

CS22510 Aphids & Ladybugs

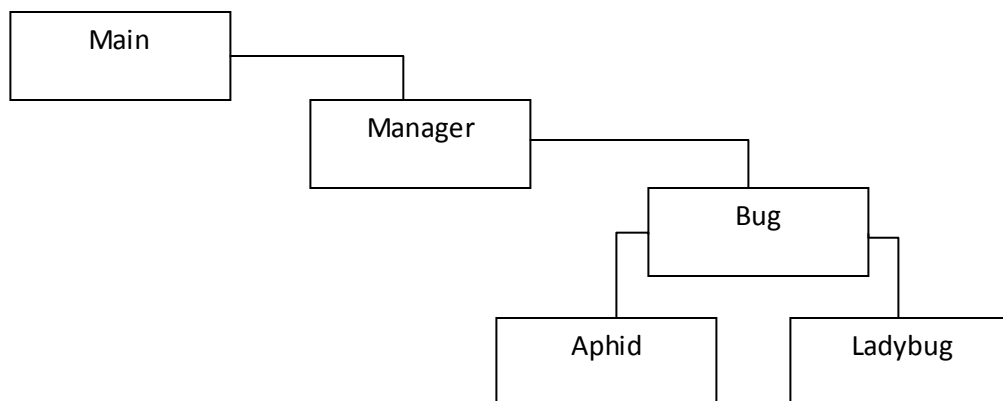
Introduction

This assignment is about implementing a grid system, and an ecosystem of Aphids & Ladybugs that live in a 2D world of cells. This is the first C++ assignment we have had, and personally I have found this the most demanding, yet still the most enjoyable assignment I have had so far this year, I've liked the challenge of working with C++.

Design

Creating a good, usable design at the beginning of the project would have been an idea for this piece of coursework, however I often like to dive in as I did with this one, and found myself getting a little lost half-way through the implementation, therefore I came up with a series of designs and pieces of pseudo-code to help me when creating the rest of the program.

The core file in the design is my main class, which reads in the documents, and creates many objects to be used later, it links directly with my Manager class by creating just one object of manager, and passing all important information to it. The Manager class itself is what actually runs, and monitors everything that happens. It has been passed vectors of both Aphids and Ladybugs, and has in turn created its own vectors, mimicking the ones it was passed, the manager is also responsible for drawing the grid, and the bugs onto that grid. The bug class is the base class for the derived Aphid, and ladybug classes, it holds several variables that are common to the two such as their x and y co-ordinate.



Issues & Improvements

Initially I had lots of issues with the program, as when I created it, I did very little planning, and just went ahead and started implementing it. However later I created a class diagram; with which I started to properly implement my program.

Originally I was going to use a 2D array to represent the cells, however that was proving exceedingly difficult, partially due to when 2D arrays are created, they need to have a static size, but I was attempting to use an integer variable (one the size of the config file).

I choose to use arrays for my assignment. Firstly the board vector is a vector of vectors (or 2D vector) however as a vectors size can either change, or remain undefined until data is added, it made them much more suitable to my needs.

One of the problems I had with vectors, was passing them from one class to another, for example where the 'main.cpp' reads in all aphid data, and stores that data in a vector, I had to pass it through to the 'manager' class. In the end I did this by passing in both of the vectors as well as the board size, when I created the manager object.

One of the largest issues I had with the early implementation of this project was the rand() function, this was giving me several problems. Initially the modulo definition on this rand (rand()%10) was coming back with a number that couldn't possibly be correct, in the thousands, which turned out to be a temporary error with my IDE. Also the rand() function, every time I restarted the program, would define the same random number each time. This is due to seeds in the rand function, and I got around it by including the <time.h> library, and calling srand(time(0)); in the main.cpp file.

I also had issues keeping the bugs within the boundaries, while the aphids was time consuming creating many checks, I had further issues with the Ladybugs. The ladybugs have a preferred and a sub direction, when they are at a border, I switched their preferred direction (essentially bouncing them off a wall) however this did not work when they were against two walls (a corner) as my checks didn't initially cover both instances of wall.

Extra Features

Once I had implemented all of the required features, I decided that as I had some time left I would like to include some additional features. For example every Aphid and ladybug has a health meter. They start off; Aphids 100HP, Ladybugs 500HP, and go down a certain amount per turn, if they fall below 0 they die. However they have the chance to increase their HP when they fight another creature. If they win a fight, then there HP increases massively, allowing them to live longer. However if they lose then their HP will decrease to below 0, effectively killing them. I also included a count function for the total amount of aphids & ladybugs on screen, to make for easier viewing, adding on to this I made a function that stopped the game (exited the .exe) when either population reached 0, declaring the surviving species, the winner!

Self Evaluation

Overall I feel that I performed well in this assignment, however I would have liked to manage my time a bit better, despite finishing slightly early and being able to implement a few extra features, I would have liked to include many more, I was very much enjoying the project once I had the fundamentals implemented. This assignment has given me a great insight and some significant experience in C++, a language which prior to the assignment I was not all that familiar.