

# Mergesort

Walkthrough

```
mergeSort(a, 0, 7):  
  mergeSort(a, 0, 3)  
  mergeSort(a, 4, 7)  
  merge(a, 0, 3, 7)
```

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

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

```
mergeSort(a, 0, 7):  
  mergeSort(a, 0, 3)  
  mergeSort(a, 4, 7)  
  merge(a, 0, 3, 7)
```

```
mergeSort(a, 0, 3):  
  mergeSort(a, 0, 1)  
  mergeSort(a, 2, 3)  
  merge(a, 0, 1, 3)
```

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

```
mergeSort(a, 0, 7):  
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  mergeSort(a, 4, 7)  
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mergeSort(a, 0, 3):  
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  merge(a, 0, 1, 3)
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```
mergeSort(a, 0, 1):  
  mergeSort(a, 0, 0)  
  mergeSort(a, 1, 1)  
  merge(a, 0, 0, 1)
```

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

```
mergeSort(a, 0, 7):  
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mergeSort(a, 0, 3):  
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  mergeSort(a, 2, 3)  
  merge(a, 0, 1, 3)
```

```
mergeSort(a, 0, 1):  
  mergeSort(a, 0, 0)  
  mergeSort(a, 1, 1)  
  merge(a, 0, 0, 1)
```

```
mergeSort(a, 0, 0):  
  // base case  
  return
```

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

```
mergeSort(a, 0, 7):  
  mergeSort(a, 0, 3)  
  mergeSort(a, 4, 7)  
  merge(a, 0, 3, 7)
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mergeSort(a, 0, 3):  
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  mergeSort(a, 2, 3)  
  merge(a, 0, 1, 3)
```

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mergeSort(a, 0, 1):  
  mergeSort(a, 0, 0)  
  mergeSort(a, 1, 1)  
  merge(a, 0, 0, 1)
```

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

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  merge(a, 0, 1, 3)
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mergeSort(a, 0, 1):  
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  mergeSort(a, 1, 1)  
  merge(a, 0, 0, 1)
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  mergeSort(a, 2, 3)  
  merge(a, 0, 1, 3)
```

```
mergeSort(a, 0, 1):  
  mergeSort(a, 0, 0)  
  mergeSort(a, 1, 1)  
  merge(a, 0, 0, 1)
```

```
mergeSort(a, 1, 1):  
  // base case  
  return
```



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

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mergeSort(a, 0, 7):  
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0	1	2	3	4	5	6	7
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```
mergeSort(a, 0, 1):  
  mergeSort(a, 0, 0)  
  mergeSort(a, 1, 1)  
  merge(a, 0, 0, 1)
```

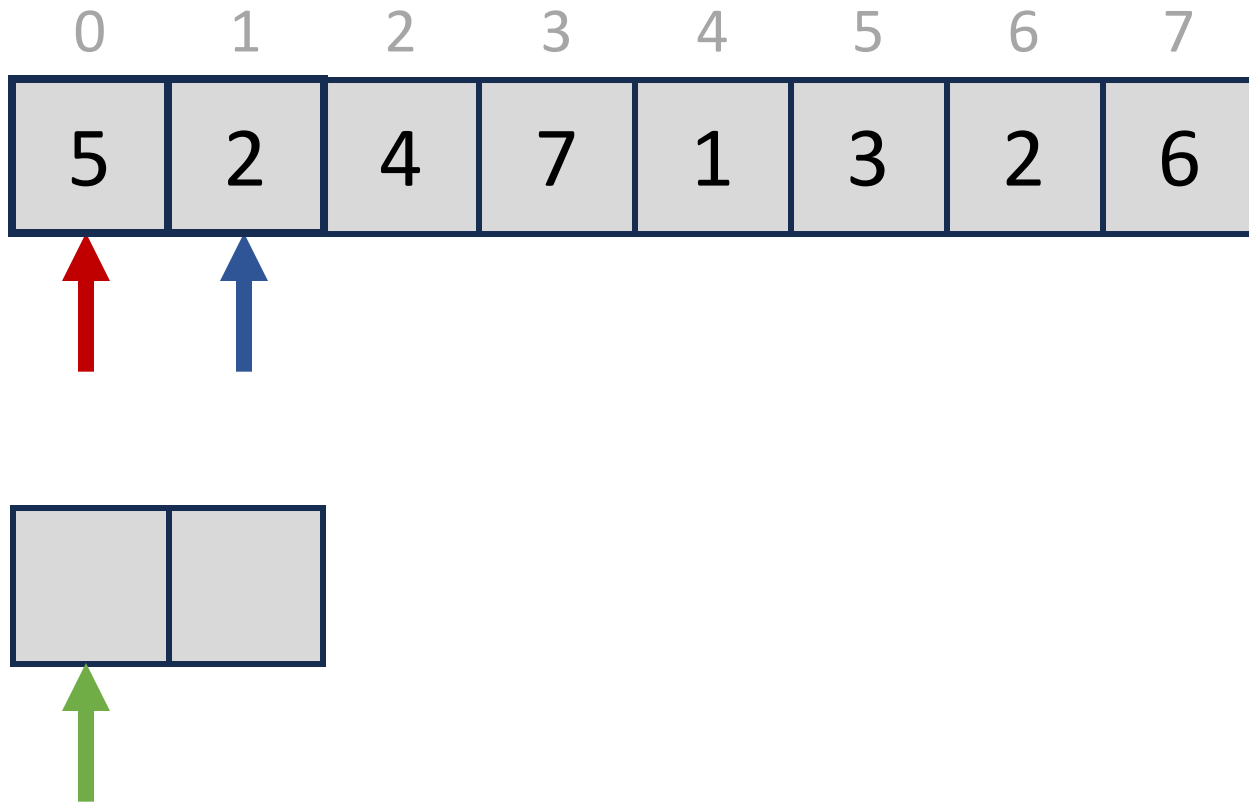
0	1	2	3	4	5	6	7
5	2	4	7	1	3	2	6

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mergeSort(a, 0, 7):  
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mergeSort(a, 0, 1):  
  mergeSort(a, 0, 0)  
  mergeSort(a, 1, 1)  
  merge(a, 0, 0, 1)
```

```
merge(a, 0, 0, 1):  
  merge into temp arr  
  copy back
```

