CSEN B303: Concepts of Programming Languages, Spring Term 2024
Practice Assignment 1

Exercise 1-1 Movies

The supplied file `movies.pl` includes a database of movies specified by 4 different predicates:

```
movie(M,Y). % movie M was produced in year Y

director(M,D). % movie M was directed by director D

actor(M,A,R). % actor A played role R in movie M

actress(M,A,R). % actress A played role R in movie M
```

a) Implement the queries that answer the following questions:

1. What is the production year of the movie American Beauty?
2. Find a movie that was produced in the year 2000.
3. Find a movie that was produced before the year 2000.
4. Find the name and year of a movie.
5. Find a director who has directed a movie in which the actress Scarlett Johansson appeared.
6. Find an actor who has also directed a movie.
7. Find an actor who has appeared in more than one movie.
8. Find an actor or actress who has also directed a movie (You may use disjunction).

b) Implement the following Prolog predicates:

1. `same_year_as(M1,M2)` succeeds if movie `M1` was produced in the same year as movie `M2`.
2. `cast_member(A,M)` succeeds if person `A` was an actor or actress in movie `M` (write 2 rules).
3. `cast_member2(A,M)` succeeds if person `A` was an actor or actress in movie `M` (write a single rule).
4. `directed_by(X,Y)` succeeds if person `X` has been in a movie directed by person `Y`.
5. `released_since(M,Y)` succeeds if movie `M` was produced during or after year `Y`.
6. `newer(M1,M2)` succeeds if movie `M1` was produced after movie `M2`.
7. `released_between(M,Y1,Y2)` succeeds if movie `M` was produced between year `Y1` and year `Y2` inclusively.

c) What is the difference between the three queries below?

```
?- actor(M1,D,_),actor(M2,D,_).

?- actor(M1,D,_),actor(M2,D,_),M1\=M2.

?- actor(M1,D,_),actor(M2,D,_),M1@<M2
```

[0]The exercises are due to Prof. Dr. Slim Abdennadher and Dr. Nada Sharaf.

Exercise 1-2 Family

We are going to add some new predicates to the family database `family.pl`. The database is specified by 3 different predicates:

```
parent(X,Y). % person X is the parent of person Y.

male(X). % person X is a male.

husband(X,Y). % person X is the husband of person Y.
```

Your task is to implement the following Prolog predicates:

a) `female(A)`: `A` is a female person.

b) `grandfather(A,B)`: `A` is the grandfather of `B`.

c) `grandmother(A,B)`: `A` is the grandmother of `B`.

d) `brother(A,B)`: `A` is the brother of `B`.

e) `uncle(A,B)`: `A` is the uncle of `B`.

f) `sister(A,B)`: `A` is the sister of `B`.

g) `has_son(A)`: The person `A` has a son.

h) `married(A,B)`: `A` and `B` are married to each other.

i) `siblings(A,B)`: `A` and `B` are siblings (both parents in common).

j) `cousins(A,B)`: `A` and `B` are cousins.

k) `no_children(A)`: `A` has no children.

l) `brother_in_law(A,B)`: `A` is the brother-in-law of `B`.

Hint: Insert new facts about your own parents and other relatives to see if the predicates work as expected!.