

CS23820 Assignment Writeup

Sam Matthews - sam82

1 The C Program

1.1 Overview

The goal of this program was to calculate the positions of mammals based on observer and sighting data within given files. The extension to this is to only return mammals that are within a specified sea area. My C program achieves both of these requirements to a competent degree by performing the following general steps:

1. Prompt user for file and read in observer data
2. Stores the read in data in a linked list
3. Repeat Steps 1 and 2 for sighting data
4. Prompts the user for an output file name
5. Calculates the positions of the mammals
6. Checks if the mammals are within the sea area before returning the calculated location
7. Outputs the mammal data to the console and to the specified file

1.2 Design Justifications

There is no implemented functionality for specifying the folder that contains data files outside of things like "../file.txt" for example. This basically assumes that the data will be in the same directory as the program or maybe in the parent directory.

The data read in is stored in one of two linked lists. This is so you don't need to know the required capacity like with an array, meaning that it is not necessary to go through the entire file before actually reading the contents.

The structs used are defined globally along with the heads of the linked lists to make it easier to access the data from functions within different files. This could have arguably been fixed by passing a pointer to the head to the functions but seeing as basically all of the functions require the heads, this was simply an easier way of achieving the same results.

Arguably, I could have made insert_observers.c and insert_sightings.c one function (same for print functions) and just had them call other smaller functions for doing things like printing the different amounts of member variables. However, I think that having two separate functions reads better especially in regards to variable names (ie sightings having bearing and range instead of latitude and longitude)

2 The C++ Program

2.1 Overview

The goal of this program was to check if any set of mammals were in fact the same sighted mammal and subsequently calculate the location of that mammal using the average location between those mammals. The extension to this is to identify pods based on mammals being a certain distance apart from each other and then counting the pods. My program achieves both of these goals for all of the provided test data provided using the following general steps:

1. Prompt user for the filename and read in mammal data
2. Find average locations of similar mammals
3. Check for mammal duplication
4. Locate pods of mammals
5. Check for pod duplication
6. Print the pods as well as the number of pods to the console

2.2 Design Justifications

The majority of the functionality is written within the class Mammal which inherits from the provided Location class. I could have potentially extended Mammal to Dolphin and Porpoise, however, there is no real purpose to this other than to differentiate between types of mammals which I do anyway using a member variable called "type".

The reason I have check functions for each stage of the program is because the program is checking each mammal in a given list X with every other mammal in X and then outputting to a list Y . Because of this, any $A = B$ relationship that is found will result in an equivalent $B = A$ relationship also being found. This results in a duplication of data in the improved list Y and means that the duplications need to be removed. This is the purpose of the check member functions.

I did consider the possibility of fixing potential issues involving mammal chaining. By this I mean the idea that if mammals $A = B$ and $B = C$, does that mean that $A = C$. The way I deal with this is assuming that the correct pod out of all if the duplicated pods is the one with the most mammals in it. There is a more elegant way of dealing with this using recursion, however, this effectively achieves the same result.