3) Assume that there are 3 floors and 4 rooms in each floor. Design the vacuum cleaner to ensure the rooms are clean. You may make suitable assumption for initial state.

Program:

```
floor = [[1,0,0,0],
         [0,1,0,1],
         [1,0,1,1]]
def clean(floor):
    m = len(floor[0]) # no of cols
    n = len(floor) # no of rows
    no_of_tiles = m * n
    tiles_checked = 0
    row = 0
    col = 0
    while tiles_checked < no_of_tiles:
        # Current position
        print_floor(floor, row, col)
        # Suck if dirty
        if floor[row][col] == 1:
            floor[row][col] = 0
            print('Sucked the dirt')
        else:
            print('Already Clean')
        # Next tile
        if row % 2 == 0:
            if col < m-1:
                col += 1
            else:
                row += 1
        elif row % 2 == 1:
            if 0 < col:
                col -= 1
            else:
                row += 1
        tiles_checked += 1
        print('---------------')
        print('Cleaned!!!')
def print_floor(floor, row, col):
    temp = floor[row][col]
    floor[row][col] = 'VC'
    for x in floor:
        print(x)
    floor[row][col] = temp
    # Call the function
clean(floor)
```

Output:

```
['VC', 0, 0, 0]
[0, 1, 0, 1]
[1, 0, 1, 1]
Sucked the dirt
---------------
Cleaned!!!
[0, 'VC', 0, 0]
[0, 1, 0, 1]
[1, 0, 1, 1]
Already Clean
---------------
Cleaned!!!
[0, 0, 'VC', 0]
[0, 1, 0, 1]
[1, 0, 1, 1]
Already Clean
---------------
Cleaned!!!
[0, 0, 0, 'VC']
[0, 1, 0, 1]
[1, 0, 1, 1]
Already Clean
---------------
Cleaned!!!
[0, 0, 0, 0]
[0, 1, 0, 'VC']
[1, 0, 1, 1]
Sucked the dirt
---------------
Cleaned!!!
[0, 0, 0, 0]
[0, 1, 'VC', 0]
[1, 0, 1, 1]
Already Clean
---------------
```

```
Cleaned!!!
[0, 0, 0, 0]
[0, 'VC', 0, 0]
[1, 0, 1, 1]
Sucked the dirt
---------------
Cleaned!!!
[0, 0, 0, 0]
['VC', 0, 0, 0]
[1, 0, 1, 1]
Already Clean
---------------
Cleaned!!!
[0, 0, 0, 0]
[0, 0, 0, 0]
['VC', 0, 1, 1]
Sucked the dirt
---------------
Cleaned!!!
[0, 0, 0, 0]
[0, 0, 0, 0]
[0, 'VC', 1, 1]
Already Clean
---------------
Cleaned!!!
[0, 0, 0, 0]
[0, 0, 0, 0]
[0, 0, 'VC', 1]
Sucked the dirt
---------------
Cleaned!!!
[0, 0, 0, 0]
[0, 0, 0, 0]
[0, 0, 0, 'VC']
Sucked the dirt
---------------
Cleaned!!!
```