K.G.C.E.
Karjat - Raigad

Prolog Programming Assignment

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Q. 1 How does the queries in kb.pl file are executed?

=> Code :-

```
loves(vincent, mia).
loves(marcellus, mia).
loves(pumpkin, honey_bunny).
loves(honey_bunny, pumpkin).

jealous(X,Y) :-
    loves(X,Z),
    loves(Y,Z).
```

Query1 :- ?- loves(X, mia).
Output :- X = vincent
X = Marcellus

Explanation :-
- Here as we know vincent loves Mia as well as marellus loves mia.
- Thus the kb assumes that X is either vincent or marcellus.

Query 2 :- ?- jealous(X,Y).
Output :- X = Y, X = vincent
X = vincent
Y = marellus
X = marcellus
X = Y, Y = pumpkin
X = Y, Y = Honey_bunny.

Explanation :-
- As there is no fixed parameters in, our query.
- The query will produce output of every jealous(X, Y) pair on our prolog code.
- The jealous (') rule follows jealous(X, Y) :- loves (X, Z), loves (Y, Z).
- Initially, X and Y both were associated to vincent. i.e. self association. It then follows receive property for the rest of the prolog code.

Q.2 How does the queries in lists.pl file are executed ?

=> code :-

```
suffix(XS, YS) :-
    append(_, YS, XS).

prefix(XS, YS) :-
    append(YS, _, XS).

sublist(XS, YS) :-
    suffix(XS, ZS),
    prefix(ZS, YS).
```

Query 1 : ?- sublist([a,b,c,d,e],[c,d]).
Output : True

Explanation :-

- A sublist procedure looks for a match between the first elements of the sub-list and the main-list.
- Here, [c,d] is the sub-list of the main list [a,b,c,d,e].
- As the main list contains the sublist [c,d], the output is true. Else, the output would have been false.

Query 2 : ?- suffix([a,b,c], zs)

Output : zs = [a,b,c]
zs = [b,c]
zs = [c]
zs = []
false

Explanation :-

- suffix in general elimnates the front elements from a list.
- Here, by using suffix procedure, [a,b,c] elements are removed from a and continues until all the elements are removed.
- As there are no more elements in the list, the output will be displayed as 'false'.

Q.3 Programming create a Prolog code to find factorial of a number ?

=> Code : factorial (0, 1).
factorial (N, F) :-
N > 0,
N1 is N-1,
factorial (N1, F1),
N is N * F1.

Query : ?- factorial (3, W)

output : W = 6

Q.4 In examples data set movies.pl write query strings and results of query execution for any of 5 tasks :-

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

Query : ?- movie (american_beauty, Y)

output Y = 1999.

b) Find the movies relased in year 2000

Query : ?- movie (M, 2000).

output : M = down_from_the_mountain
M = o_brother_where_art_thou
M = ghost_world

c) Find movies released before 2000.

Query : ? - movie(M, Y), Y < 2000

Output : M = american_beauty
Y = 1999

M = anna
Y = 1987

M = barton_fink
Y = 1991

d) Find the movies released after 1990

Query : ? - movie(M, Y), Y > 1990.

Output : M = american_beauty
Y = 1999

M = barton_fink
Y = 1991

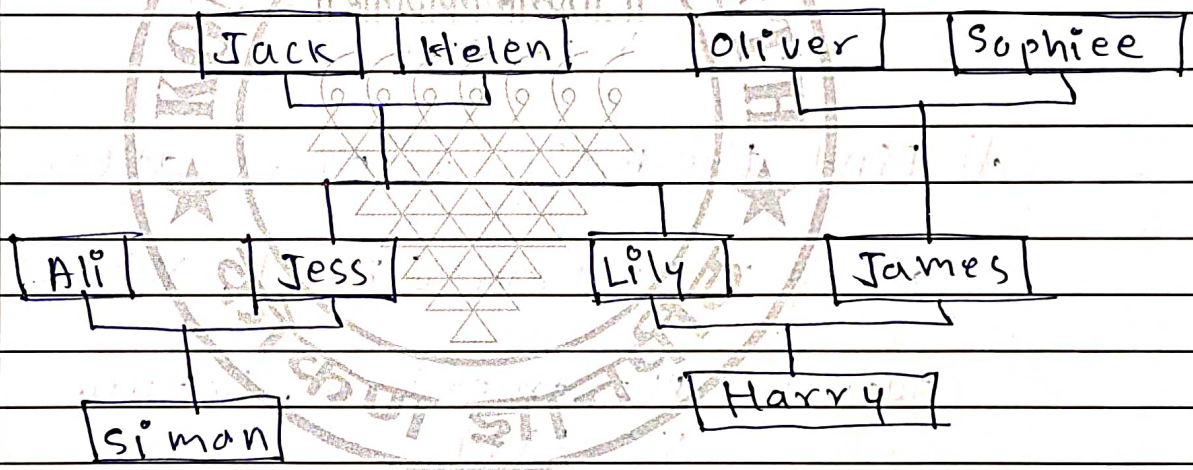
e) Find a director of a movie in which Scarleth Johansson appenared.

Query : ? - actress(M, Scarleth_Johansson), director(M, O)

Output : O = peter_webber
M = girs_with_a_pearl_earning

Q.5 a) Draw a family tree of you leay arbitary family. which has the following relations mother, father, daughter, son, grandson, grand mother, sibling, uncle, person, male, female. you need to convert it into KB and write atleast 6 queries and Query results on your KB.

=> Diagram :-



Family Tree

Query 1 : ?- mother_of(x, jess).
Output : x = Helen

Query 2 : ?- parent_of(x, simon)
Output : x = Jess

Query 3 : ?- sister_of (x, lily).
output : x = jess

Query 4 : ?- parent_of (x, harry).
output : x = lily
x = janes

Query 5 : ?- aunt_of (x, simon).
output : x = lily

Query 6 : ?- grandfather_of (x, harry).
output : x = jack.