**Experiment-No.2**

**Objective:** Write a program to implement water jug problem'

| **Scheduled Date:** | **Compiled Date:** | **Submitted Date:** |
| --- | --- | --- |
| 11 Sep 2023 | 11 Sep 2023 | 17- Sep 2023 |

**Description of Water Jug Problem :**

The Water Jug Problem involves two jugs with known capacities and the goal of measuring an exact target amount of water. You can perform operations like filling, emptying, and pouring water between the jugs. The challenge is to use these operations to reach the target amount in one of the jugs. For example, given a 5-liter jug, a 3-liter jug, and a target of 4 liters, you must find a sequence of steps to achieve exactly 4 liters.

### Algorithm for Water Jug Problem:

1. **Initialization:**
   * Define two jugs:
     + jug1Cap = 5 liters (capacity of jug1).
     + jug2Cap = 3 liters (capacity of jug2).
   * Set both jug1 = 0 and jug2 = 0 (initial water in both jugs is zero).
   * Define the target amount (user input) that we want in jug1.
2. **Start Process:**
   * Repeat the following steps until jug1 contains the target amount.
3. **Apply Rules Based on User Input:**

Ask the user to select a rule by entering a number from 1 to 8:

Rule 1: Fill jug1 to its full capacity (5 liters).

Rule 2: Fill jug2 to its full capacity (3 liters).

Rule 3: Empty jug1.

Rule 4: Empty jug2.

Rule 5: Pour water from jug1 into jug2 until jug2 is full or jug1 is empty.

Rule 6: Pour water from jug2 into jug1 until jug1 is full or jug2 is empty.

Rule 7: Transfer water from jug2 into jug1 to fill jug1 to its full capacity.

Rule 8: Transfer water from jug1 into jug2 to fill jug2 to its full capacity.

1. **Check Condition:**
   * After applying each rule, check if jug1 contains the target amount of water:
     + If jug1 == target, display the success message and stop.
2. **Repeat:**
   * Continue applying rules and checking the condition until the target amount is reached.
3. **End:**
   * Once jug1 contains the target amount, print a success message and stop the process.

**Python Code for Water Jug Problem :**

jug1Cap = 5

jug2Cap = 3

target = int(input("Enter target: "))

jug1 = 0

jug2 = 0

while jug1 != target:

r = int(input("Enter rule number (1-8): "))

if r == 1:

jug1 = jug1Cap # Fill jug1

print(jug1, jug2)

elif r == 2:

jug2 = jug2Cap # Fill jug2

print(jug1, jug2)

elif r == 3:

jug1 = 0 # Empty jug1

print(jug1, jug2)

elif r == 4:

jug2 = 0 # Empty jug2

print(jug1, jug2)

elif r == 5:

# water from jug1 into jug2

transfer = min(jug1, jug2Cap - jug2)

jug1 -= transfer

jug2 += transfer

print(jug1, jug2)

elif r == 6:

# water from jug2 into jug1

transfer = min(jug2, jug1Cap - jug1)

jug2 -= transfer

jug1 += transfer

print(jug1, jug2)

elif r == 7:

# Fill jug1 to its full capacity from jug2

transfer = min(jug2, jug1Cap - jug1)

jug1 += transfer

jug2 -= transfer

print(jug1, jug2)

elif r == 8:

# Fill jug2 to its full capacity from jug1

transfer = min(jug1, jug2Cap - jug2)

jug2 += transfer

jug1 -= transfer

print(jug1, jug2)

if jug1 == target:

print("Done",jug1)