Today - Lecture 15 — CS163

1) Review 2-3, 2-3-4, Red Black and AVL
2) Inserting when data is sorted ?!
3) Topic 11 - Heaps
4) Next - Preview of the deletion algs !

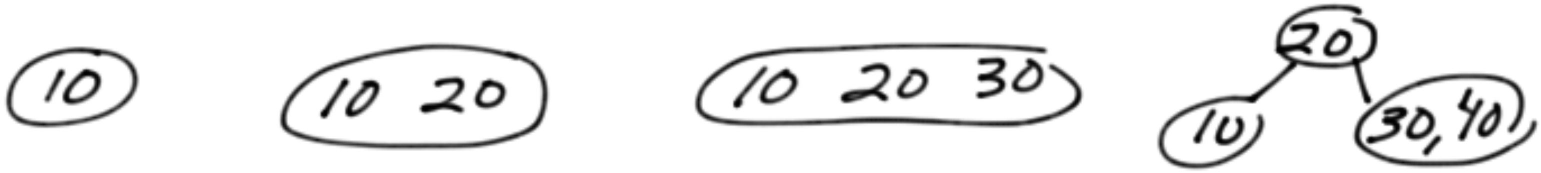
Announcements:

- Practice Recursion !
- Practic BST code !
- Practice Advanced Trees!

Review – 2-3-4 trees

What if data is inserted in sorted order?

10 20 30 40 50 60 70 80 90



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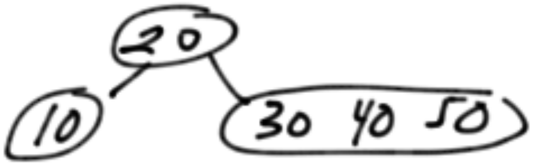

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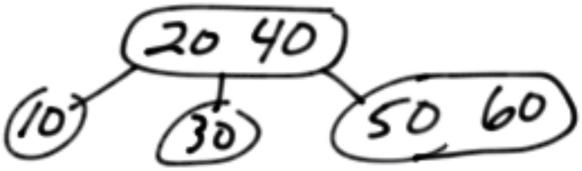

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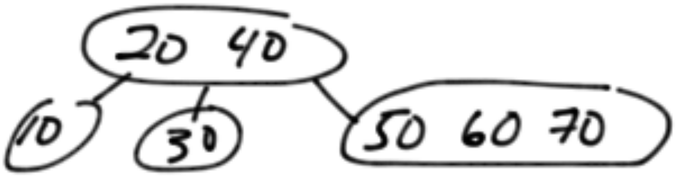

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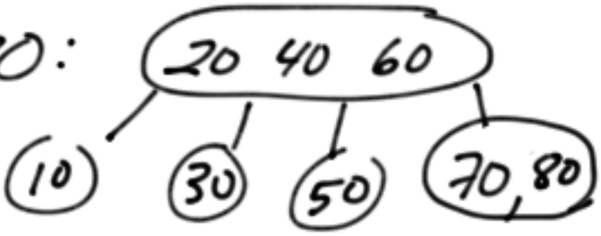

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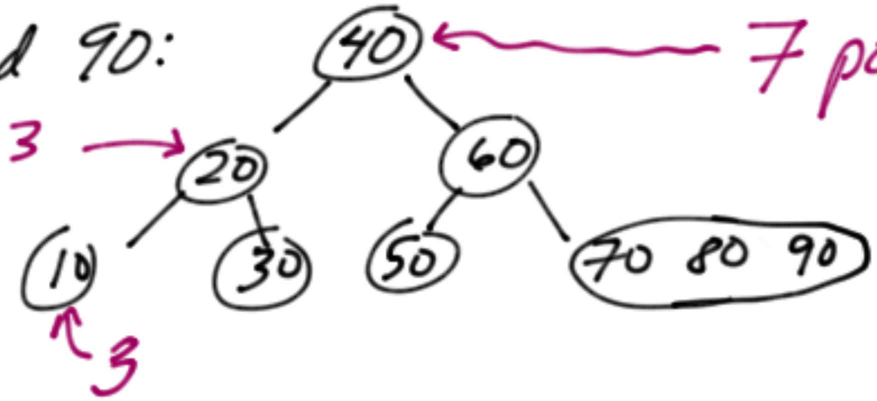
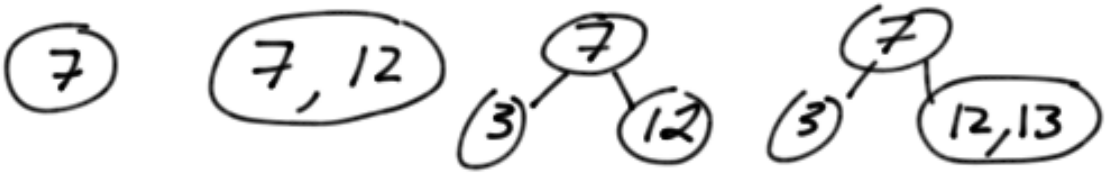


