Bir İkili Ağaç Uygulaması

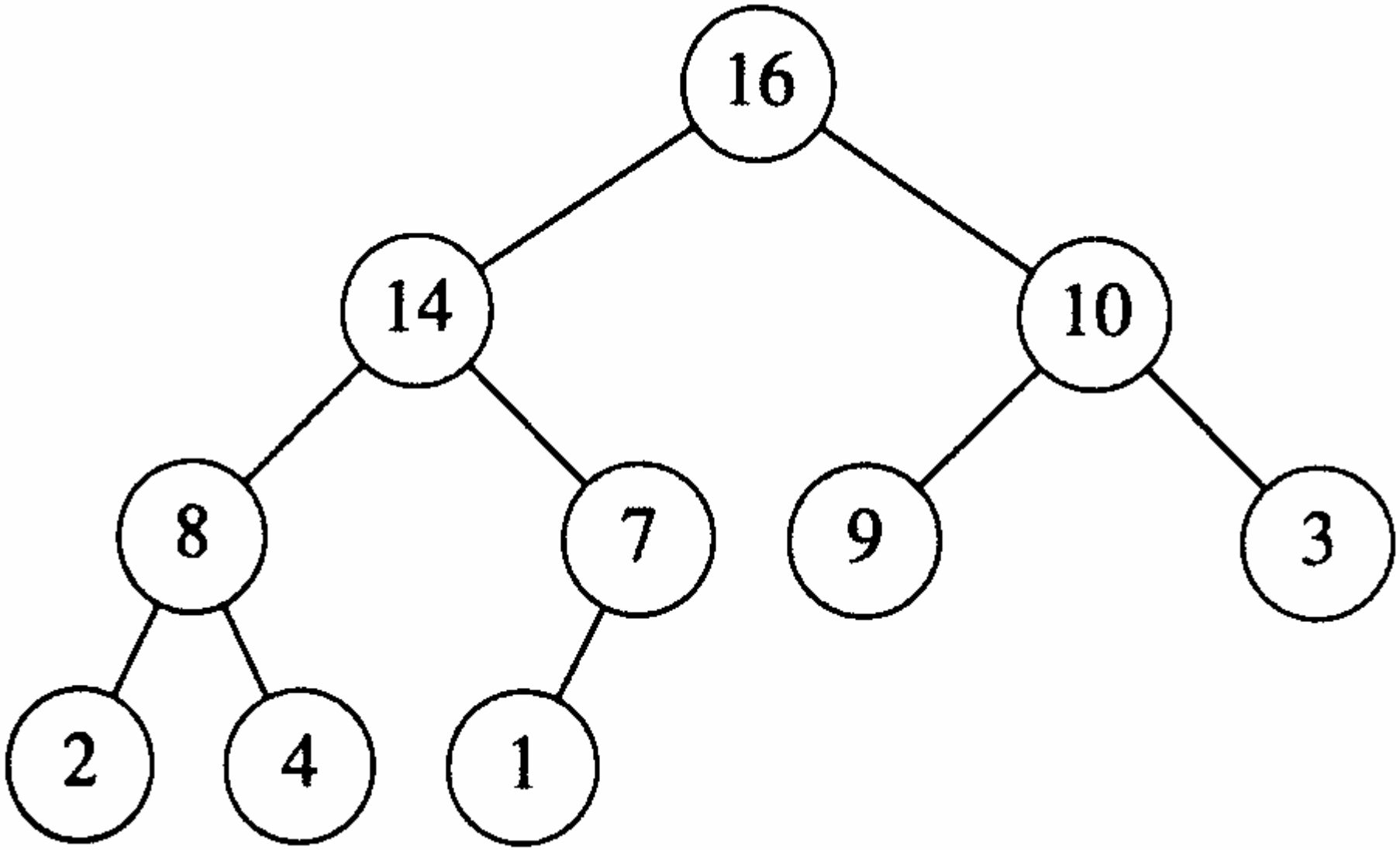
HeapSort

Heap özelliği

- Bir ikili ağacın heap özellikli olabilmesi için aşağıdaki iki özelliği sağlamalıdır.

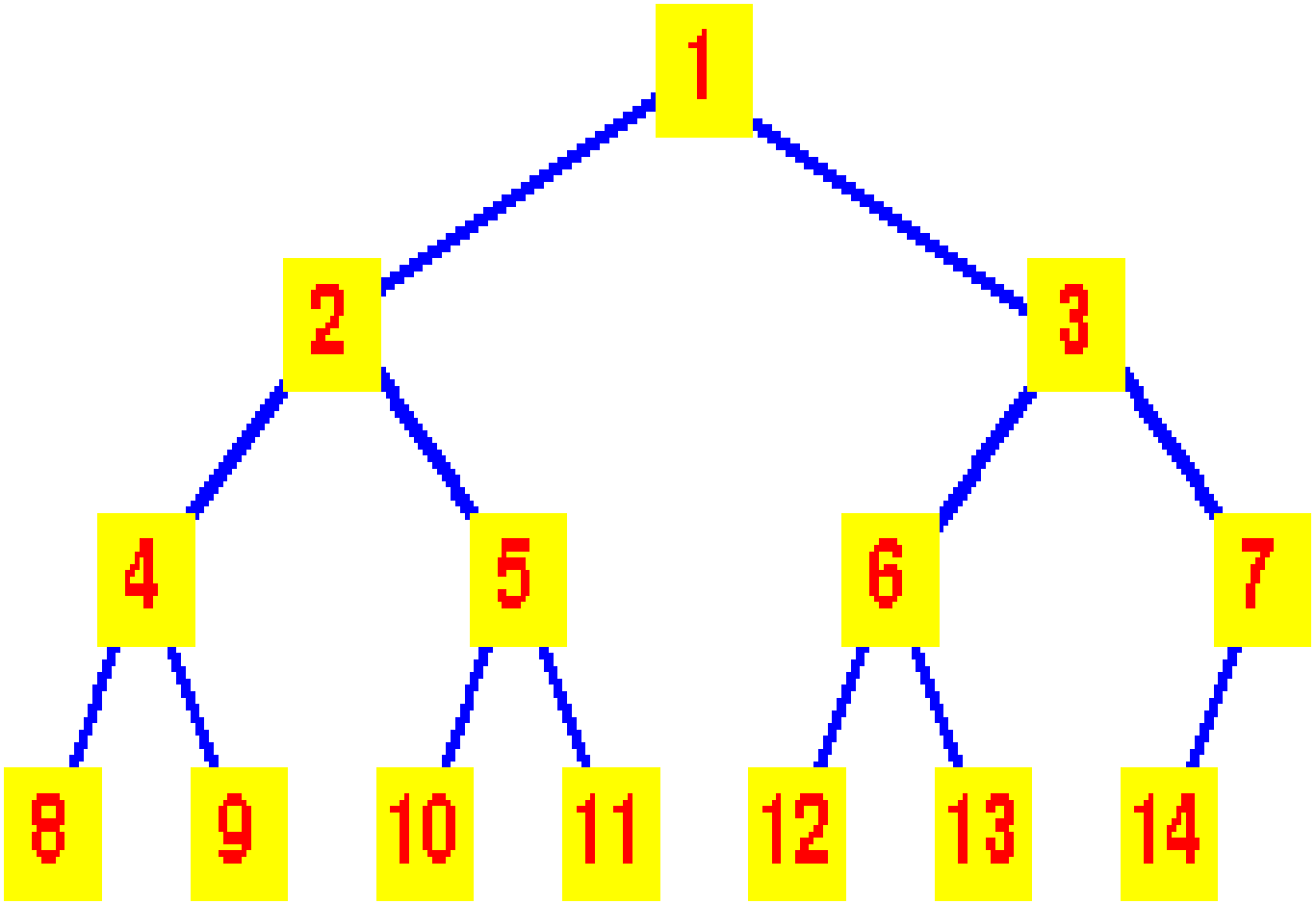
a) Ağacın bütün seviyeleri (yapraklar hariç) doludur. Yani ağaç tam ve dengeli bir ağaçtır.

b) Bir düğüm çocuklarından ya büyüktür yada çocuklarına eşittir.



