W13 - B Tree Functions

Due 9 Apr at 23:59 **Points** 20 **Questions** 10
Available 3 Apr at 9:00 - 9 Apr at 23:59 **Time limit** None
Allowed attempts Unlimited

This quiz was locked 9 Apr at 23:59.

Attempt history

	Attempt	Time	Score
KEPT	Attempt 3	1 minute	20 out of 20
LATEST	Attempt 3	1 minute	20 out of 20
	Attempt 2	less than 1 minute	18 out of 20
	Attempt 1	22 minutes	18 out of 20

Correct answers are hidden.

Score for this attempt: **20** out of 20
Submitted 9 Apr at 14:54
This attempt took 1 minute.

Question 1

2 / 2 pts

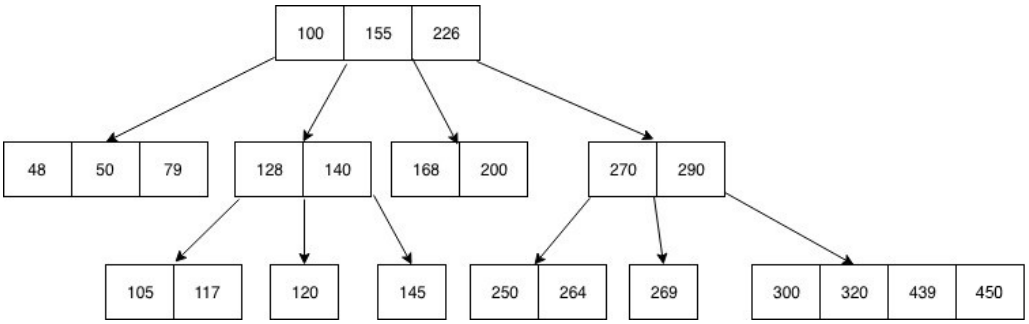
The relationship between Tree data structures and sorting can be exploited in many ways. An appropriate Tree structure pays the cost of an initial sort during the creation phase and is able to maintain sortedness without additional effort after that. Given that the lower bound on sorting *n* keys is in the order of *n* log *n*, what could be the lower bound on the average cost of the *add* function in any such tree data structure?

- O(n)

- (●) O(1)
- ( ) O(log n)

Question 2

2 / 2 pts



Consider running **add(500)** to this B-Tree. What is the value of **median**?

Assuming that your median selection is left biased without including the newly inserted key.

320

Question 3

2 / 2 pts

Space utilization in a B-Tree is always at or above...

- ( ) 25%
- ( ) 75%
- (●) 50%

Question 4

2 / 2 pts

The key motivation behind using B-Tree (in place of AVL or RB Tree) is improving:

- ○ time complexity
- ◉ I/O complexity
- ○ space complexity

Question 5

3 / 3 pts

The following is true for a B-Tree of order d:

- ☐ Each node can contain maximum 'd' number of keys.
- ☐ The tree can have some empty sub-trees.
- ☑ All leaf nodes are at the same level.
- ☑ Th root can contain at least 2 and at most d children.
- ☐ It does not follow binary search tree property.
- ☑ Each child node can contain at least ceil (d/2) children and at most d children.

Question 6

1 / 1 pts

In a 2-4 tree, you can simply delete a key (without doing any rotation/merging/splitting) if the node from which the key is being deleted is a 3-node or 4-node .

Answer 1:

3-node or 4-node

Question 7

2 / 2 pts

The time complexity of split operation is [Select]

while that of insert operation is [Select] .

Answer 1:

O(1)

Answer 2:

O(logn)

Question 8

2 / 2 pts

B-trees are balanced, with a uniform path length in root-to leaf searches. This guarantees uniformly efficient search.

- (●) True
- ( ) False

Question 9

2 / 2 pts

An (a,b)-tree is a multi way search tree such that each node has between a and b children and stores between a−1 and b−1 entries. The tree in qs. 1 is an (choose all that apply):

- [ ] (2,3)-tree
- [x] (3,5)-tree
- [x] (2,4)-tree
- [x] (3,4)-tree

Question 10

2 / 2 pts

If a B-tree contains *N* keys, *L* keys per node and an average of *F* children per node, then the number of levels are O($\log_F$ _____)

N/L

Quiz score: **20** out of 20