Coding Assignment 2: CS2233

August 31, 2023

Kindly adhere to the following instructions.

- Please write a C program corresponding to each problem. Your code should be well commented and variable names should be appropriately chosen. Also prepare a `readme` text file where you can mention instructions to run the program/how to take input etc.
- Create a folder and put all the code files and `readme` text file in it, give name to the folder as "yourName_yourRollNo", zip the folder and submit it to the google classroom portal.
- Your code will also be checked against plagiarism (both from web and peer).
- Any form of plagiarism (web/chatGPT/with peers) will be severely penalised and will result in F grade.
- The submission (strict) timeline is 14th September, Thursday, 11 AM.
- Each question consists of 10 marks.

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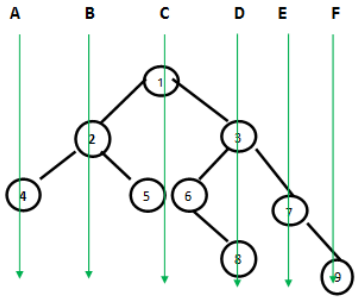
1. Write a non-recursive implementation of `inorder, preorder, postorder` traversal.
2. Write a C program that takes `inorder` and `preorder` traversal as input, output the tree. You need to print the nodes of the tree level by level. Your code should output an error message if the `inorder` and `preorder` are not corresponding to the same tree.
3. Write a C program that takes `inorder` and `postorder` traversal as input, output the tree. You need to print the nodes of the tree level by level. Your code should output an error message if the `inorder` and `preorder` are not corresponding to the same tree.

4. Write a C program that takes `preorder` and `postorder` traversal as input, output the tree. It is given that each node consists of exactly two children. Your code should output an error message if the `inorder` and `preorder` are not corresponding to the same tree. You need to print the nodes of the tree level by level.

5. Write a C program that takes an arithmetic tree as input and outputs the result of the arithmetic expression. The leaf node is numeric data in an arithmetic expression tree, and the `non-leaf/internal` node is the operator.

6. Write a C program that prints the given tree vertically. The following example explains the vertical tree traversal.

Vertical Lines



Vertical order traversal is:

A- 4

B- 2

C- 1 5 6

D- 3 8

E- 7

F- 9

Instructions: In Question $1, 3$ and 5 a tree is given as input. Let there be n nodes in the tree, and its description is given as an array of size $n \times 3$. For the i-th row, $(i, 1)$ index represent the i-th node, and $(i, 2)$, $(i, 3)$ indices denotes its left and right child respectively. The corresponding indices are marked as NULL if a node doesn't have left/right or both children. For Questions $1, 3, 5$, you can consider $n \times 3$ array for the tree given in Question 6.