Department of Electrical and Software Engineering
Schulich School of Engineering

ENSF 694 - Principles of Software Development II
Summer 2023

Lab 7 – July 24, 2023
Topic: Trees

- All codes must be complete and compile without any errors.
- The codes should work for not only the given sample inputs but also any inputs of the same data types.
- **Submission: github link of the codes in the d2l dropbox 'Lab#07_Jul24' and push your code in the github classroom repository**
    - Go to this link - https://classroom.github.com/a/--LZjXNz
    - Refresh and accept the Lab7 link
    - Clone the repository and then push your code
    - Then submit the github link to the d2l dropbox 'Lab#07_Jul24'

Lab Tasks

15 marks + 05 bonus marks =
05 marks for input-output format +
10 marks for implementing both trees.
05 bonus marks for deleting nodes from the trees.

Q1.

1. Take an integer n from the user as the number of nodes for a binary search tree.
2. Take n characters/letters from users as the data for the tree nodes.
3. Keep a copy of the original letters and then apply a random shuffle operation on the set of letters (you can use any built-in or your own methods for the random shuffle).
4. Create two separate binary search trees – one with the original sequence of letters, the other with the shuffled set of letters.
5. Show the inorder, preorder, and postorder traversals for both trees.

Bonus Part:

1. Now delete the n-3 th node from each tree.
   For example, n = 10, the original input letters are 'ABCDEFGHIJ' and the shuffled letters are 'FGAICHBEDJ'. So, n-3 = 10-3=7th letter. Delete node 'G' from tree 1 (i.e., tree for 'ABCDEFGHIJ') and delete node 'B' from tree 2 (i.e., tree for 'FGAICHBEDJ').
2. Show the current inorder, preorder, and postorder traversals for both trees.

Sample Run of the Code:

```
Enter number of nodes:
6

Enter the nodes:
Q W E R T Y


Original Sequence of Nodes:
Q W E R T Y
Inorder Traversal (left-root-right) of the Tree1:
E Q R T W Y
Preorder Traversal (root-left-right) of the Tree1:
Q E W R T Y
Postorder Traversal (left-right-root) of the Tree1:
E T R Y W Q

Shuffled Sequence of Nodes:
E R Q Y T W
Inorder Traversal (left-root-right) of the Tree2:
E Q R T W Y
Preorder Traversal (root-left-right) of the Tree2:
E R Q Y T W
Postorder Traversal (left-right-root) of the Tree2:
Q W T Y R E

Deleting 3 th Letter (E) from Tree1:
Inorder Traversal (left-root-right) of the Tree1:
Q R T W Y
Preorder Traversal (root-left-right) of the Tree1:
Q W R T Y
Postorder Traversal (left-right-root) of the Tree1:
T R Y W Q

Deleting 3 th Letter (Q) from Tree2:
Inorder Traversal (left-root-right) of the Tree2:
E R T W Y
Preorder Traversal (root-left-right) of the Tree2:
E R Y T W
Postorder Traversal (left-right-root) of the Tree2:
W T Y R E
```