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: Lion's (which are predators) and Zebra's (which are prey).

Assignment

Create a class Simulation. The simulation will hold a vector of Critter pointers. Some of the critters will be Lion's and others will be Zebra's.

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 Zebra (40%), Lion (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.