

AI ASSIGNMENT – 3

Consider the following story.

“I married a widow (call her W) who has a grown-up daughter (D). My father (F), who visited us quite often, fell in love with my step-daughter and married her. Hence my father became my son-in-law and my step-daughter became my mother. Some months later, my wife gave birth to a son (S1), who became the brother-in-law of my father, as well as my uncle. The wife of my father-that is, my step-daughter also had a son (S2).” Using Prolog, create a list of facts that represents the situation in the above story. Add rules defining the family relationships (such as father-in-law) described in the story. Show how a Prolog system would use your program to prove the goal “I am my own grandfather”.

Source Code:

```
%Predicate
husband(me, widow).
husband(father, widow_daughter).

father(me, boy_S1).
father(father, me).
father(father, boy_S2).

mother(widow, boy_S1).
mother(widow, widow_daughter).
mother(widow_daughter, boy_S2).

%Clauses
married(X, Y) :- husband(X, Y); wife(X,Y).
wife(X, Y) :- husband(Y, X).

parent(X, Y) :- parent0(X, Y) ; step_parent(X, Y).
parent0(X, Y) :- father(X, Y); mother(X, Y).

step_parent(X, Z) :-
    married(X, Y),
    parent0(Y, Z),
    \+ parent0(X, Z).

grandparent(X, Z) :-
    parent(X, Y),
    parent(Y, Z).

sibling(X, Y) :- parent(Z, X),
    parent(Z, Y),
    X \= Y.
```

```
sibling_in_law(X, Z) :-  
    married(X, Y),  
    sibling(Y, Z).  
  
uncle_aunt(X, Z) :-  
    sibling(X, Y),  
    parent(Y, Z).
```

Output:

```
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For online help and background, visit https://www.swi-prolog.org  
For built-in help, use ?- help(Topic). or ?- apropos(Word).  
  
?- consult('grandparent.pl').  
true.  
  
?- grandparent(me,me).  
true .  
  
?- sibling(me,boy_S2).  
true .  
  
?- sibling_in_law(boy_S1,father).  
false.  
  
?- sibling_in_law(father,boy_S1).  
true .  
  
?- married(father,widow_daughter).  
true .  
  
?- step_parent(me,widow_daughter).  
true .  
  
?- uncle_aunt(boy_S1,me).  
true .  
  
?-   
[]
```