EECE.2160: ECE Application Programming

Programming Assignment #4: The “Drunken Sailor” Problem

Figures and Test Cases

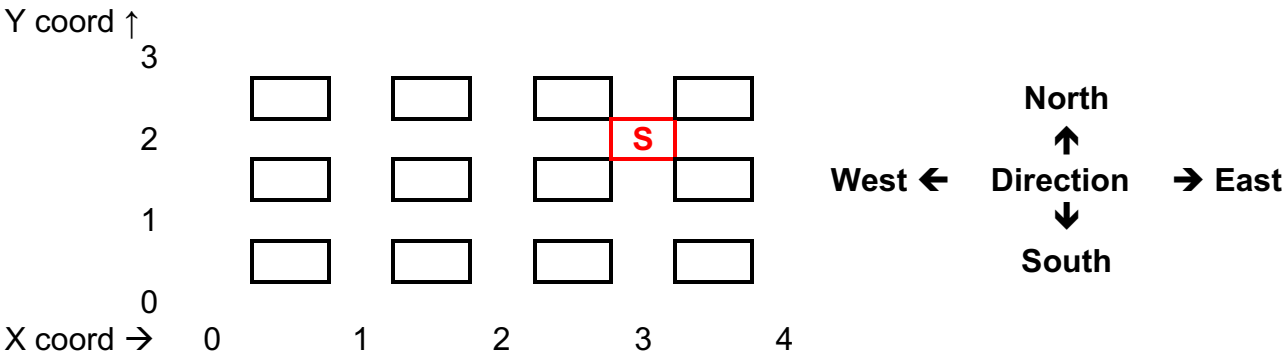

Figure 1: A 4 x 3 city (M = # X blocks = 4, Y = # Y blocks = 3), with the sailor at position (3, 2). The sailor can be at any (X,Y) position where $0 \le X \le M$ and $0 \le Y \le N$. The sailor must start inside the border, with the border defined as any position where X == 0, Y == 0, X == M, or Y == N.

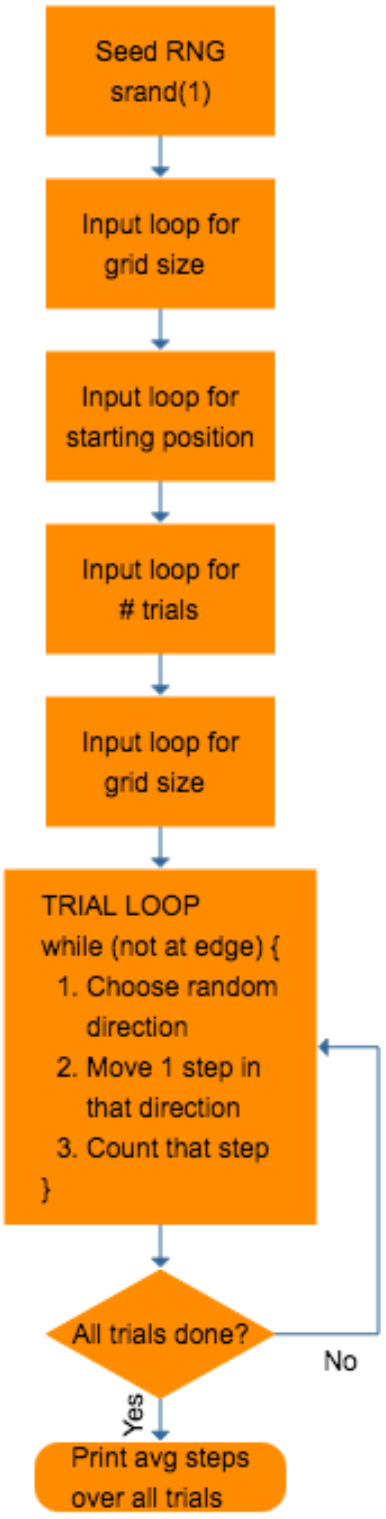

Figure 2: General program flowchart discussed in class. Note that the "trial loop" is a while or do-while loop that runs until the sailor reaches the edge, and, as shown by the decision block near the bottom of the flowchart, that "trial loop" should be inside a for loop that iterates over the total number of trials.

Test Cases

The results of two full program runs are shown below, with user inputs underlined. Remember, when running the program in zyBooks, user inputs are not shown.

Program run #1:

```
City size in X, Y  (# blocks >= 2 and <= 10): 2 2
Starting position (X Y): 1 1
Number of trials: 3
Trial # 1 Start: 1 1
  South: 1 0
Trial # 1 total steps = 1
Trial # 2 Start: 1 1
  North: 1 2
Trial # 2 total steps = 1
Trial # 3 Start: 1 1
  East: 2 1
Trial # 3 total steps = 1
Average # of steps over 3 trials: 1.00
```

Program run #2:

```
City size in X, Y  (# blocks >= 2 and <= 10): 1 1
# X blocks must be >= 2 and <= 10
# Y blocks must be >= 2 and <= 10
City size in X, Y  (# blocks >= 2 and <= 10): 12 3
# X blocks must be >= 2 and <= 10
City size in X, Y  (# blocks >= 2 and <= 10): 10 10
Starting position (X Y): 0 10
Starting X position must satisfy (1 <= X <= 9)
Starting Y position must satisfy (1 <= Y <= 9)
Starting position (X Y): 2 8
Number of trials: 0
Number of trials must be > 0 and <= 10
Number of trials: 1
Trial # 1 Start: 2 8
  South: 2 7
  North: 2 8
  East: 3 8
  South: 3 7
  East: 4 7
  South: 4 6
  North: 4 7
  West: 3 7
  East: 4 7
  East: 5 7
  North: 5 8
  South: 5 7
  North: 5 8
```

Program run #2 (continued):

```
  South: 5 7
  South: 5 6
  North: 5 7
  West: 4 7
  North: 4 8
  West: 3 8
  West: 2 8
  South: 2 7
  West: 1 7
  South: 1 6
  East: 2 6
  North: 2 7
  North: 2 8
  North: 2 9
  South: 2 8
  South: 2 7
  South: 2 6
  East: 3 6
  North: 3 7
  North: 3 8
  North: 3 9
  East: 4 9
  South: 4 8
  East: 5 8
  West: 4 8
  South: 4 7
  North: 4 8
  East: 5 8
  East: 6 8
  East: 7 8
  South: 7 7
  West: 6 7
  East: 7 7
  North: 7 8
  West: 6 8
  South: 6 7
  North: 6 8
  East: 7 8
  North: 7 9
  South: 7 8
  West: 6 8
  West: 5 8
  East: 6 8
  North: 6 9
  North: 6 10
Trial # 1 total steps = 58
Average # of steps over 1 trial: 58.00
```