Date: Ex No: 5.01.2022	Title of the Lab Toy Program Implementation (Vacuum Cleaner Problem)	Name: MAINAK CHAUDHURI Registration Number: RA1911027010039 Section: N1 Lab Batch: 2 Day Order: 3

AIM: **To implement a toy program for vacuum cleaner working**

Description of the Concept or Problem given:

Here, states 1 and 2 are our initial states and state 7 and state 8 are our final states (goal states). This means that, initially, both the rooms are full of dirt and the vacuum cleaner can reside in any room. And to reach the final goal state, both the rooms should be clean and the vacuum cleaner again can reside in any of the two rooms.

The vacuum cleaner can perform the following functions: move left, move right, move forward, move backward and to suck dust. But as there are only two rooms in our problem, the vacuum cleaner performs only the following functions here: move left, move right and suck.

Manual Solution:

1. Select a room out of Room A and Room B

2. If there is dirt in Room A, suck the dirt

3. If there is no dirt, move to the next room

4. If there is dirt in Room B, suck the dirt.

5. If both rooms are clean, stop the process

6. If the other room is dirty, then move the vacuum cleaner to the room and clean the dirt

7. Check if both rooms are clean before stopping.

Program Implementation [Coding]

```python
# Room Cleaning Problem using AI


def room_cleaner():
    goal_state = {'A':'0','B':'0'}  # The final state of the rooms after cleaning.
    cost = 0                        # The cost of an operation with the vacuum cleaner


    loc_input = input("Enter the vacuum cleaner\'s location ")
    status_1 = input("Enter the status of the present room ")
    status_2 = input("Enter the status of the next room ")


    if loc_input == 'A':
        # Room A is dirty
        print("Vacuum is placed in Room A")
        if status_1 == '1':
            print("Room A is dirty")
            # clean the dirt from room
            goal_state['A'] = '0'
            cost += 1
            print("Cost of cleaning Room A " + str(cost))
            print("Room A has been cleaned")


            if status_2 == '1':

                print("Room B is dirty")
                print("Move right to the Room B")
                cost +1     #cost for moving right
                print("Cost for moving right " + str(cost))
                # clean the room
```

```python
                    goal_state['B'] = '0'
                    cost += 1                          #cost for suck
                    print("Cost of cleaning " + str(cost))
                    print("Room B has been cleaned")
                else:
                    print("No action was performed " + str(cost))
                    # cleaned the room
                    print("Room B is already clean")


        if status_1 == '0':
            print("Room A is already clean ")
            if status_2 == '1':# if B is Dirty
                print("Room B is dirty")
                print("Moving right to the Room B")
                cost += 1  #cost for moving right
                print("Cost of moving right " + str(cost))
                # suck the dirt and mark it as clean
                goal_state['B'] = '0'
                cost += 1    #cost for suck
                print("Cost for cleaning" + str(cost))
                print("Room B has been cleaned")
            else:
                print("No action was performed " + str(cost))
                print(cost)
                # cleaned the room
                print("Room B is already clean.")


    else:
        print("Vacuum is placed in Room B")
        # Location B is Dirty.
```

```python
    if status_1 == '1':

        print("Room B is dirty")

        # suck the dirt  and mark it as clean

        goal_state['B'] = '0'

        cost += 1  # cost for suck

        print("Cost of cleaning " + str(cost))

        print("Room B has been cleaned")
```

```python
        if status_2 == '1':

            # if A is Dirty

            print("Room A is dirty")

            print("Move left to the Room A")

            cost += 1  # cost for moving right

            print("Cost for moving Left " + str(cost))

            # suck the dirt and mark it as clean

            goal_state['A'] = '0'

            cost += 1  # cost for suck

            print("Cost for cleaning " + str(cost))

            print("Location A has been cleaned")
```

```python
    else:

        print(cost)

        # suck and mark clean

        print("Room B is already clean")
```

```python
        if status_2 == '1':  # if A is Dirty

            print("Room A is dirty")

            print("Moving left to the Room A")

            cost += 1  # cost for moving right

            print("Cost for moving left " + str(cost))
```

```
                    # suck the dirt and mark it as clean

                    goal_state['A'] = '0'

                    cost += 1   # cost for suck

                    print("Cost for cleaning " + str(cost))

                    print("Location A has been cleaned")

              else:

                    print("No action is performed " + str(cost))

                    # suck and mark clean

                    print("Room A is already clean")
```

```
    # done cleaning

    print("GOAL STATES : ")

    print(goal_state)

    print("Total Cost: " + str(cost))
```
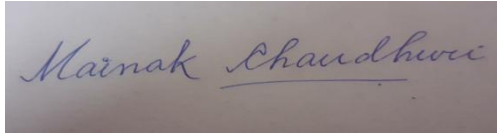
```
room_cleaner()
```

Screenshots of the Outputs

```
Enter the vacuum cleaner's location A
Enter the status of the present room 1
Enter the status of the next room 0
Vacuum is placed in Room A
Room A is dirty
Cost of cleaning Room A 1
Room A has been cleaned
No action was performed 1
Room B is already clean
GOAL STATES :
{'A': '0', 'B': '0'}
Total Cost: 1
```

Signature of the Student

MAINAK CHAUDHURI