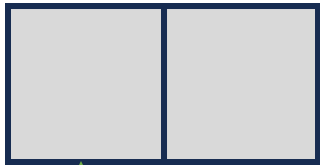
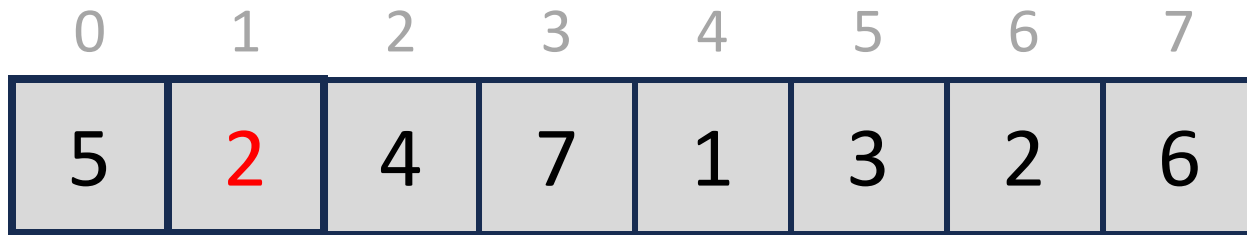


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```

```
mergeSort(a, 0, 1):  
  mergeSort(a, 0, 0)  
  mergeSort(a, 1, 1)  
  merge(a, 0, 0, 1)
```

```
merge(a, 0, 0, 1):  
  merge into temp arr  
  copy back
```



```
mergeSort(a, 0, 7):
```

```
  mergeSort(a, 0, 3)
```

```
  mergeSort(a, 4, 7)
```

```
  merge(a, 0, 3, 7)
```

```
mergeSort(a, 0, 3):
```

```
  mergeSort(a, 0, 1)
```

```
  mergeSort(a, 2, 3)
```

```
  merge(a, 0, 1, 3)
```

```
mergeSort(a, 0, 1):
```

```
  mergeSort(a, 0, 0)
```

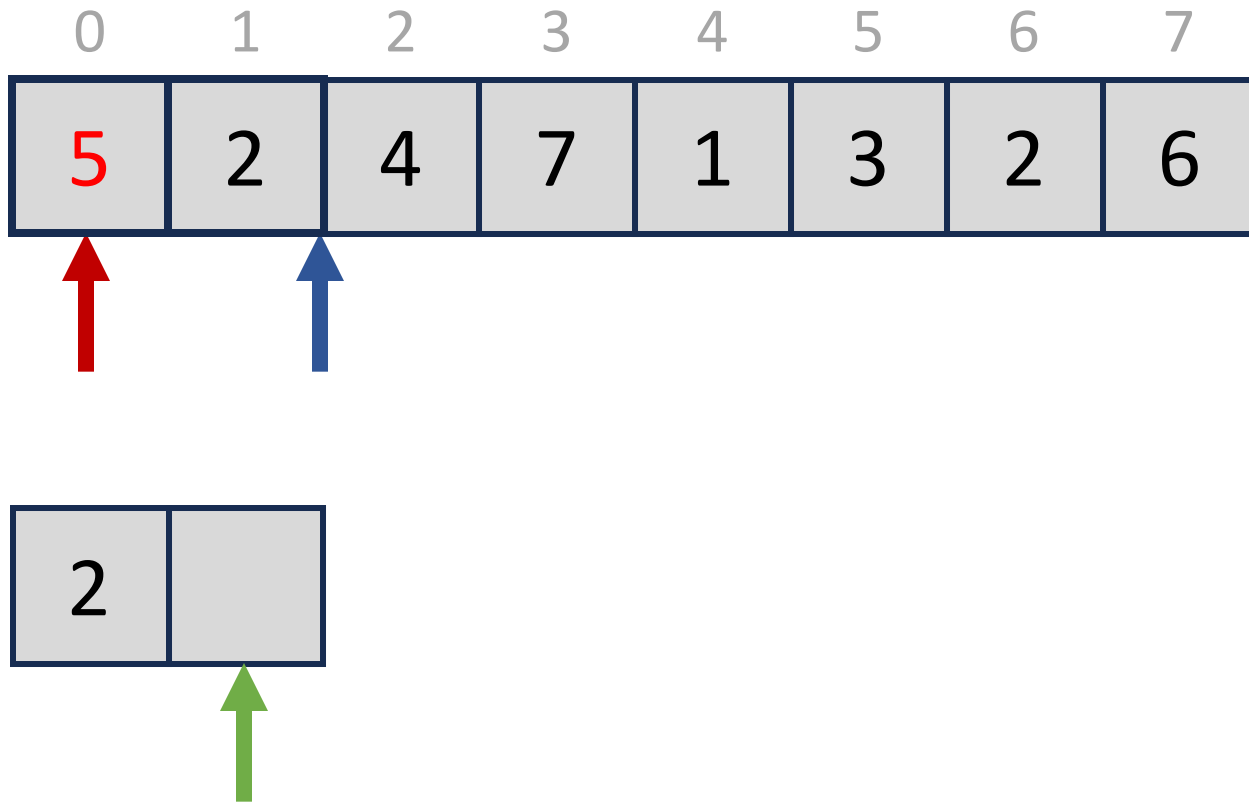
```
  mergeSort(a, 1, 1)
```

```
  merge(a, 0, 0, 1)
```

```
merge(a, 0, 0, 1):
```

```
  merge into temp arr
```

```
  copy back
```

