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MODULE: AI

TP: 2

TASK1:

```
% FACTS.
mammal(kitty).
mammal(ratatat).
mammal(fido).
claws(kitty).
tail(ratatat).
bestfriend(fido).
feathers(tweety).
```

From the above prolog facts, kitty, ratatat, fido and tweety are arguments while mammal, claws, tail, bestfriend and feathers are predicates.

Prolog Rules:

```
has_fur(X) :- mammal(X).
rat(X) :- has_fur(X), tail(X).
cat(X) :- has_fur(X), claws(X).
meows(X) :- cat(X).
bird(X) :- feathers(X).
dog(X) :- bestfriend(X), has_fur(X).
likes(X, Y) :- dog(X), meows(Y).
likes(X, Y) :- cat(X), bird(Y).
likes(X, Y) :- cat(X), rat(Y).
```

Execution:

```
GNU Prolog console                                    —  □  ×

File  Edit  Terminal  Prolog  Help
compiling C:/Users/Abhay/OneDrive/Documents/UDM/Semester6/AI/TP_2/TP2/task1.pl for byte
C:/Users/Abhay/OneDrive/Documents/UDM/Semester6/AI/TP_2/TP2/task1.pl compiled, 19 lines

yes
| ?- has_fur(X).

X = kitty ? ;

X = ratatat ? ;

X = fido

yes
| ?- rat(X).

X = ratatat ? ;

no
| ?- cat(X).

X = kitty ? ;

(16 ms) no
| ?- meows(X).

X = kitty ? ;

no
| ?- bird(X).

X = tweety

yes
| ?- dog(X).

X = fido

yes
```

1. Create and Run 5 queries against the Knowledge Base created above:

```
  I.    ?- mammal(kitty).
 II.    ?- meows(fido).
III.    ?- cat(X).
 IV.    ?- likes(X, bird(Y)).
  V.    ?- rat(X).
```

```
(32 ms) no
| ?- mammal(kitty).

yes
| ?- meows(fido).

no
| ?- cat(X).

X = kitty ? ;

no
| ?- likes(X, bird(Y)).

no
| ?- rat(X).

X = ratatat ? ;

no
| ?-
```

Provide the output of the following query.

?:- likes(X,Y).

```
| ?- likes(X, Y).

X = fido
Y = kitty ? ;

X = kitty
Y = tweety ? ;

X = kitty
Y = ratatat ? ;

(32 ms) no
| ?- |
```

TASK 2

Write a Prolog program of your family tree by creating an appropriate Knowledge Base, going back at least to your grandparents.

In my family i have 1 grandfather (Carlos) [His nick name is Carlos], 1 grand mother(Ansuya), my father(Vikram), my mother(Simla) and my brother(Adarsh) and me (Abhay). My grand father and grand mother has a second child who is my father's brother (Anil) and his wife(Preity) and 1 son(Akhil) ,

Creating the facts:

```
1   % Create the Genders
2   male(carlos).
3   male(vikram).
4   male(anil).
5   male(abhay).
6   male(adarsh).
7   male(akhil).
8
9   female(ansuya).
10  female(simla).
11  female(preity).
12
13  % Create the Relationships
14  parent(carlos, vikram).
15  parent(ansuya, vikram).
16  parent(carlos, anil).
17  parent(ansuya, anil).
18  parent(vikram, abhay).
19  parent(simla, abhay).
20  parent(vikram, adarsh).
21  parent(simla, adarsh).
22  parent(anil, akhil).
23  parent(preity, akhil).
24
```

