

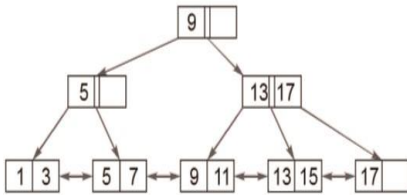
Assignment- File organization, indexing (B and B+ tree)

- Q1.** B+ trees are preferred to binary trees in databases because
- A. Disk capacities are greater than memory capacities
 - B. Disk access is much slower than memory access
 - C. Disk data transfer rates are much less than memory data transfer rates
 - D. Disks are more reliable than memory
- Q2.** A B+ tree index is to be built on the Name attribute of the relation STUDENT. Assume that all the student names are of length 8 bytes, disk blocks are of size 512 bytes, and index pointers are of size 4 bytes. Given the scenario, what would be the best choice of the degree (i.e. number of pointers per node) of the B+ tree?
- A. 16
 - B. 42
 - C. 43
 - D. 44
- Q3.** Consider a table T in a relational database with a key field K. A B-tree of order p is used as an access structure on K, where p denotes the maximum number of tree pointers in a B-tree index node. Assume that K is 10 bytes long; disk block size is 512 bytes; each data pointer P_D is 8 bytes long and each block pointer P_B is 5 bytes long. In order for each B-tree node to fit in a single disk block, the maximum value of p is
- A. 20
 - B. 22
 - C. 23
 - D. 32
- Q4.** A B-tree of order 4 is built from scratch by 10 successive insertions. What is the maximum number of node splitting operations that may take place?
- A. 3
 - B. 4
 - C. 5
 - D. 6
- Q5.** Consider a B+ tree in which the search key is 12 bytes long, block size is 1024 bytes, recorder pointer is 10 bytes long and the block pointer is 8 byte long. The maximum number of keys that can be accommodated in each non-leaf node of the tree is _____

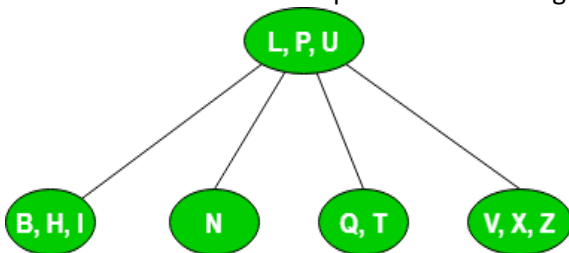
- Q6.** The following key values are inserted into a B+ - tree in which order of the internal nodes is 3, and that of the leaf nodes is 2, in the sequence given below. The order of internal nodes is the maximum number of tree pointers in each node, and the order of leaf nodes is the maximum number of data items that can be stored in it. The B+ - tree is initially empty
10, 3, 6, 8, 4, 2, 1
The maximum number of times leaf nodes would get split up as a result of these insertions is
- A. 2
 - B. 3
 - C. 4
 - D. 5
- Q7.** A clustering index is defined on the fields which are of type
- A. non-key and ordering
 - B. non-key and non-ordering
 - C. key and ordering
 - D. key and non-ordering
- Q8.** A file is organized so that the ordering of the data records is the same as or close to the ordering of data entries in some index. Then that index is called
- A. Dense
 - B. Sparse
 - C. Clustered
 - D. Unclustered
- Q9.** In a B+ tree, if the search-key value is 8 bytes long, the block size is 512 bytes and the block pointer is 2 bytes, then the maximum order of the B+ tree is _____.

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- Q10.** With reference to the B+ tree index of order 1 shown below, the minimum number of nodes (including the Root node) that must be fetched in order to satisfy the following query. "Get all records with a search key greater than or equal to 7 and less than 15" is _____.



