Job No: 08

Job Name: Write a program for Water Jug Problem.

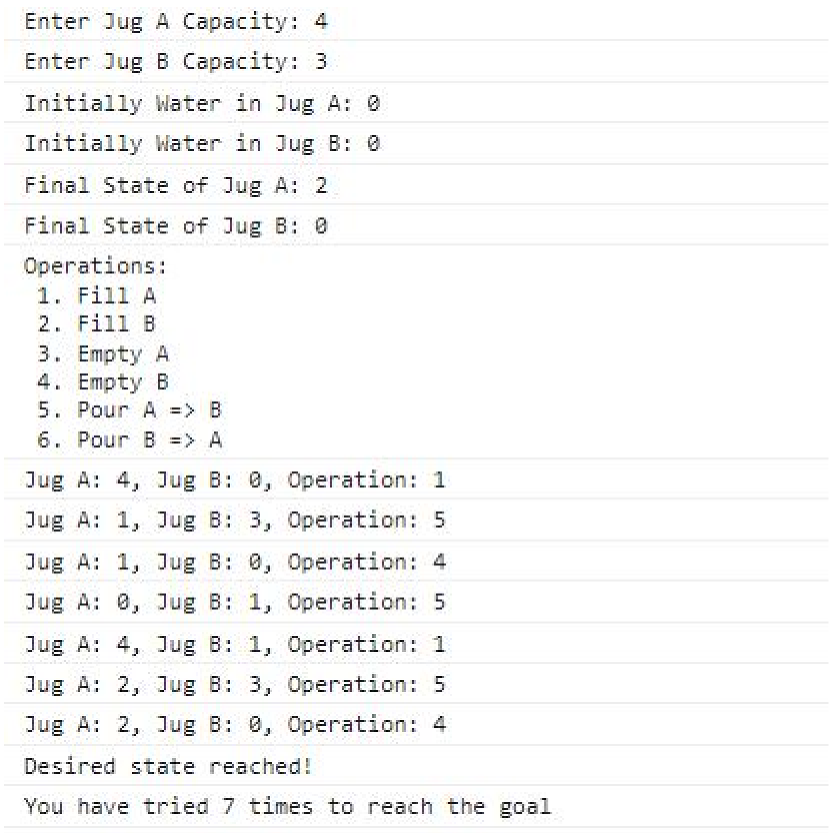
Theory:

The Water Jug Problem is a puzzle in AI ,It involves two jugs with different capacities, 4L and 3L, and the challenge is to figure out a series of actions using the 3L jug to end up with 2L of water in the 4L jug.

Code:

```
const jugACapacity = parseInt(prompt("Enter Jug A Capacity: "));
const jugBCapacity = parseInt(prompt("Enter Jug B Capacity: "));
let jugAWater = parseInt(prompt("Initially Water in Jug A: "));
let jugBWater = parseInt(prompt("Initially Water in Jug B: "));
const jugAFinal = parseInt(prompt("Final State of Jug A: "));
const jugBFinal = parseInt(prompt("Final State of Jug B: "));

console.log(`Enter Jug A Capacity: ${jugACapacity}`);
console.log(`Enter Jug B Capacity: ${jugBCapacity} `);
console.log(`Initially Water in Jug A: ${jugAWater} `);
console.log(`Initially Water in Jug B: ${jugBWater}`);
console.log(`Final State of Jug A: ${jugAFinal} `);
console.log(`Final State of Jug B: ${jugBFinal} `);

let count = 0;

console.log(
  "Operations:\n 1. Fill A\n 2. Fill B\n 3. Empty A\n 4. Empty B\n 5.
    Pour A => B\n 6. Pour B => A");

while (jugAWater !== jugAFinal || jugBWater !== jugBFinal) {
  const operation = parseInt(prompt("Enter the Operation: "));
  count++;

  if (operation === 1) jugAWater = jugACapacity;
  else if (operation === 2) jugBWater = jugBCapacity;
  else if (operation === 3) jugAWater = 0;
  else if (operation === 4) jugBWater = 0;
  else if (operation === 5)
    [jugAWater, jugBWater] = [
      jugAWater - Math.min(jugAWater, jugBCapacity - jugBWater),
      jugBWater + Math.min(jugAWater, jugBCapacity - jugBWater),
    ];
  else if (operation === 6)
    [jugBWater, jugAWater] = [
      jugBWater - Math.min(jugBWater, jugACapacity - jugAWater),
      jugAWater + Math.min(jugBWater, jugACapacity - jugAWater),
    ];
  else console.log("Invalid operation. Please enter a valid operation number.");
  console.log(`Jug A: ${jugAWater}, Jug B: ${jugBWater}, Operation:
                ${operation}`);
}

console.log("Desired state reached!");
console.log(`You have tried ${count} times to reach the goal`);
```

