National Institute of Technology Calicut
Department of Computer Science and Engineering
Third Semester B. Tech.(CSE)
CS2092D Programming Laboratory

Evaluation - Assignment #9 (19.11.2020)

Instructions: Write the design in the shared doc, get your design approved by the instructor before coding. In case of clarifications, your instructor will help you.

Marks (Design + Implementation): 5+5

Time: till 4.00 P.M. The marks for implementation will be based on the results for the test cases. The instructor will be conducting a viva-voce, if required. If your result verification is not done before 4.00 P.M you should send the screen shots of your result to the instructor before 4.00 P.M. and then wait for the verification.

Question: Write algorithms for the following BST operations and implement by adding the corresponding functions to the code submitted for Assignment 9, Question 1:

- COMBINE1($T1, k, T2$): Combines the two BSTs T1 and T2 along with another key value k to create a new BST consisting of all keys in T1 and T2 and the key k. It is assumed that each key in T1 is smaller than k and each key in T2 is greater than k. Both T1 and T2 should be empty after the operation. The running time of this function should be O(1).

  Input format:

  - First line of the input contains the keys in $T1$ separated by space.
  - Second line of the input contains the keys in $T2$ separated by space.
  - Third line of the input contains the key k.
  - If a line is blank, then corresponding tree is empty.

  Output format: The output is the inorder traversal of the newly constructed BST.

  Sample Input 1:
  1 2 3 4 5
  7 8 9 10
  6

  Sample Output 1:
  1 2 3 4 5 6 7 8 9 10

  Sample Input 2:
  1 2 3 4 5
  //T2 is empty
  6

  Sample Output 2:
  1 2 3 4 5 6

  Sample Input 3:
  //T1 is empty
  7 8 9 10
  6

Sample Output 3:
6 7 8 9 10

Sample Input 4:
//T1 is empty
//T2 is empty
6

Sample Output 4:
6

- COMBINE2(T1, T2): Combines the two BSTs T1 and T2 and creates a new BST consisting of all keys in T1 and T2. It is assumed that all keys in T1 are smaller than all keys in T2. There should be an invocation of COMBINE1() from COMBINE2(). Both T1 and T2 should be empty after the operation. The running time of this function should be O(height(T1)).

  Input format:

  - First line of the input contains the keys in $T1$ separated by space.
  - Second line of the input contains the keys in $T2$ separated by space.
  - If a line is blank, then corresponding tree is empty.

  Output format: The output is the inorder traversal of the newly constructed BST.

  Sample Input 1:
  1 2 3 4 5
  7 8 9 10
  Sample Output 1:
  1 2 3 4 5 7 8 9 10

  Sample Input 2:
  1 2 3 4 5
  //T2 is empty

  Sample Output 2:
  1 2 3 4 5

  Sample Input 3:
  //T1 is empty
  7 8 9 10

  Sample Output 3:
  7 8 9 10

DESIGN: In the shared document, write the pseudocode for the above two functions.