

Naive Heap Sort

Heap sorting N items:

- Insert all items into a max heap, and discard input array. Create output array.
- Repeat N times:
 - Delete largest item from the max heap.
 - Put largest item at the end of the unused part of the output array.

Input:

32	15	2	17	19	26	41	17	17
----	----	---	----	----	----	----	----	----

Naive Heap Sort: Phase 1: Heap Creation

Heap sorting N items:

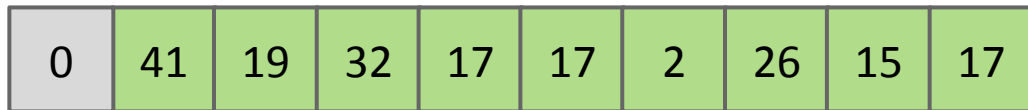
- **Insert all items into a max heap**, and discard input array. Create output array.

Input:

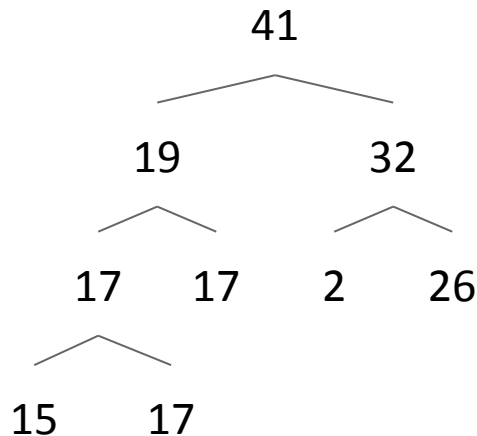


(Recall our heap implementation left position 0 unused)

Heap:



Size: 9



Naive Heap Sort: Phase 1: Heap Creation

Heap sorting N items:

- **Insert all items into a max heap**, and discard input array. Create output array.
- **Test your understanding: What is the runtime to complete this step?**

Input:

32	15	2	17	19	26	41	17	17
----	----	---	----	----	----	----	----	----

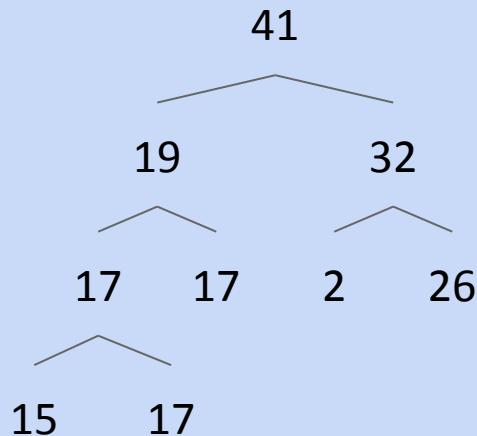


(Recall our heap implementation left position 0 unused)

Heap:

0	41	19	32	17	17	2	26	15	17
---	----	----	----	----	----	---	----	----	----

Size: 9

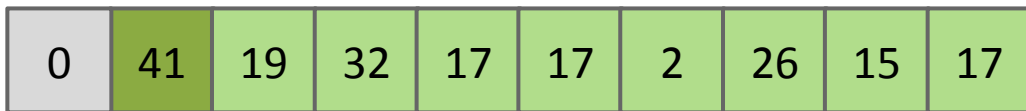


Naive Heap Sort: Phase 2: Heap Deletion

Heap sorting N items:

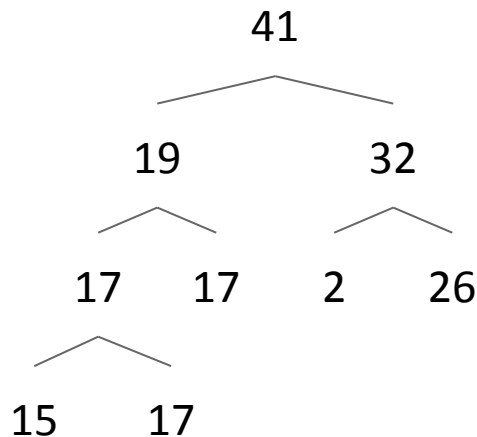
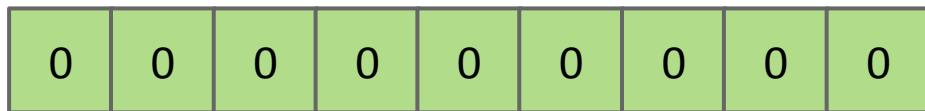
- Insert all items into a max heap, and discard input array. Create output array.
- Repeat N times:
 - Delete largest item from the max heap.
 - Put largest item at the end of the unused part of the output array.