7 pointers per note

Practice: Build 2-3 Tree

7 12 3 13 21 5 8 50



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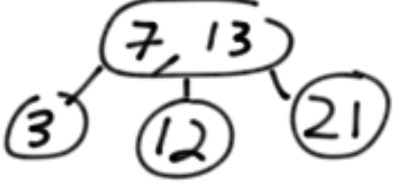

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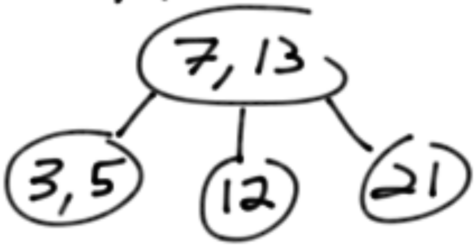

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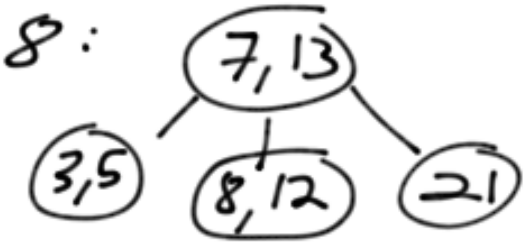

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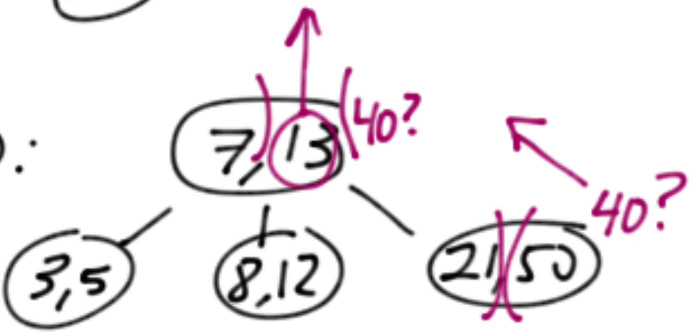

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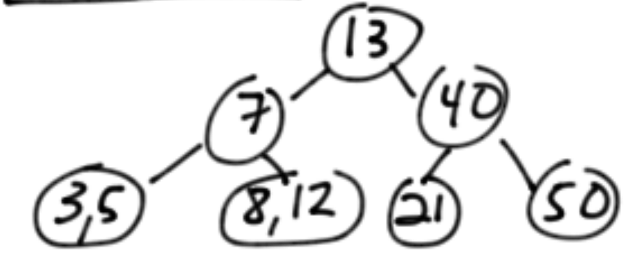
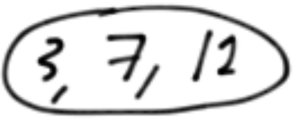
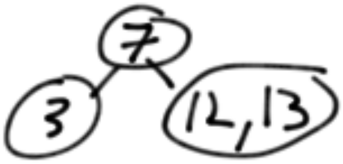


Practice: Build a 2-3-4 Tree

7 12 3 13 21 5 8 50





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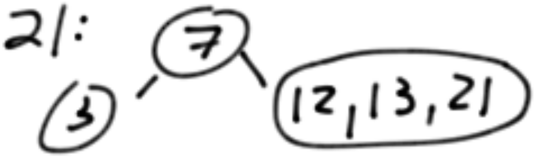

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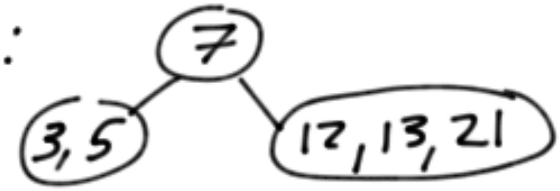