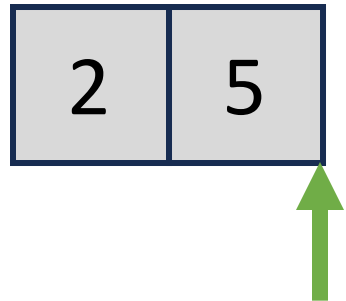
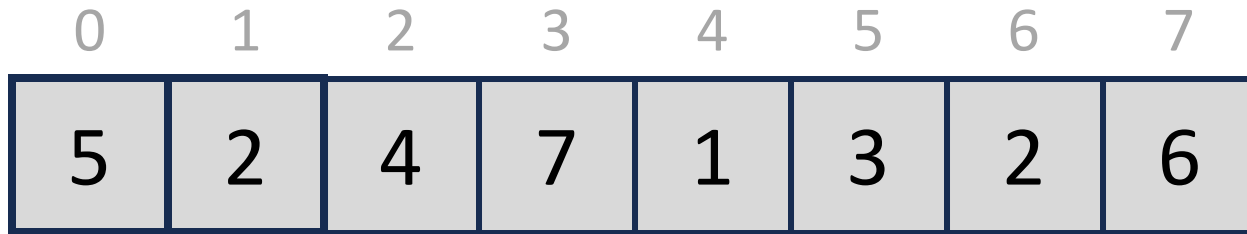


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```

```
mergeSort(a, 0, 1):  
  mergeSort(a, 0, 0)  
  mergeSort(a, 1, 1)  
  merge(a, 0, 0, 1)
```

```
merge(a, 0, 0, 1):  
  merge into temp arr  
  copy back
```



```
mergeSort(a, 0, 7):  
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  mergeSort(a, 4, 7)  
  merge(a, 0, 3, 7)
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mergeSort(a, 0, 3):  
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  merge(a, 0, 1, 3)
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```
mergeSort(a, 0, 1):  
  mergeSort(a, 0, 0)  
  mergeSort(a, 1, 1)  
  merge(a, 0, 0, 1)
```

```
merge(a, 0, 0, 1):  
  merge into temp arr  
  copy back
```

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

2	5
---	---

```
mergeSort(a, 0, 7):  
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  merge(a, 0, 3, 7)
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mergeSort(a, 0, 3):  
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  mergeSort(a, 2, 3)  
  merge(a, 0, 1, 3)
```

```
mergeSort(a, 0, 1):  
  mergeSort(a, 0, 0)  
  mergeSort(a, 1, 1)  
  merge(a, 0, 0, 1)
```

```
merge(a, 0, 0, 1):  
  merge into temp arr  
  copy back
```



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

```
mergeSort(a, 0, 7):  
  mergeSort(a, 0, 3)  
  mergeSort(a, 4, 7)  
  merge(a, 0, 3, 7)
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mergeSort(a, 0, 3):  
  mergeSort(a, 0, 1)  
  mergeSort(a, 2, 3)  
  merge(a, 0, 1, 3)
```

```
mergeSort(a, 0, 1):  
  mergeSort(a, 0, 0)  
  mergeSort(a, 1, 1)  
  merge(a, 0, 0, 1)
```

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

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mergeSort(a, 0, 7):  
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mergeSort(a, 0, 3):  
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  merge(a, 0, 1, 3)
```

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

```
mergeSort(a, 0, 7):  
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mergeSort(a, 0, 3):  
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0	1	2	3	4	5	6	7
2	5	4	7	1	3	2	6

```
mergeSort(a, 0, 7):  
  mergeSort(a, 0, 3)  
  mergeSort(a, 4, 7)  
  merge(a, 0, 3, 7)
```

```
mergeSort(a, 0, 3):  
  mergeSort(a, 0, 1)  
  mergeSort(a, 2, 3)  
  merge(a, 0, 1, 3)
```

```
mergeSort(a, 2, 3):  
  mergeSort(a, 2, 2)  
  mergeSort(a, 3, 3)  
  merge(a, 2, 2, 3)
```

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

```
mergeSort(a, 0, 7):  
  mergeSort(a, 0, 3)  
  mergeSort(a, 4, 7)  
  merge(a, 0, 3, 7)
```

```
mergeSort(a, 0, 3):  
  mergeSort(a, 0, 1)  
  mergeSort(a, 2, 3)  
  merge(a, 0, 1, 3)
```

```
mergeSort(a, 2, 3):  
  mergeSort(a, 2, 2)  
  mergeSort(a, 3, 3)  
  merge(a, 2, 2, 3)
```

```
mergeSort(a, 2, 2):  
  // base case  
  return
```

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

```
mergeSort(a, 0, 7):  
  mergeSort(a, 0, 3)  
  mergeSort(a, 4, 7)  
  merge(a, 0, 3, 7)
```

```
mergeSort(a, 0, 3):  
  mergeSort(a, 0, 1)  
  mergeSort(a, 2, 3)  
  merge(a, 0, 1, 3)
```

```
mergeSort(a, 2, 3):  
  mergeSort(a, 2, 2)  
  mergeSort(a, 3, 3)  
  merge(a, 2, 2, 3)
```

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

```
mergeSort(a, 0, 7):  
  mergeSort(a, 0, 3)  
  mergeSort(a, 4, 7)  
  merge(a, 0, 3, 7)
```

```
mergeSort(a, 0, 3):  
  mergeSort(a, 0, 1)  
  mergeSort(a, 2, 3)  
  merge(a, 0, 1, 3)
```

```
mergeSort(a, 2, 3):  
  mergeSort(a, 2, 2)  
  mergeSort(a, 3, 3)  
  merge(a, 2, 2, 3)
```

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

```
mergeSort(a, 0, 7):  
  mergeSort(a, 0, 3)  
  mergeSort(a, 4, 7)  
  merge(a, 0, 3, 7)
```

```
mergeSort(a, 0, 3):  
  mergeSort(a, 0, 1)  
  mergeSort(a, 2, 3)  
  merge(a, 0, 1, 3)
```

```
mergeSort(a, 2, 3):  
  mergeSort(a, 2, 2)  
  mergeSort(a, 3, 3)  
  merge(a, 2, 2, 3)
```

```
mergeSort(a, 3, 3):  
  // base case  
  return
```



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

```
mergeSort(a, 0, 7):  
  mergeSort(a, 0, 3)  
  mergeSort(a, 4, 7)  
  merge(a, 0, 3, 7)
```

```
mergeSort(a, 0, 3):  
  mergeSort(a, 0, 1)  
  mergeSort(a, 2, 3)  
  merge(a, 0, 1, 3)
```

```
mergeSort(a, 2, 3):  
  mergeSort(a, 2, 2)  
  mergeSort(a, 3, 3)  
  merge(a, 2, 2, 3)
```

