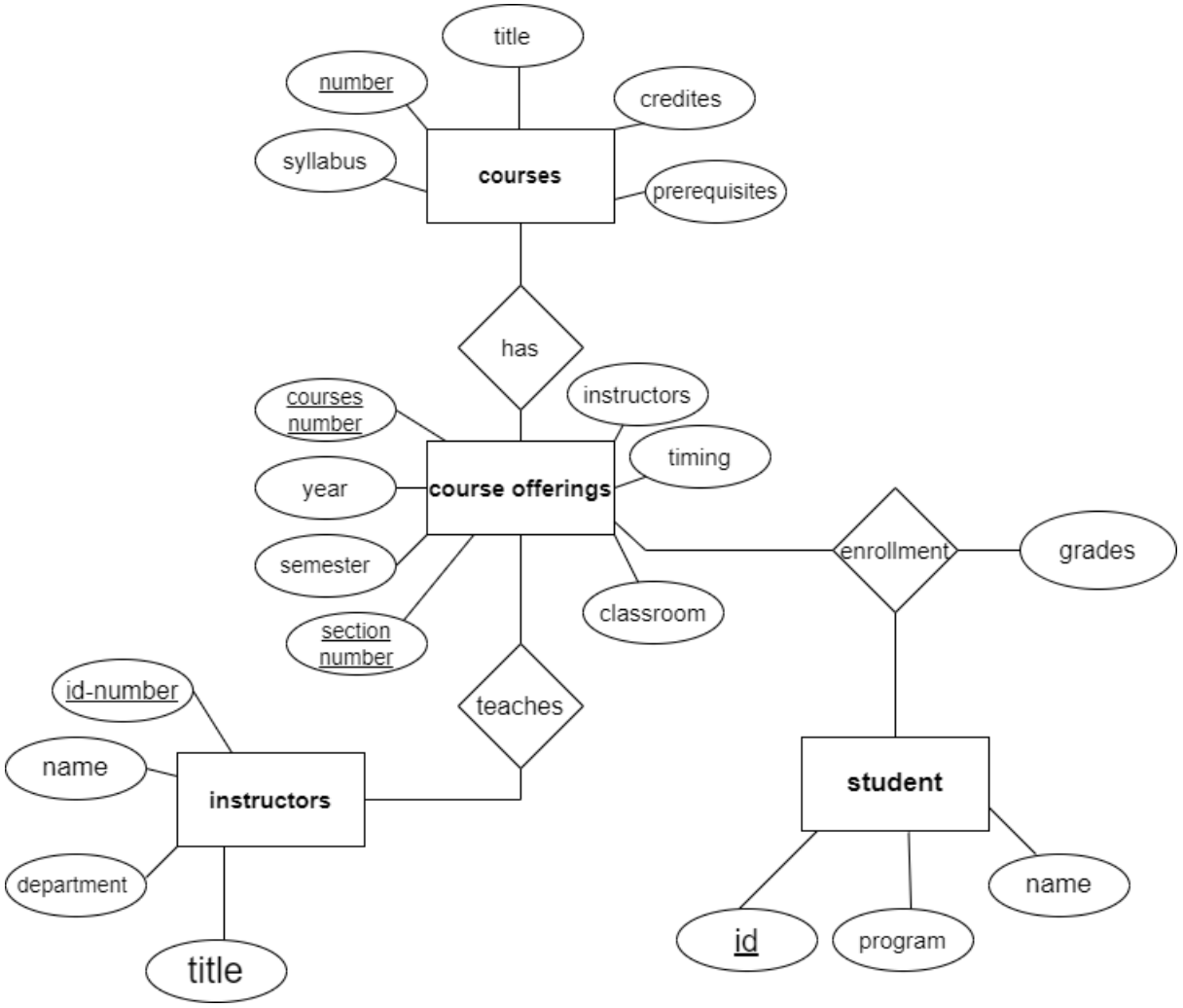


- the diagram which I suggest :

