

**GAME 2014 Android Game Development**

**Assignment (15%)**

**Due: October 5, 2016 (in class)**

**DESCRIPTION:**

Create a simple 2D predator-prey simulator. In this simulation the pray are ants and the predators are doodlebugs. The critters live in a 20 x 20 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 edge of the world. Time is simulated in steps. Each critter performs some action every time step.

The ants behave according to the following model:

* **Move**. For every time step, the ants *randomly* try to move up, down, left or right. If the neighboring cell in the selected direction is occupied or would move the ant off the grid, then the ant stays in the current cell.
* **Breed**. If an ant survives for three time steps, at the end of the time step (i.e., after moving) the ant will breed. This is simulated by creating a new ant in an adjacent (up, down, left, or right) cell that is empty. If there is no empty cell available, no breeding occurs. Once an offspring is produced an ant cannot produce an offspring again until it has survived three more steps.

The doodlebugs behave according to the following model:

* **Move**. For every time step, the doodlebug will move to an adjacent cell containing an ant and eat the ant. If there are no ants in adjoining cells, the doodlebug moves according to the same rules as the ant (randomly). Note that a doodlebug cannot eat another doodlebug.
* **Breed**. If a doodlebug survives for eight time steps, at the end of the time step it will spawn off a new doodlebug in the same manner as the ant.
* **Starve**. If a doodlebug has not eaten within three time steps, at the end of the third time step it will starve and die. The doodlebug should then be removed from the cells.

During one turn, all the *doodlebugs should move before the ants*.

Write a simple console program to implement this simulation and draw the world using the characters of “O” for an ant and “X” for a doodlebug. Create a class named **Organism** that encapsulates basic data common to ants and doodlebugs. This class should have methods named **move** and **breed** that are defined in the derived classes of **Ant** and **Doodlebug**.

Initialize the world with 5 doodlebugs and 100 ants. After each time step prompt the user to press Enter to move to the next time step.

**GRADING SCHEME**

* Organism class implementation: 5 points
* Ant class implementation: 3 points
* Doodlebug class implementation: 3 points
* Main class implementation: 4 points

**Total: 15 points**

**Due Date**: Have your assignment submitted on BlackBoard and ready for Week 5 lab. You will need to demo it for the instructor in class. (October 5, 2017)

Late submission: any work submitted late will be subject to penalty 10% per day.

After 10 days past the deadline automatic grade of 0 points is entered.

Late submissions are subject to in-class demo before grading!