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EX NO 10 : IMPLEMENTATION OF AVL TREE

#include <stdio.h> #include <stdlib.h>

struct AVLNode {

int key; struct AVLNode \*left; struct AVLNode \*right; int height;

};

int max(int a, int b) {

return (a > b) ? a : b;

}

int height(struct AVLNode \*node) {

if (node == NULL) return 0;

return node->height;

}

struct AVLNode \*newNode(int key) {

struct AVLNode \*node = (struct AVLNode \*)malloc(sizeof(struct AVLNode)); node->key = key; node->left = NULL; node->right = NULL; node->height = 1; return node;

}

struct AVLNode \*rotateRight(struct AVLNode \*y) {

struct AVLNode \*x = y->left; struct AVLNode \*T2 = x->right;

x->right = y; y->left = T2;

y->height = max(height(y->left), height(y->right)) + 1; x->height = max(height(x->left), height(x->right)) + 1; return x;

}

struct AVLNode \*rotateLeft(struct AVLNode \*x) {

struct AVLNode \*y = x->right; struct AVLNode \*T2 = y->left;

y->left = x; x->right = T2;

x->height = max(height(x->left), height(x->right)) + 1; y->height = max(height(y->left), height(y->right)) + 1;

return y;

}

int getBalance(struct AVLNode \*node) {

if (node == NULL) return 0;

return height(node->left) - height(node->right);

}

struct AVLNode \*insert(struct AVLNode \*node, int key) {

if (node == NULL) return newNode(key);

if (key < node->key)

node->left = insert(node->left, key);

else if (key > node->key)

node->right = insert(node->right, key);

else

return node; node->height = 1 + max(height(node->left), height(node->right)); int balance = getBalance(node);

if (balance > 1 && key < node->left->key) return rotateRight(node);

if (balance < -1 && key > node->right->key) return rotateLeft(node);

if (balance > 1 && key > node->left->key) {

node->left = rotateLeft(node->left);

return rotateRight(node);

}

if (balance < -1 && key < node->right->key) {

node->right = rotateRight(node->right); return rotateLeft(node);

}

return node;

}

void inorder(struct AVLNode \*node) {

if (node != NULL) {

inorder(node->left); printf("%d ", node->key); inorder(node->right);

}

}

int main() {

struct AVLNode \*root = NULL; root = insert(root, 10); root = insert(root, 20); root = insert(root, 30); root = insert(root, 40); root = insert(root, 50); root = insert(root, 25);

printf("Inorder traversal of the AVL tree:\n"); inorder(root); printf("\n");

return 0;

}