**CSCI 301 Moustafa Elsayed**

**Computer Science 2**

**Program 10: IMPLEMENTING AN ORDERED LIST WITH A BINARY SEARCH TREE**

**Introduction**

Binary trees are useful when we want to access and manipulate data quickly without changing their order. In this program, the user is given a menu of option of what to do with data in a binary tree, the user can add, remove or search for an item within a list, and can re-initialize a list to be empty, print the contents of the list, and print the number of items in the list. All the options and all the results are presented in the terminal.

**Data Structures**

This program uses 7 data structures :-

* An Item type “data” in the header file: this is used to hold the data that is kept in the list.
* A pointer Node type “left” in the header file: this is used to hold the small valued data
* A pointer Node type “right” in the header file: this is used to hold the large valued data
* A pointer Node type “root” in the header file: this is used to hold the largest valued data.
* An int type “var” in the main file: this is used to hold the data that is being inserted,removed or searched for in the list.
* A char type “ans” in the main file: this is used to hold the inputs of the user regarding what to do with the list.
* A Boolean type “found” in the main file: this is used to mark if the item was found in the list or not.

**Functions**

This program uses 1 function:

* Void Menu() in the main file: This function is used to manage the list according to what the input parameter carries, if the input is “i” then the function will add the integer that the user inputs to the list, if the input is “r” then the function will remove the integer that the user inputs from the list, if the input is “p” then the function will search for the integer that the user inputs in the list, if the input is “e” then the function will delete all the contents of the list, if the input is “l” then the function will print the number of contents in the list, if the input is “w” then the function will print the contents of the list, if the input is “h” then the function will print the menu again, if the input is “q” then the function will print “Exit program” , if the input is anything else then the function will print “Invalid input”.

**Main function**

The program will print the description what it can do then print the menu. The program then will open a loop that can stop when the user enters “q”, in the loop the user enters a letter then the program will call the function menu() with the input as its parameter. If the user enters q the loop ends and the program us terminated.