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

```
mergeSort(a, 0, 7):  
  mergeSort(a, 0, 3)  
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```

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mergeSort(a, 0, 3):  
  mergeSort(a, 0, 1)  
  mergeSort(a, 2, 3)  
  merge(a, 0, 1, 3)
```

```
mergeSort(a, 2, 3):  
  mergeSort(a, 2, 2)  
  mergeSort(a, 3, 3)  
  merge(a, 2, 2, 3)
```

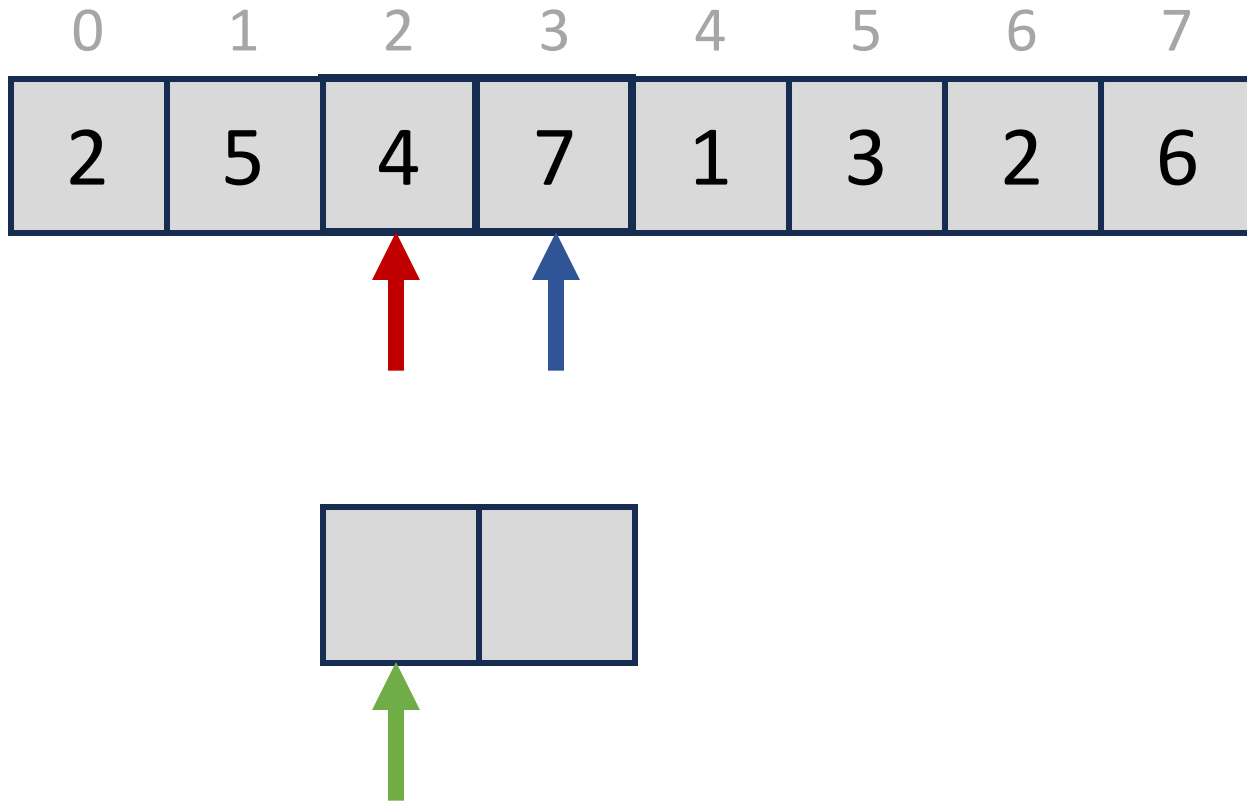
0	1	2	3	4	5	6	7
2	5	4	7	1	3	2	6

```
mergeSort(a, 0, 7):  
  mergeSort(a, 0, 3)  
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  merge(a, 0, 3, 7)
```

```
mergeSort(a, 0, 3):  
  mergeSort(a, 0, 1)  
  mergeSort(a, 2, 3)  
  merge(a, 0, 1, 3)
```

```
mergeSort(a, 2, 3):  
  mergeSort(a, 2, 2)  
  mergeSort(a, 3, 3)  
  merge(a, 2, 2, 3)
```

```
merge(a, 2, 2, 3):  
  merge into temp arr  
  copy back
```

