2069. Walking Robot Simulation II

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.

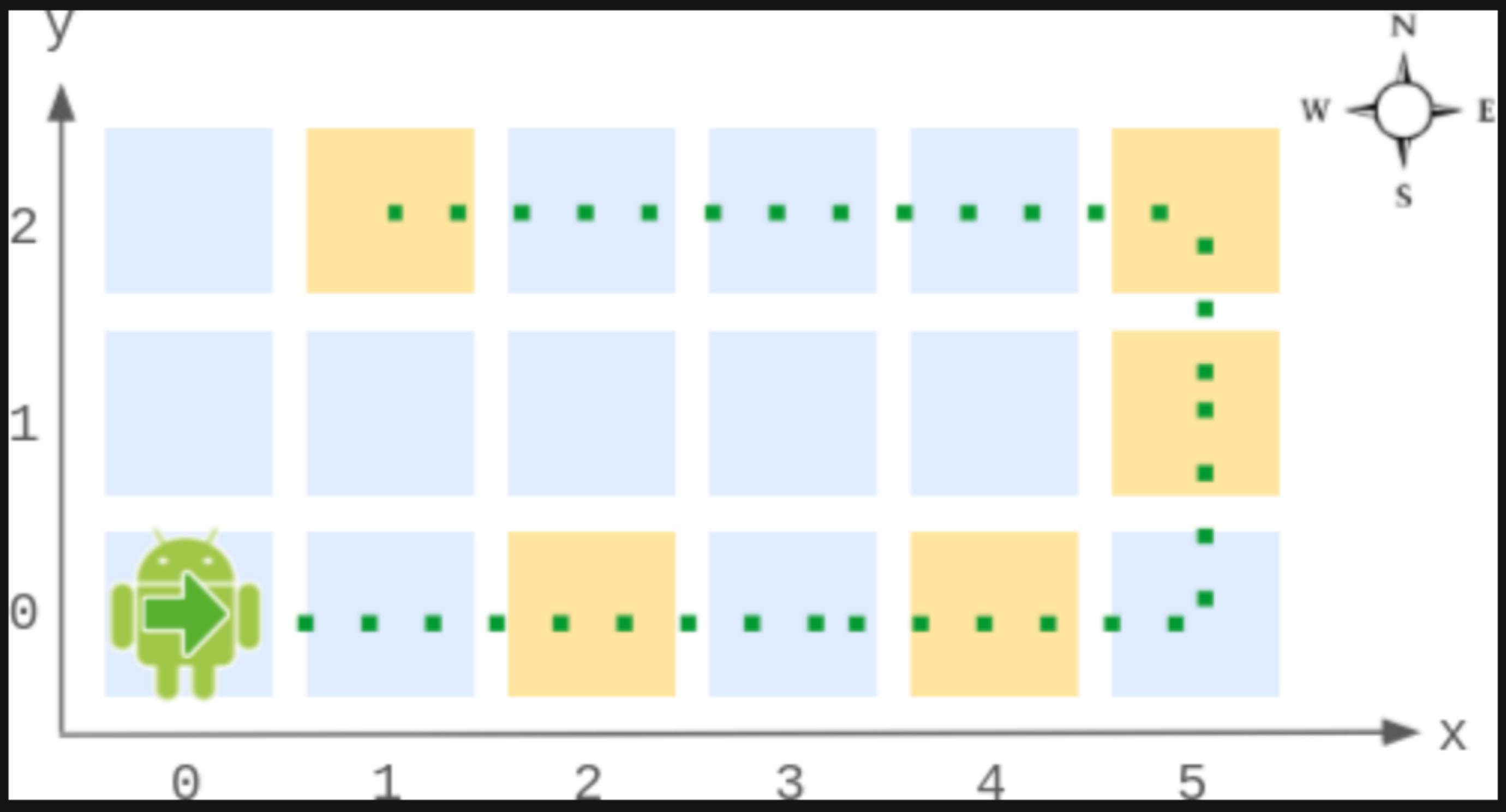
1. Attempts to move **forward one** cell in the direction it is facing.
2. If the cell the robot is **moving to** is **out of bounds**, the robot instead **turns** 90 degrees **counterclockwise** and retries the step.

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 <=` 10^5
- At most 10^4 calls **in total** will be made to `step`, `getPos`, and `getDir`.