CS 3005: Programming in C++

Predator Prey Simulation (Part 2 - Fight and Flight)

A variety of critters wander in the grasslands. Some are looking for grass to eat. We will call these the prey. Others are looking for prey to eat. We will call these the predators.

Assignment

In this step of the assignment, you will create an application that can generate 5 predators and 25 prey, and place them in a 20x20 grid. We call this collection the critters.

The critters must be created in random order (not all predators and then all prey). And this order must be preserved.

When a prey is asked to move, it must randomly choose from the 4 cardinal directions. If the direction of movement would not have it walk off of the grid, and the new location isn’t already occupied, then it will move.

When a predator is asked to move, it must look for neighboring locations with prey. If there is one or more, it will choose one and move there, consuming the prey. If there is no neighboring prey, it must randomly choose from the 4 cardinal directions. If the direction of movement would not have it walk off of the grid, and the new location isn’t already occupied, then it will move.

Every three time steps that a prey is asked to move, it will generate a new prey next to it, if there is an open space.

Every eight time steps that a predator is asked to move, it will generate a new predator next to it, if there is an open space.

If a predator is unable to eat a prey for three consecutive time steps, it will starve to death, and must be removed.

This will be a visual simulation. Your application must display all of the critters on a grid. The size of the display is your choice. But remember the grid is 20x20.

The simulation will allow one critter to move, reproduce and starve at a time. The critters must be allowed their turn in a cyclical order. Each movement must be initiated by the user pressing the s key on the keyboard.

Requirements

- Program must use OpenGL to display the grid and critters.
- Program must use OpenGL to receive the s key presses to advance the simulation.
- Program must have a 20x20 grid.
- Program must start with 5 predators.
- Program must start with 25 prey.
- Program must create and store the critters in an initially random order.
- Critters must move one at a time.
- Critters must move as described above.
- Critters must not leave the grid.
- Predators must try to consume prey.
- Predators and prey must reproduce at the rates specified above.
- Predators must starve at the rate specified above.
- Predators and prey must be drawn differently.
- The display must be kept up to date.
- The executable program must be called PP.

Show Off Your Work

To receive credit for this assignment, you must upload the source code (.h and .cpp files) and the Makefile to the CIT submission system linked at the top of the page.

Additionally, the program must build and run. Any incorrect performance or memory errors will be counted against the assignment score.