SUPERIOR UNIVERSITY

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Project Report: Water Jug Problem

Report on Water Jug Problem Implementation

Introduction

This report explains the implementation of the Water Jug Problem using the Breadth-First Search (BFS) approach. The goal of the problem is to measure a specific amount of water using two jugs with different capacities while following a set of valid operations.

Problem Definition

Given two jugs with capacities c1c1 and c2c2, the objective is to measure exactly a given amount of water (goal) using the following operations:

Rules:

1. **Fill Jug 1:** Completely fill the first jug to its full capacity.
2. **Fill Jug 2:** Completely fill the second jug to its full capacity.
3. **Empty Jug 1:** Completely empty the first jug.
4. **Empty Jug 2:** Completely empty the second jug.
5. **Pour Jug 1 → Jug 2:** Pour water from the first jug into the second jug until either the second jug is full or the first jug is empty.
6. **Pour Jug 2 → Jug 1:** Pour water from the second jug into the first jug until either the first jug is full or the second jug is empty.

7. **Check Goal Condition:** If either jug contains the required amount of water at any step, the solution is achieved.

Example:

```
jug1Capacity = 4
jug2Capacity = 3
goal = 2
```

```
...   Solution Found
      (0, 0)
      (4, 0)
      (0, 3)
      (3, 3)
      (4, 4)
      (4, 3)
      (0, 4)
      (1, 3)
      (3, 0)
      (4, 1)
      (0, 6)
      (6, 0)
      (4, 2)

...   True
```