# PRACTICAL – 9 : Water Jug Problem

travel.pl | Travelling salesman .pl | test.pl | eight queen.pl | water jug.pl

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/* Description:
"You are given two jugs, a 4-gallon one and a 3-gallon one. Neither have any measuring markers on it. There is a tap that can
be used to fill the jugs with water. How can you get exactly 2 gallons of water into the 4-gallon jug?".
*/

/* Production Rules:-
R1: (x,y) --> (4,y) if x < 4
R2: (x,y) --> (x,3) if y < 3
R3: (x,y) --> (x-d,y) if x > 0
R4: (x,y) --> (x,y-d) if y > 0
R5: (x,y) --> (0,y) if x > 0
R6: (x,y) --> (x,0) if y > 0
R7: (x,y) --> (4,y-(4-x)) if x+y >= 4 and y > 0
R8: (x,y) --> (x-(3-y),y) if x+y >= 3 and x > 0
R9: (x,y) --> (x+y,0) if x+y =< 4 and y > 0
R10: (x,y) --> (0,x+y) if x+y =< 3 and x > 0
*/

%database
    visited_state(integer,integer).

%predicates
    state(integer,integer).

%clauses
    state(2,0).

state(X,Y):- X < 4,
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    state(2,0).

state(X,Y):- X < 4,
    not(visited_state(4,Y)),
    assert(visited_state(X,Y)),
    write("Fill the 4-Gallon Jug: (",X,",",Y,") --> (", 4,",",Y,")\n"),
    state(4,Y).

    state(X,Y):- Y < 3,
            not(visited_state(X,3)),
            assert(visited_state(X,Y)),
            write("Fill the 3-Gallon Jug: (", X,",",Y,") --> (", X,",",3,")\n"),
            state(X,3).

    state(X,Y):- X > 0,
            not(visited_state(0,Y)),
            assert(visited_state(X,Y)),
            write("Empty the 4-Gallon jug on ground: (", X,",",Y,") --> (", 0,",",Y,")\n"),
            state(0,Y).

    state(X,Y):- Y > 0,
            not(visited_state(X,0)),
            assert(visited_state(X,0)),
            write("Empty the 3-Gallon jug on ground: (", X,",",Y,") --> (", X,",",0,")\n"),
            state(X,0).