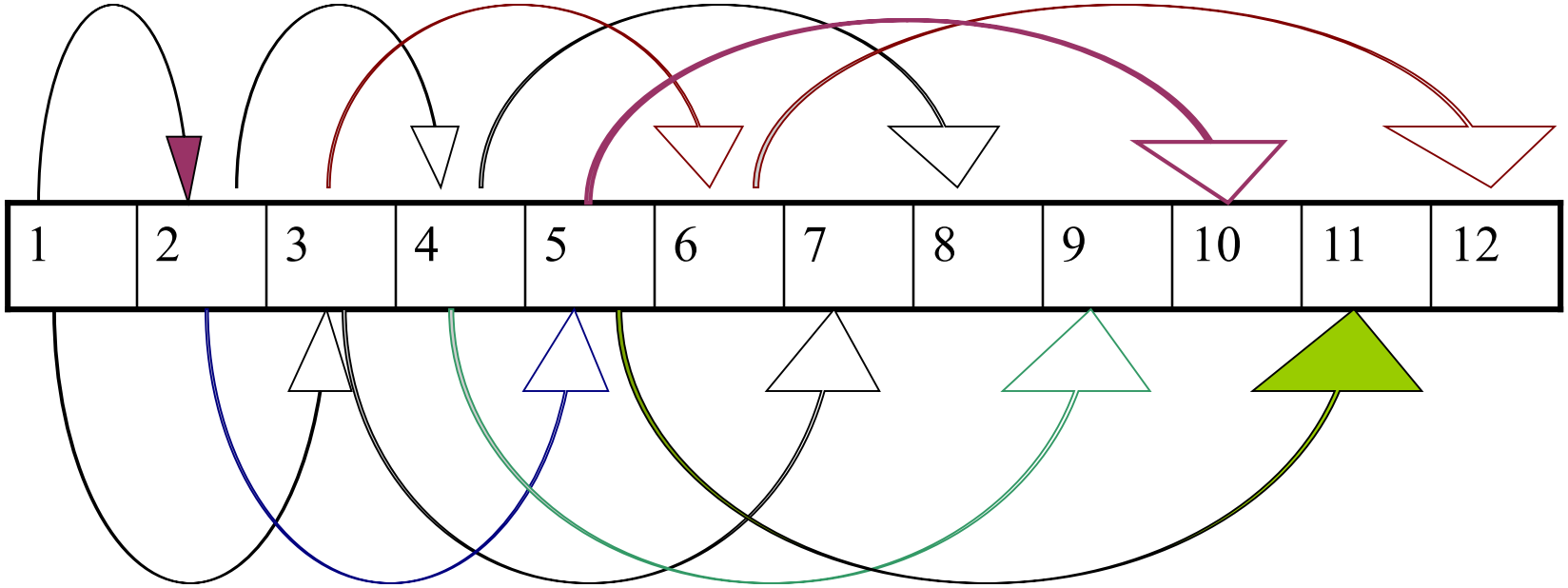
1)Her düğümün içeriği çocuklarından büyüktür.

2)Ağaç tam ikili ağaçtır.



Ağaç tam bir ikili ağaçtır. Ama hiçbir düğüm çocuklarından büyük değildir.

i indisinin sol çocukları 2*i



i indisinin sağ çocukları 2*i+1

Heap üzerindeki temel işlemler

```
int HeapTree::SolCocukIndeks(int dugumIndeks){
    return 2*dugumIndeks + 1;
}
int HeapTree::SagCocukIndeks(int dugumIndeks){
    return 2*dugumIndeks + 2;
}
int HeapTree::EbeveynDugumIndeks(int dugumIndeks){
    return (dugumIndeks-1)/2;
}
```

Heapify (A, i)

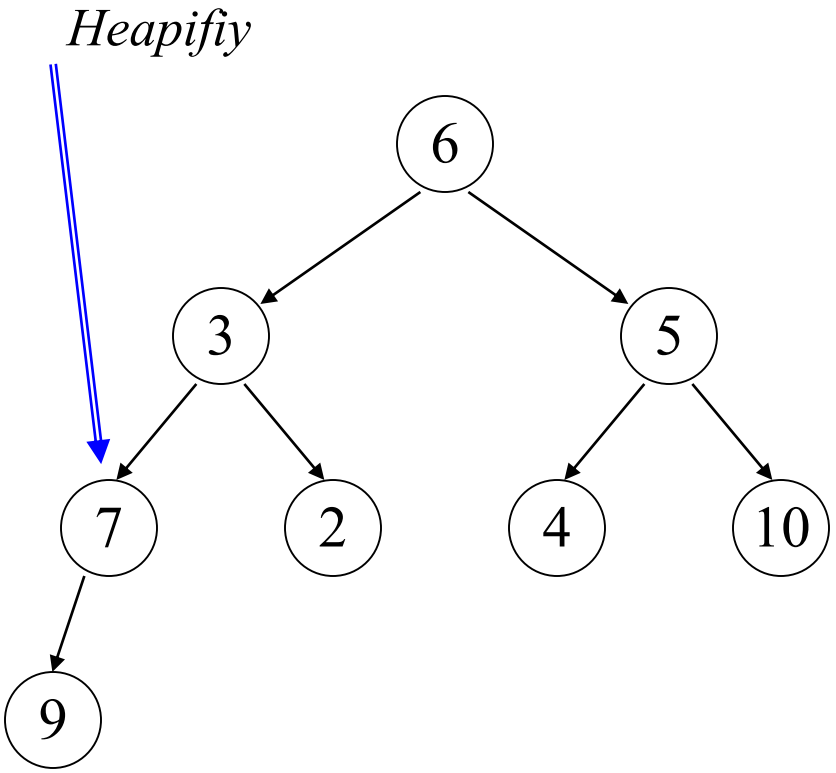
1. $l \leftarrow$ solÇocuk(i)
2. $r \leftarrow$ SağÇocuk(i)
3. if $l \leq$ *heap-size*[A] and $A[l] > A[i]$
4. then max $\leftarrow l$
5. else max $\leftarrow i$
6. if $r \leq$ *heap-size*[A] and $A[r] > A$[max]
7. then max $\leftarrow r$
8. if $max \neq i$
9. then exchange $A[i] \leftrightarrow A$[max]
10. Heapify(A, max)

Build-Heap(A)

1. $heap\text{-}size[A] \leftarrow length[A]$
2. for $i \leftarrow \lfloor length[A]/2 \rfloor$ downto 1
3. do Heapify(A, i)

