Experiment Number: 7

Aim:

WAP for Water Jug Problem in Prolog.

Theory:

This is the jug problem using simple depth-first search of a graph. The modified water-jug problem is as follows: Jug A holds 4 liters, and jug B holds 3 liters. There is a pump, which can be used to fill either Jug. How can you get exactly 2 liters of water into the 4-liter jug?

Assumptions:

- We can fill a jug from the pump
- We can pour water out of the jug onto the ground
- We can pour water from one jug to another
- There are no other measuring devices available

To solve the water jug problem, apart from problem statement we also need a control structure that loops through a simple cycle in which some rule whose left side matches the current state is chosen, the appropriate change to state is made as described in corresponding right side and the resulting state is checked to see if it corresponds to a goal state. As long as it does not the cycle continues.

Algorithm:

Rules for water jug problem

Table 7.1. Rules

Rule	Current state	New state	Rules
1	(x, y) if x<4	(4,y)	Fill the 4-gallon jug.
2	(x, y) if y<3	(x,3)	Fill the 3-gallon jug.
3	(x, y) if x>0	(x-d, y)	Pour some water out of 4-gallon jug.
4	(x, y) if y>0	(x, y-d)	Pour some water out of 3-gallon jug.
5	(x, y) if x>0	(0, y)	Empty the 4-gallon jug on ground.
6	(x, y) if y>0	(x, 0)	Empty the 3-gallon jug on ground.
7	(x, y) if (x+y)>=4 &(y>0)	(4,y-(4-x))	Pour water from 3-gallon jug into the 4-gallon jug until the 4-gallon jug is full.
8	if (x+y)>=3 &(x>0)	(x-(3-y),3)	Pour water from 4-gallon jug into the 3-gallon jug until the 3-gallon jug is full.
9	(x, y) if (x+y)<=4 &(y>0)	(x+y,0)	Pour all the water from 3-gallon jug into the 4-gallon jug.
10	(x, y)if	(0,x+y)	Pour all the water from 4-gallon

	(x+y)<=3 &(x>0)		jug into the 3-gallon jug.
11	(0,2)	(2,0)	Pour the 2 gallons from the 3-gallon jug into the 4-gallon jug.
12	(2,y)	(0,y)	Empty 2 gallons in the 4-gallon jug on the ground.

Conclusion: Thus, the program of water jug problem has been executed successfully.