Creating the rules:

```prolog
25   % Father
26   father(Parent, Child) :-
27     male(Parent),
28     parent(Parent, Child).
29
30   % Mother
31   mother(Parent, Child) :-
32     female(Parent),
33     parent(Parent, Child).
34
35   % Child
36   child(Child, Parent) :-
37     parent(Parent, Child).
38
39   % Son
40   son(Child, Parent) :-
41     male(Child),
42     child(Child, Parent).
43
44   % Daughter
45   daughter(Child, Parent) :-
46     female(Child),
47     child(Child, Parent).
48
49   % Grandparent
50   grandparent(GP, GC) :-
51     parent(GP, X),
52     parent(X, GC).
53
54   % Grandmother
55   grandmother(GM, GC) :-
56     female(GM),
57     grandparent(GM, GC).
58
59   % Grandfather
60   grandfather(GF, GC) :-
61     male(GF),
62     grandparent(GF, GC).
63
64   % Grandchild
65   grandchild(GC, GP) :-
66     grandparent(GP, GC).
67
68   % Grandson
69   grandson(GS, GP) :-
70     male(GS),
71     grandchild(GS, GP).
72
```

```prolog
73   % Granddaughter
74   granddaughter(GD, GP) :-
75     female(GD),
76     grandchild(GD, GP).
77
78   % Spouse
79   spouse(Husband, Wife) :-
80     married(Husband, Wife).
81   spouse(Wife, Husband) :-
82     married(Husband, Wife).
83
84   % Husband
85   husband(Person, Wife) :-
86     male(Person),
87     spouse(Person, Wife).
88
89   % Wife
90   wife(Person, Husband) :-
91     female(Person),
92     spouse(Person, Husband).
93
94   % Sibling
95   sibling(Person1, Person2) :-
96     parent(Parent, Person1),
97     parent(Parent, Person2),
98     Person1 \= Person2.
99
100  % Brother
101  brother(Person, Sibling) :-
102    male(Person),
103    sibling(Person, Sibling).
104
105  % Sister
106  sister(Person, Sibling) :-
107    female(Person),
108    sibling(Person, Sibling).
109
110  % Aunt
111  aunt(Person, NieceNephew) :-
112    sister(Person, Parent),
113    parent(Parent, NieceNephew).
114
115  % Uncle
116  uncle(Person, NieceNephew) :-
117    brother(Person, Parent),
118    parent(Parent, NieceNephew).
119
```

```prolog
120  % Nephew
121  nephew(Person, AuntUncle) :-
122    male(Person),
123    parent(Parent, Person),
124    sibling(Parent, AuntUncle).
125
126  % Niece
127  niece(Person, AuntUncle) :-
128    female(Person),
129    parent(Parent, Person),
130    sibling(Parent, AuntUncle).
131
132  % First Cousin
133  first_cousin(Person1, Person2) :-
134    parent(Parent1, Person1),
135    parent(Parent2, Person2),
136    sibling(Parent1, Parent2).
137
138  % Nth Cousins
139  nth_cousins(Person1, Person2, N) :-
140    parent(Parent1, Person1),
141    parent(Parent2, Person2),
142    nth_cousins_helper(Parent
```

Execution:

Check for father:

```
|
yes
| ?- father(X, vikram).

X = carlos ? ;

(15 ms) no
| ?- father(X, anil).

X = carlos ? ;

no
| ?- father(X, adarsh).

X = vikram ? ;

no
| ?- father(X, anhay).

no
| ?- father(X, abhay).

X = vikram ? ;

no
| ?- father(X, akhil).

X = anil ? ;

no
| ?-
```

Check for mother:

```
| ?- mother(X, akhil).

X = preity

yes
| ?- mother(X, abhay).

X = simla ? ;

no
| ?- mother(X, vikram).

X = ansuya ? ;

no
| ?-
```

Check for brother:

```
| ?- brother(X, abhay).

X = adarsh ? ;

X = adarsh ? ;

no
| ?- brother(X, adarsh).

X = abhay ? ;

X = abhay ? ;

(16 ms) no
| ?- brother(X, akhil).

no
| ?- brother(X, anil).

X = vikram ? ;

X = vikram ? ;

no
| ?-
```

Check for uncle:

```
| ?- uncle(Uncle, vikram).

no
| ?- uncle(Uncle, adarsh).

Uncle = anil ? ;

Uncle = anil ? ;

[15 ms] no
| ?- |
```

Check for grandmother:

```
| ?- grandmother(Grandmother, abhay).

Grandmother = ansuya ? ;

no
| ?- grandmother(Grandmother, vikram).

no
```

Check for grandfather:

```
| ?- grandfather(Grandfather, vikram).

no
| ?- grandfather(Grandfather, adarsh).

Grandfather = carlos ? ;

(31 ms) no
| ?-
```