**Water Jug Problem Solver Documentation**

**Overview**

This Python program solves the classic Water Jug problem using a breadth-first search approach. It determines the sequence of steps required to measure an exact amount of water using two jugs with given capacities.

**Functions**

**1. jug\_solver(limit\_x, limit\_y, goal)**

**Description:** Finds a sequence of steps to measure the desired amount of water using two jugs of fixed capacities.

**Parameters:**

* limit\_x (int): Capacity of Jug X.
* limit\_y (int): Capacity of Jug Y.
* goal (int): Target amount of water to measure.

**Returns:**

* path (list of tuples): A sequence of steps representing jug states leading to the goal, or None if no solution exists.

**Internal Functions:**

* possible\_moves(state): Generates all possible states from the current state by performing valid jug operations.

**2. display\_steps(steps)**

**Description:** Displays the solution path in a step-by-step format.

**Parameters:**

* steps (list of tuples): The solution path containing jug states.

**Output:**

* Prints the sequence of steps leading to the goal amount or a message indicating no solution was found.

**3. get\_integer\_input(prompt)**

**Description:** Handles user input validation to ensure only positive integers are accepted.

**Parameters:**

* prompt (str): The message displayed to the user for input.

**Returns:**

* value (int): A valid positive integer entered by the user.

**Main Execution**

When the script is run, it:

1. Prompts the user to enter the capacities of Jug X and Jug Y.
2. Asks for the target amount of water to measure.
3. Calls jug\_solver to determine a solution.
4. Displays the sequence of steps using display\_steps.

**Example Usage**

Enter capacity of Jug X: 4

Enter capacity of Jug Y: 3

Enter target amount: 2

Solution path:

Step 1: Jug X: 0, Jug Y: 0

Step 2: Jug X: 4, Jug Y: 0

Step 3: Jug X: 1, Jug Y: 3

Step 4: Jug X: 1, Jug Y: 0

Step 5: Jug X: 0, Jug Y: 1

Step 6: Jug X: 4, Jug Y: 1

Step 7: Jug X: 2, Jug Y: 3

