ESO207: Data Structures and Algorithms
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Assignment 3

Queute Coders

Q1(d) *Now, starting with an empty treap, insert items 1, 2, 3, . . . , 100 successively into it using procedure Insert1(T,k) of part (b). Run height(T) to find height of the final treap T. Repeat this five times (each time starting with an empty treap T). Print the heights of these five treaps individually and their average. Compare these heights with the scenario where we insert items 1, 2, 3, . . . , 100 successively into an empty (and ordinary) bst R. What do you observe?*

Answer- When we insert the numbers 1,2 . . . , 100 into an empty treap using the Insert1(T,k) function the height of the treap for 5 runs come out to be 16,11,12,15,11 and the average of these heights is 13.If we would have inserted these numbers into an ordinary BST in the same order then the height of the tree would have been 100.So here we observed that a treap has an average height of the order of O(logN) as numbers are inserted using a random priority. Whereas we know that in case of a BST the height of the tree could be anything between O(logN) to O(N).

Q1(e) *Repeat part (d) for sequence 12, 6, 18, 3, 9, 15, 21, 2, 1, 4, 5, 7, 8, 10, 11, 13, 14, 16, 17, 19, 20, 23, 22, 24 instead of sequence 1, 2, 3, . . . , 100*

Answer-When we inserted the given numbers into empty treap using the Insert1(T,k) function the height of the treap for 5 runs come out to be 8,7,10,7,7 and the average of these heights is 7.8.If we would have inserted these numbers into an ordinary BST in the same order then the height of the tree would have been 5. So we can observe that in case of ordinary BST the height can be anything between O(logN) and O(N) and in this case it is of order O(logN) and hence the height for a normal BST depends on the order of insertion of the numbers whereas in case of a treap the height is always of the order of O(logN).