Heap:



Size: 9

Output:

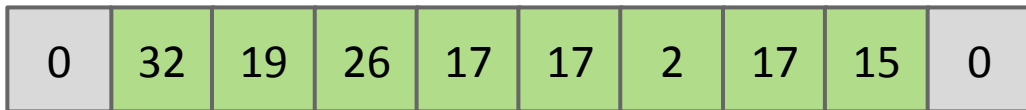


Naive Heap Sort: Phase 2: Heap Deletion

Heap sorting N items:

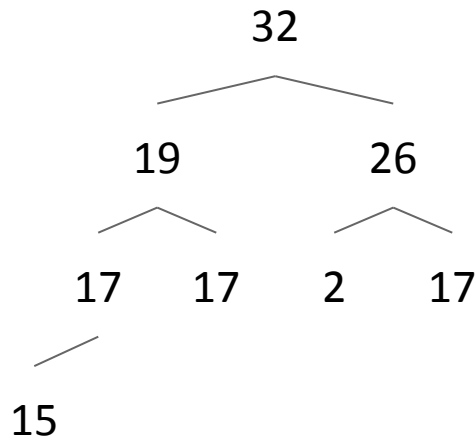
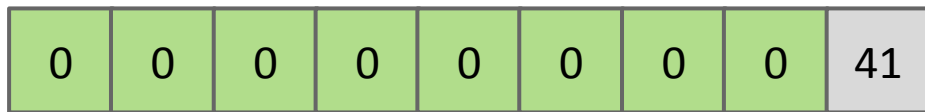
- Insert all items into a max heap, and discard input array. Create output array.
- Repeat N times:
 - **Delete largest item from the max heap.**
 - **Put deleted item at the end of the unused part of the output array.**

Heap:



Size: 8

Output:

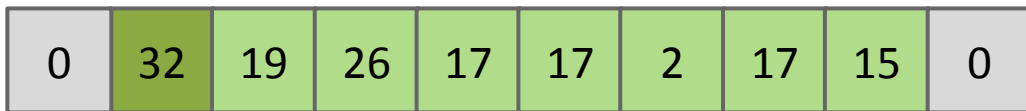


Naive Heap Sort: Phase 2: Heap Deletion

Heap sorting N items:

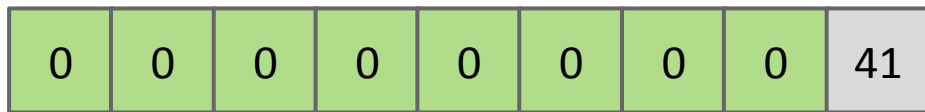
- Insert all items into a max heap, and discard input array. Create output array.
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 - Delete largest item from the max heap.
 - Put deleted item at the end of the unused part of the output array.

Heap:

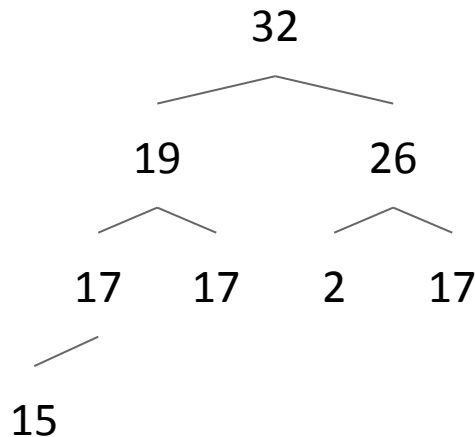


Size: 8

Output:

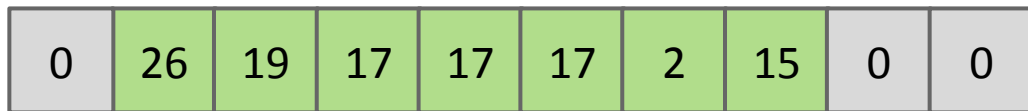


sorted



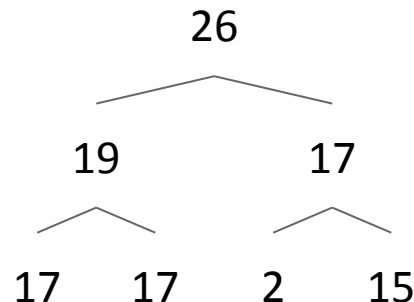
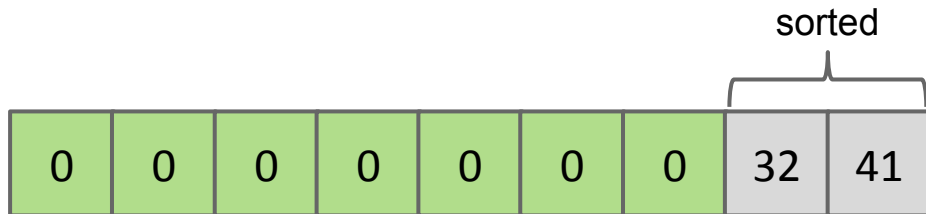
- Insert all items into a max heap, and discard input array. Create output array.
- Repeat N times:
 - **Delete largest item from the max heap.**
 - **Put deleted item at the end of the unused part of the output array.**

Heap:



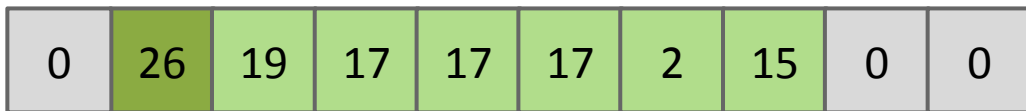
Size: 7

Output:



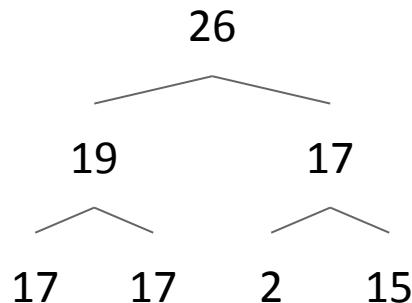
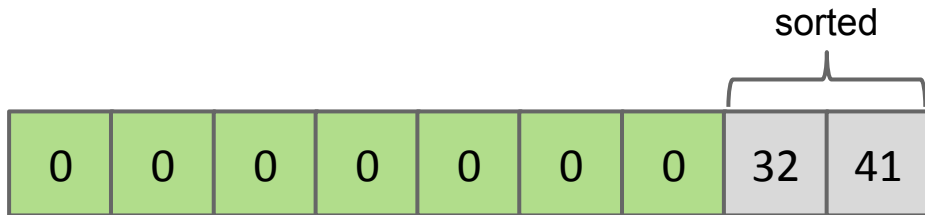
- Insert all items into a max heap, and discard input array. Create output array.
- Repeat N times:
 - Delete largest item from the max heap.
 - Put deleted item at the end of the unused part of the output array.