Input/Output:



```
Enter Jug A Capacity: 4
Enter Jug B Capacity: 3
Initially Water in Jug A: 0
Initially Water in Jug B: 0
Final State of Jug A: 2
Final State of Jug B: 0
Operations:
 1. Fill A
 2. Fill B
 3. Empty A
 4. Empty B
 5. Pour A => B
 6. Pour B => A
Jug A: 4, Jug B: 0, Operation: 1
Jug A: 1, Jug B: 3, Operation: 5
Jug A: 1, Jug B: 0, Operation: 4
Jug A: 0, Jug B: 1, Operation: 5
Jug A: 4, Jug B: 1, Operation: 1
Jug A: 2, Jug B: 3, Operation: 5
Jug A: 2, Jug B: 0, Operation: 4
Desired state reached!
You have tried 7 times to reach the goal
```

Job No: 09

Job Name: **Write a program for Tower Of Hanoi Of Hanoi Problem.**

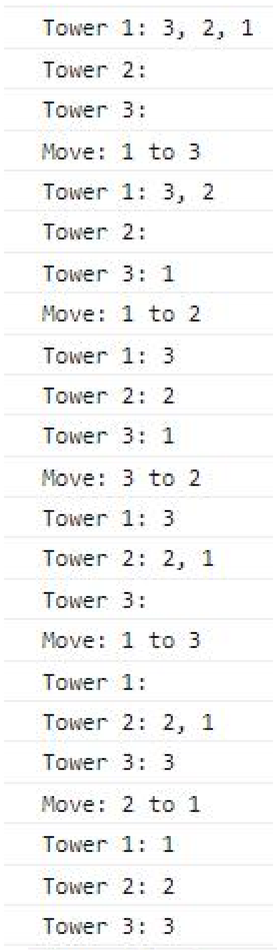
Theory: The Tower of Hanoi problem is a classic puzzle. The objective is to transfer a stack of disks from one peg to another, abiding by specific rules including moving only one disk at a time and avoiding placing bigger disks over smaller ones.

Code:

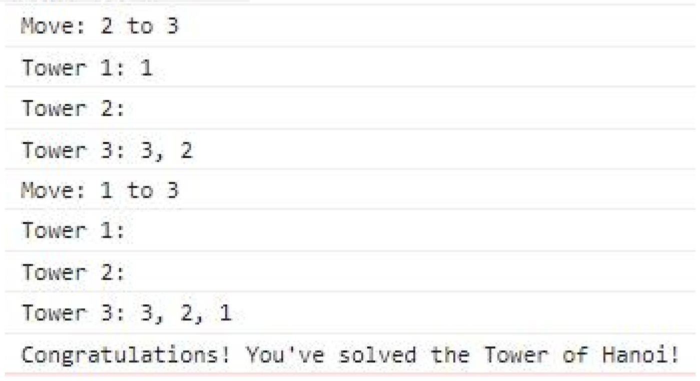
```
const towers = [[], [], []];
function initializeTowers(numDisks) {
  for (let i = numDisks; i > 0; i--) {
    towers[0].push(i);
  }
}
function displayTowers(source, target) {
  console.log(`${source === undefined? "": "Move: " + (source + 1) + " to " +
              (target + 1)}`);
  for (let i = 0; i < 3; i++) {
    console.log(`Tower ${i + 1}: ${towers[i].join(", ")}`);
  }
  console.log();
}
function moveDisk(sourceTower, targetTower) {
  const disk = towers[sourceTower].pop();
  towers[targetTower].push(disk);
  displayTowers(sourceTower, targetTower);
  checkWin();
}
function checkWin() {
  if (towers[0].length === 0 && towers[1].length === 0) {
    console.log("Congratulations! You've solved the Tower of Hanoi!");
  }
}
function promptMove() {
  const input = prompt("Enter source tower and target tower (e.g., 1 3):");
  const [source, target] = input.split(" ").map(Number);
  if (source >= 1 && source <= 3 && target >= 1 && target <= 3 &&
      source !== target) {
   if (towers[target - 1].length === 0 ||
       towers[source - 1][towers[source - 1].length - 1] <
       towers[target - 1][towers[target - 1].length - 1]) {
       moveDisk(source - 1, target - 1);
```

```
        promptMove();
    }
}
const numDisks = 3;
initializeTowers(numDisks);
displayTowers();
promptMove();
```

Input/Output:



```
Tower 1: 3, 2, 1
Tower 2:
Tower 3:
Move: 1 to 3
Tower 1: 3, 2
Tower 2:
Tower 3: 1
Move: 1 to 2
Tower 1: 3
Tower 2: 2
Tower 3: 1
Move: 3 to 2
Tower 1: 3
Tower 2: 2, 1
Tower 3:
Move: 1 to 3
Tower 1:
Tower 2: 2, 1
Tower 3: 3
Move: 2 to 1
Tower 1: 1
Tower 2: 2
Tower 3: 3
```



```
Move: 2 to 3
Tower 1: 1
Tower 2:
Tower 3: 3, 2
Move: 1 to 3
Tower 1:
Tower 2:
Tower 3: 3, 2, 1
Congratulations! You've solved the Tower of Hanoi!
```