Problem 2069: Walking Robot Simulation II

Problem Information

Difficulty: Medium
Acceptance Rate: 25.39%
Paid Only: No
Tags: Design, Simulation

Problem Description

A `width x height` grid is on an XY-plane with the **bottom-left** cell at `(0, 0)` and the **top-right** cell at `(width - 1, height - 1)`. The grid is aligned with the four cardinal directions (`"North"`, `"East"`, `"South"`, and `"West"`). A robot is **initially** at cell `(0, 0)` facing direction `"East"`.

The robot can be instructed to move for a specific number of **steps**. For each step, it does the following.

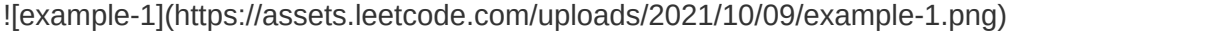
1. Attempts to move **forward one** cell in the direction it is facing. 2. If the cell the robot is **moving to** is **out of bounds** , the robot instead **turns** 90 degrees **counterclockwise** and retries the step.

After the robot finishes moving the number of steps required, it stops and awaits the next instruction.

Implement the `Robot` class:

* `Robot(int width, int height)` Initializes the `width x height` grid with the robot at `(0, 0)` facing `"East"`. * `void step(int num)` Instructs the robot to move forward `num` steps. * `int[] getPos()` Returns the current cell the robot is at, as an array of length 2, `[x, y]`. * `String getDir()` Returns the current direction of the robot, `"North"`, `"East"`, `"South"`, or `"West"`.

Example 1:



Input ["Robot", "step", "step", "getPos", "getDir", "step", "step", "step", "getPos", "getDir"] [[6, 3], [2], [2], [], [], [2], [1], [4], [], []] **Output** [null, null, null, [4, 0], "East", null, null, null, [1, 2], "West"] **Explanation** Robot robot = new Robot(6, 3); // Initialize the grid and the robot at (0, 0) facing East. robot.step(2); // It moves two steps East to (2, 0), and faces East. robot.step(2); // It moves two steps East to (4, 0), and faces East. robot.getPos(); // return [4, 0] robot.getDir(); // return "East" robot.step(2); // It moves one step East to (5, 0), and faces East. // Moving the next step East would be out of bounds, so it turns and faces North. // Then, it moves one step North to (5, 1), and faces North. robot.step(1); // It moves one step North to (5, 2), and faces **North** (not West). robot.step(4); // Moving the next step North would be out of bounds, so it turns and faces West. // Then, it moves four steps West to (1, 2), and faces West. robot.getPos(); // return [1, 2] robot.getDir(); // return "West"

Constraints:

* `2 <= width, height <= 100` * `1 <= num <= 105` * At most `104` calls **in total** will be made to `step`, `getPos`, and `getDir`.

Code Snippets

C++:

```
class Robot {
public:
Robot(int width, int height) {

}

void step(int num) {

}

vector<int> getPos() {

}

string getDir() {

}
};

/**
```

```
* Your Robot object will be instantiated and called as such:
* Robot* obj = new Robot(width, height);
* obj->step(num);
* vector<int> param_2 = obj->getPos();
* string param_3 = obj->getDir();
*/
```

Java:

```
class Robot {

public Robot(int width, int height) {

}

public void step(int num) {

}

public int[] getPos() {

}

public String getDir() {

}
}

/**
* Your Robot object will be instantiated and called as such:
* Robot obj = new Robot(width, height);
* obj.step(num);
* int[] param_2 = obj.getPos();
* String param_3 = obj.getDir();
*/
```

Python3:

```
class Robot:

def __init__(self, width: int, height: int):
```

```
def step(self, num: int) -> None:


def getPos(self) -> List[int]:


def getDir(self) -> str:



# Your Robot object will be instantiated and called as such:
# obj = Robot(width, height)
# obj.step(num)
# param_2 = obj.getPos()
# param_3 = obj.getDir()
```