Heap:



Size: 7

Output:

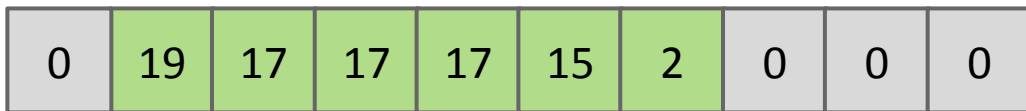


Naive Heap Sort: Phase 2: Heap Deletion

Heap sorting N items:

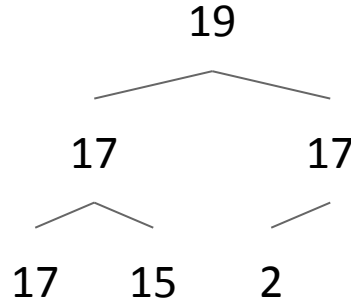
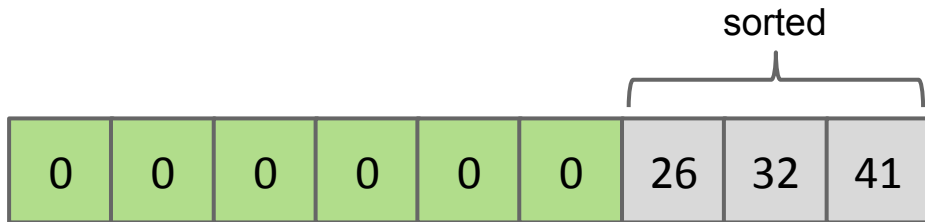
- Insert all items into a max heap, and discard input array. Create output array.
- Repeat N times:
 - **Delete largest item from the max heap.**
 - **Put deleted item at the end of the unused part of the output array.**

Heap:



Size: 6

Output:

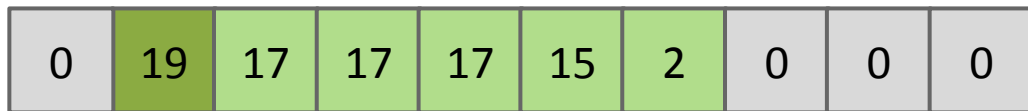


Naive Heap Sort: Phase 2: Heap Deletion

Heap sorting N items:

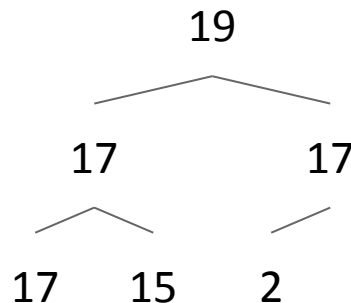
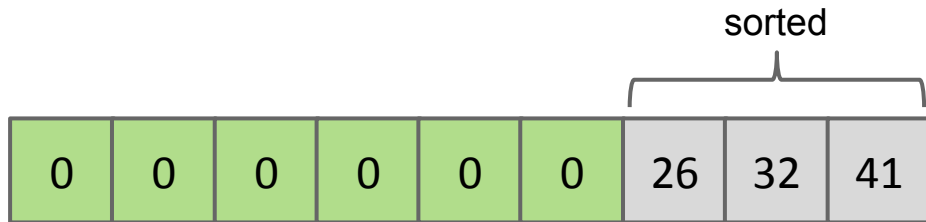
- Insert all items into a max heap, and discard input array. Create output array.
- Repeat N times:
 - Delete largest item from the max heap.
 - Put deleted item at the end of the unused part of the output array.

Heap:



Size: 6

Output:

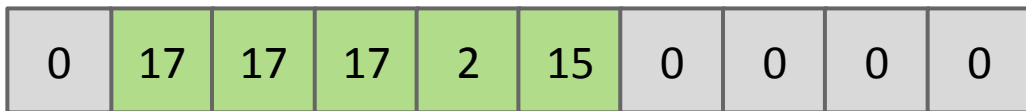


Naive Heap Sort: Phase 2: Heap Deletion

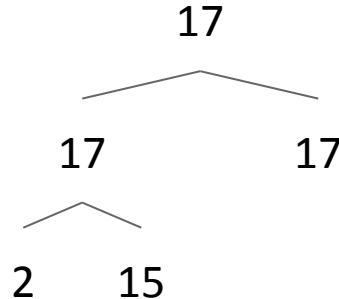
Heap sorting N items:

- Insert all items into a max heap, and discard input array. Create output array.
- Repeat N times:
 - **Delete largest item from the max heap.**
 - **Put deleted item at the end of the unused part of the output array.**