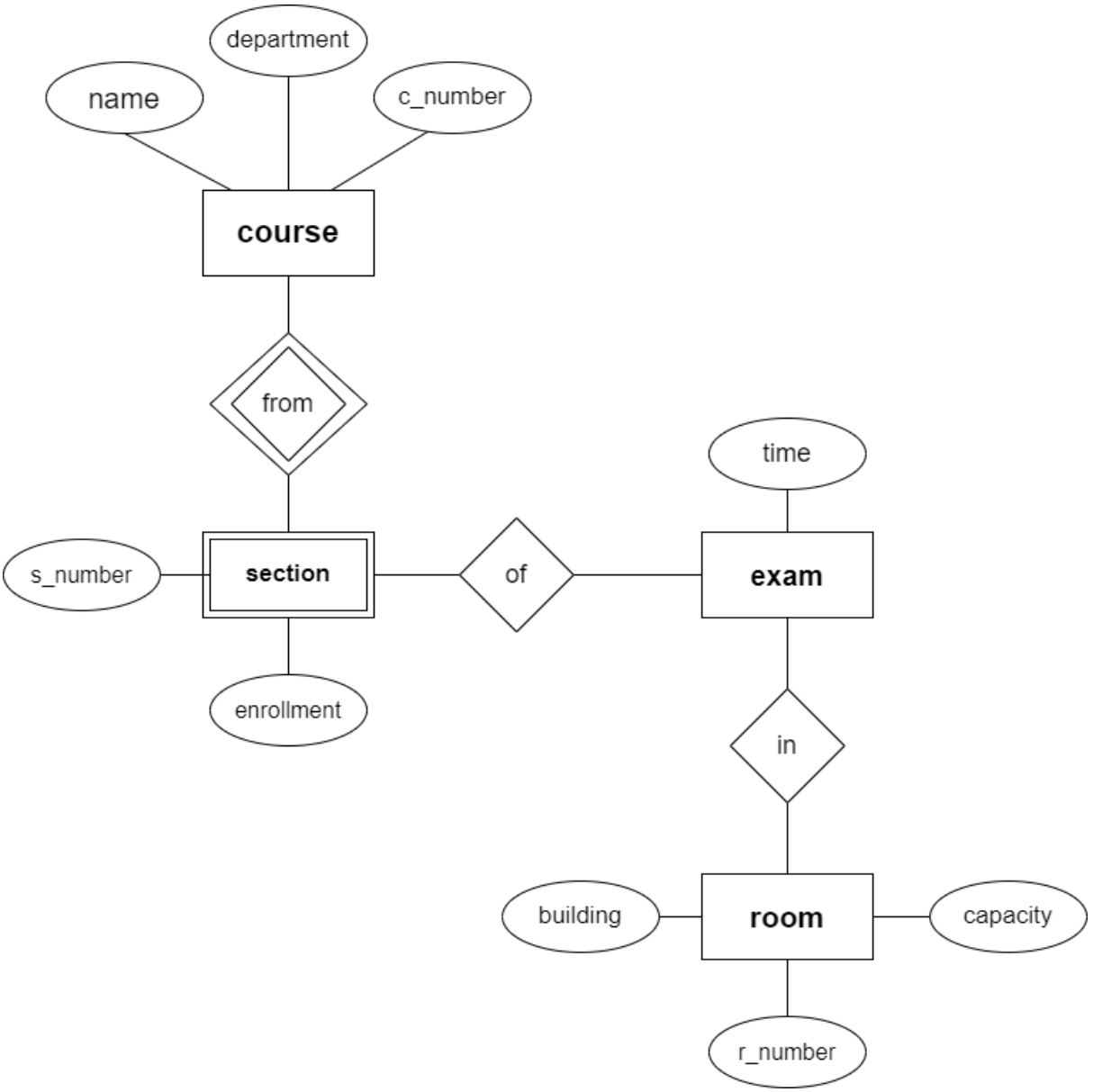


by having attributes and keys it will be possible to determine every mother of every child determine which baby from which mother or wich birth and which doctor has deleverd the baby.

