

Deletion in Heap

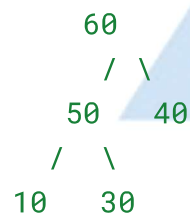
In **Heap Deletion**, we always delete the **root element** (Max element in Max Heap, Min element in Min Heap).

Steps:

1. Replace the root with the **last element** in the heap.
2. Remove the last element.
3. Perform **Heapify Down (Bubble Down)** to restore heap property.

Example 1: Max Heap Deletion

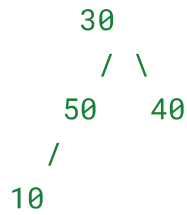
Heap:



Array Representation: [60, 50, 40, 10, 30]

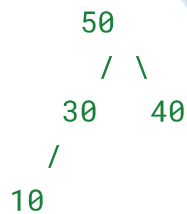
Step 1: Delete Root (60)

- Replace **60** with last element **30**.
- New Array: [30, 50, 40, 10]



Step 2: Heapify Down

- Compare 30 with children (50 and 40).
- Largest child = 50 → Swap 30 and 50.

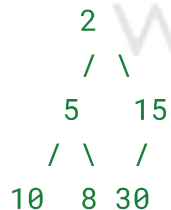


- Compare 30 with child 10 → No swap needed.

Final Heap after deletion: [50, 30, 40, 10]

Example 2: Min Heap Deletion

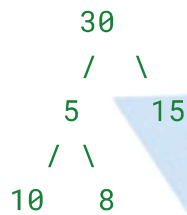
Heap:



Array Representation: [2, 5, 15, 10, 8, 30]

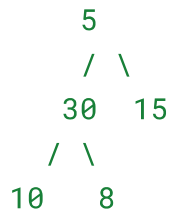
Step 1: Delete Root (2)

- Replace 2 with last element 30.
- New Array: [30, 5, 15, 10, 8]



Step 2: Heapify Down

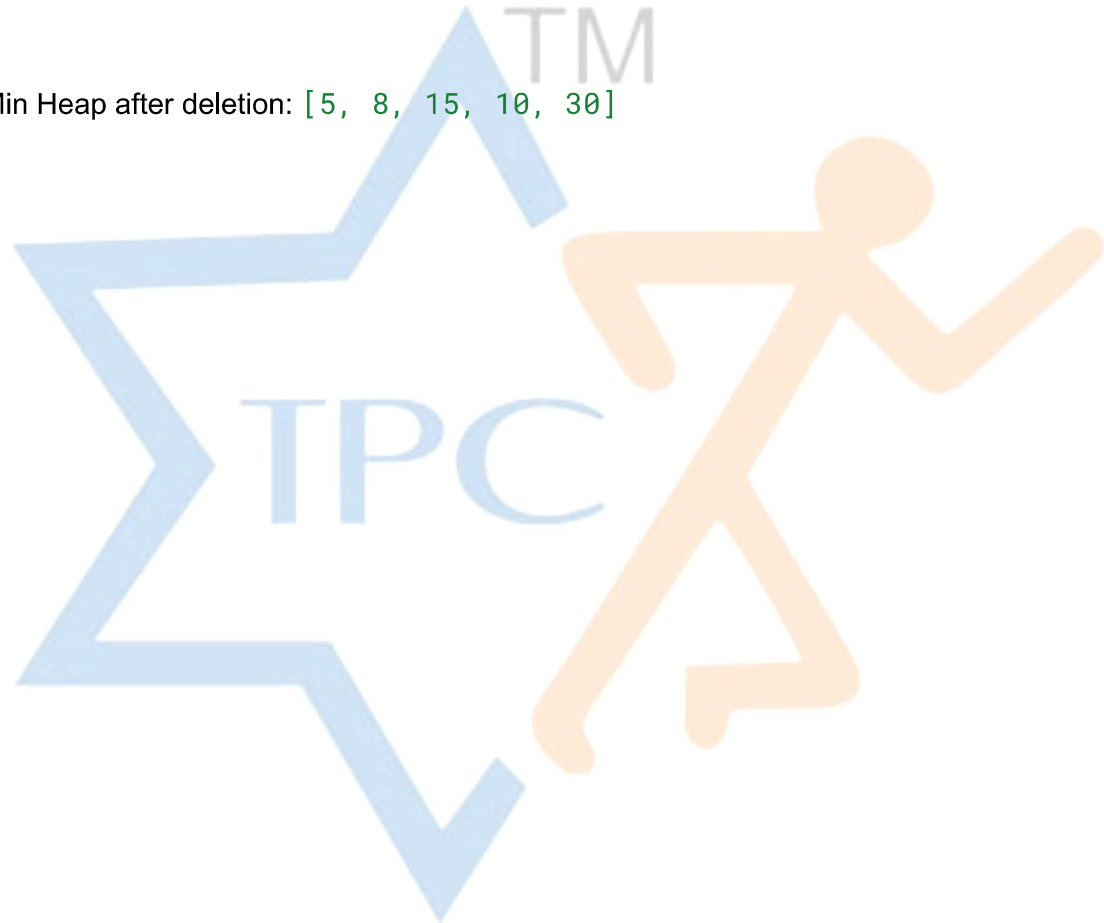
- Compare 30 with children (5 and 15).
- Smallest child = 5 → Swap 30 and 5.



- Compare 30 with children (10, 8).
- Smallest child = 8 → Swap 30 and 8.

```
    5
   / \
  8   15
 / \
10  30
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Final Min Heap after deletion: [5, 8, 15, 10, 30]



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