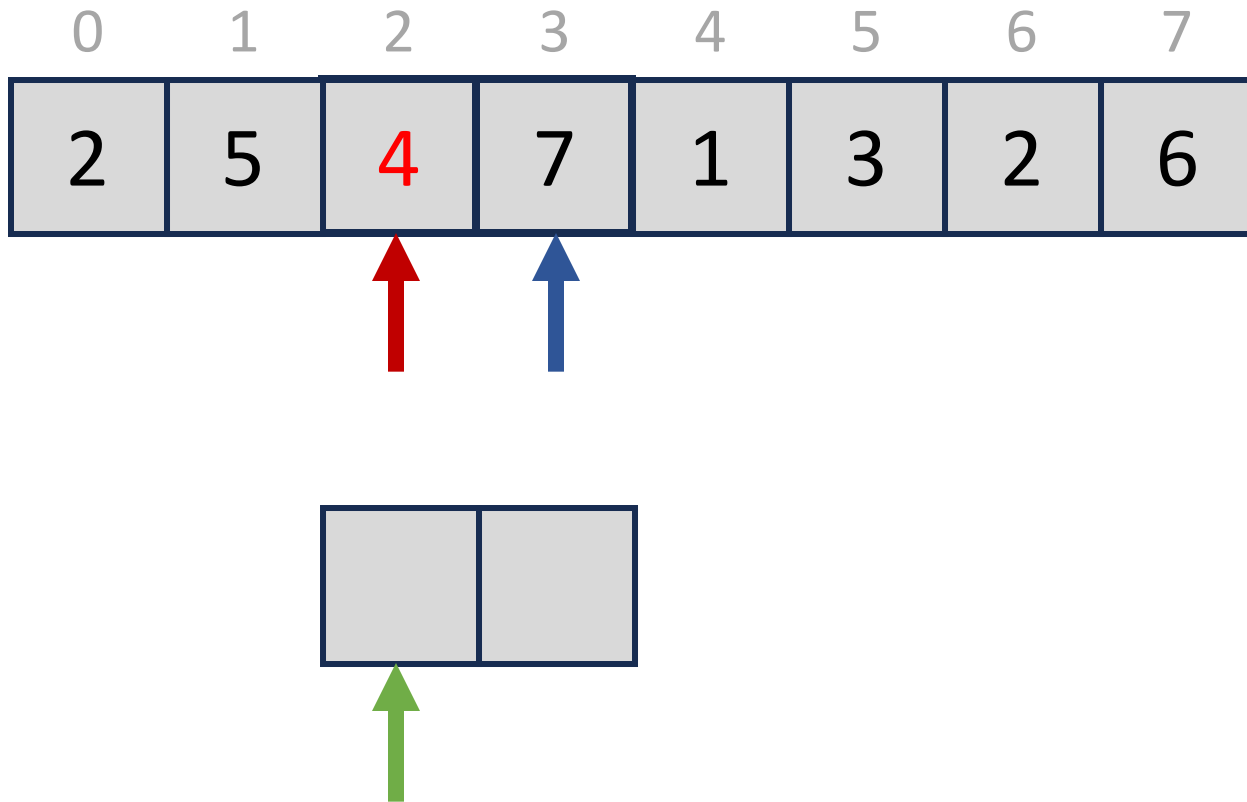


```
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  mergeSort(a, 4, 7)  
  merge(a, 0, 3, 7)
```

```
mergeSort(a, 0, 3):  
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  mergeSort(a, 2, 3)  
  merge(a, 0, 1, 3)
```

```
mergeSort(a, 2, 3):  
  mergeSort(a, 2, 2)  
  mergeSort(a, 3, 3)  
  merge(a, 2, 2, 3)
```

```
merge(a, 2, 2, 3):  
  merge into temp arr  
  copy back
```

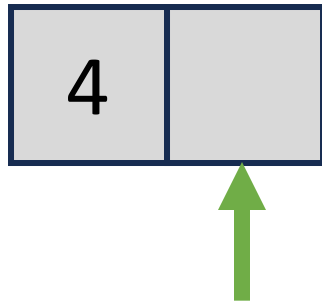
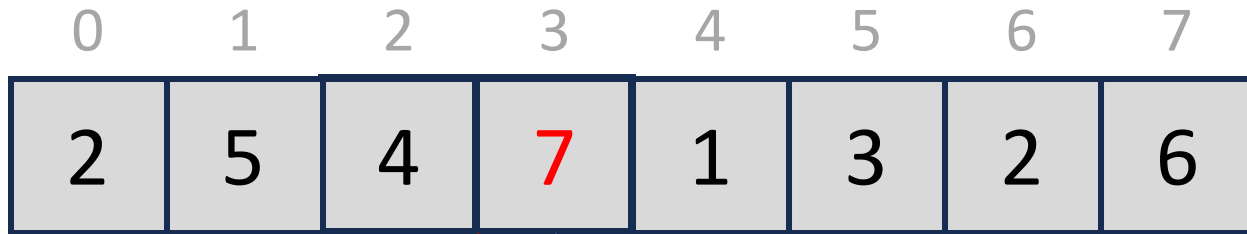


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  merge(a, 0, 3, 7)
```

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  mergeSort(a, 2, 3)  
  merge(a, 0, 1, 3)
```

```
mergeSort(a, 2, 3):  
  mergeSort(a, 2, 2)  
  mergeSort(a, 3, 3)  
  merge(a, 2, 2, 3)
```

```
merge(a, 2, 2, 3):  
  merge into temp arr  
  copy back
```

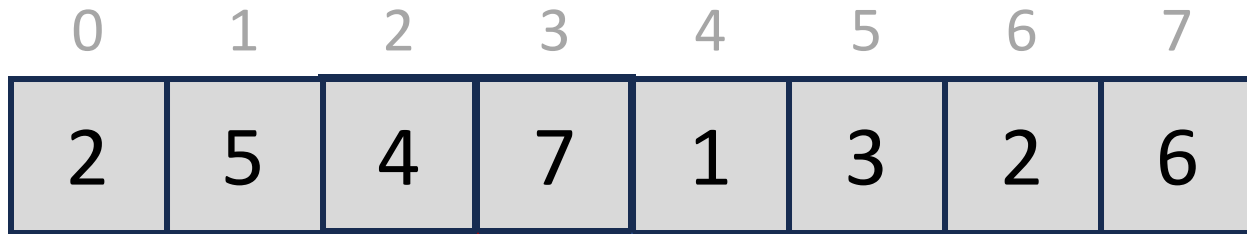


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```
mergeSort(a, 2, 3):  
  mergeSort(a, 2, 2)  
  mergeSort(a, 3, 3)  
  merge(a, 2, 2, 3)
```

```
merge(a, 2, 2, 3):  
  merge into temp arr  
  copy back
```



```
mergeSort(a, 0, 7):
```

```
  mergeSort(a, 0, 3)
```

```
  mergeSort(a, 4, 7)
```

```
  merge(a, 0, 3, 7)
```

```
mergeSort(a, 0, 3):
```

```
  mergeSort(a, 0, 1)
```

```
  mergeSort(a, 2, 3)
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```
  merge(a, 0, 1, 3)
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```
mergeSort(a, 2, 3):
```

```
  mergeSort(a, 2, 2)
```

```
  mergeSort(a, 3, 3)
```

```
  merge(a, 2, 2, 3)
```

```
merge(a, 2, 2, 3):
```

```
  merge into temp arr
```

```
  copy back
```

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

4	7
---	---

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```
mergeSort(a, 2, 3):  
  mergeSort(a, 2, 2)  
  mergeSort(a, 3, 3)  
  merge(a, 2, 2, 3)
```

```
merge(a, 2, 2, 3):  
  merge into temp arr  
  copy back
```