    state(X,Y):- X + Y >= 4,
            Y > 0,
            NEW_Y = Y - (4 - X),
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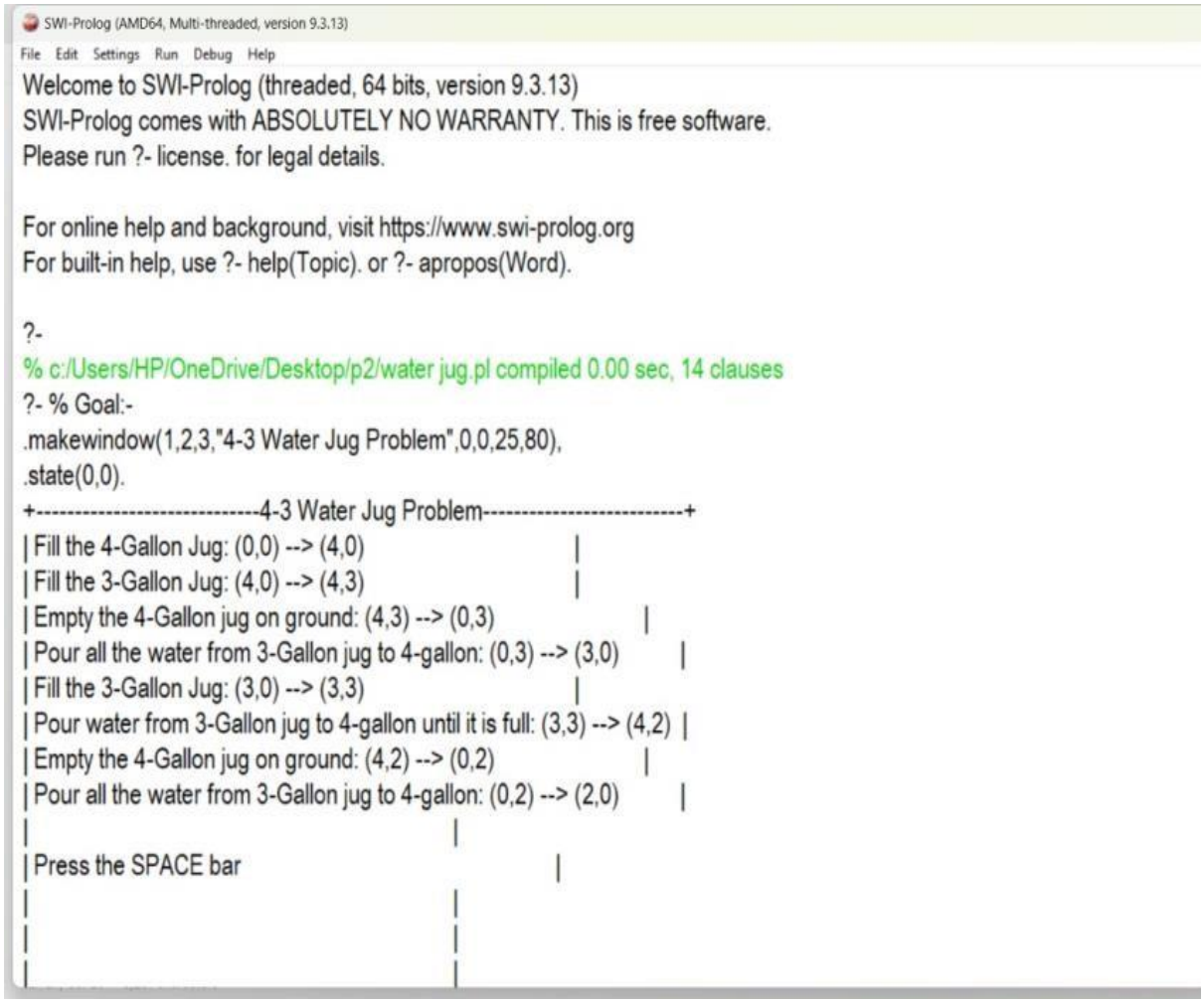
   state(X,Y):- X + Y >= 4,
           Y > 0,
           NEW_Y = Y - (4 - X),
           not(visited_state(4,NEW_Y)),
           assert(visited_state(X,Y)),
           write("Pour water from 3-Gallon jug to 4-gallon until it is full: (", X,",",Y,") --> (", 4,",",NEW_Y,")\n"),
           state(4,NEW_Y).


    state(X,Y):- X + Y >=3,
           X > 0,
           NEW_X = X - (3 - Y),
           not(visited_state(X,3)),
           assert(visited_state(X,Y)),
           write("Pour water from 4-Gallon jug to 3-gallon until it is full: (", X,",",Y,") --> (", NEW_X,",",3,")\n"),
           state(NEW_X,3).

    state(X,Y):- X + Y>=4,
           Y > 0,
           NEW_X = X + Y,
           not(visited_state(NEW_X,0)),
           assert(visited_state(X,Y)),
           write("Pour all the water from 3-Gallon jug to 4-gallon: (", X,",",Y,") --> (", NEW_X,",",0,")\n"),
           state(NEW_X,0).

    state(X,Y):- X+Y >=3,
           X > 0,
           NEW_Y = X + Y,
           not(visited_state(0,NEW_Y)),
```


SWI-Prolog (AMD64, Multi-threaded, version 9.3.13)
File Edit Settings Run Debug Help
Welcome to SWI-Prolog (threaded, 64 bits, version 9.3.13)
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For built-in help, use ?- help(Topic). or ?- apropos(Word).
?-
% c:/Users/HP/OneDrive/Desktop/p2/water jug.pl compiled 0.00 sec, 14 clauses
?- % Goal:-
.makewindow(1,2,3,"4-3 Water Jug Problem",0,0,25,80),
.state(0,0).
+----------4-3 Water Jug Problem----------+
| Fill the 4-Gallon Jug: (0,0) --> (4,0) |
| Fill the 3-Gallon Jug: (4,0) --> (4,3) |
| Empty the 4-Gallon jug on ground: (4,3) --> (0,3) |
| Pour all the water from 3-Gallon jug to 4-gallon: (0,3) --> (3,0) |
| Fill the 3-Gallon Jug: (3,0) --> (3,3) |
| Pour water from 3-Gallon jug to 4-gallon until it is full: (3,3) --> (4,2) |
| Empty the 4-Gallon jug on ground: (4,2) --> (0,2) |
| Pour all the water from 3-Gallon jug to 4-gallon: (0,2) --> (2,0) |
| |
| Press the SPACE bar |
| |
| |
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