

Lab5 - CIT315

Goals

The primary goal of this project is to develop linked lists and then use the linked lists to build data structures. This lab is broken into 2 parts. The first part is construction of the single linked list with all of its structure and functions.

The second part is the use of the linked list to construct *stacks* and *queues*, and *trees*. The structures will then be used to store and search for data. The second part of the lab will be given next, as Lab 6.

To build the data structure, ***you will have an interactive menu***, with a menu choice that represents each of the functions below. In total, beyond the main, there are at least 10 functions, so at least 10 choices on the menu.

The goal of this lab is to build a flexible, dynamically allocated structure which can store the necessary data with great flexibility.

1. Create a List with no nodes and just a start pointer
2. Create a list with a single node
3. Insert a node at the front of the list
4. insert a node in the middle of the of the list
5. ...
6. Exit the program

Part 1 - Single Linked List

Develop a single linked list data structure to support building of higher-level data structures. To build the linked list, you will need, at minimum, the following functions:

- CreateListNoNodes - create list with no nodes, just a *start* pointer.
- CreateListNode - create list with a single node. Data to fill the node is the precondition and must be passed as a parameter.
- InsertFront - insert a node at the front of the list.
- InsertMiddle - insert a node in the middle of the list. (Hint: use the data to know where to insert the node)
- InsertEnd - insert a node at the end of the list.
- DeleteFront - delete the first node in the list.

- DeleteMiddle - delete a node in the middle of the list. (Hint: use the data to know where to delete the node)
- DeleteEnd - delete a node at the end of the list.
- Traverse - traverse the list based on some key value in the data portion of the node.
- Search - find a particular node by using the PUID of each node to search. Return -1 if that PUID is not in the list which means it does not exist.

The specifications for each of these functions will be given in the notes and lectures. There must be a Node Struct containing data and a pointer. In this case, the data will be a Struct with the following data: *First Name*, *Last Name*, *PUID* and *Age*. You will need a *start* pointer to maintain the head of the list and a *current* pointer when traversing the list. Use the PUID as the key value search for values in the list.

Hint - think about the order to write the functions, as some are dependent on others!

Scoring

- Use Struct to create the Node - 3 points
- Functions - 20 points, 2 for each successful function
- Documentation - 2 point

Submission

Complete the lab and submit the project file(s) by the required date and time.