

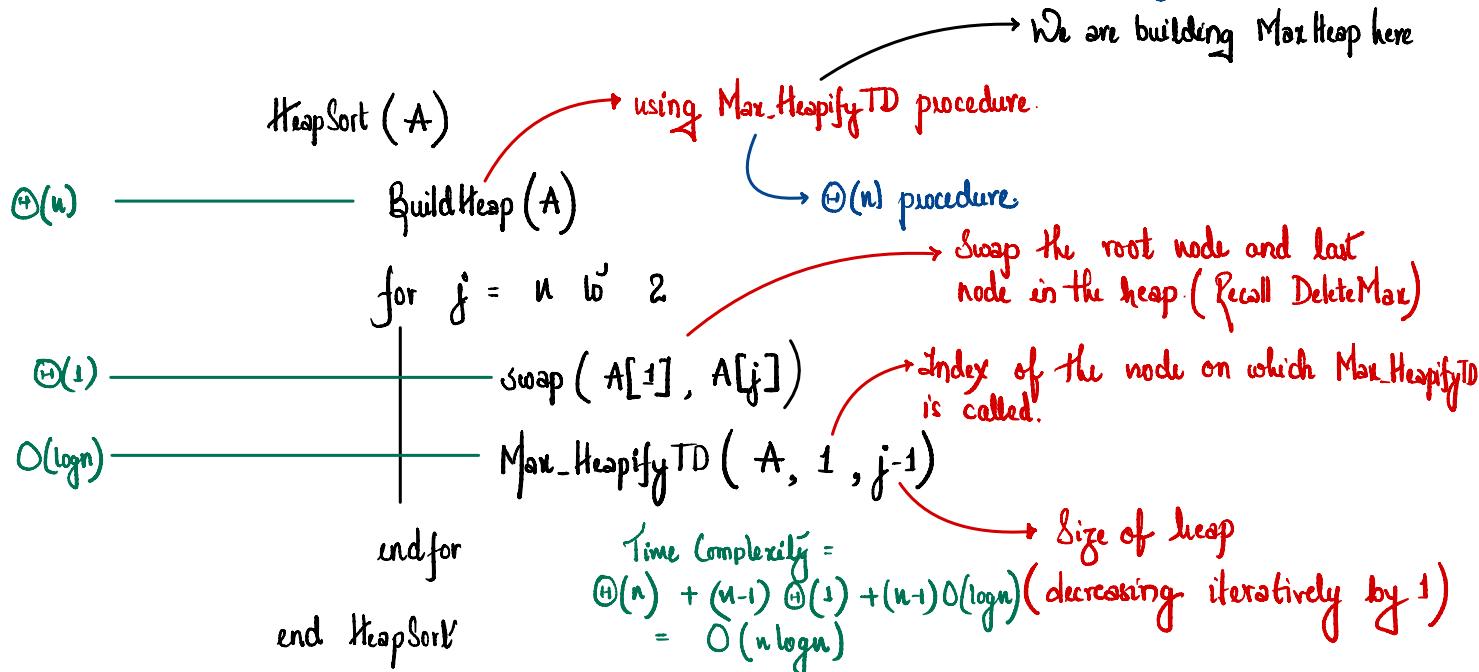
## Heap Sort

Given:

An array A

Output:

A sorted Array (increasing order) without loss of generality



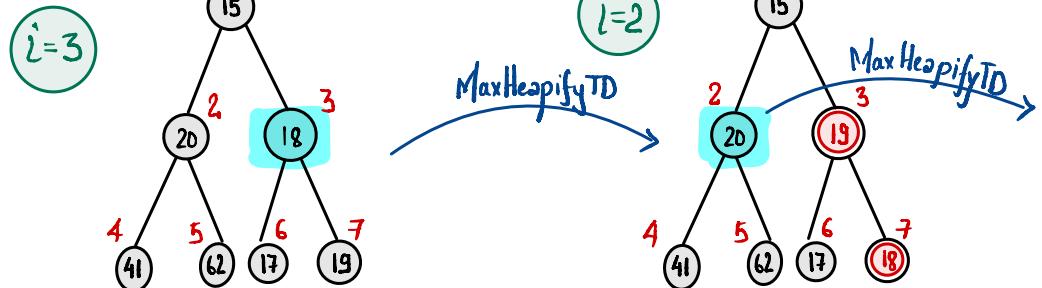
Example:-

Given an array  $A = \{15, 20, 18, 41, 62, 17, 19\}$

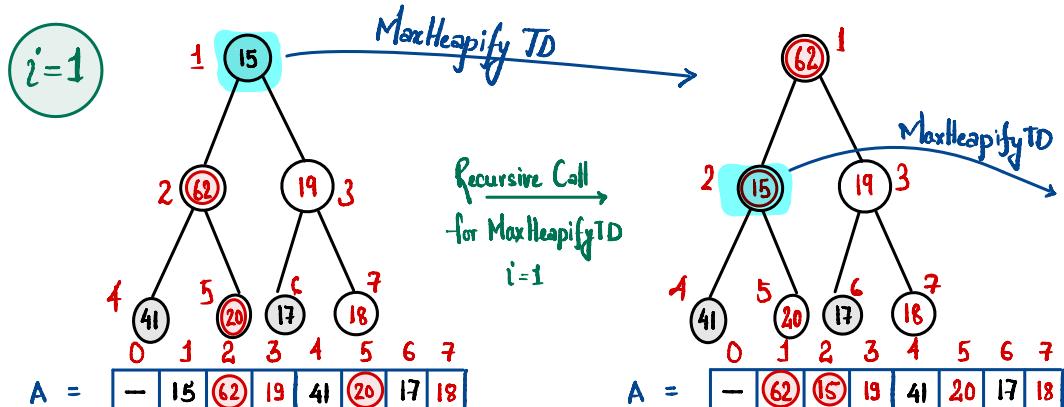
A =	0	1	2	3	4	5	6	7
	- 15	20	18	41	62	17	19	

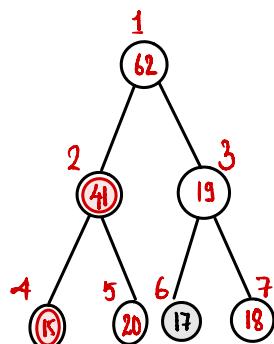
Build Heap :-

$$\text{for } i = \left\lfloor \frac{n}{2} \right\rfloor = \left\lfloor \frac{7}{2} \right\rfloor = 3$$



A =	0	1	2	3	4	5	6	7
	- 15	20	18	41	62	17	19	





$A = \begin{array}{cccccccc} 0 & 1 & 2 & 3 & 4 & 5 & 6 & 7 \\ - & 62 & 41 & 19 & 15 & 20 & 17 & 18 \end{array}$

for  $j = n$  to 2 :

$j = 7$

$A = \begin{array}{cccccccc} 0 & 1 & 2 & 3 & 4 & 5 & 6 & 7 \\ - & 62 & 41 & 19 & 15 & 20 & 17 & 18 \end{array}$

$A = \begin{array}{cccccccc} 0 & 1 & 2 & 3 & 4 & 5 & 6 & 7 \\ - & 18 & 41 & 19 & 15 & 20 & 17 & 62 \end{array}$

$\downarrow \text{MaxHeapify TD}(A, 1, 6)$

$A = \begin{array}{cccccccc} 0 & 1 & 2 & 3 & 4 & 5 & 6 & 7 \\ - & 41 & 20 & 19 & 15 & 18 & 17 & 62 \end{array}$

$A = \begin{array}{cccccccc} 0 & 1 & 2 & 3 & 4 & 5 & 6 & 7 \\ - & 17 & 20 & 19 & 15 & 18 & 41 & 62 \end{array}$

$\downarrow \text{MaxHeapify TD}(A, 1, 5)$

$A = \begin{array}{cccccccc} 0 & 1 & 2 & 3 & 4 & 5 & 6 & 7 \\ - & 20 & 18 & 19 & 15 & 17 & 41 & 62 \end{array}$

$A = \begin{array}{cccccccc} 0 & 1 & 2 & 3 & 4 & 5 & 6 & 7 \\ - & 17 & 18 & 19 & 15 & 20 & 41 & 62 \end{array}$

$\downarrow \text{MaxHeapify TD}(A, 1, 4)$

$A = \begin{array}{cccccccc} 0 & 1 & 2 & 3 & 4 & 5 & 6 & 7 \\ - & 19 & 18 & 17 & 15 & 20 & 41 & 62 \end{array}$

$A = \begin{array}{cccccccc} 0 & 1 & 2 & 3 & 4 & 5 & 6 & 7 \\ - & 15 & 18 & 17 & 19 & 20 & 41 & 62 \end{array}$

$\downarrow \text{MaxHeapify TD}(A, 1, 3)$

$A = \begin{array}{cccccccc} 0 & 1 & 2 & 3 & 4 & 5 & 6 & 7 \\ - & 18 & 15 & 17 & 19 & 20 & 41 & 62 \end{array}$

$j = 5$

$j = 4$

j=3

A =	0	1	2	3	4	5	6	7
	-	17	15	18	19	20	41	62

↓ MaxHeapify(A, 1, 2)

A =	0	1	2	3	4	5	6	7
	-	17	15	18	19	20	41	62

j=2

A =	0	1	2	3	4	5	6	7
	-	15	17	18	19	20	41	62

↓ MaxHeapify(A, 1, 1)

A =	0	1	2	3	4	5	6	7
	-	15	17	18	19	20	41	62