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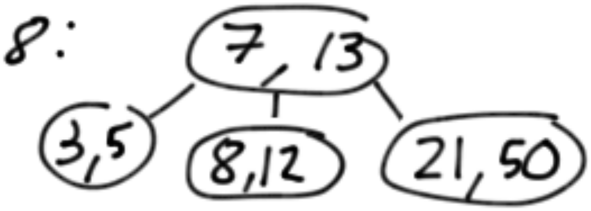
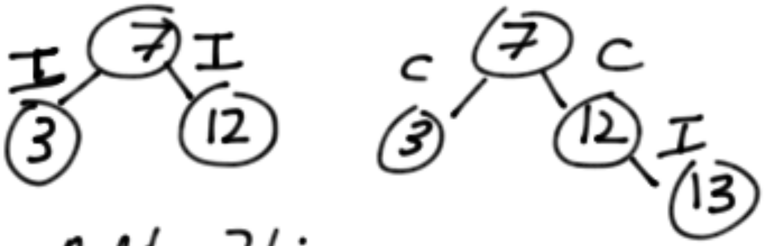


Add 50

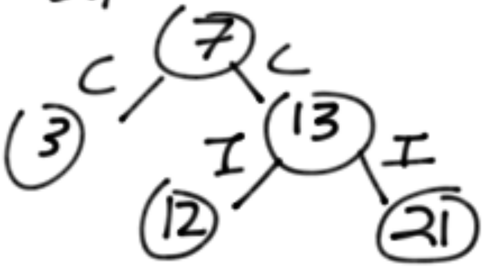
Practice: Build a Red-Black Tree

7 12 3 13 21 5 8 50



I - Internal
C - child

Add 21:



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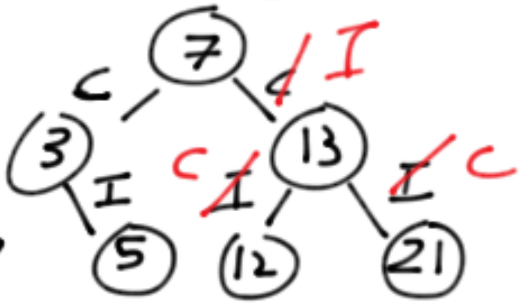
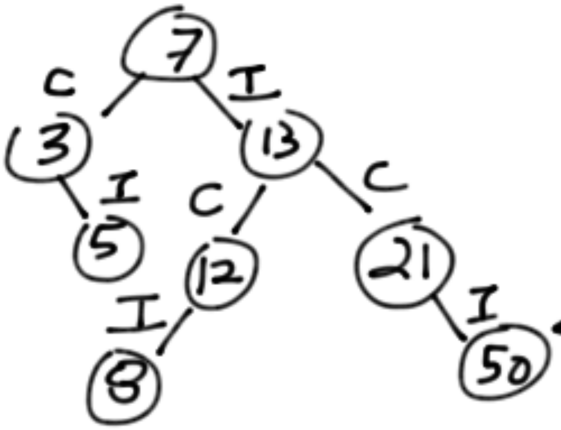


(Red)

Add 8:



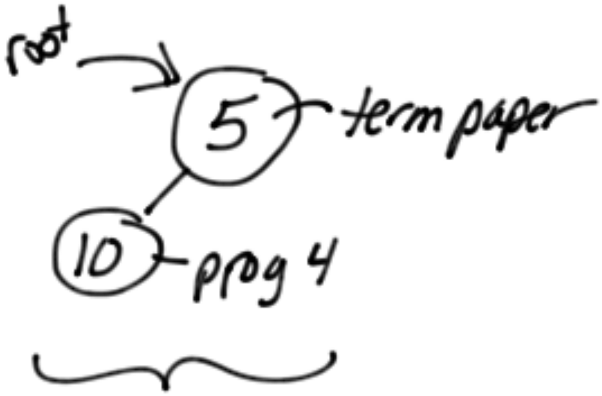
ADD 50

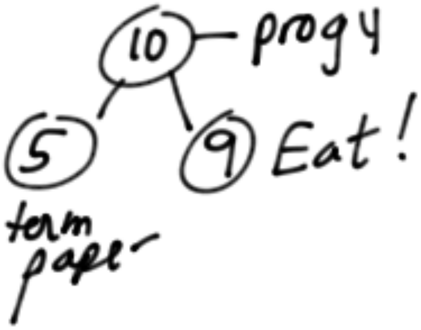
Practice - Build an AVL Tree

7 12 3 13 21 5 8 50

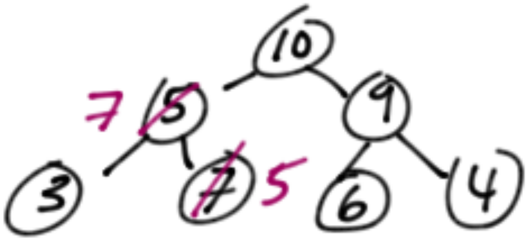
Heap - insert

10 - High priority
1 - low priority

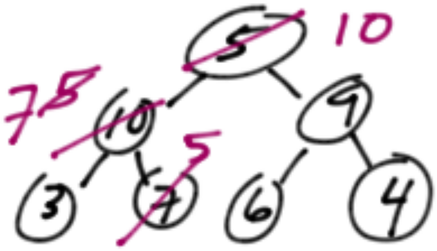




Add 3 7 6 4

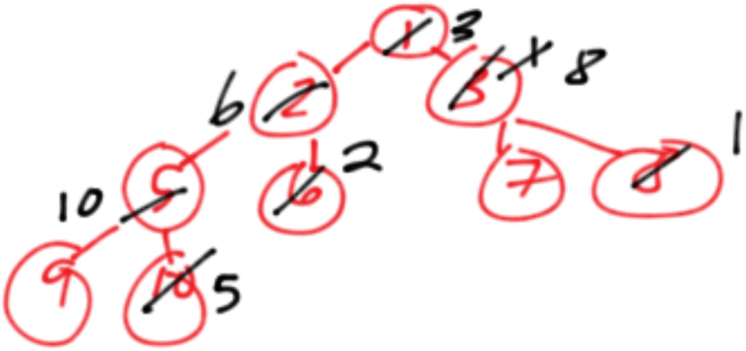


5 10 9 3 7 6 4



Heap Sort

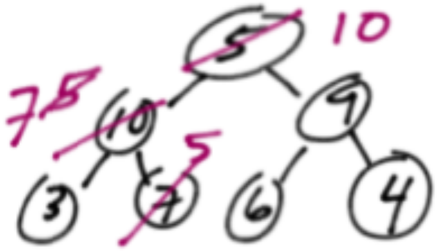
what if:



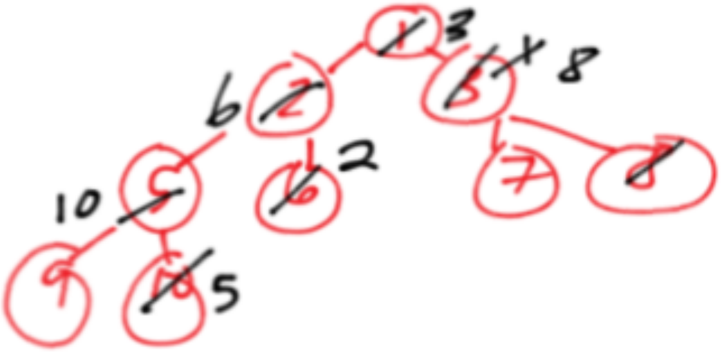
Pass 1

5 10 9 3 7 6 4

Heap Sort

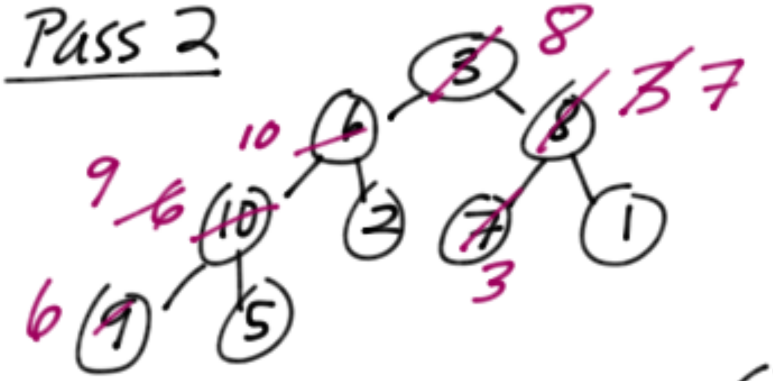


what if:

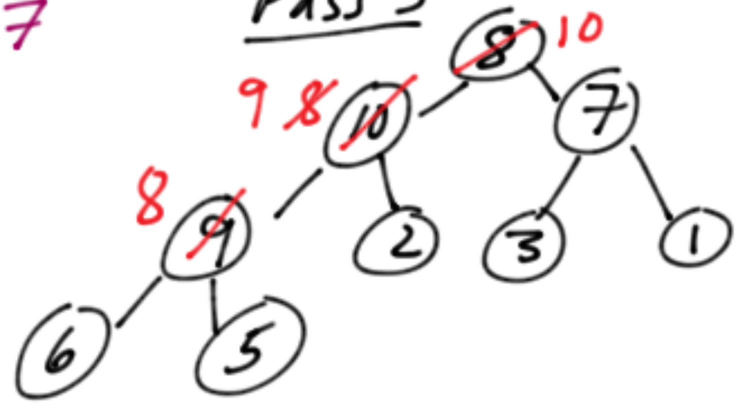


Pass 1

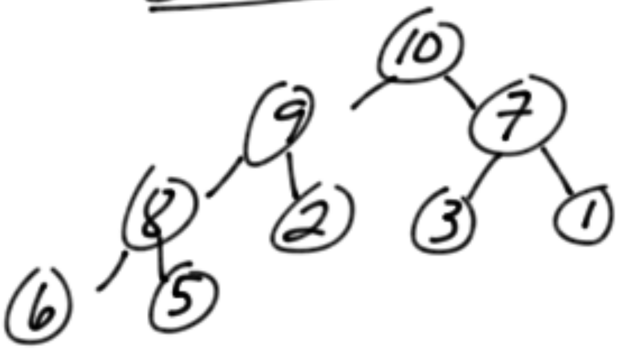
Pass 2



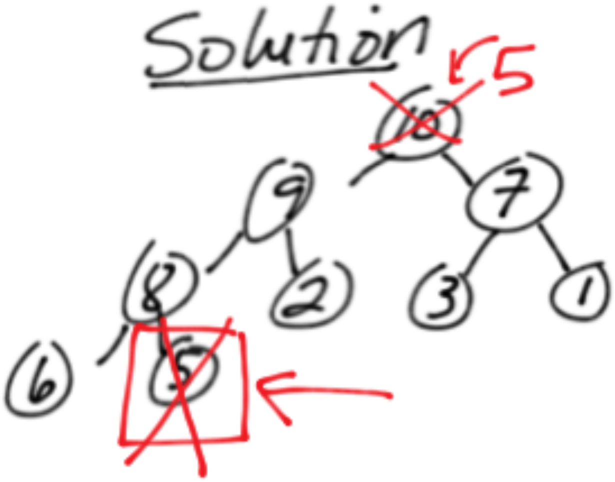
Pass 3



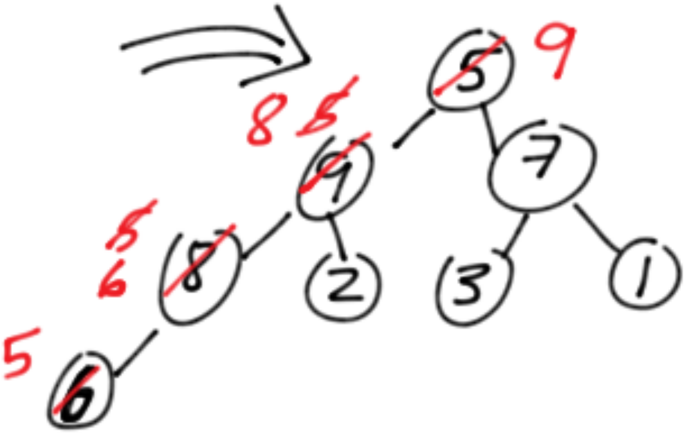
Solution



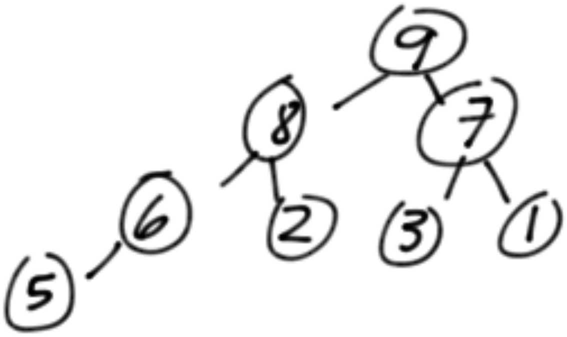
Solution



Remove



Solution After Removing 10



Practice BST code -

1) write the code to copy every Leaf of a BST and place it into a LLL

2) write the code to make a copy of a BST and place it into an Empty LLL

3) Write the code to display the LARGEST item in a BST

4) write the code to remove the LARGEST from a BST

5) write the code to count the # of items in a BST

6) Revise #5 for a 2-3 tree
   - count just the # of nodes
   - or, count all data !