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CS202 Program 1 Analysis and Debuggers

Analysis:

In this project, I was aiming to create an object-oriented program to simulate several kinds of drones. Based on the different type of drones, each kind of drones have different abilities. The program was designed to control the movement and each unique ability of the drones.

Design:

In this program, I have developed at least eight classes to implement all the functions needed. Firstly, I have created a control center class, this class is a client for user to control all the functions that drones have, and manage the new drone or search a specific drone with it’s name. It stores a dynamically allocated array of the vertex node which is each drones, and it has default constructor and destructor to handle the dynamic memory. It also has the search, remove, and several other functions which can invoke the direct function under vertex class. Secondly, I have developed a vertex class as the node to store each drone with the adjacent list. It has copy constructor and search, remove. There also a move function to control the movement of this drone. Thirdly, I have created an edge List class and a Node class to build an edge list. The edge list class has the head pointer of the list and also contains the copy constructor. The Node class contains the pointer points to each adjacent vertex, and a next pointer. Finally, I have created the virtual Drone class, which stores the information about position such like longitude, latitude, and altitude. It also has the basic character to store the name. The default constructor was used to initial the drone and copy constructor to deep copy and assignment. It also has abstract move function and abstract modify function to change the private member of the position information. What’s more, I have also created three different kind of drones which derived from the base drone class which has several pure virtual functions for the derived class to override. They are small Drone class with the racing and exploring function, the medium drone class with the photograph and research function, last, the large drone class which can be used to deliver goods or used to assist some agriculture activities such like crop-dusting. Those derived class all has the default constructor and copy constructor which are used to initial the drone and invoke the constructor in their base class to assign the value of the name and position.

UNIX Debuggers:

In this program, there are many places have to use dynamically allocated memory including several pointers and dynamically allocated array to build the ARR for the vertex and edge list to form the whole Graph. So how to manage all the pointers correctly and invoke and modify them properly as well as efficient deallocate those pointers is a tough point. Using the gdb, I can get to know every pointers? address and check the address with the arguments which I pass into the function, also, I can access those pointer to see if the value was passed in or not to find and figure out the problem. I always use valgrind to check my memory leak. (valgrind ?tool =memcheck ?leak-check=yes ./a.out). During the debugging period, I’ve found many mistakes I made, such as Invalid write, which stand for I was using a pointer allocated and then use that pointer outside the range, and other reference fault, segmentation fault like invoke head -> function while head was NULL and many other mistakes. Using the breakpoints, I can run my program until the breakpoint to minimum the scope to find the specific problem.