



**SNS COLLEGE OF TECHNOLOGY, COIMBATORE-35**

**(AN AUTONOMOUS INSTITUTION)**



**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**DATABASE MANAGEMENT SYSTEM**

## **UNIT-V**

### **PHYSICAL STORAGE AND MONGODB**

**Topic: B-Tree Index File**

#### **B tree:**

A **B Tree** Index is a multilevel index.

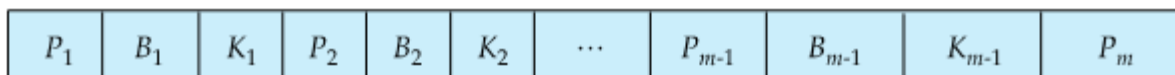
A **B Tree** is a rooted tree satisfying the following properties :

1. All paths from the root to the leaf are equally long.
2. A node that is not a root or leaf, has between  $\lceil n/2 \rceil$  and ' $n$ ' children.
3. A leaf node has between  $\lceil (n-1)/2 \rceil$  and ' $n-1$ ' values.

The structures of leaf, non-leaf nodes of this tree is :



(a)



(b)

#### **Properties of B-tree**

Following are some of the properties of B-tree in DBMS:

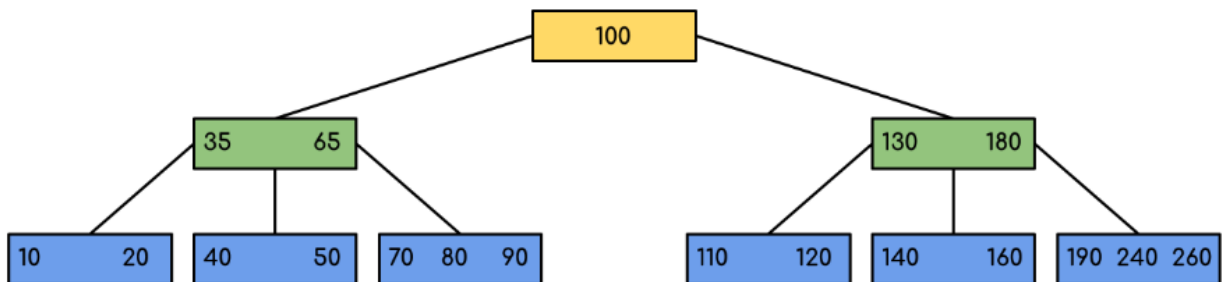
- A non-leaf node's number of keys is one less than the number of its children.
- The number of keys in the root ranges from one to  $(m-1)$  maximum.  
Therefore, root has a minimum of two and a maximum of  $m$  children.

- The keys range from  $\min(\lceil m/2 \rceil - 1)$  to  $\max(m-1)$  for all nodes (non-leaf nodes) besides the root. Thus, they can have between  $m$  and  $\lceil m/2 \rceil$  children.
- The level of each leaf node is the same.

### Time Complexity of B-Tree:

Sr. No.	Algorithm	Time Complexity
1.	Search	$O(\log n)$
2.	Insert	$O(\log n)$
3.	Delete	$O(\log n)$

1.



### Solution:

