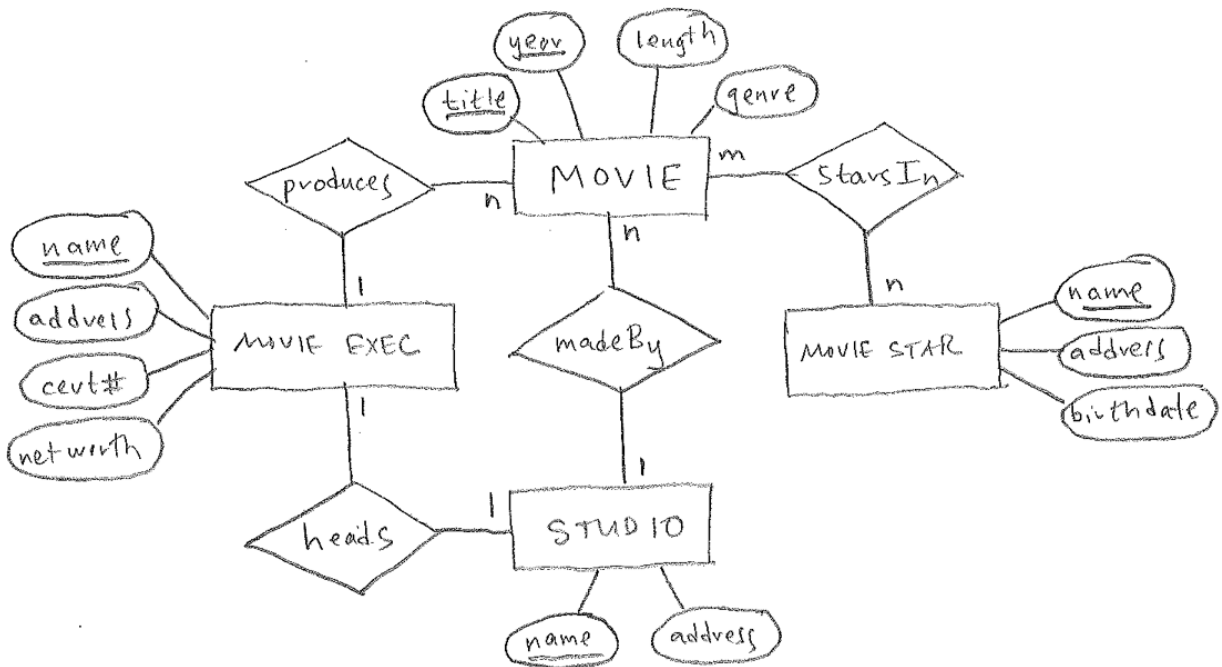1. This ER diagram and relational schema reflect the movie domain we saw over several sessions in class.


```
Movie(                          MovieStar(
  title: string,                  name: string,
  year: int,                      address: string,
  length: int,                    birthdate: date
  genre: string,                )
  studioName: string,
  producerC#: int               StarsIn(
)                                 movieTitle: string,
                                  movieYear: string,
                                  starName: string
MovieExec(                      )
  name: string,
  address: string,
  cert#: int,                   Studio(
  netWorth: int                   name: string,
)                                 address: string,
                                  presC#: int
                                )
```

Give an example of each of these terms in either the ER diagram or the schema, or explain why there isn't one.

a. entity
b. relation
c. relationship
d. attribute
e. schema
f. database
g. tuple
h. key
i. instance
j. artificial key

2. Design a database recording information about families on a TV show such as *Game of Thrones*, characters in the show, and fans of the show. (If you don't know this show, feel free to think of another show, or even of sports teams and their players.)
   • For each family, we will record its name, its family members, its leader (one of the family members), and the set of colors associated with it.
   • For each character, we will record a name.
   • For each fan, we will record the fan's name and the fan's favorite family, favorite character, and favorite color.

   Draw an ER diagram for your conceptual design.
   State clearly any assumptions you make in your design.

3. Design a database is that stores information about employees and their job skills. For instance:
   employee skills
   Jones   programming
   Smith   management, programming, documentation
   Wilson   management, documentation
   For each employee, the database contains an employee number, a name, and an address. For each job skill, it stores a skill name, a course number, and a job grade code. An employee must complete the course before they can be said to have the skill. The database records which courses an employee has taken and the date on which they completed each course.

