```prolog
%% KRR EXAM QUESTION IN 2014

%% A Prolog program is used to make inferences regarding the students on university courses
%% and the times of lectures on those courses. The program incorporates facts asserted using
%% a studies/2 predicate that associates each student with his/her course, and a lecture/4
%% predicate that relates a course, a room, a time period and a day of the week (meaning that
%% the course includes a lecture in that room at the given time, on the given day).

%% Examples, of the facts asserted are as follows:
studies( john, maths ).
studies( karen, maths ).
studies( lucy, physics ).
studies( mark, computing ).
lecture( maths, room1, 10-11, monday ).
lecture( maths, room1, 10-12, tuesday ).
lecture( physics, room2, 10-11, monday ).
lecture( physics, room1, 11-13, tuesday ).
lecture( physics, room1, 12-13, tuesday ).

%% The courses are such that every student on a given course attends every lecture that is part
%% of that course (e.g. John takes all maths lectures).
%
%% Time periods of lectures are represented by a term of the form T1-T2, with T1 being the start
%% time and T2 being the end time.
%
%% The times are given using the 24 hour clock representation
%% and are always in whole hours (no minutes). You may assume that all time periods lie within
%% a single day, so that the start time is always strictly less than the end time.
%
%
%% Define the following Prolog predicates, satisfying the given definitions of the conditions under
%% which they are true:

%% i) same course( S1, S2 ) — Holds when students S1 and S2 are studying on the same course. [1 mark]

%% ii) visits room( S, R ) — Holds when student S has at least one lecture in room R. [2 marks]

%% iii) periods_clash( B1-E1, B2-E2 ) — Holds when the given time periods are such that there is at least
%one hour which is both within P1 and within P2. [2 marks]

%% iv) course has clash( C ) [2 marks]
```

```prolog
%% People have pets...
%1
person_s_pets('Paul',[dog(baxter),dog(bolt),spider]).
%2
person_s_pets('Claire',[cat(luna),horse(rufus)]).
%3
person_s_pets('Seb',[lizard]).
%4
person_s_pets('Laura',[]).

% What does each of them have?
%
%
% Show one pet of each
%
%
% Who has pets?
%
%
% Who has only one pet?
%
%
% Who has only two pets?
%
%
%
% How many pets does each person have?
```

```prolog
%%% ID Surname First Name User Name Degree
student(101, 'SMITH', 'John', cs2010js, 'CS').
student(102, 'SMITH', 'Sarah', cs2010ss, 'CS').
student(103, 'JONES', 'Jack', cs2010jj, 'CS').
student(104, 'MORGAN', 'Augustus',lg2010adm, 'Logic').
student(105, 'RAMCHUNDRA','Lal', lg2010lr, 'Logic').
coursework( 1, cs2010js, 45 ).
coursework( 1, cs2010ss, 66 ).
coursework( 1, cs2010jj, 35 ).
coursework( 1, lg2010adm, 99 ).
coursework( 1, lg2010lr, 87 ).

top_mark( CW, [First, Sur] ) :-  coursework( CW, User, Mark1 ),
                                 \+( ( coursework( CW, _, Mark2 ), Mark2 > Mark1 ) ),
                                 student( _, Sur, First, User, _ ).

student_user( U ) :- student( _, _, _, U, _).
user_pass_cw( U, CW ) :- coursework( CW, U, Mark ), Mark >= 40.
user_name( U, [S,F] ) :- student( _, S, F, U, _).

pass_list( CW, PassList ) :-
    setof( Name-Surname, U^(user_pass_cw(U,CW), user_name(U,[Name,Surname|_])), PassList).

%%%%%%%%%%%%%%%%%%%%%%%% ANOTHER EXAMPLE

child(martha,charlotte).
child(charlotte,caroline).
child(caroline,laura).
child(laura,rose).

descend(X,Y)  :-  child(X,Y).

descend(X,Y)  :-  child(X,Z),  descend(Z,Y).

%%%%%% findall(Child,descend(Mother,Child),List).
%%%%%% setof(Child,descend(Mother,Child),List).
%%%%%% setof(Child,Mother^(descend(Mother,Child)),List).
