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Lab 4 Report

**Objectives:**

The objectives that we explored in this module and in this lab were to be able to use pointers correctly in C++, understand linked lists, be able to describe the advantages of linked lists over array based lists, and build working linked lists.  The first objective of being able to use pointers correctly in C++ is critical to our success in this class, as pointers are used in the construction of all different types of data structures.  Being able to use pointers is also incredibly important for a career in engineering as projects we work on in the future may require us to work with memory allocation, linked lists and other data structures, and other possible implementations of pointers that would be necessary for the correct operation of the code.  We demonstrate our ability to use pointers throughout the entirety of lab 4, as pointers are the foundation for the construction of linked lists  The second objective of being able to understand linked lists is important to our success in this class, as we were not only required in the lab to create and implement a functioning linked list, but linked lists are a significant data structure and we are in a data structures course.  Understanding linked lists is also important to a career in engineering as we may be required to implement or modify the use of linked lists in projects we work on in our careers, which would require a proper understanding of linked lists to be able to properly implement all of the desired functionality of the list you are creating or modifying.  We demonstrate our understanding of linked lists in this assignment through our implementation of our linked list and our creation of its member functions that allow the list to operate properly.  The third objective of understanding the advantages of linked lists over array based lists is important to our success in this class because it is an important part of understanding all data structures: knowing the advantages and disadvantages of different data structures over one another so that you know which ones to choose in certain situations.  Likewise, knowing the advantages that a linked list has over an array-based list is incredibly important to our success in a career in engineering as we will be required to develop programs that follow a desired functionality, but won’t usually be given many requirements as to how to implement that functionality.  Knowing the advantages and disadvantages of certain data structures would allow us to use the data structures that would best allow us to implement the desired functionality.  We demonstrate our understanding of the advantages of linked lists in Task 3 of the lab, specifically, when we modified the stack and queue classes we made in lab 3 to be derived classes of the linked list class, allowing us to create easy implementations of stacks and queues via linked lists that had no restrictions on size, unlike array-based lists.  The fourth objective of building working linked lists is important to our success in this class, as we were required in the lab to create and implement a functioning linked list.  Being able to build working linked lists is incredibly important to a career in engineering because, as an engineer, the products and programs we create need to be functional.  Being able to understand linked lists is one thing, but as an engineer, you need to be able to translate your understanding into a functioning program, device, or some other medium.  Therefore, it is crucial to a career in engineering to be able to build working linked lists that function as desired.  We demonstrate our ability to build working linked lists throughout the entirety of lab 4, as the whole lab required us to construct a working linked list and its member functions.

**Task 2:**

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**Task 3:**

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**Group Member Contributions:**

The lab was worked on together by both Ryan and Thomas while on a call together in Microsoft Teams. Both worked on creating the linked list functions in the header file and the main file for task 2 and then used Ryan’s for the final submission. We both worked together for the task 3 header and some of the main but Thomas finished up the main file testing for the queue and stack. Ryan implemented the seeNext function and Thomas added the seeCounter to the function. For the final grade each member of the group should receive 100 percent of the grade as we feel that we both evenly contributed to the lab and worked together for almost the whole time it was being worked on.