Birla Institute of Technology & Science, Pilani
Data Structures & Algorithms (CS F211)
Lab Assignment – 8 (Node Insertion in AVL Tree)

Instructions:

- All input expressions should be read from stdin and output should be printed on stdout.
- Only the last submission by the student before end of lab will be considered for evaluation.
- Following messages by online portal will **tentatively** fetch these marks:
  - Correct ➔ 4 marks
  - Wrong-answer (correct for more than half test cases) ➔ 3 marks
  - Run-error/Compiler-error/Timelimit-error ➔ 2 marks
- All submitted source code will be later checked manually by the instructor and final marks will be awarded, which will be posted on Nalanda after the lab assignment has been done by all lab sections.
- Solution must be implemented using the algorithm and data structures mentioned in the lab sheet only.

Problem

Node Insertion in AVL tree.

Input

You will be given English words (all capital letter): one word per line.

Output

1. First print in-order traversal of the final AVL tree: On each line print the word, then blank space, then height of the node, then balance factor of the node.
2. Finally print pre-order traversal of the final AVL tree: On each line print the word, then blank space, then height of the node, then balance factor of the node.

Procedure

Please refer "Lecture 18" on Nalanda. Read the English words one by one and insert them in sequence in an AVL tree. Use dictionary order for insertion in AVL tree.

NOTE:

In case of clash of words (i.e. new word is same as that on current node), the new word should be inserted in the right-subtree of current node.

Test Cases:

Case 1:

Input:
MAR
MAY
NOV
AUG
APR
JAN
DEC
JUL
FEB
JUN
OCT
SEP

Sample Output:

APR 1 0
AUG 2 1
DEC 3 1
FEB 1 0
JAN 5 -1
JUL 2 -1
JUN 1 0
MAR 4 -1
MAY 1 0
NOV 3 -1
OCT 2 -1
SEP 1 0
JAN 5 -1
DEC 3 1
AUG 2 1
APR 1 0
FEB 1 0
MAR 4 -1
JUL 2 -1
JUN 1 0
NOV 3 -1
MAY 1 0
OCT 2 -1
SEP 1 0

Case 2:

Input:
IT
IS
THE
HAVING
INDEX
PAGE
PARAGRAPH
NOW
ONE
THIS

Sample Output:
HAVING 1 0
INDEX 2 0
IS 1 0
IT 4 -1
NOW 1 0
ONE 2 0
PAGE 1 0
PARAGRAPH 3 0
THE 2 -1
THIS 1 0
IT 4 -1
INDEX 2 0
HAVING 1 0
IS 1 0
PARAGRAPH 3 0
ONE 2 0
NOW 1 0
PAGE 1 0
THE 2 -1
THIS 1 0

Case 3:

Input:
HELLO
WORLD
LAB
DSA
LAB
WORLD
BINARY
SEARCH

TREE
AVL
HELLO
DSA
LAB
CODE
PROGRAM

Sample Output:
AVL 1 0
BINARY 2 0
CODE 1 0
DSA 3 0
DSA 1 0
HELLO 2 0
HELLO 1 0
LAB 4 0
LAB 1 0
LAB 2 0
PROGRAM 1 0
SEARCH 3 0
TREE 1 0
WORLD 2 0
WORLD 1 0
LAB 4 0
DSA 3 0
BINARY 2 0
AVL 1 0
CODE 1 0
HELLO 2 0
DSA 1 0
HELLO 1 0
SEARCH 3 0
LAB 2 0
LAB 1 0
PROGRAM 1 0
WORLD 2 0
TREE 1 0
WORLD 1 0

Case 4:

Input:
THIS
IS
DSA
LAB

ASSIGNMENT
EIGHT
AVL
TREE
CREATE
GOOD
STORY
HAVE
FAITH
HONESTY
BEST
POLICY
GOOD
LUCK
DSA
LAB

Case 5:

Input:
PECK
PEPPER
PETER
PICKED
PICKLED
PIPER
THE
WHERE
PLAY
NICE
DEAR
FRIEND
STAY
CONNECTED
WORK
HARD
ACHIEVE
GOAL
SERVE
OTHERS
WHOLE
WORLD
WILL
REMEMBER
YOU
FOREVER

Case 6:

Input:
AXLE
BAIL
BALK
BRACE
CANTILEVER
COLUMN
CROSSBAR
CROSSPIECE
GIRDER
JAMB
JOIST
LATH
LINTEL
PILE
SOLDIERY
SQUAD
TROOPS
POLE
POST
PROP
RAFTER
REACH
SCAFFOLDING
SCANTLING
SHAFT
SILL
SPAR
STANCHION
BAR
BEACON
CHINK
COLUMN
STRUT
STUD
TIMBER
TRANSVERSE