```

```prolog
/* Here's a first version of a set of exercises for practising the querying
of a simple Prolog database, in this case a movie database (see below).
Modified from exercises found on the web. Not sure who first made them.  */


/* EXERCISES

Part 1: Write queries to answer the following questions.

    a. In which year was the movie American Beauty released?

    b. Find the movies released in the year 2000.

    c. Find the movies released before 2000.

    d. Find the movies released after 1990.

    e. Find an actor who has appeared in more than one movie.

    f. Find a director of a movie in which Scarlett Johansson appeared.

    g. Find an actor who has also directed a movie.

    h. Find an actor or actress who has also directed a movie.

    i. Find the movie in which John Goodman and Jeff Bridges were co-stars.

Part 2: Add rules to the database to do the following,

    a. released_after(M, Y) <- the movie was released after the given year.

    b. released_before(M, Y) <- the movie was released before the given year.

    c. same_year(M1, M2) <- the movies are released in the same year.

    d. co_star(A1, A2) <- the actor/actress are in the same movie.

*/

/* DATABASE

    movie(M, Y) <- movie M came out 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

*/

:- discontiguous
        movie/2,
        director/2,
        actor/3,
        actress/3.

movie(american_beauty, 1999).
director(american_beauty, sam_mendes).
actor(american_beauty, kevin_spacey, lester_burnham).
actress(american_beauty, annette_bening, carolyn_burnham).
actress(american_beauty, thora_birch, jane_burnham).
actor(american_beauty, wes_bentley, ricky_fitts).
actress(american_beauty, mena_suvari, angela_hayes).
actor(american_beauty, chris_cooper, col_frank_fitts_usmc).
actor(american_beauty, peter_gallagher, buddy_kane).
actress(american_beauty, allison_janney, barbara_fitts).
actor(american_beauty, scott_bakula, jim_olmeyer).
actor(american_beauty, sam_robards, jim_berkley).
actor(american_beauty, barry_del_sherman, brad_dupree).
actress(american_beauty, ara_celi, sale_house_woman_1).
actor(american_beauty, john_cho, sale_house_man_1).
actor(american_beauty, fort_atkinson, sale_house_man_2).
actress(american_beauty, sue_casey, sale_house_woman_2).
actor(american_beauty, kent_faulcon, sale_house_man_3).
actress(american_beauty, brenda_wehle, sale_house_woman_4).
actress(american_beauty, lisa_cloud, sale_house_woman_5).
actress(american_beauty, alison_faulk, spartanette_1).
actress(american_beauty, krista_goodsitt, spartanette_2).
actress(american_beauty, lily_houtkin, spartanette_3).
actress(american_beauty, carolina_lancaster, spartanette_4).
actress(american_beauty, romana_leah, spartanette_5).
actress(american_beauty, chekeshka_van_putten, spartanette_6).
actress(american_beauty, emily_zachary, spartanette_7).
actress(american_beauty, nancy_anderson, spartanette_8).
actress(american_beauty, reshma_gajjar, spartanette_9).
actress(american_beauty, stephanie_rizzo, spartanette_10).
actress(american_beauty, heather_joy_sher, playground_girl_1).
actress(american_beauty, chelsea_hertford, playground_girl_2).
actress(american_beauty, amber_smith, christy_kane).
actor(american_beauty, joel_mccrary, catering_boss).
actress(american_beauty, marissa_jaret_winokur, mr_smiley_s_counter_girl).
actor(american_beauty, dennis_anderson, mr_smiley_s_manager).
actor(american_beauty, matthew_kimbrough, firing_range_attendant).
actress(american_beauty, erin_cathryn_strubbe, young_jane_burnham).
actress(american_beauty, elaine_corral_kendall, newscaster).

movie(anna, 1987).
director(anna, yurek_bogayevicz).
actress(anna, sally_kirkland, anna).
actor(anna, robert_fields, daniel).
actress(anna, paulina_porizkova, krystyna).
actor(anna, gibby_brand, director_1).
actor(anna, john_robert_tillotson, director_2).
actress(anna, julianne_gilliam, woman_author).
actor(anna, joe_aufiery, stage_manager).
actor(anna, lance_davis, assistant_1).
```