OOP 2024S HW10 (due to 5/8 23:59)

TA 楊翔斌 a32129846@gmail.com

The original task was simplified due to its high complexity, and the deadline for submission has been extended to 5/8 23:59 (三).

可以在 5/6 或 5/13 的晚上 lab 找助教 demo，但程式碼一定要在規定時間內繳交到 E3 上

Problem:

The goal for this Project is to create a simple two-dimensional predator-prey simulation. In this simulation the prey are ants and the predator are doodlebug. These critters live in a world composed of a 5×5 grid of cells. Only one critter may occupy a cell at a time. The grid is enclosed, so a critter is not allowed to move off the edges of the world. Time is simulated in time steps. Each critter performs one move action every time step.

The ants move according to the following model:

Every time step, try to move up, right, down, or left. If the all neighboring cell is occupied or would move the ant off the grid, then the ant stays in the current cell.(The priority for selecting the direction to move when multiple directions are available is as follows: 1. Upward, 2. Rightward, 3. Downward, 4. Leftward. The smaller the number, the higher the priority.)

The doodlebug move according to the following model:

1.Every time step, if there is an adjacent ant (up, right, down, or left), then the doodlebug will move to that cell and eat the ant. (The priority for selecting the direction to move to eat ant when multiple directions are available is as follows: 1. Upward, 2. Rightward, 3. Downward, 4. Leftward. The smaller the number, the higher the priority.)

2.The doodlebug moves according to the same rules as the ant if a doodlebug cannot eat ant.

In the 5*5 grid, using characters of "o" for an ant and "x" for a doodlebug , "-" for an empty space. The coordinate of the bottom-left corner of the 5*5 grid is (0, 0). Initialize The world with 1 doodlebugs and 3 ants and specifying their coordinates using cin. cin "n" to move to the next time step and cin "q" to end the program

Create a class named Organism that encapsulates basic data common to both ants and doodlebugs. This class should have a virtual function named move that is defined in the derived classes of Ant and Doodlebug.

為了大家理解的一致性，請照以下流程圖運行程式。
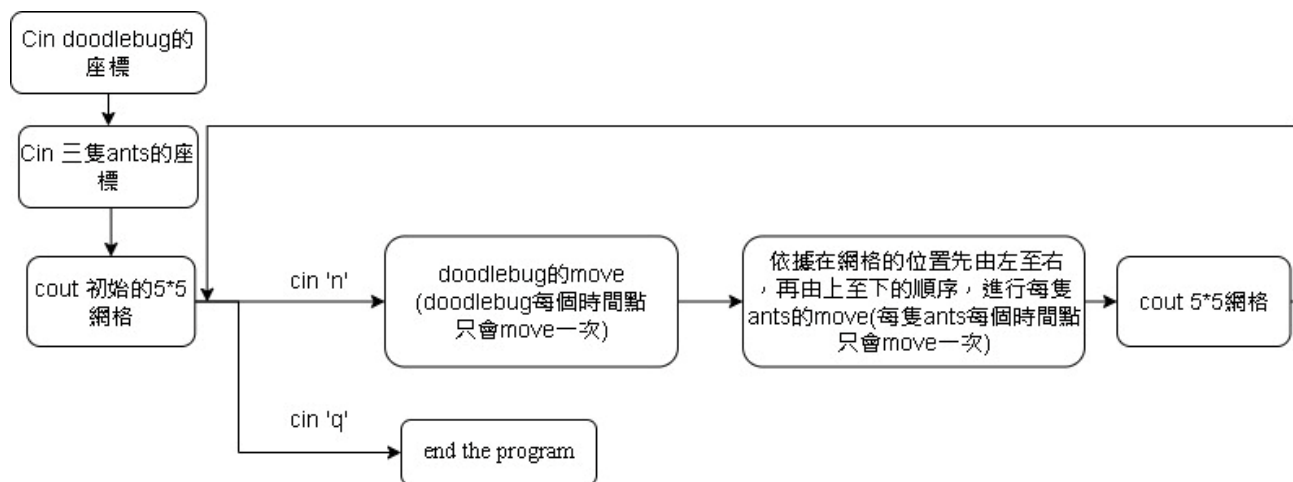
Testcase:　cout 格式要完全照下面範例

輸出 5*5 網格前要先輸出 ” ----time<#step>---- “

```
2 3
0 0
1 1
2 2
----time0----
-----
--x--
--o--
-o---
o----
n
----time1----
-----
-----
-ox--
o----
-----
n
----time2----
-----
-----
ox---
-----
-----
q
```

用 Cin>>x>>y 讀入 doodlebug 的 x,y 座標

用連續三個 Cin>>x>>y　讀入三隻 ants 的 x,y 座標

cout 初始的 5*5 網格

輸入 n:　cout 下一個時間點的 5*5 網格

輸入 n:　cout 下一個時間點的 5*5 網格

輸入 q: 停止程式

Command

compile

g++ main.cpp organism.cpp -o Hw10

execute

./Hw10

OJ

/home/share/demo_OOP112_2 Hw 10

Submission

Compress all cpp file and header file into <Student ID>_HW10.zip and submit it on newE3

Other:

會提供一個測試輸入 case1.txt，可以透過以下指令產生 output1.txt:

./Hw10 < case1.txt > output1.txt

再拿 output1.txt 去與提供的 golden1.txt 比對是否相同