

## Prolog Programming Assignment

Q1. 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 Marcellus loves mia. Thus the kb assumes that X is either vincent or marcellus

query2: ? - jealous(X, Y).

Output: X = Y, Y = vincent

X = vincent

Y = Marcellus

X = Marcellus

X = Y, Y = 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 reflexive property for the rest of the prolog code.

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).

nrev([], []).

nrev([H|T0], L) :-

nrev(T0, T),

append(T, [H], L).

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

Output: True

Explanation: In this query, A sublist procedure looks for a match between the first elements of the sub-list and the main-list  $LS$ . 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 elimates 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 of the as there are no more elements in the list, the output will be displayed as 'false'.

Q3. Programming create a Prolog code to find factorial of a number?

→ code: factorial(0,1).  
factorial(N,F) :-

$N > 0,$   
 $N_1 \text{ is } N - 1,$   
 $\text{factorial}(N_1, F_1),$   
 $N \text{ is } N * F_1.$

query: ?- factorial(3, W).

Output:  $W = 6$

Explanation:

Q4. 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 released 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

X = 1987

$\Delta G = \text{baron} - \text{fink}$

X = 1991

d) Find the movies released after 1990.

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

Output :  $m = \text{american-beauty}$   
 $y = 1999$

M = barton - fink  
Y = 1991.

e) Find a director of a movie in which Scarlett Johansson appeared.

Query: ?- actress(M ; scarlett-johansson), director(M, D)

Output : O = Peter - webber,

Ma = girl - with - a - pearl - earring .

c) Find movies released before 2000.

cquery : ? - movie(M,y) , y < 2000

Output:  $M = \text{american-beauty}$   
 $Y = 1999$

$$M = 0.779$$

x = 1987

M = barton - fink

X = 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 Scarlett Johansson appeared.

query: ?- actress(M ; scarlett-johansson), director(M, O)

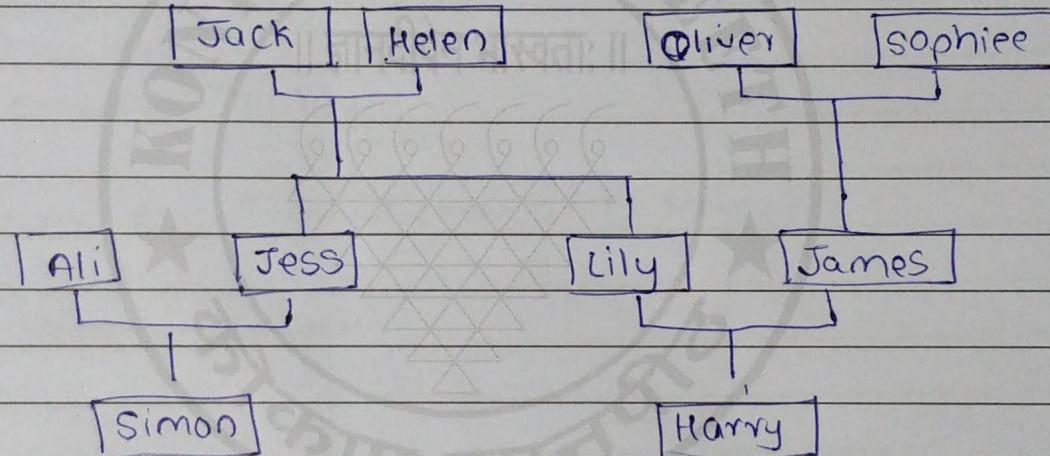
Output : D = Peter - webber ,

girl-with-a-pearl-earring.

05.

draw a family tree of you/any arbitrary family . which has the following relations mother , father , daughter , son , grandson , grandmother , sibling , uncle , person , male , female . You need to convert it into KB and write atleast 6 queries and query results on your KB .

→ ~~every~~ Diagram:



## Family Tree

query 1: ?-mother\_of (x,jess) .

Output : X = helen

Query 2: ? parent\_of (x, simon).

Output: x = jess

K.G.C.E.

Karjat - Raigad

Query 3: ? - sister-of (x, lily).

Output : x = jess

Query 4 : ? - parent-of (x, harry) .

Output :  $X = 11y$

X = james

Query 5: ?- aunt\_of (x,simon).

Output: x = lily

query 6: ? grandfather\_of (x, harry).

Output: x=jack