Student name:
Student ID:
EECS login ID:

Assignment 4 Report

Instruction: Complete the report then convert it to PDF to submit.

Academic Honesty Pledge: I affirm that I have not given or received any unauthorized help in this assignment, and that this work is my own. Any authorized references are acknowledged below.

Sign or type your name here: _____Vikram Thangavel_____

For each function to be implemented, fill in the information using the following template.

Function Name: insertFirst()

- Reference(s): https://www.programiz.com/dsa/linked-list
- https://www.geeksforgeeks.org/linked-list-set-1-introduction/
- https://www.tutorialspoint.com/learn_c_by_examples/simple_linked_list_program_in_c.htm
- https://codeforwin.org/2015/09/c-program-to-insert-node-at-beginning-of-singly-linked-list.html
- https://stackoverflow.com/questions/20418624/how-to-check-if-a-linked-list-is-empty
- Slides and code example provided by the professor (eClass)
- ZyBook (8.10)
- Error conditions: If node cannot be created, function calls function ptrError() to display an error message and null will be returned.
- Description of the code (algorithm): A node is created and checks if it is created. Then, it inserts the element in the data part of the node and inserts itself as the first node in the chain and returns the pointer of the node.
- Running time of the function (algorithm): O(1)
- Explanation of the running time: The function assigns the pointer, data, and link to each variable. As there is no loop and the function is constant, the running time is O(1).

Function Name: insertLast()

- Reference(s): https://codeforwin.org/2015/09/c-program-to-insert-node-at-end-of-singly-linked-list.html
- https://www.programiz.com/dsa/linked-list-operations
- Error conditions: If node cannot be created, functions calls function prtError() to display an error message and null will be returned.
- Description of the code (algorithm): A node is created and checks if it is created. Then, it inserts the element in the data part of the node and inserts itself as the last node in the chain and returns the pointer of the node.
- Running time of the function (algorithm): O(1)
- Explanation of the running time: Function assigns the pointer, data, and link to each variable. As the function remains constant, the running time is O(1).

Function Name: removeFirst()

- Reference(s): https://codeforwin.org/2015/09/c-program-to-delete-first-node-of-singly-linked-list.html
- Error conditions: If the list is empty, the function calls the function prtError to display an error message and return -1;
- Description of the code (algorithm): A node is created and inserted in the chain of nodes. Then, the element takes the first node's location and is removed from the chain of nodes.
- Running time of the function (algorithm): O(1)
- Explanation of the running time: Function assigns the pointer, data, and link to each variable. The function remains constant so therefore, the running time is O(1).

Function Name: search()

- Reference(s): https://www.geeksforgeeks.org/search-an-element-in-a-linked-list-iterative-and-recursive/
- Error conditions: If the list does not contain the non-negative integer k, the function will return null.
- Description of the code (algorithm): A node is created and inserted in the chain of nodes. Then, the element takes the first node's location and searches for a node that contains the element k and returns its address.
- Running time of the function (algorithm): O(n)
- Explanation of the running time: Function performs a linear search to look for a node that contains the element k so therefore, the function's running time is O(n).