   Draw an ER diagram for your conceptual design.
   State clearly any assumptions you make in your design.

4. At UNI, a course is given by a unique department, but the only attribute of a course is its number. Different departments can offer courses with the same number. Each department has a unique name. For example, both Computer Science and Math offer courses numbered 3530.

   a. **Draw an ER diagram for these entities**.
   b. **Identify the weak entity and the supporting entity.**
   c. **Identify the key for both entities.**

5. This ER diagram models students attending a college.
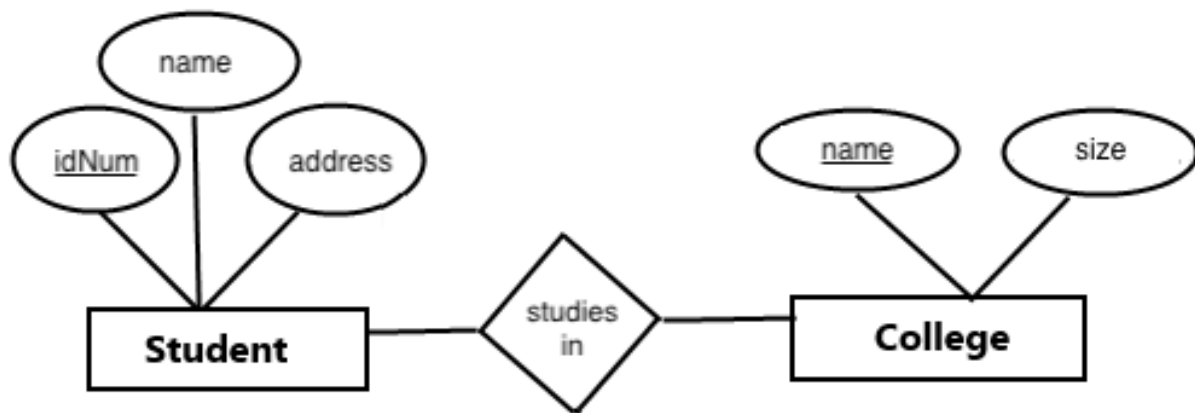
   Convert this diagram into a set of relational schema.

6. Consider this ER diagram for bank customers with phones and addresses:
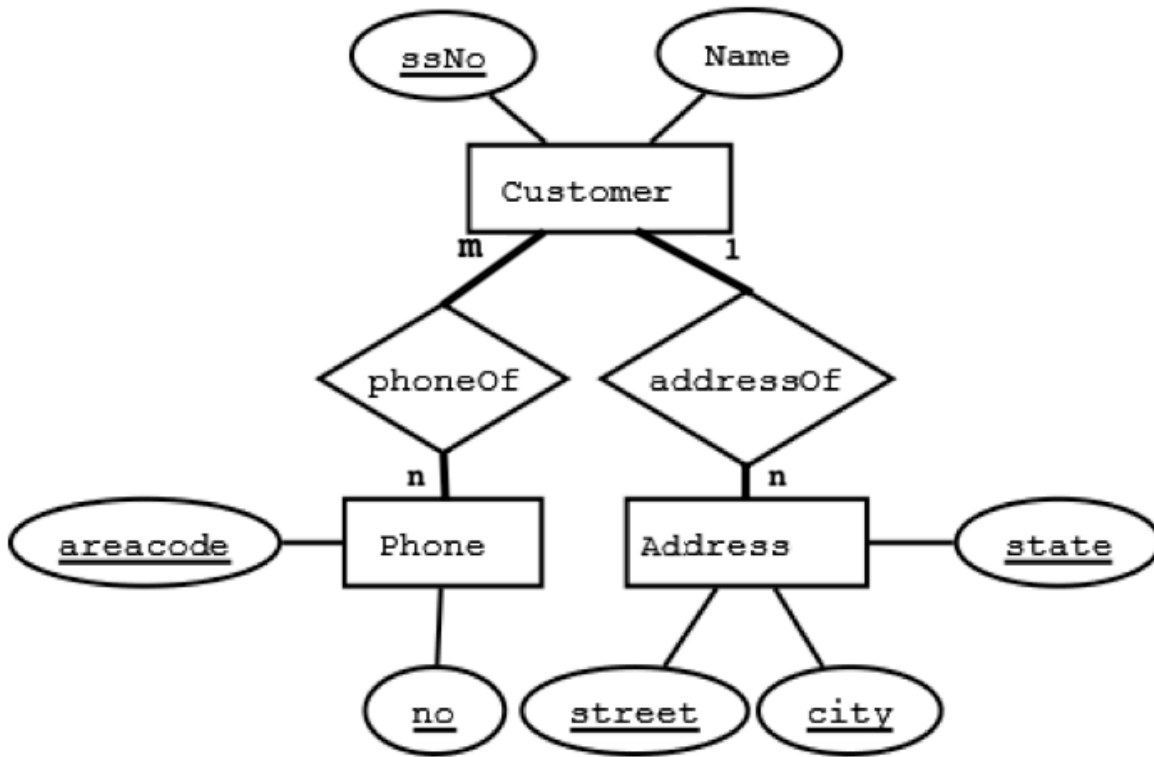
a. **Write relational schema for the two relationships, phoneOf and addressOf.**
b. **Which of these schema can we eliminate?**
c. **Why can we eliminate it?**
d. **How would that change the remaining schema in our database?**