Bir diziyi heap ağacına dönüştürmek

6	3	5	7	2	4	10	9
0	1	2	3	4	5	6	7

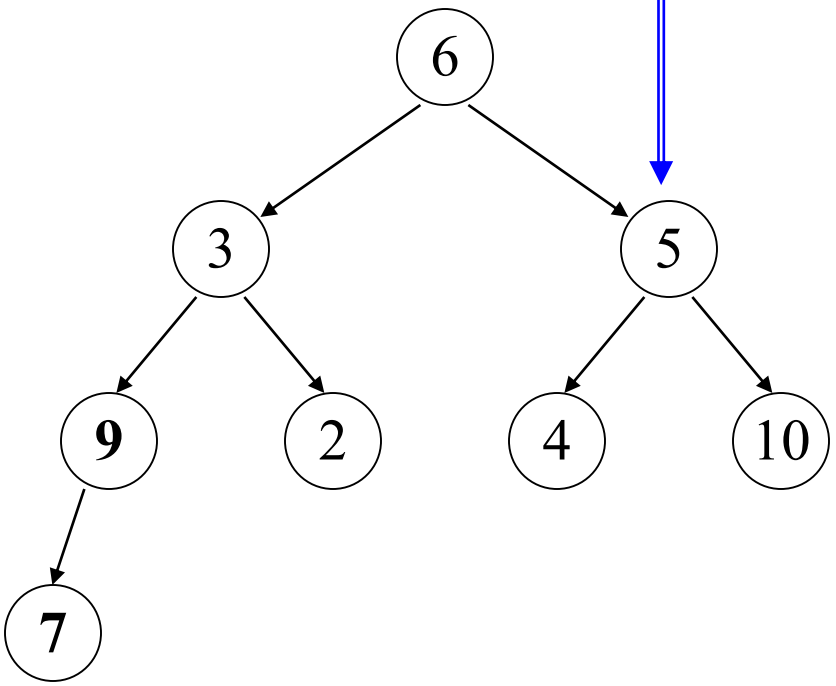


- Yukarıdaki dizi bir ikili ağaca şu şekilde dizilebilir.
- Yapraklar(2, 4, 9 ve 10) heap'tir.

Bir diziyi heap ağacına dönüştürmek

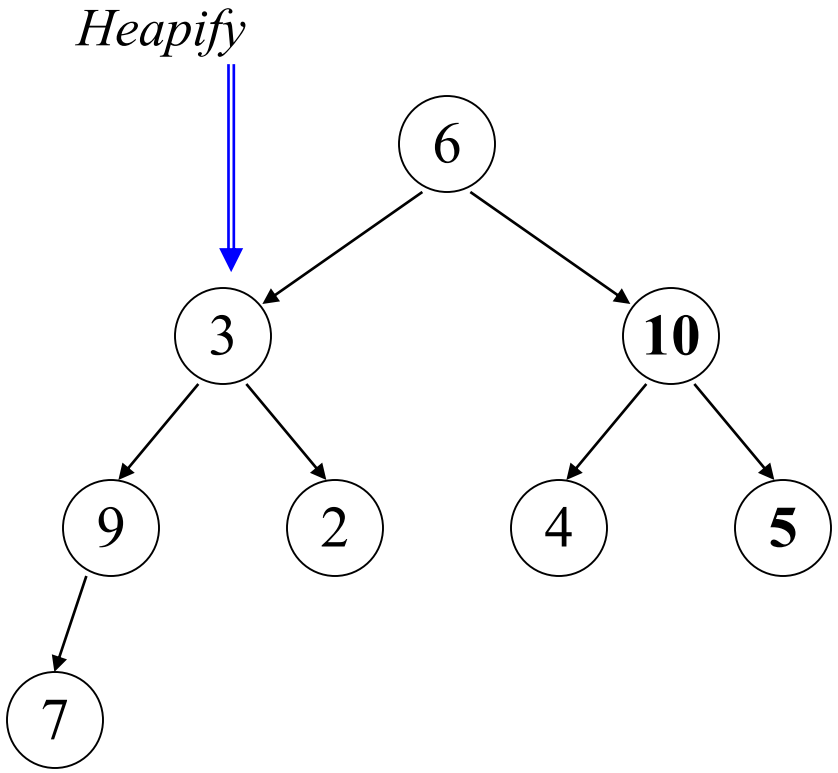
6	3	5	**9**	2	4	10	**7**
0	1	2	3	4	5	6	7

