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**Subject: Programming for AI**

**Task: 3**

**Submitted To: Sir Rasikh**

**WaterJug Problem**

**Problem Explanation:**

The Water Jug Problem is a classic puzzle where you are given two jugs with different capacities and a target amount of water. The goal is to determine a series of operations that will allow you to measure exactly the target amount of water using the two jugs. The operations you can perform are:

1. Fill a jug to its full capacity.
2. Empty a jug.
3. Pour water from one jug into the other until one is either full or empty.

**Objective:**

The goal of the Water Jug Problem solver is to use two jugs, with capacities C1 and C2, and find a series of operations that will result in one of the jugs containing exactly the target amount of water, g.

### ****Approach:****

The approach to solving the Water Jug Problem involves representing the problem states (amounts of water in the two jugs) as pairs and then exploring all possible transitions (actions) from one state to another using Depth-First Search (DFS). This search continues until a state where one of the jugs contains the target amount of water is found.

### ****Steps Involved in the Water Jug Problem Solver:****

1. **State Representation**:

Each state is represented by a pair (J1, J2), where J1 is the amount of water in the first jug, and J2 is the amount of water in the second jug.

1. **Actions**:

The following actions are possible at each state:

* + Fill Jug 1 to its full capacity.
  + Fill Jug 2 to its full capacity.
  + Empty Jug 1.
  + Empty Jug 2.
  + Pour water from Jug 1 to Jug 2.
  + Pour water from Jug 2 to Jug 1.

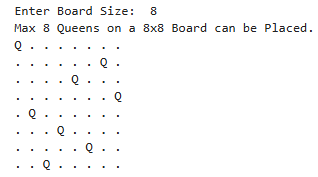
1. **DFS Search**:

The DFS algorithm explores all possible states starting from (0, 0), representing both jugs being empty. Each time a new state is reached, the algorithm checks whether either jug contains the target amount of water. If it does, the solution is found, and the sequence of actions is printed.

1. **Solution Check**:

If the target amount of water g is found in either of the jugs, the sequence of actions leading to the solution is printed. If no solution is found after exploring all possible actions, the algorithm prints "Solution was not Found."

**Output:**

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