DEPARTMENT OF INFORMATION TECHNOLOGY

**Academic Year: 2023 – 24**

**COURSE CODE: DJS22ITL303 CLASS: S. Y. B. Tech. Sem III (I1)**

**COURSE NAME: Database Management Systems SAP ID:60003220045**

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**EXPERIMENT NO:10**

**To Implement Binary Trees**

**CODE:**

class BTreeNode {

int[] keys;

int t; // Minimum degree

BTreeNode[] children;

int n; // Current number of keys

boolean leaf;

BTreeNode(int t, boolean leaf) {

this.t = t;

this.leaf = leaf;

keys = new int[2 \* t - 1];

children = new BTreeNode[2 \* t];

n = 0;

}

void insertNonFull(int key) {

int i = n - 1;

if (leaf) {

while (i >= 0 && key < keys[i]) {

keys[i + 1] = keys[i];

i--;

}

keys[i + 1] = key;

n++;

} else {

while (i >= 0 && key < keys[i]) {

i--;

}

if (children[i + 1].n == 2 \* t - 1) {

splitChild(i + 1, children[i + 1]);

if (key > keys[i + 1]) {

i++;

}

}

children[i + 1].insertNonFull(key);

}

}

void splitChild(int i, BTreeNode y) {

BTreeNode z = new BTreeNode(y.t, y.leaf);

z.n = t - 1;

for (int j = 0; j < t - 1; j++) {

z.keys[j] = y.keys[j + t];

}

if (!y.leaf) {

for (int j = 0; j < t; j++) {

z.children[j] = y.children[j + t];

}

}

y.n = t - 1;

for (int j = n; j >= i + 1; j--) {

children[j + 1] = children[j];

}

children[i + 1] = z;

for (int j = n - 1; j >= i; j--) {

keys[j + 1] = keys[j];

}

keys[i] = y.keys[t - 1];

n++;

}

void traverse() {

int i;

for (i = 0; i < n; i++) {

if (!leaf) {

children[i].traverse();

}

System.out.print(keys[i] + " ");

}

if (!leaf) {

children[i].traverse();

}

}

}

class BTree {

private BTreeNode root;

private int t;

BTree(int t) {

this.t = t;

root = new BTreeNode(t, true);

}

void insert(int key) {

if (root.n == 2 \* t - 1) {

BTreeNode s = new BTreeNode(t, false);

s.children[0] = root;

s.splitChild(0, root);

int i = 0;

if (s.keys[0] < key) {

i++;

}

s.children[i].insertNonFull(key);

root = s;

} else {

root.insertNonFull(key);

}

}

void traverse() {

if (root != null) {

root.traverse();

}

}

}

class Main {

public static void main(String[] args) {

int[] sequence = { 120, 2, 45, 201, 42, 78, 350, 401, 50, 135, 88, 71 };

int degree = 3; // Degree of the B-tree

BTree bTree = new BTree(degree);

for (int key : sequence) {

bTree.insert(key);

}

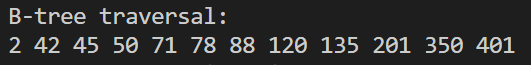
System.out.println("B-tree traversal:");

bTree.traverse();

}

}

**OUTPUT:**

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