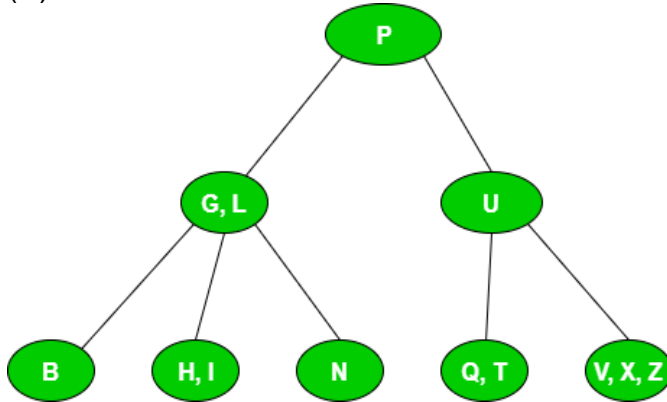
- Q11.** B+ Trees are considered BALANCED because.
- The lengths of the paths from the root to all leaf nodes are all equal.
 - The lengths of the paths from the root to all leaf nodes differ from each other by at most 1.
 - The number of children of any two non-leaf sibling nodes differ by at most 1.
 - The number of records in any two leaf nodes differ by at most 1.
- Q12.** Which of the following is correct?
- B-trees are for storing data on disk and B trees are for main memory.
 - Range queries are faster on B+ trees.
 - B-trees are for primary indexes and B+ trees are for secondary indexes.
 - D. The height of a B+ tree is independent of the number of records.
- Q13.** Consider a B+ tree in which the maximum number of keys in a node is 5. What is the minimum number of keys in any non-root node?
- 1
 - 2
 - 3
 - 4
- Q14.** Consider the following 2-3-4 tree (i.e., B-tree with a minimum degree of two) in which each data item is a letter. The usual alphabetical ordering of letters is used in constructing the tree.



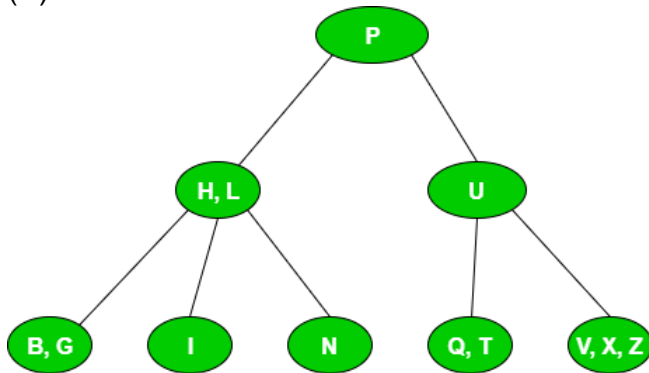
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What is the result of inserting G in the above tree?

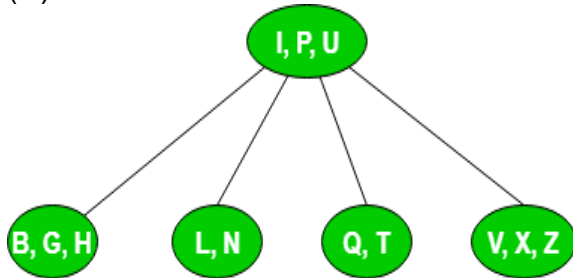
(A)



(B)



(C)



(D) None



- Q15. Consider a file of 16384 records. Each record is 32 bytes long and its key field is of size 6 bytes. The file is ordered on a non-key field, and the file organization is unspanned. The file is stored in a file system with block size 1024 bytes, and the size of a block pointer is 10 bytes. If the secondary index is built on the key field of the file, and a multi-level index scheme is used to store the secondary index, the number of first-level and second-level blocks in the multi-level index are respectively.
- (A) 8 and 0
 - (B) 128 and 6
 - (C) 256 and 4
 - (D) 512 and 5

Answers

1	B
2	C
3	C
4	C
5	50
6	C
7	A
8	C
9	52
10	B
11	A
12	B
13	B
14	B
15	C