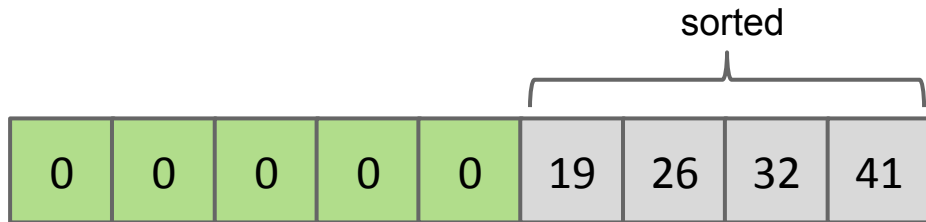
Heap:



Size: 5



Output:

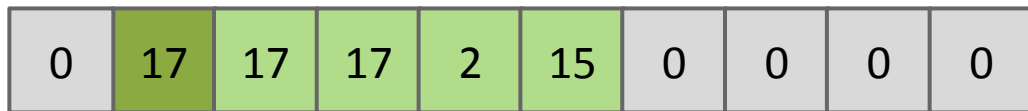


Naive Heap Sort: Phase 2: Heap Deletion

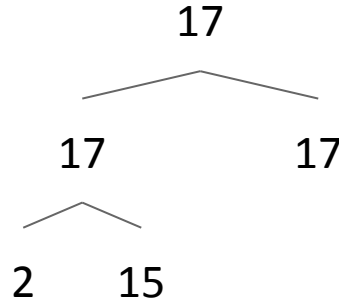
Heap sorting N items:

- Insert all items into a max heap, and discard input array. Create output array.
- Repeat N times:
 - Delete largest item from the max heap.
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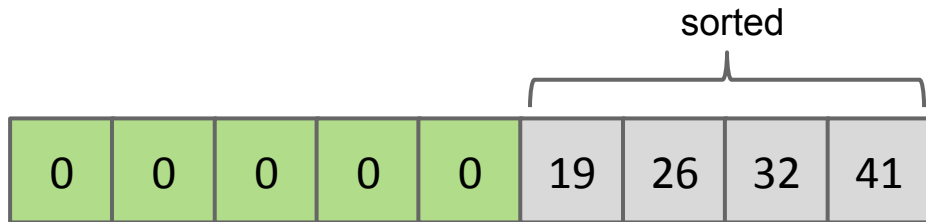
Heap:



Size: 5



Output:

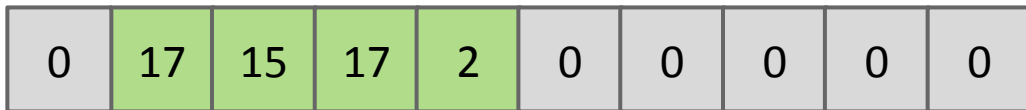


Naive Heap Sort: Phase 2: Heap Deletion

Heap sorting N items:

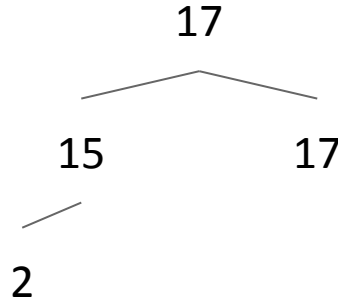
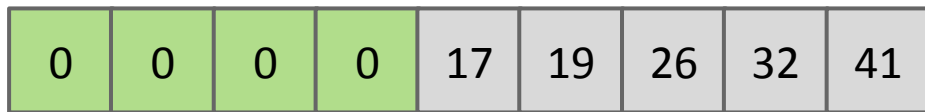
- Insert all items into a max heap, and discard input array. Create output array.
- Repeat N times:
 - **Delete largest item from the max heap.**
 - **Put deleted item at the end of the unused part of the output array.**

Heap:



Size: 4

Output:

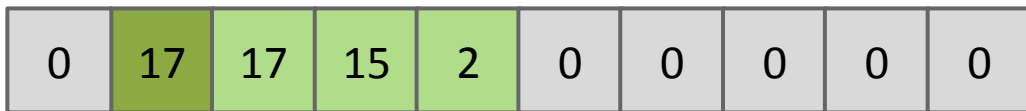


Naive Heap Sort: Phase 2: Heap Deletion

Heap sorting N items:

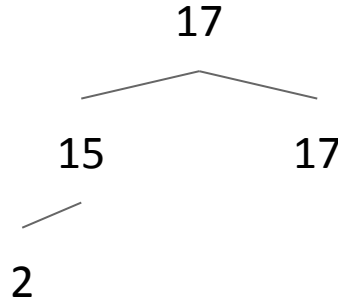
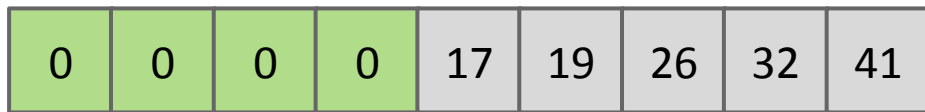
- Insert all items into a max heap, and discard input array. Create output array.
- Repeat N times:
 - Delete largest item from the max heap.
 - Put deleted item at the end of the unused part of the output array.

Heap:



Size: 4

Output:



Naive Heap Sort: Phase 2: Heap Deletion

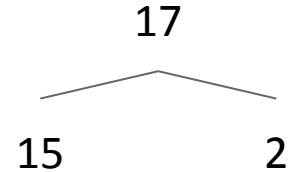
Heap sorting N items:

- Insert all items into a max heap, and discard input array. Create output array.
- **Repeat N times:**
 - **Delete largest item from the max heap.**
 - **Put deleted item at the end of the unused part of the output array.**

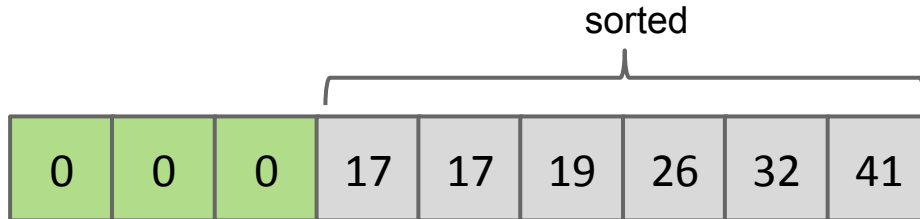
Heap:



Size: 3



Output:

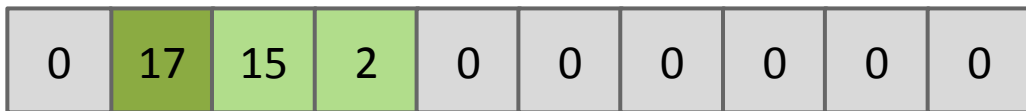


Naive Heap Sort: Phase 2: Heap Deletion

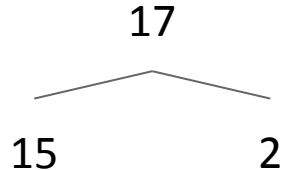
Heap sorting N items:

- Insert all items into a max heap, and discard input array. Create output array.
- Repeat N times:
 - Delete largest item from the max heap.
 - Put deleted item at the end of the unused part of the output array.

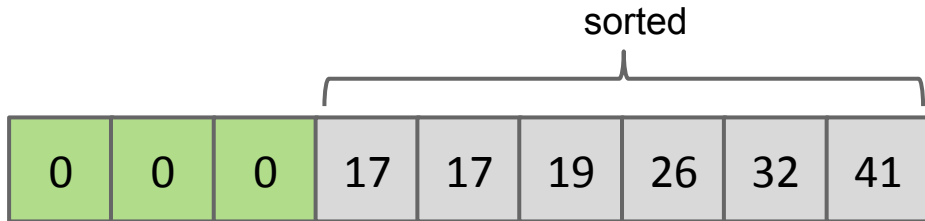
Heap:



Size: 3



Output:



Naive Heap Sort: Phase 2: Heap Deletion

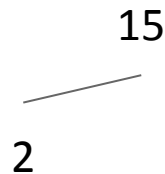
Heap sorting N items:

- Insert all items into a max heap, and discard input array. Create output array.
- Repeat N times:
 - **Delete largest item from the max heap.**
 - **Put deleted item at the end of the unused part of the output array.**

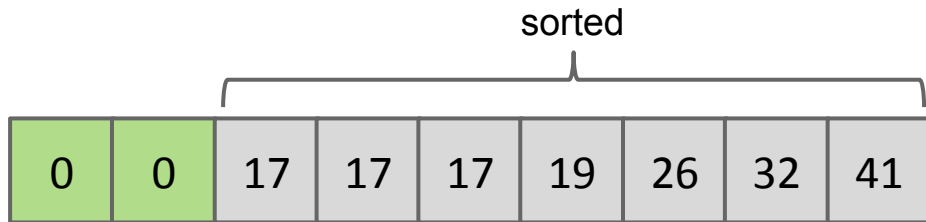
Heap:



Size: 2



Output:

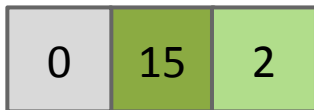


Naive Heap Sort: Phase 2: Heap Deletion

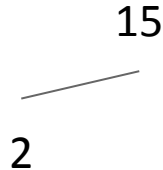
Heap sorting N items:

- Insert all items into a max heap, and discard input array. Create output array.
- Repeat N times:
 - Delete largest item from the max heap.
 - Put deleted item at the end of the unused part of the output array.

Heap:



Size: 2



sorted

Output:



Naive Heap Sort: Phase 2: Heap Deletion

Heap sorting N items:

- Insert all items into a max heap, and discard input array. Create output array.
- Repeat N times:
 - **Delete largest item from the max heap.**
 - **Put deleted item at the end of the unused part of the output array.**

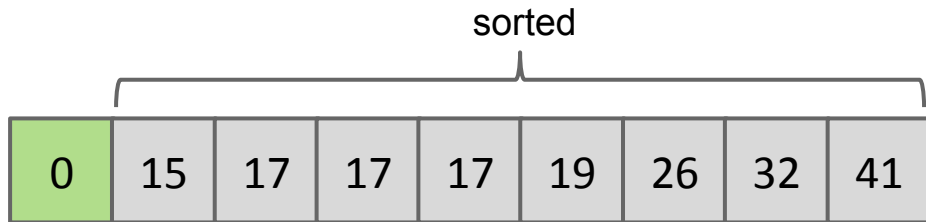
2

Heap:



Size: 1

Output:



Naive Heap Sort: Phase 2: Heap Deletion

Heap sorting N items:

- Insert all items into a max heap, and discard input array. Create output array.
- Repeat N times:
 - Delete largest item from the max heap.
 - Put deleted item at the end of the unused part of the output array.

2

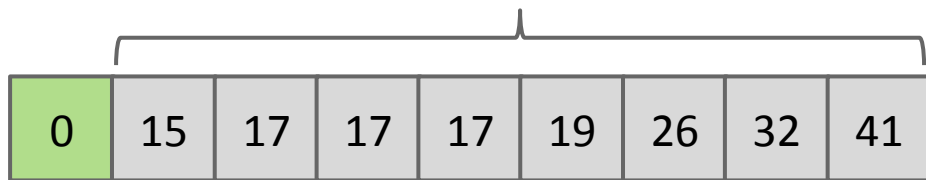
Heap:



Size: 1

sorted

Output:



Naive Heap Sort: Phase 2: Heap Deletion

Heap sorting N items:

- Insert all items into a max heap, and discard input array. Create output array.
- Repeat N times:
 - Delete largest item from the max heap.
 - Put deleted item at the end of the unused part of the output array.

2

Heap:

0	0	0
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Size: 0

sorted

Output:

sorted								
2	15	17	17	17	19	26	32	41