Heapify



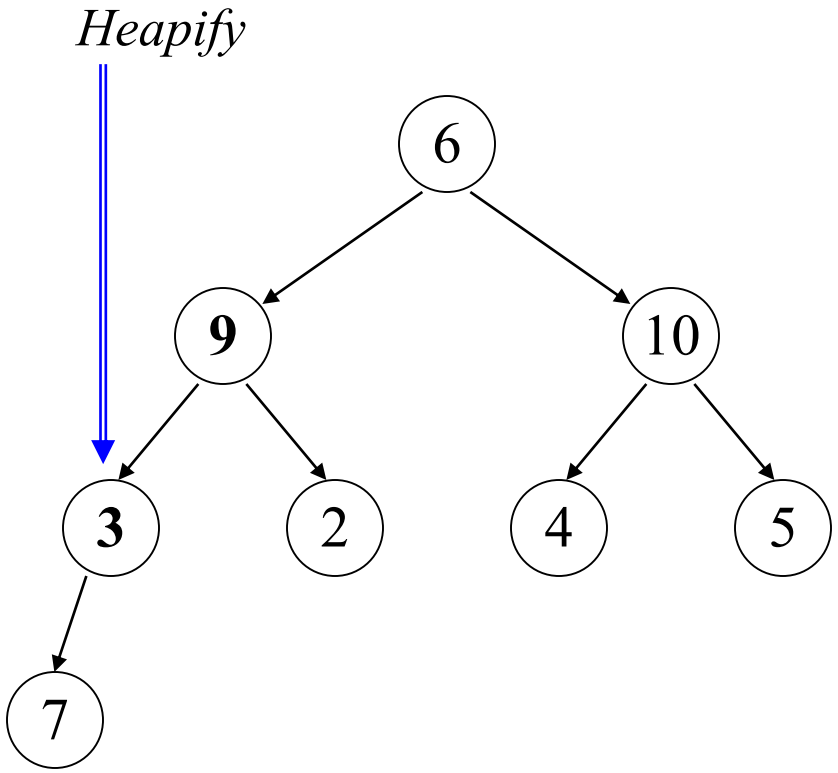
Bir diziyi heap ağacına dönüştürmek

6	3	**10**	9	2	4	**5**	7
0	1	2	3	4	5	6	7



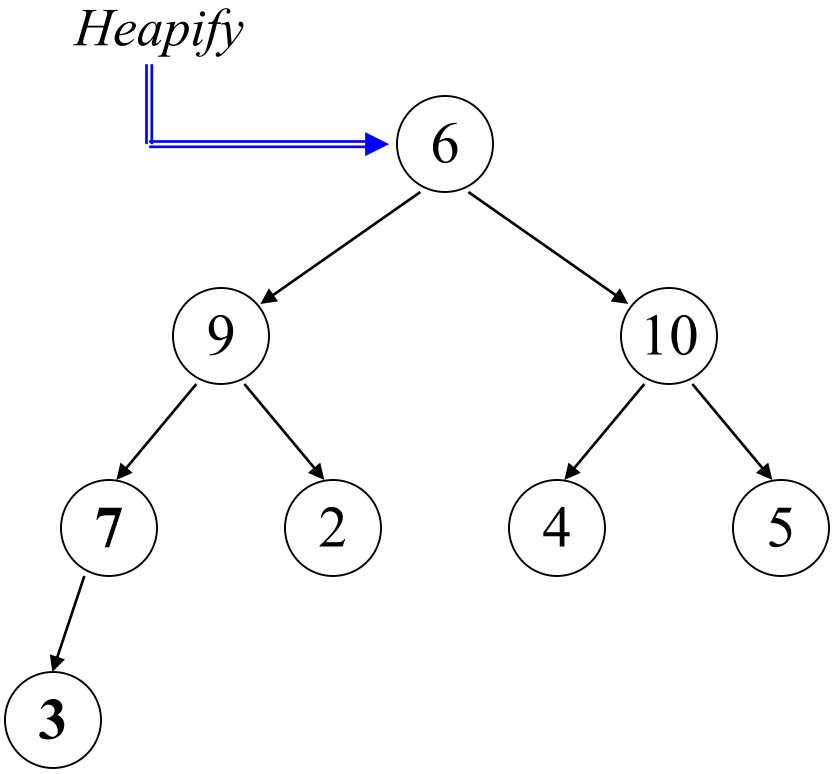
Bir diziyi heap ağacına dönüştürmek

6	**9**	10	**3**	2	4	5	7
0	1	2	3	4	5	6	7



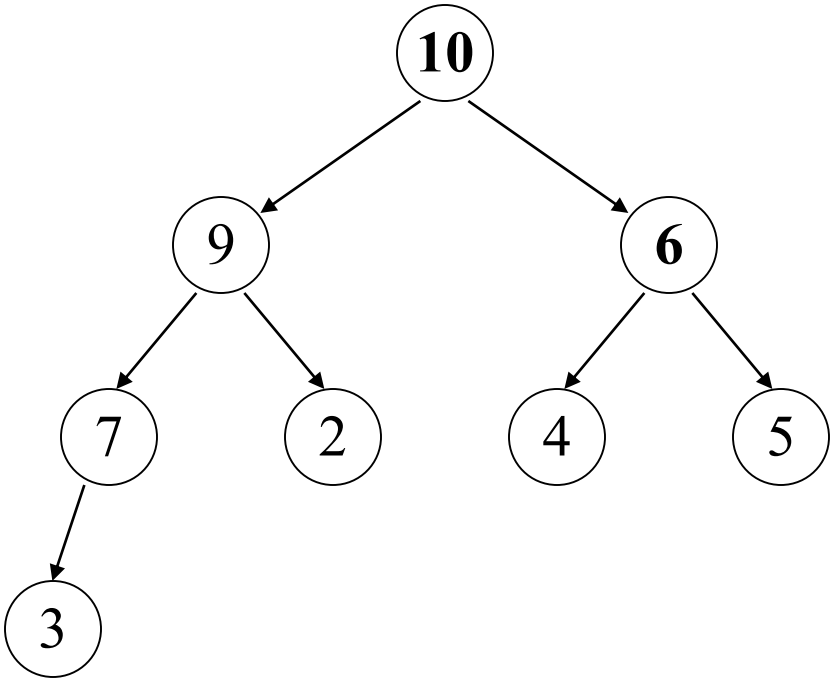
Bir diziyi heap ağacına dönüştürmek

6	9	10	**7**	2	4	5	**3**
0	1	2	3	4	5	6	7



Bir diziyi heap ağacına dönüştürmek

10	9	**6**	7	2	4	5	3
0	1	2	3	4	5	6	7



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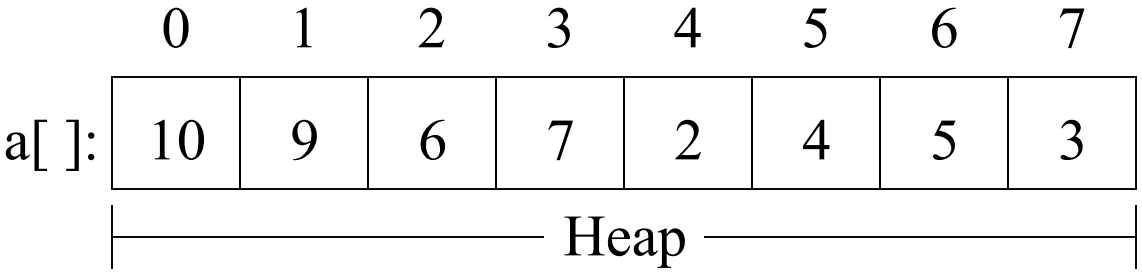

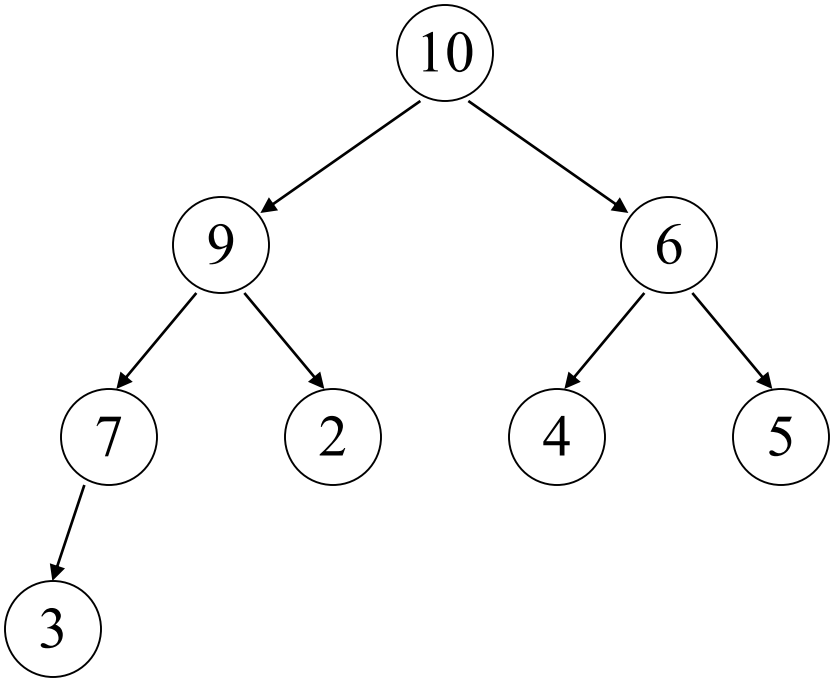

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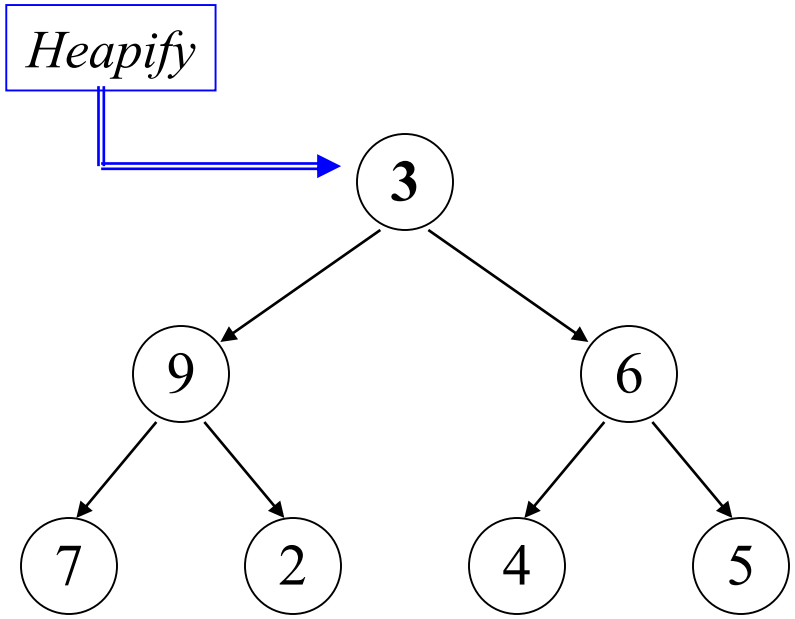