- The registrar's office:



- Classroom scheduling:



  - in case of the entity set “course” before adding we just have data of courses case by adding we will have data about which department each course belong to and the number of each course.
  - in the case of entity set “section” by adding this entity we will get data about each section number and data about the student who is registered in this section.
  - in case of adding room we will get more data about each room as the building which will help to know which building this room is and the capacity of this

room which will lead to knowing how many rooms it needs for the number of the registered student which we have in the entity set “section”, and the number of each room.

- Relational algebra:

  1. What are the names of students enrolled in 2dv513?
  $\pi_{name}\ (\sigma_{code=\ 2dv513}(student \bowtie enrolledIn))$

  2. What are the names of students in both 1dv513 and 2dv513?
  $\pi_{name}\ (\sigma_{code=\ 2dv513}(student \bowtie enrolledIn)\ ) \cap \pi_{name}\ (\sigma_{code=\ 1dv513}(student \bowtie enrolledIn))$

  3. Who teaches 2dv610?
  $\pi_{lucturer}\ (\sigma_{code=\ 2dv610}(subject))$

  4. Who teaches 1dv513 and 2dv513?
  $\pi_{lucturer}\ (\sigma_{code=\ 2dv610}(subject)\ ) \cap \pi_{lucturer}\ (\sigma_{code=\ 2dv513}(subject))$

  5. What are the names of students who are taking a subject not taught by Ilir?
  $\pi_{name}\ (\sigma_{lucturer<>llir}(student \bowtie enrolledIn \bowtie subject))$

- FDs and Normalization:

  schema:
  intervew(maneger, applicant, day, time, room)

  1- find functional dependencies :
  - the firsrt one FD1:
    applicant day → manger time room
    becuse an applicant is intreviewd each day and the intrview will be with one maneger wich has booked a certian room at a certian time for this interview.

  - second one FD2:
    maneger day → room
    one room will be used by one maneger all the day

  - the third one FD3:
    day time room → maneger applicant

a room is booked for certain time at a cetain day by a certain maneger to meet one apllicant

- the fourth one FD4:
  maneger day time → applicant room
  a maneger will do one interview in a certain time at a certain day with a certain applicant at acertain room

2- Find the keys of relation:

- by calculating the closures of all FD's:
  m : maneger
  d : day
  a : applicant
  t : time
  r : room

  interview(m,d,a,t,r)
  ad→mtr, dtr→ ma, md→ r, mdt → ar

  $\{ad\}^+$={a,d,m,t,r} it is akey becuse it has all attributes.

  $\{md\}^+$ = {m,d,r} it is not a key because we add all atributes

  $\{dtr\}^+$={d,t,r,m,a} it is a key beacuse all atributes

  $\{mdt\}^+$={m,d,t,r,a} it is a key

  keys = (ad, dtr, mdt)

3- Show that the relation is in 3NF but not in BCNF:

- the relation is in 3NF

prime attributes (m, a,d,t,r) which are presented in key

the relation is in 3NF because the lift side of FD1, FD3, and FD4 are all candidate kyes and also the right side of FD2 is a prime attribute.
and that's because for any relationship to be in NF3 all left side of FD is candidate key(set of super keys)or the right side should be a prime attribute.

- the relation is not in BCNF because of FD2 because md is not in the set of keys.

for every relation to be in BCNF, the left side of every FD must be a candidate key

4-Decompose the relation in relations that are in BCNF:

FD2 violates BCNF rule so we start with creat a new relation with attributes that appears in FD2 with a primary key which is a combination of md

R1(<u>manager</u>, <u>day</u>, room)

then we create another relation with all attributes, without those on the right side of FD2

R2(maneger,day,time,applicant)

now R1 and R2 are in BCNF

4-Draw an E/R diagram that describes the system. Try to incorporate all dependencies