Shri Vile Parle Kelavani Mandal's
DWARKADAS J. SANGHVI COLLEGE OF ENGINEERING
(Autonomous College Affiliated to the University of Mumbai)
NAAC Accredited with "A" Grade (CGPA : 3.18)

DEPARTMENT OF INFORMATION TECHNOLOGY

COURSE CODE: DJ19ITL504 **DATE: 6/12/2022**

COURSE NAME: Artificial Intelligence Laboratory **CLASS: TYBTech-IT**

EXPERIMENT NO. 8

CO/LO: Apply NLP algorithms and methods to solve domain-specific problems

AIM: Implement examples of Predicate Logic, for forward and backward reasoning and resolution using prolog.

DESCRIPTION OF EXPERIMENT:

Prolog always performs depth-first-search, Matches facts & rules (i.e. knowledge base) in top-down manner and resolves the goals or subgoals in left-to-right manner. Most important thing to keep in mind while writing prolog program - "order of writing facts & rules always matters".

Example 1 : Below food table shows the facts, rules, goals and their English meanings.

Facts	**English meanings**
food(burger).	// burger is a food
food(sandwich).	// sandwich is a food
food(pizza).	// pizza is a food
lunch(sandwich).	// sandwich is a lunch
dinner(pizza).	// pizza is a dinner
Rules	
meal(X) :- food(X).	// Every food is a meal OR Anything is a meal if it is a food
Queries / Goals	
?- food(pizza).	// Is pizza a food?
?- meal(X), lunch(X).	// Which food is meal and lunch?
?- dinner(sandwich).	// Is sandwich a dinner?

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Facts	**English meanings**
studies(charlie, csc135).	// charlie studies csc135
studies(olivia, csc135).	// olivia studies csc135
studies(jack, csc131).	// jack studies csc131
studies(arthur, csc134).	// arthur studies csc134
teaches(kirke, csc135).	// kirke teaches csc135
teaches(collins, csc131).	// collins teaches csc131
teaches(collins, csc171).	// collins teaches csc171
teaches(juniper, csc134).	// juniper teaches csc134
Rules	
professor(X, Y) :- teaches(X, C), studies(Y, C).	// X is a professor of Y if X teaches C and Y studies C.
Queries / Goals	
?- studies(charlie, What).	// charlie studies what? OR What does charlie study?
?- professor(kirke, Students).	// Who are the students of professor kirke.

From Example 1 :

(1) ?- meal(X), dinner(X).

(2) ?- meal(What).

(3) ?- meal(X), dinner(Y).

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From Example 2 :

(1) ?- studies(Who, csc135). (hint : after getting first solution type ' ; ' to find all the possible solutions)

Using Example-2 just copy paste below query and see the result -
?- studies(charlie, Which), teaches(Who,Which), write('charlie studies '), write(Which), write(' and professor '), write(Who), write(' teaches '), write(Which).

CODE:

```
/* Facts */
male(jack).
male(oliver).
male(ali).
male(james).
male(simon).
male(harry).
female(helen).
female(sophie).
female(jess).
female(lily).

parent_of(jack,jess).
parent_of(jack,lily).
parent_of(helen, jess).
parent_of(helen, lily).
parent_of(oliver,james).
parent_of(sophie, james).
parent_of(jess, simon).
parent_of(ali, simon).
parent_of(lily, harry).
parent_of(james, harry).

/* Rules */
father_of(X,Y):- male(X),
    parent_of(X,Y).

mother_of(X,Y):- female(X),
    parent_of(X,Y).

grandfather_of(X,Y):- male(X),
    parent_of(X,Z),
    parent_of(Z,Y).

grandmother_of(X,Y):- female(X),
    parent_of(X,Z),
    parent_of(Z,Y).

sister_of(X,Y):- %(X,Y or Y,X)%
    female(X),
    father_of(F, Y), father_of(F,X),X \= Y.

```

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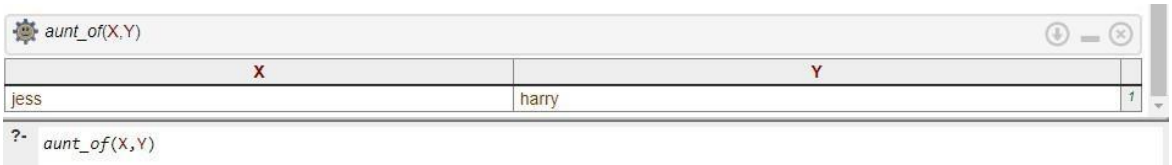
```
43 sister_of(X,Y):- female(X),
44     mother_of(M, Y), mother_of(M,X),X \= Y.
45
46 aunt_of(X,Y):- female(X),
47     parent_of(Z,Y), sister_of(Z,X),!.
48
49 brother_of(X,Y):- %(X,Y or Y,X)%
50     male(X),
51     father_of(F, Y), father_of(F,X),X \= Y.
52
53 brother_of(X,Y):- male(X),
54     mother_of(M, Y), mother_of(M,X),X \= Y.
55
56 uncle_of(X,Y):-
57     parent_of(Z,Y), brother_of(Z,X).
58
59 ancestor_of(X,Y):- parent_of(X,Y).
60 ancestor_of(X,Y):- parent_of(X,Z),
61     ancestor_of(Z,Y).
```

OUTPUT:



TECHNOLOGY STACK USED:

SWISH –SWI PROLOG FOR SHaring

CONCLUSION:

We were able to query relations in a family tree using PROLOG . The relations werefrom child to grandparents and ancestors.

REFERENCES:

1. Online Compiler from https://swish.swi-prolog.org/
2. https://cse.sc.edu/~ahein/330/example.html
3. https://athena.ecs.csus.edu/~mei/logicp/prolog/programming-examples.html