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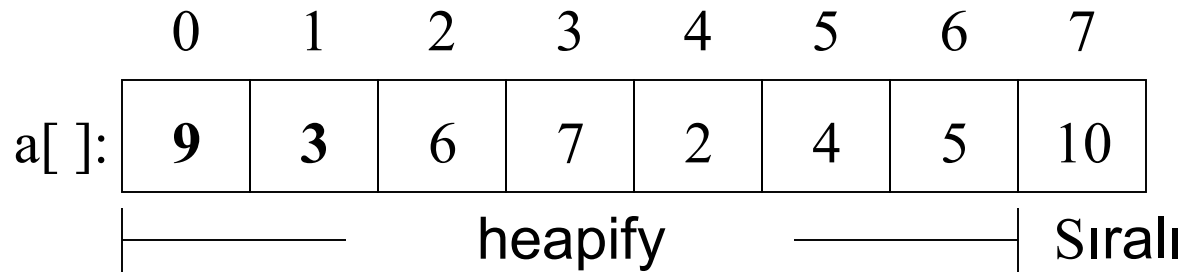

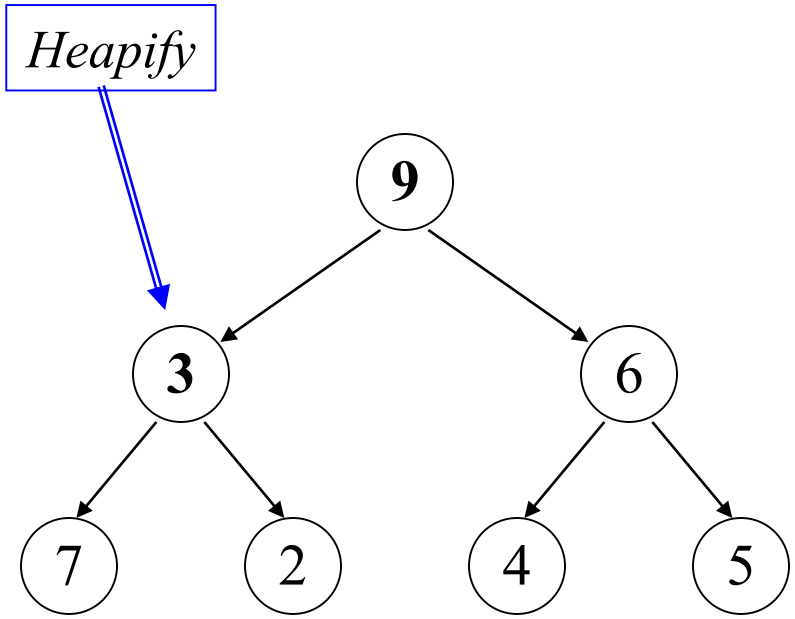

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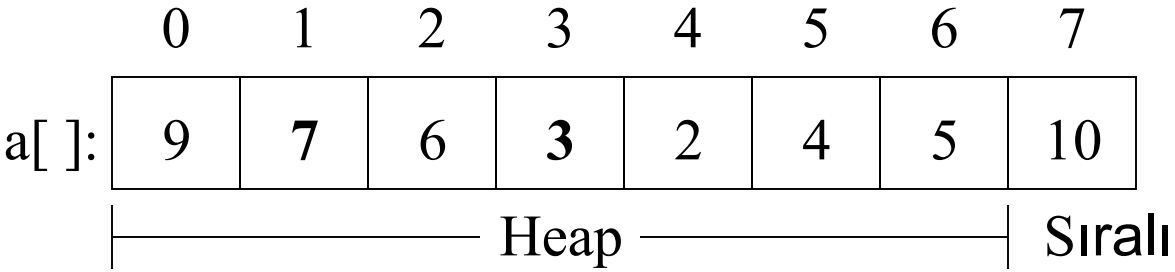

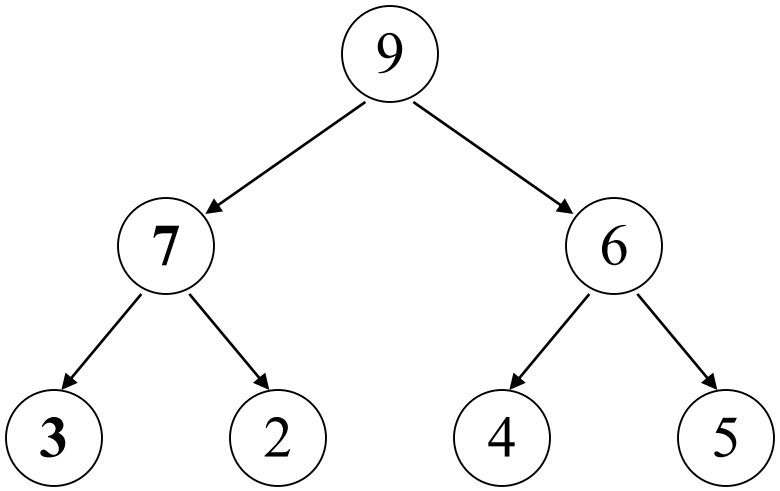

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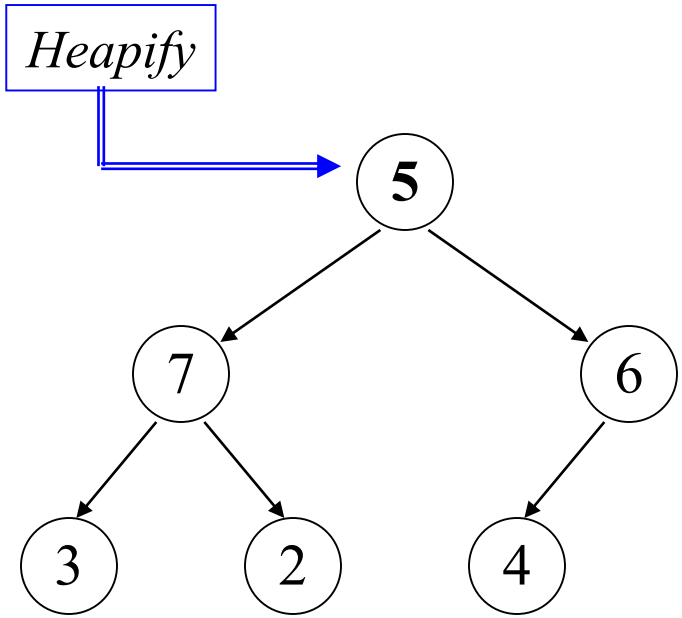

