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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, X = 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 ('s role 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.

Q2) 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, ZS) :-
suffix (XS, ZS)
prefix (ZS, YS).

nrev ([], []).
nrev ([H|T], Z) :-
nrev (T, T)
append (T, [H], Z).

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 ie. 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 eliminates 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'.

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Q3. 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.

Q4. In examples data set movie.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.

M = barton_fink
X = 1991.

d) Find the movie 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 scalett Johansson appeared.

Query: ?- actress(M, scarlett_johansson).
director(M,O).
Output: O = peter_webber.
M = girl_with_a_pearl_earring.

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c) Find movies released before 2000.

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

query: ?- actress(M, Scarlett-Johansson),
director(M,O).

output: O = peter_webber.
M = girl_with_a_pearl_earring.

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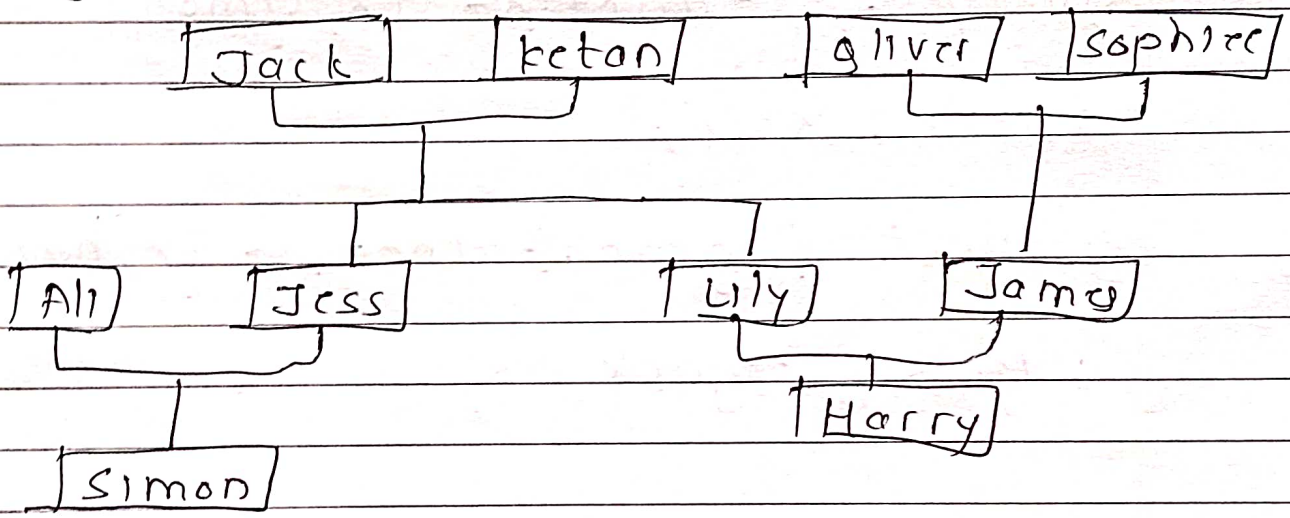
Q5) Draw a family tree of your any arbitrary family, which has the following relations Mother, Father, daughter, son, grandson, grandmother, sibling, unde, person, male, female. You need to convert it into KB and write atleast 6 queries and query results on your KB.

→ Diagram.



Family Tree.

Query 1 - ? - mother_of (X, jess).

output: X = helen.

Query 2: ? parent_of (X, simon).

Output: X = jess.

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Query 3: ? - sister_of (X, lily).

output: X = jess.

Query 4: ? - parent_of (X, harry).

Output: X = lily
X = james.

Query 5: ? - aunt of (X, simon).

output: X = lily.

Query 6: ? grandfather_of (X, harry).

output: X = jack