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

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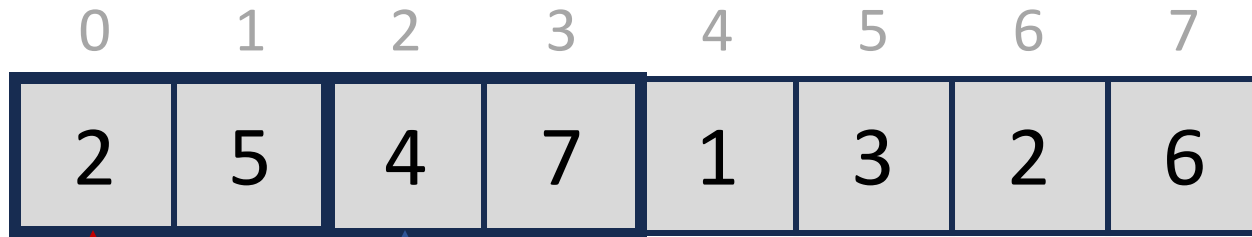
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mergeSort(a, 0, 3):  
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  merge(a, 0, 1, 3)
```

```
merge(a, 0, 1, 3):  
  merge into temp arr  
  copy back
```



```
mergeSort(a, 0, 7):
```

```
  mergeSort(a, 0, 3)
```

```
  mergeSort(a, 4, 7)
```

```
  merge(a, 0, 3, 7)
```

```
mergeSort(a, 0, 3):
```

```
  mergeSort(a, 0, 1)
```

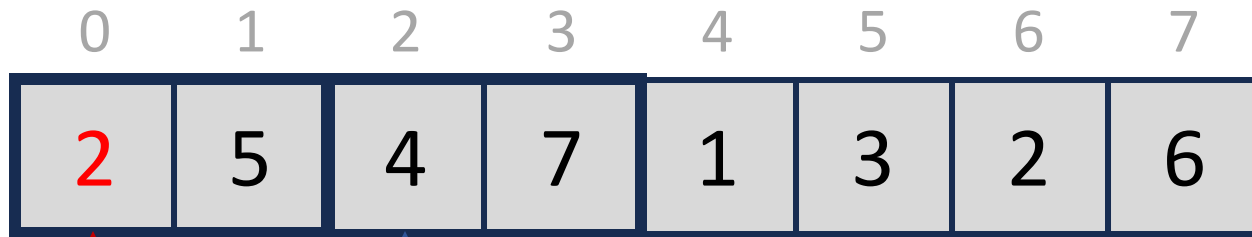
```
  mergeSort(a, 2, 3)
```

```
  merge(a, 0, 1, 3)
```

```
merge(a, 0, 1, 3):
```

```
  merge into temp arr
```

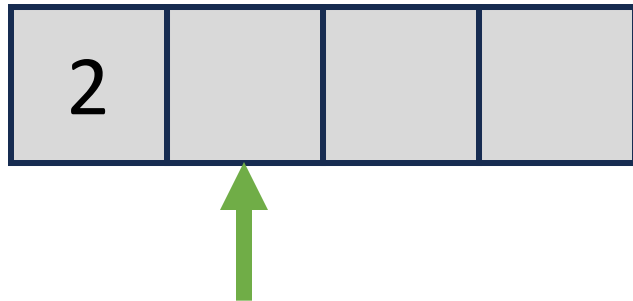
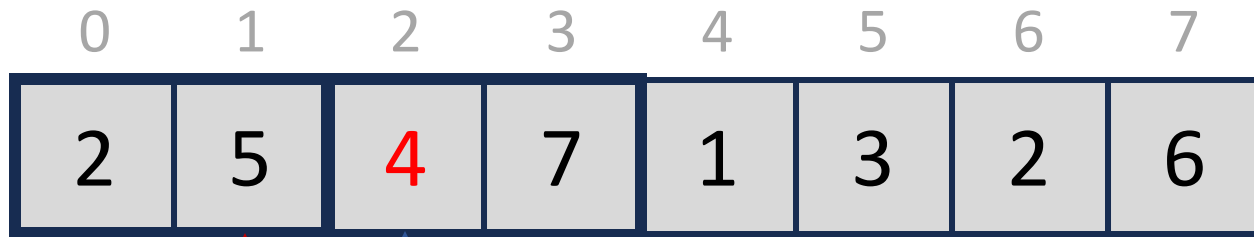
```
  copy back
```



```
mergeSort(a, 0, 7):  
  mergeSort(a, 0, 3)  
  mergeSort(a, 4, 7)  
  merge(a, 0, 3, 7)
```

```
mergeSort(a, 0, 3):  
  mergeSort(a, 0, 1)  
  mergeSort(a, 2, 3)  
  merge(a, 0, 1, 3)
```

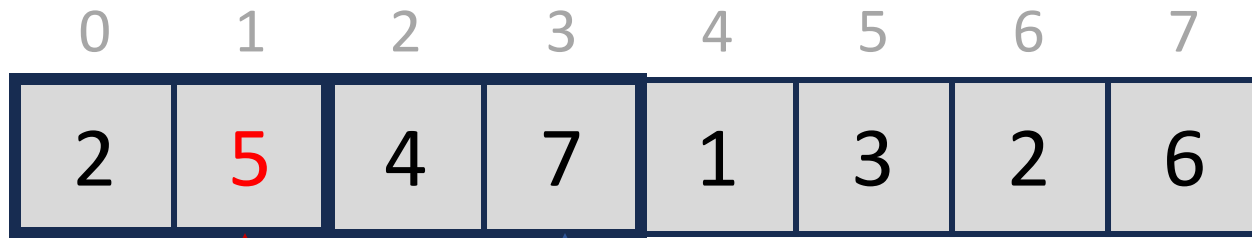
```
merge(a, 0, 1, 3):  
  merge into temp arr  
  copy back
```



```
mergeSort(a, 0, 7):  
  mergeSort(a, 0, 3)  
  mergeSort(a, 4, 7)  
  merge(a, 0, 3, 7)
```

```
mergeSort(a, 0, 3):  
  mergeSort(a, 0, 1)  
  mergeSort(a, 2, 3)  
  merge(a, 0, 1, 3)
```

