



Max Heap: Introduction

This lesson will give a brief introduction to Max-Heaps and how their elements are inserted or removed from Max-Heaps.

We'll cover the following



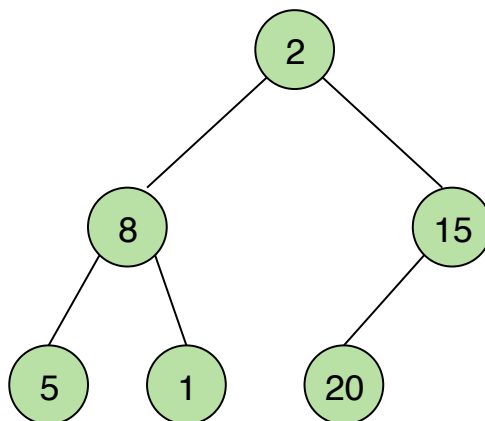
- Building a Max-Heap
- Insertion in a Max-Heap
- Remove Maximum in a Max Heap

Building a Max-Heap#

As mentioned in the previous lesson, max heaps follow the max heap property which means that the key at the parent node is always greater than the keys at the child nodes. Heaps can be implemented using lists or using node and tree classes. Although they are generally implemented using lists or arrays as that is the more space-efficient approach! To build a heap, start with an empty one and successively `insert()` all the elements.

For a visual demonstration of heap creation, check out the following illustration.



Build Max-Heap!

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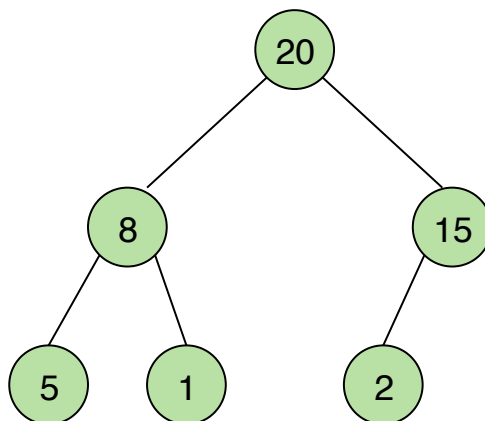
Insertion in a Max-Heap#

Here is a high-level description of the algorithm to insert elements into a heap and maintain the heap property.

- Create a new child node at the end of the heap
- Place the new key at that node
- Then, restore the heap property by swapping parent and child values if the parent key is smaller than the child key. We call this ‘percolating up’.
- Continue to percolate up until the heap property is restored.

For a clearer picture, here’s a visual representation of inserting in a max heap,



Insert 30!

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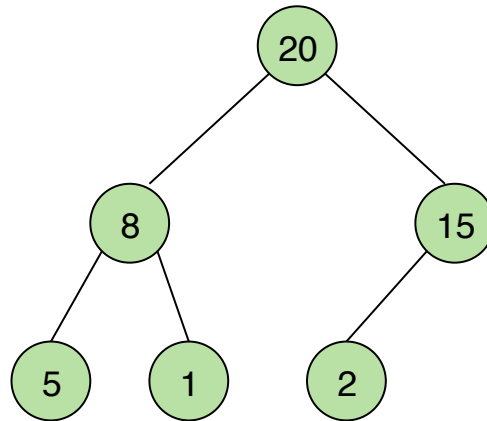
Remove Maximum in a Max Heap#

Here is the algorithm that you will follow to make sure the heap property still holds after deleting the root element

- Delete the root node
- Move the key of last child node at the last level to the root
- Now compare the key with its children and if the key is smaller than the key at any of the child nodes, swap values. We call this 'max heapifying.'
- Continue to max heapify until the heap property is restored.

For better understanding, here's the visual representation of what we just said:



Delete 20!

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What is a Heap?

Max Heap (Implementation)

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