CPE 111 – Programming with Data Structures
International Sections, January 2021
Laboratory Exercise 10-2

Objective

This lab is intended to give you the opportunity to write your own module that deals with networks.

Instructions

1. Download all files from the **demos/Lecture10** area of the website. Run **make** to build ***networkTester.*** Spend some time experimenting with this program to make sure you understand how it works. Use some of the ".net" files included in the demo directory to initialize the network. Examine the content of the ".net" files so that you understand their contents.

2. Create a new C module called ***networkWriter.c.*** Create a corresponding header file ***networkWriter.h***. This module should have one public function, **writeNetwork()**. This function should take one argument, a file name. The ***writeNetwork*** function will create a text file with the name passed in as its argument, in the same format that is used by ***networkBuilder.c.*** The file it creates will hold the current contents of the network at the time the function is called.

In coding this function, you should call functions in ***abstractNetwork.h*** in order to get all the information needed about the current network contents. **Do not** directly access the linked lists and structs inside **linkedListNetwork.c.**

You will probably need to add at least two functions to ***abstractNetwork.h/linkedListNetwork.c:***

a) A function that will return the initialization information, that is, the maximum number of vertices and whether the network is directed or not.

b) A function that will return an array of all the vertex keys. Alternatively, you can do this using an iterator pattern, something like **resetVertexList()** then **getNextVertex()**.

3. Add a new menu item to ***networkTester*** to call your new **writeNetwork()** function. You will need to include ***networkWriter.h*** in ***networkTester.c***.

4. Modify the make file to compile ***networkWriter.c*** and link ***networkWriter.o*** into the ***networkTester*** executable.

5. Build ***networkTester*** and test your new function. Start by reading in one of the ".net" files (one of the correct ones) and then immediately calling the **writeNetwork** function. The resulting output file should have the same content as the input file. Now repeat the test, adding and removing vertices and edges before writing the network contents to a file. Verify that the changes you have made are reflected in the output file.

Also test that ***networkBuilder*** can correctly read the files your module creates.

6. Upload all the files you have changed: ***abstractNetwork.h***, ***linkedListNetwork.c, networkTester.c*** and ***networkWriter.c***. Don't forget to add your name and your student ID to the header comments of each file.