CS2023 - Data Structures and Algorithms
In-class Lab Exercise

Week 8

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GitHub repo link:

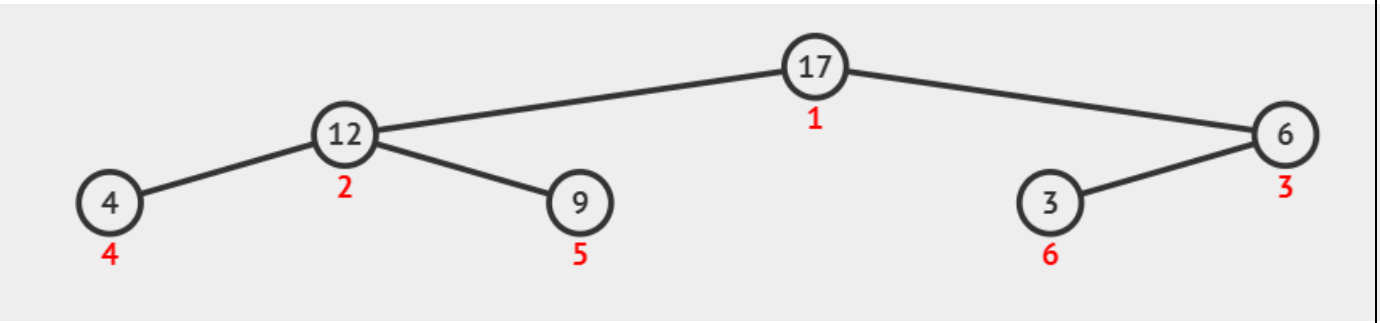
https://github.com/veejask-41/210554M-CS-2023-Data_Structures_And_Algorithms/blob/main/week%2008/lab%2008/heap.cpp

Terminal output:

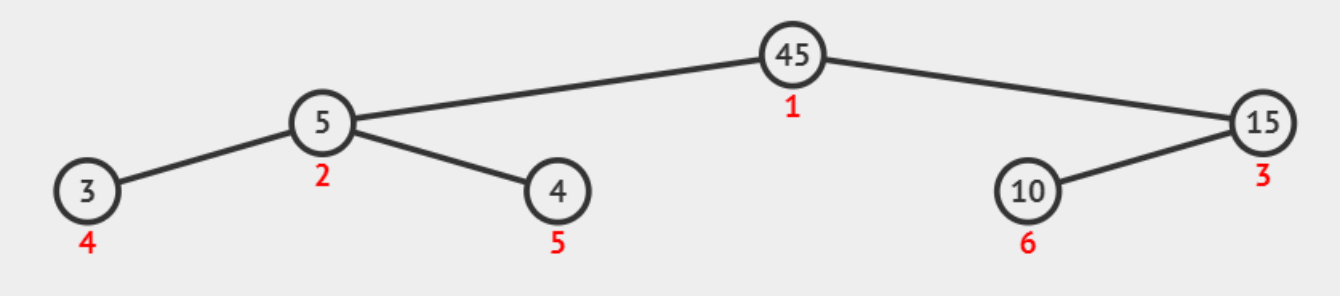
```
PS C:\Users\sajee> cd "c:\Users\sajee\OneDrive - University of Moratuwa\Academics\2nd Sem\CS2023 - DSA\3 - lecs&labs\w
}
Input array
4 17 3 12 9 6
Sorted array
3 4 6 9 12 17
PS C:\Users\sajee\OneDrive - University of Moratuwa\Academics\2nd Sem\CS2023 - DSA\3 - lecs&labs\week 08\lab 08> cd "c
23 - DSA\3 - lecs&labs\week 08\lab 08\" ; if ($?) { g++ heap.cpp -o heap } ; if ($?) { .\heap }
Input array
10 3 15 5 4 45
Sorted array
3 4 5 10 15 45
PS C:\Users\sajee\OneDrive - University of Moratuwa\Academics\2nd Sem\CS2023 - DSA\3 - lecs&labs\week 08\lab 08> cd "c
23 - DSA\3 - lecs&labs\week 08\lab 08\" ; if ($?) { g++ heap.cpp -o heap } ; if ($?) { .\heap }
Input array
12 11 13 5 6 7
Sorted array
5 6 7 11 12 13
PS C:\Users\sajee\OneDrive - University of Moratuwa\Academics\2nd Sem\CS2023 - DSA\3 - lecs&labs\week 08\lab 08>
```

Max-heap visualization:

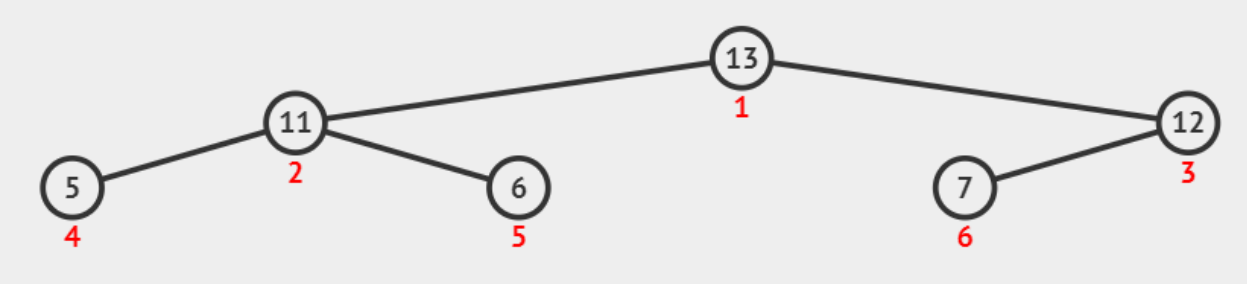
Input – 4,17,3,12,9,6



Input – 10,3,15,5,4,45



Input – 12,11,13,5,6,7



Discussion:

Heap sort uses comparison method for sorting. It builds a binary heap from the input array in order to be sorted. The heapify operation takes O(logn) time complexity for an n sized input array. And we do it n times for each element from the input array. So the time complexity of the heap sort will be like this,

- Best case: O(nlogn)
- Average case: O(nlogn)
- Worst case: O(nlogn)