```
merge(a, 0, 1, 3):  
  merge into temp arr  
  copy back
```

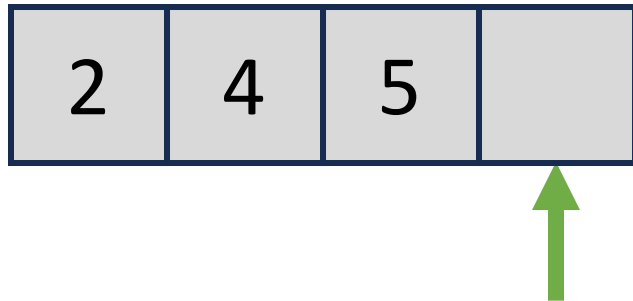
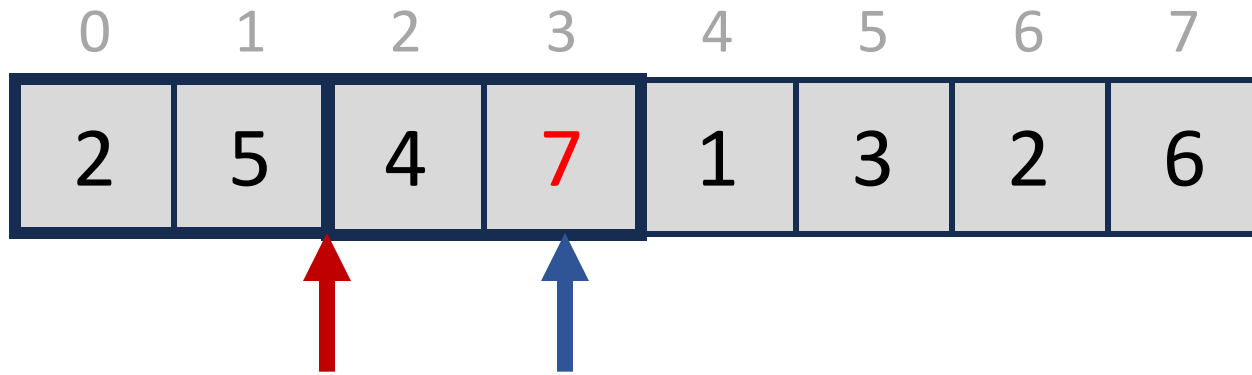


```
mergeSort(a, 0, 7):  
  mergeSort(a, 0, 3)  
  mergeSort(a, 4, 7)  
  merge(a, 0, 3, 7)
```

```
mergeSort(a, 0, 3):  
  mergeSort(a, 0, 1)  
  mergeSort(a, 2, 3)  
  merge(a, 0, 1, 3)
```

```
merge(a, 0, 1, 3):  
  merge into temp arr  
  copy back
```

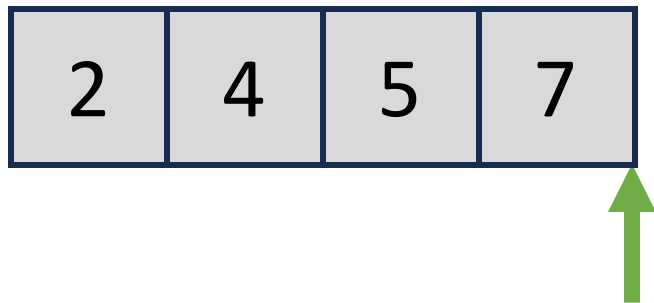
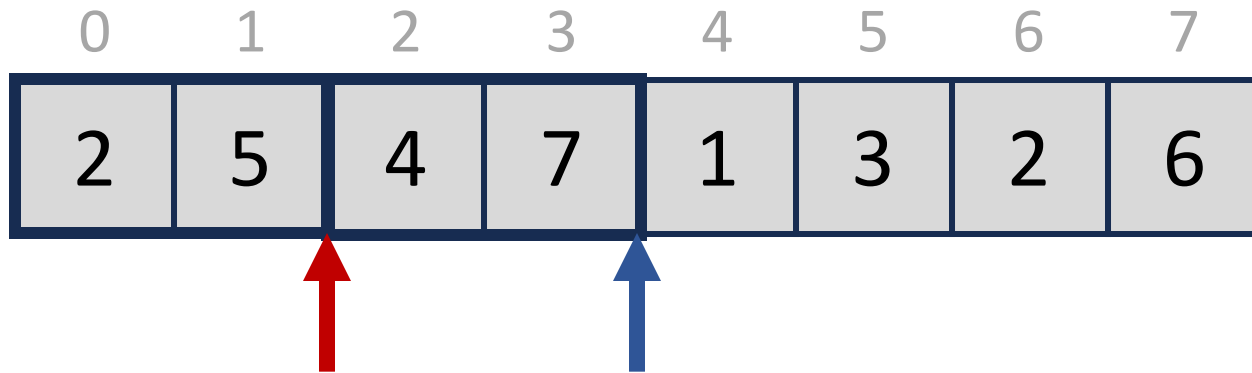




```
mergeSort(a, 0, 7):  
  mergeSort(a, 0, 3)  
  mergeSort(a, 4, 7)  
  merge(a, 0, 3, 7)
```

```
mergeSort(a, 0, 3):  
  mergeSort(a, 0, 1)  
  mergeSort(a, 2, 3)  
  merge(a, 0, 1, 3)
```

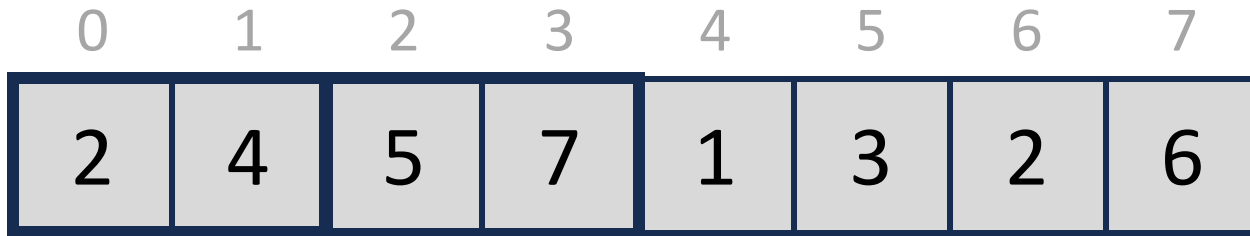
```
merge(a, 0, 1, 3):  
  merge into temp arr  
  copy back
```



