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UNIT – 5
B-TREE

* B-Tree :-

- A B-tree is also known as the balanced sort tree. It finds its use in external sorting. It is not a binary tree. To reduce this access, several conditions of the tree must be used –

1. The height of the tree must be kept to be minimum.
2. There must be no empty sub-tree above the leaves of the tree.
3. The leaves of the tree must all be on the same level.
4. All nodes except the leaves must have at least some minimum number of children.

- B-tree of order M has following properties-

1. Each node has a maximum of M children and a minimum of M/2 children or any number from 2 to the maximum.
2. Each node has one fewer keys then children with maximum (M-1) key.
3. Keys are arranged in a defined order within the node.

All keys in the sub-tree do the key of a predecessors of the key and that on right are successors of the key.

Example –

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1, 2, 3, 7, 8, 9, 10, 15, 18, 20, 25, 26

Order = 4 (M)

Max key = (M-1) = 4-1 = 3

Min key = (M/2) = 4/2 = 2

* Searching :-

- Searching is a process of finding an element within the list of elements stored in any order or randomly.
- Searching is divided into 2 categories - linear search and binary search.
- Linear searching is the basic and simple method of searching.
- Binary searching is more efficient than linear searching.

1-) Linear searching -

- In linear search we access each element of an array one by one sequentially and see whether it is desired element or not.
- A search will be unsuccessful if all the elements are accessed and the desired element are not found.

2-) Binary search -

- Binary search is an extremely efficient algorithm. This search techniques searches the given item in minimum possible comparisions.

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- To do the binary search first we had to sort the array elements.
- The logic behind the binary search is -

1. Find the middle element of the array.
2. Compare the mid element with an item.
3. There are three cases -

(a) If it is a desired element then search is successful.

(b) If it is less than desired item then search only the first half of the array.

(c) If it is greater than the desired element search in the second half of the array.

Example -

8	10	11	13	25	86	1	3
0	1	2	3	4	5	6	7

Middle = $\frac{0+7}{2}$

* Hashing :-

- A very common technique of data processing involves storing information in table and then later retrieving the information stored there.
- The data comprises of a collection of key and values.
- Information is retrieved from the data base by searching for a given key.

Hash table - Hash table is a dictionary in which keys are mapped to array positions by hash functions.

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		Mod = 25/2 = 1

Hashing function — A hashing function transforms an identifier x into a hash table. The address computate is known as hash address of the identifier x. If more than one record have same hashing address, they are said to collide. The Phenomena is called address colligen. The various hashing functions are —

1. The mid square hash function
2. Division hash function.
3. Multiplication method

* Algorithm for Infix to Postfix conversion:-
Q is infix expression, P is postfix expression.

Step 1 - Push ("onto stack and add") to the end of Q.

Step 2 - Scan Q from left to right and repeat step 3 to 6 for each element of Q until the stack is empty.

Step 3 - If an operand is encountered, add it to P.

Step 4 - If the left parenthesis is encountered

then

(a) Add ⊕ to stack.

(b) Repeatedly, pop from stack and add P each operator (on the top of the stack) which has the same precedence are as higher precedence than ⊕.

Step5- If right parenthesis is encountered, then

(a) Repeatedly pop from stack and add to P each operator (on the top of stack until a left parenthesis is encountered.

(b) Remove left parenthesis (do not add left parenthesis to P.

Step7- End.