ASSIGNMENT – 1

Name:sourabh patel

Admission no: U19CS082

Design State Space Search for Water Jug Problem and Implement same problem in prolog.

Problem: There are two jugs of volume A litre and B litre. Neither has any measuring mark on it.There is a pump that can be used to fill the jugs with water.How can you get exactly of water into the Assuming that we have unlimited supply of water.

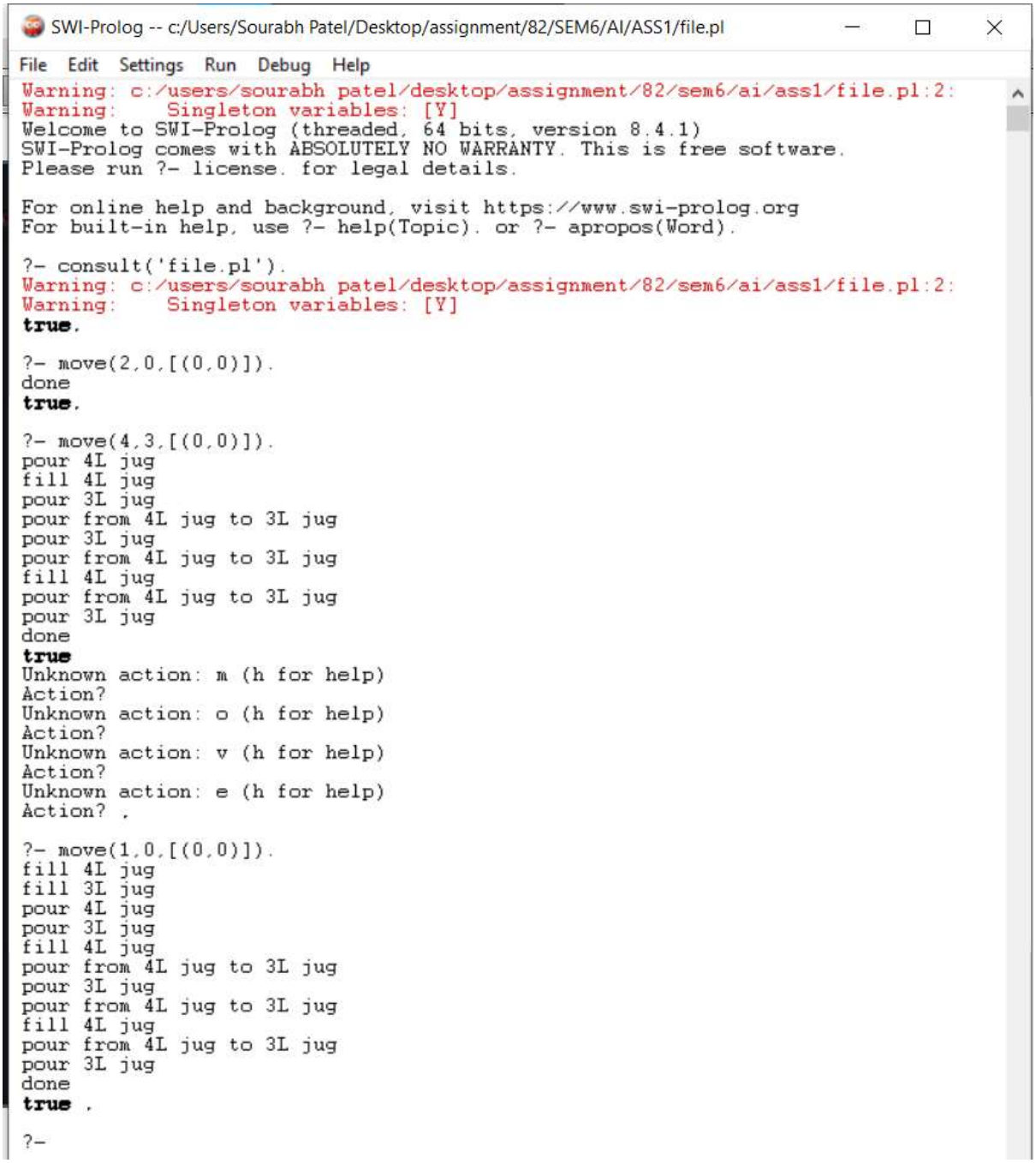
For e.g., one having the capacity to hold 3 gallons of water and the other has the capacity to hold 4 gallons of water. There is no other measuring equipment available and the jugs also do not have any kind of marking on them. So, the agent's task here is to fill the 4-gallon jug with 2 gallons of water by using only these two jugs and no other material. Initially, both our jugs are empty.

The initial state is provided by inpute:

Final state 4L->2 3L->0

```
member(X,[X|_]).
member(X,[Y|Z]):-member(X,Z).

move(X,Y,_):-
    X=:=2,
    Y=:=0,write('done'),!.

move(X,Y,Z):-
    X<4,
    \+member((4,Y),Z),
    write("fill 4L jug"),nl,
    move(4,Y,[(4,Y)|Z]).

move(X,Y,Z):-
    Y<3,
    \+member((X,3),Z),
    write("fill 3L jug"),nl,
    move(X,3,[(X,3)|z]).

move(X,Y,Z):-
    X>0,
    \+member((0,Y),Z),
    write("pour 4L jug"),nl,
    move(0,Y,[(0,Y)|Z]).
```

```
move(X,Y,Z):-
    Y>0,
    \+member((X,0),Z),
    write("pour 3L jug"),nl,
    move(X,0,[(X,0)|Z]).

move(X,Y,Z):-
    P is X+Y,
    P>=4,
    Y>0,
    K is 4-X,M is Y-K,
    \+member((4,M),Z),
    write("pour from 3L jug to 4L jug"),nl,
    move(4,M,[(4,M)|Z]).
move(X,Y,Z):-
    P is X+Y,
    P>=3,
    X>0,
    K is 3-Y,
    M is X-K,
    \+member((M,3),Z),
    write("pour from 4L jug to 3L jug"),nl,
    move(M,3,[(M,3)|Z]).

move(X,Y,Z):-
    K is X+Y,
    K<4,
    Y>0,
    \+member((K,0),Z),
    write("pour from 3L jug to 4L jug"),nl,
    move(K,0,[(K,0)|Z]).
move(X,Y,Z):-
    K is X+Y,
    K<3,
    X>0,
    \+member((0,K),Z),
    write("pour from 4L jug to 3L jug"),nl,
    move(0,K,[(0,K)|Z]).
```


SWI-Prolog -- c:/Users/Sourabh Patel/Desktop/assignment/82/SEM6/AI/ASS1/file.pl
File Edit Settings Run Debug Help
Warning: c:/users/sourabh patel/desktop/assignment/82/sem6/ai/ass1/file.pl:2:
Warning: Singleton variables: [Y]
Welcome to SWI-Prolog (threaded, 64 bits, version 8.4.1)
SWI-Prolog comes with ABSOLUTELY NO WARRANTY. This is free software.
Please run ?- license. for legal details.
For online help and background, visit https://www.swi-prolog.org
For built-in help, use ?- help(Topic). or ?- apropos(Word).
?- consult('file.pl').
Warning: c:/users/sourabh patel/desktop/assignment/82/sem6/ai/ass1/file.pl:2:
Warning: Singleton variables: [Y]
true.
?- move(2,0,[(0,0)]).
done
true.
?- move(4,3,[(0,0)]).
pour 4L jug
fill 4L jug
pour 3L jug
pour from 4L jug to 3L jug
pour 3L jug
pour from 4L jug to 3L jug
fill 4L jug
pour from 4L jug to 3L jug
pour 3L jug
done
true
Unknown action: m (h for help)
Action?
Unknown action: o (h for help)
Action?
Unknown action: v (h for help)
Action?
Unknown action: e (h for help)
Action? .
?- move(1,0,[(0,0)]).
fill 4L jug
fill 3L jug
pour 4L jug
pour 3L jug
fill 4L jug
pour from 4L jug to 3L jug
pour 3L jug
pour from 4L jug to 3L jug
fill 4L jug
pour from 4L jug to 3L jug
pour 3L jug
done
true .
?-