7. Consider this ER diagram from biological taxonomy:
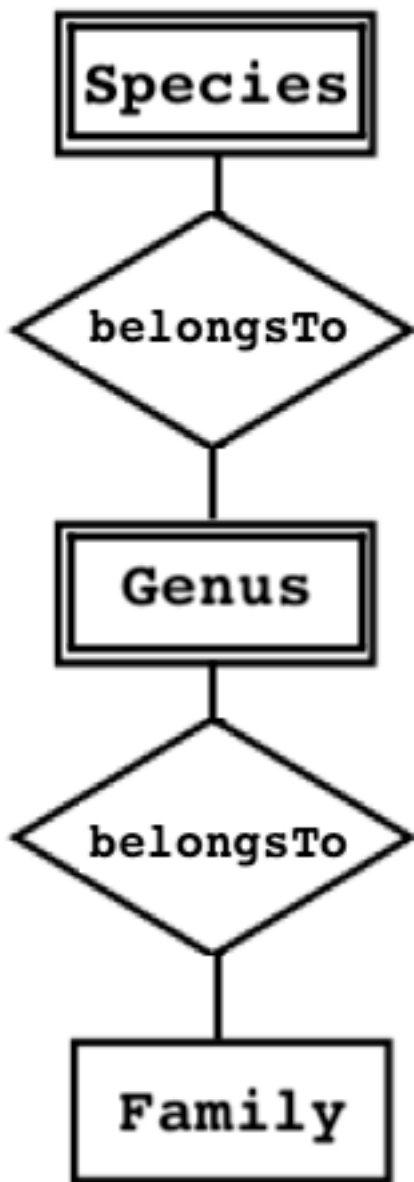
Each entity has exactly one attribute, name.

Write relational schema for all three entities. Identify the keys for all three classes.

8. Consider this partial relational schema from the movie domain of Problem 1:

```
Movie(
  title: string,
  year: int,
  length: int,
  genre: string
)
```

For each of these databases, write "OK" if it is a valid relation. If it is not, identify the rule it violates.

```
-------------------------------------------------
The Big Chill        1983   105      drama         (a)
Blade Runner         1982   117      scifi
The Princess Bride   2020   98       fantasy
Lethal Weapon        1987   109      action
Black Panther        2018   134      action
The Princess Bride   1987   98       fantasy
The Replacements     2000   118      comedy
Star Trek            1979   132      scifi
-------------------------------------------------
Black Panther        2018   action   134           (b)
The Princess Bride   1987   fantasy  98
The Replacements     2000   comedy   118
Star Trek            1979   scifi    132
Lethal Weapon        1987   action   109
Return of the Jedi   1983   scifi    131
48 Hrs.              1982   comedy   96
Lethal Weapon        1987   comedy   44
-------------------------------------------------
Lethal Weapon        1987   109      action        (c)
Return of the Jedi   1983   131      scifi
What About Bob?      1991   101      comedy
48 Hrs.              1982   96       comedy
The Princess Bride   1987   98       fantasy
The Big Chill        1983   105      drama
What About Bob?      1991   99       comedy
Blade Runner         1982   117      scifi
-------------------------------------------------
```

a.

b.

c.

.