CS 3005: Programming in C++

Predator/Prey Simulation Part 2

This assignment is the second of two assignments in which you will construct a simulation program to observe the effects of balance in the predator/prey food chain. We are concerned with two types of **Critters**: Lions (which are predators) and Zebras (which are prey).

**Assignment**

Create a class `Simulation`. The simulation will hold a vector of `Critter` pointers. Some of the critters will be Lions and others will be Zebras.

**Programming Requirements**

Your `Simulation` class must store the following data.

- Two integer values, describing the width and height of the simulation grid.
- A vector of `Critter *`.

Your `Simulation` class must have the following methods.

- `Simulation(int width, int height);` Sets the data members correctly. For each allowed \(x, y\) location, randomly choose to create a Zebras (40%), Lions (25%) or nothing (35%). If a critter is created, do so with dynamic memory and add its pointer to the critter vector.
- `virtual ~Simulation();` The destructor is required. Loop over the vector of pointers and delete all of them.
- `void eatAll();` Calls `eat` on all critters in the vector.
- `void reproduceAll();` Calls `reproduce` on all critters in the vector.
- `void moveAll();` Calls `move` on all critters in the vector.
- `void removeDead();` Removes all critters that are no longer alive from the vector. Must delete the member for each of the removed critters.
- `void step();` Calls `eatAll`, `reproduceAll`, `moveAll` and `removeDead`.

Your `Critter` class must implement the following changes.

- `Critter(int x, int y, int level);` Add a `mBreedStep` data member. Initialized to 0.
- `virtual bool reproduce(std::vector<Critter*> & critters, CritterPtr &) = 0;` Details to come (not required for assignment Fall 2017)

Your `Lion` class must implement the following changes.

- `virtual bool reproduce(std::vector<Critter*> & critters, CritterPtr &);` Details to come (not required for assignment Fall 2017)

Your `Zebra` class must have the following methods.

- `virtual bool reproduce(std::vector<Critter*> & critters, CritterPtr &);` Details to come (not required for assignment Fall 2017)

**Show Off Your Work**

To receive credit for this assignment, you must submit your working code project to Canvas. No unit tests available.