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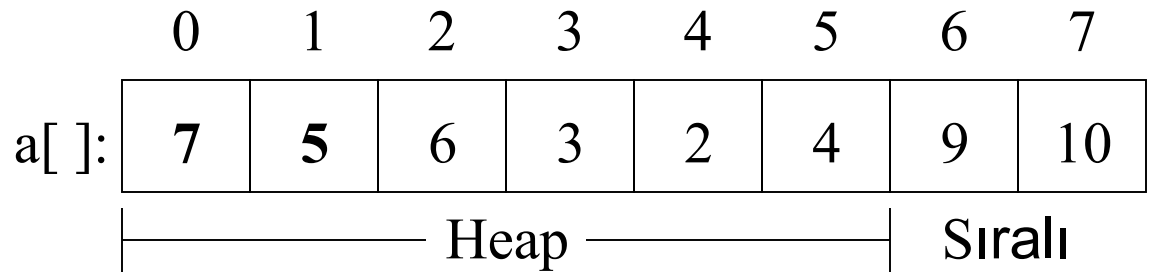

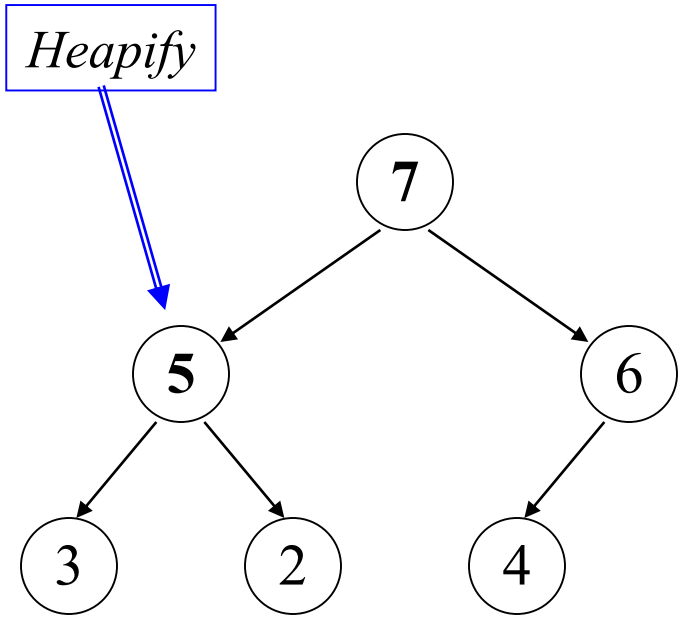

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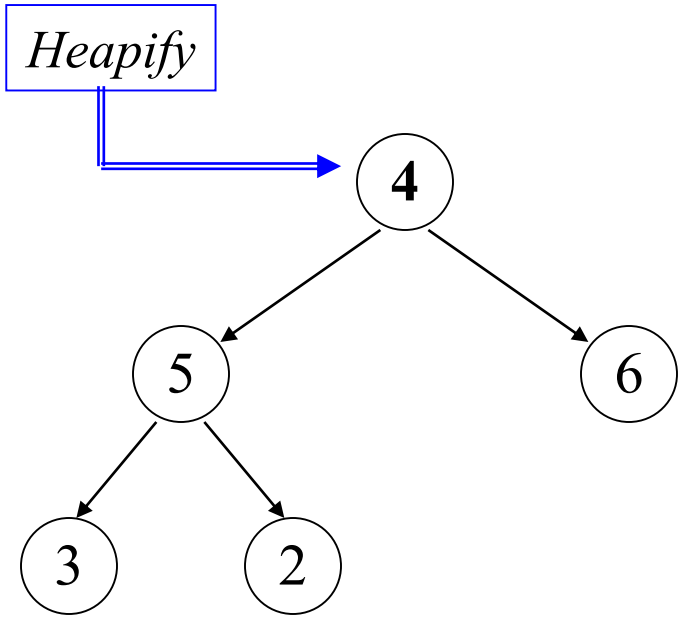

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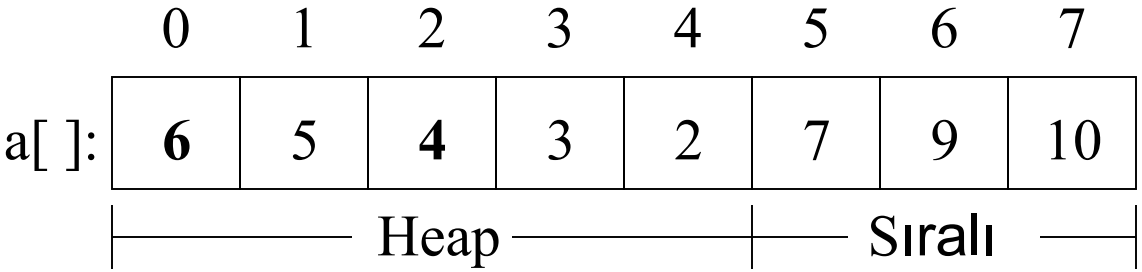

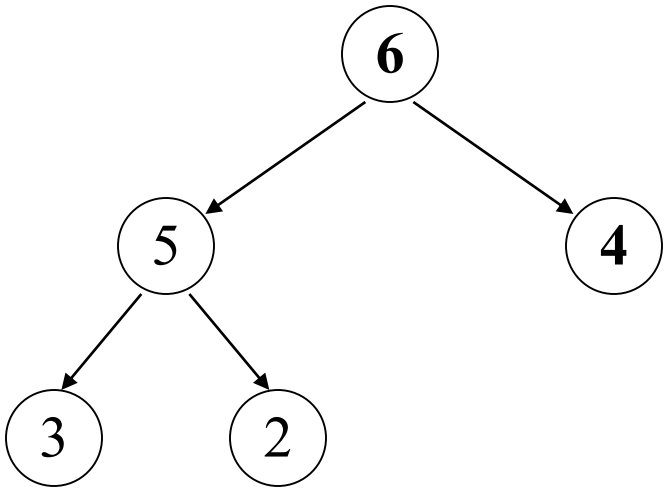

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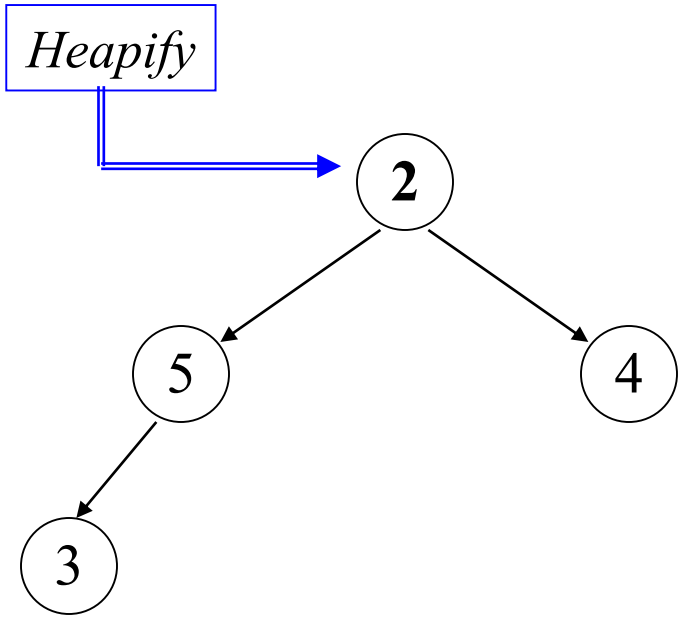

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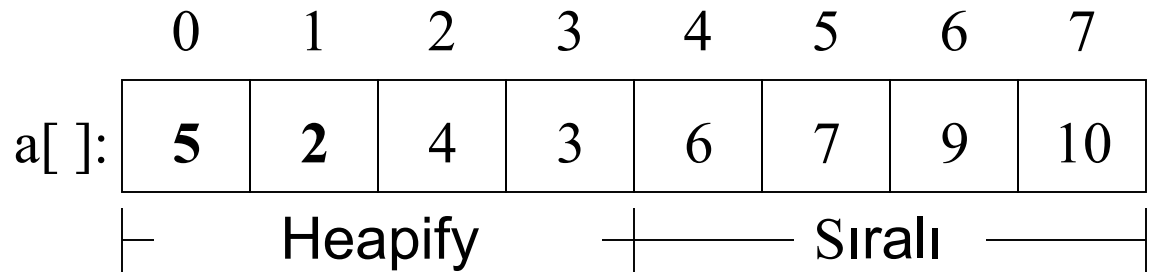

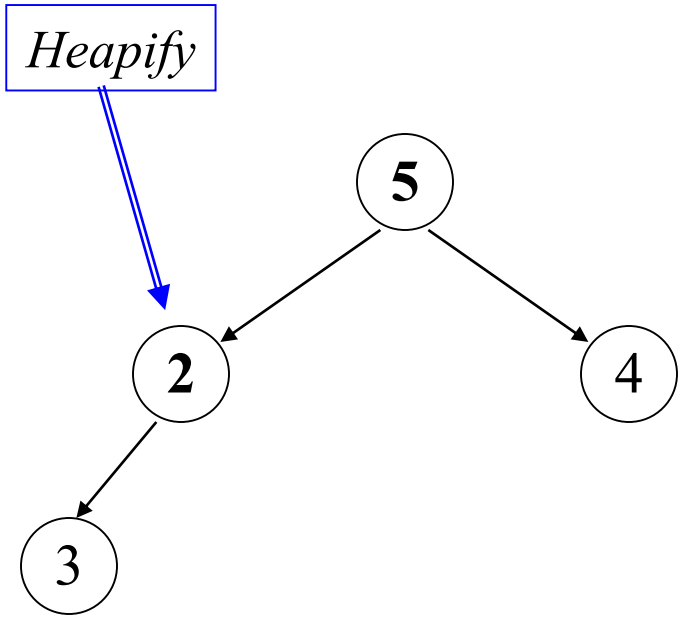

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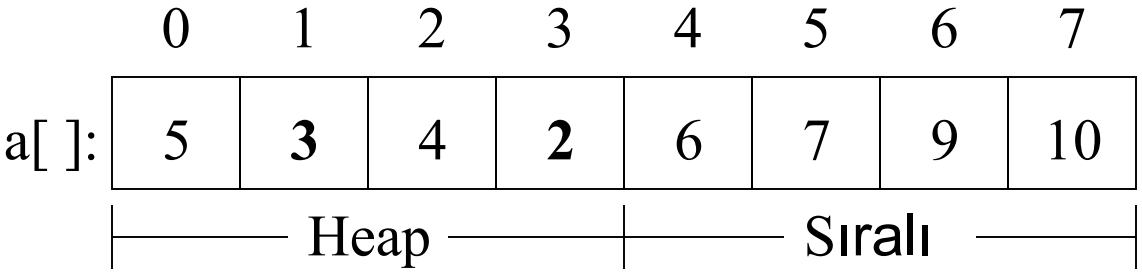

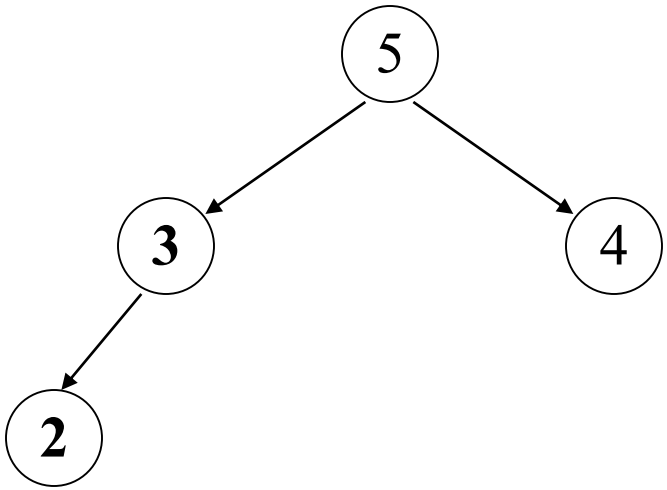

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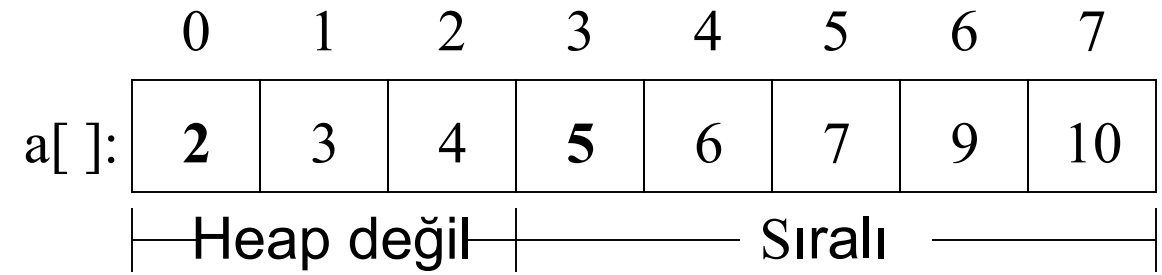

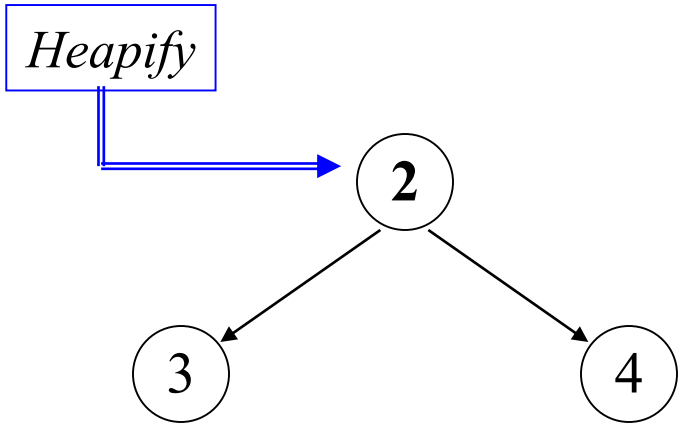

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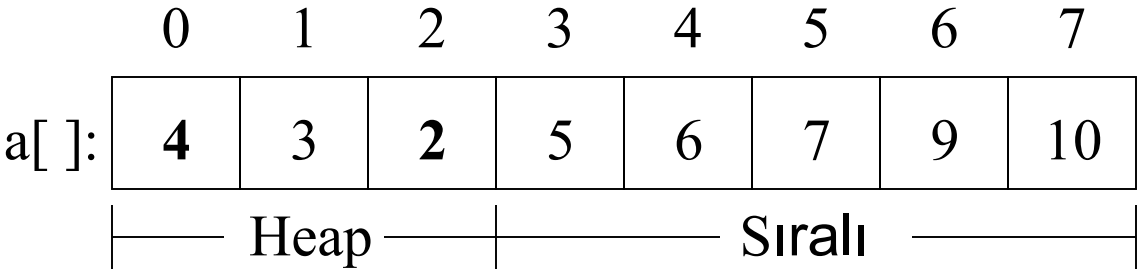

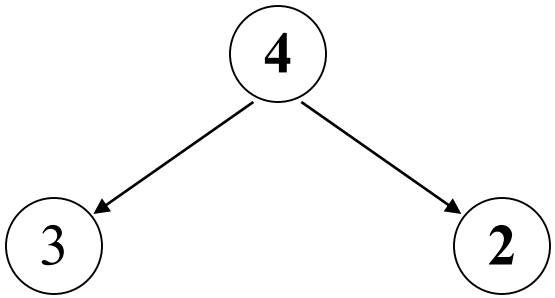

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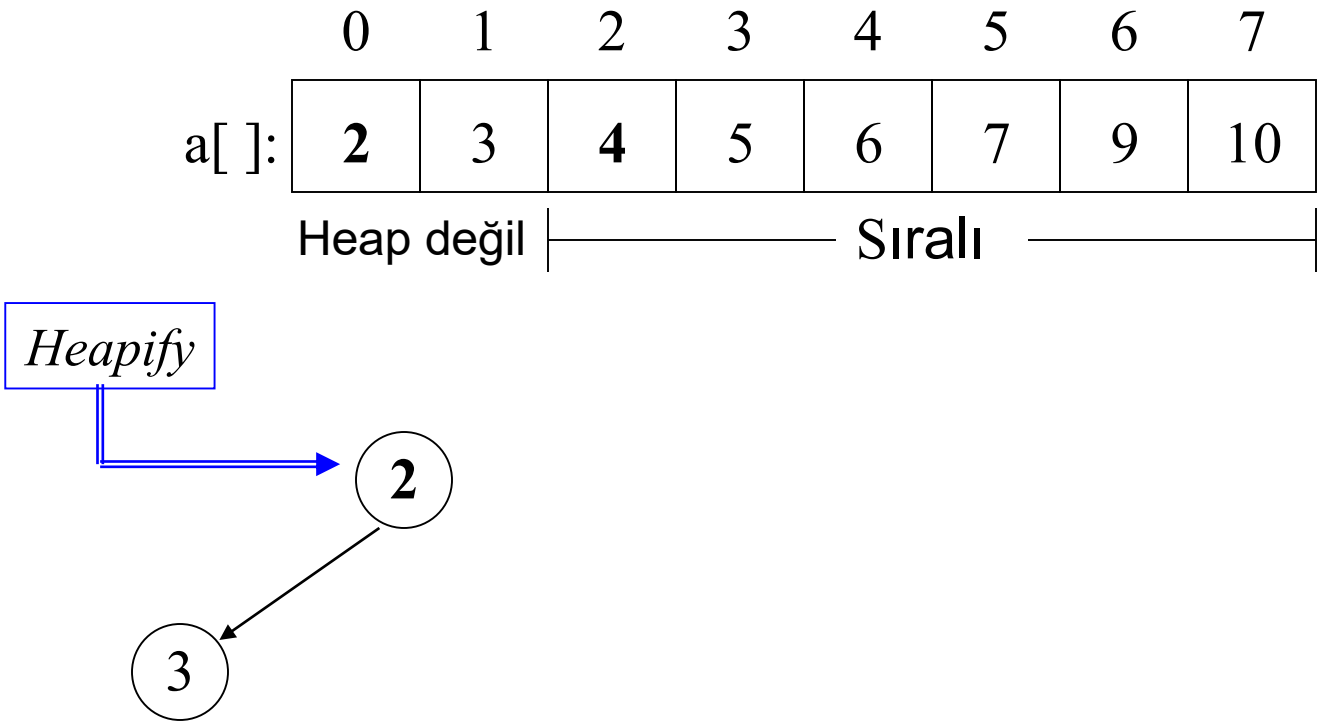

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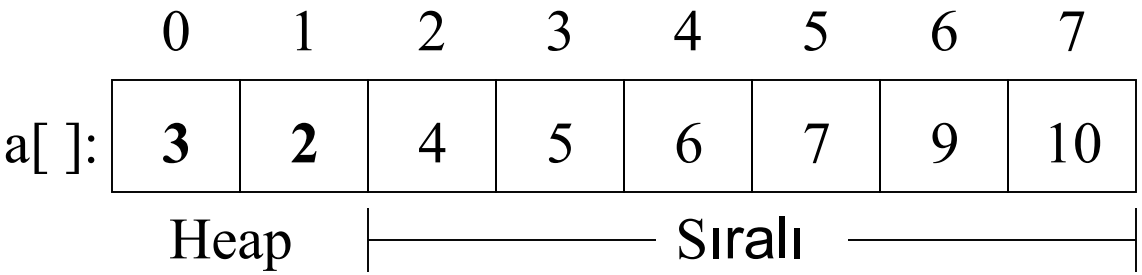

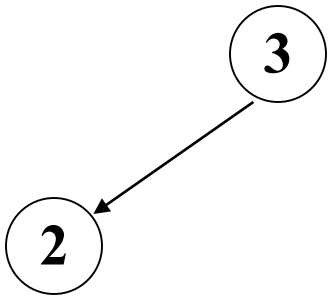

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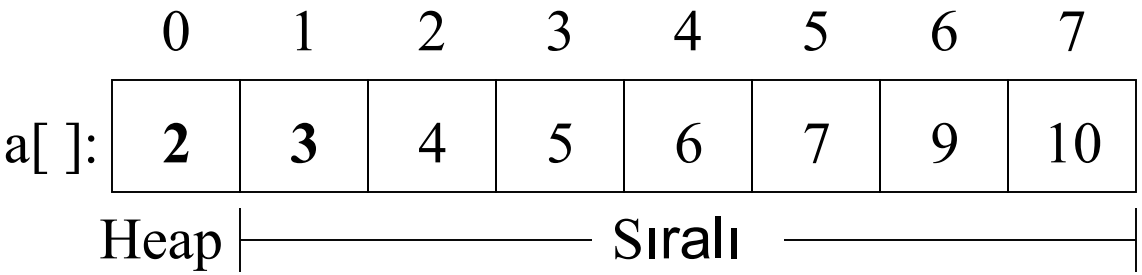

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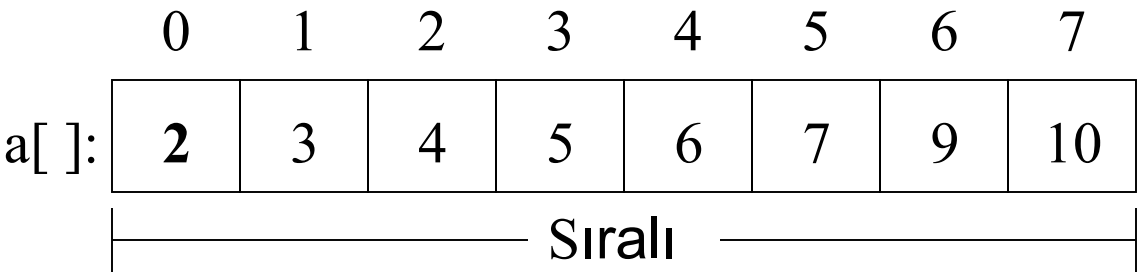

Hatırlatma

	Best case	*Average* case	*Worst* case
Selection sort	n^2	n^2	n^2
Bubble sort	n	n^2	n^2
Insertion sort	n	n^2	n^2
Mergesort	$n * \log_2 n$	$n * \log_2 n$	$n * \log_2 n$
Quicksort	$n * \log_2 n$	$n * \log_2 n$	n^2
Heapsort	$n * \log_2 n$	$n * \log_2 n$	$n * \log_2 n$