```
mergeSort(a, 0, 7):  
  mergeSort(a, 0, 3)  
  mergeSort(a, 4, 7)  
  merge(a, 0, 3, 7)
```

```
mergeSort(a, 0, 3):  
  mergeSort(a, 0, 1)  
  mergeSort(a, 2, 3)  
  merge(a, 0, 1, 3)
```

```
merge(a, 0, 1, 3):  
  merge into temp arr  
  copy back
```



```
mergeSort(a, 0, 7):  
  mergeSort(a, 0, 3)  
  mergeSort(a, 4, 7)  
  merge(a, 0, 3, 7)
```

```
mergeSort(a, 0, 3):  
  mergeSort(a, 0, 1)  
  mergeSort(a, 2, 3)  
  merge(a, 0, 1, 3)
```

```
merge(a, 0, 1, 3):  
  merge into temp arr  
  copy back
```

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

```
mergeSort(a, 0, 7):  
  mergeSort(a, 0, 3)  
  mergeSort(a, 4, 7)  
  merge(a, 0, 3, 7)
```

```
mergeSort(a, 0, 3):  
  mergeSort(a, 0, 1)  
  mergeSort(a, 2, 3)  
  merge(a, 0, 1, 3)
```

```
mergeSort(a, 0, 7):  
  mergeSort(a, 0, 3)  
  mergeSort(a, 4, 7)  
  merge(a, 0, 3, 7)
```

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

```
mergeSort(a, 0, 7):  
  mergeSort(a, 0, 3)  
  mergeSort(a, 4, 7)  
  merge(a, 0, 3, 7)
```

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

```
mergeSort(a, 0, 7):  
  mergeSort(a, 0, 3)  
  mergeSort(a, 4, 7)  
  merge(a, 0, 3, 7)
```

Fast forward...

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

```
mergeSort(a, 0, 7):  
  mergeSort(a, 0, 3)  
  mergeSort(a, 4, 7)  
  merge(a, 0, 3, 7)
```

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



```
mergeSort(a, 0, 7):  
  mergeSort(a, 0, 3)  
  mergeSort(a, 4, 7)  
  merge(a, 0, 3, 7)
```

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

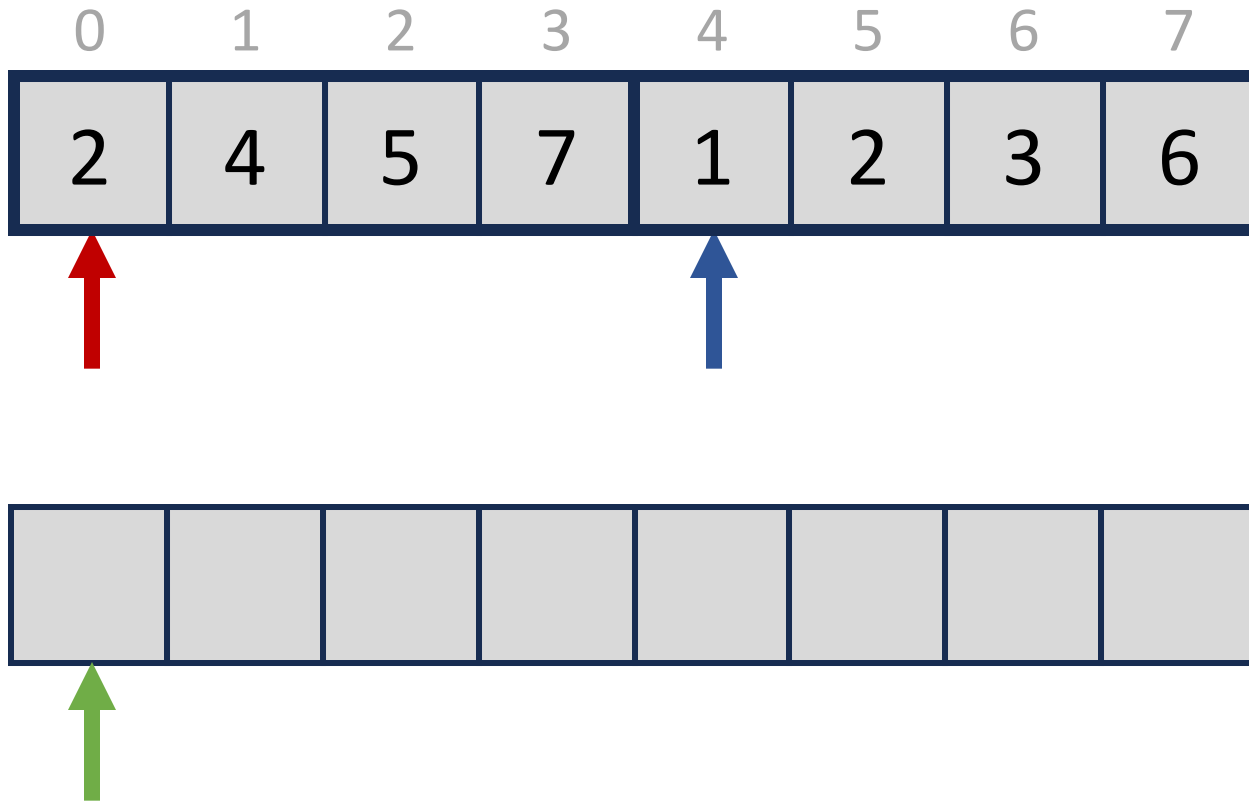
0	1	2	3	4	5	6	7
2	4	5	7	1	2	3	6

```
mergeSort(a, 0, 7):  
  mergeSort(a, 0, 3)  
  mergeSort(a, 4, 7)  
  merge(a, 0, 3, 7)
```

```
merge(a, 0, 3, 7):  
  merge into temp arr  
  copy back
```

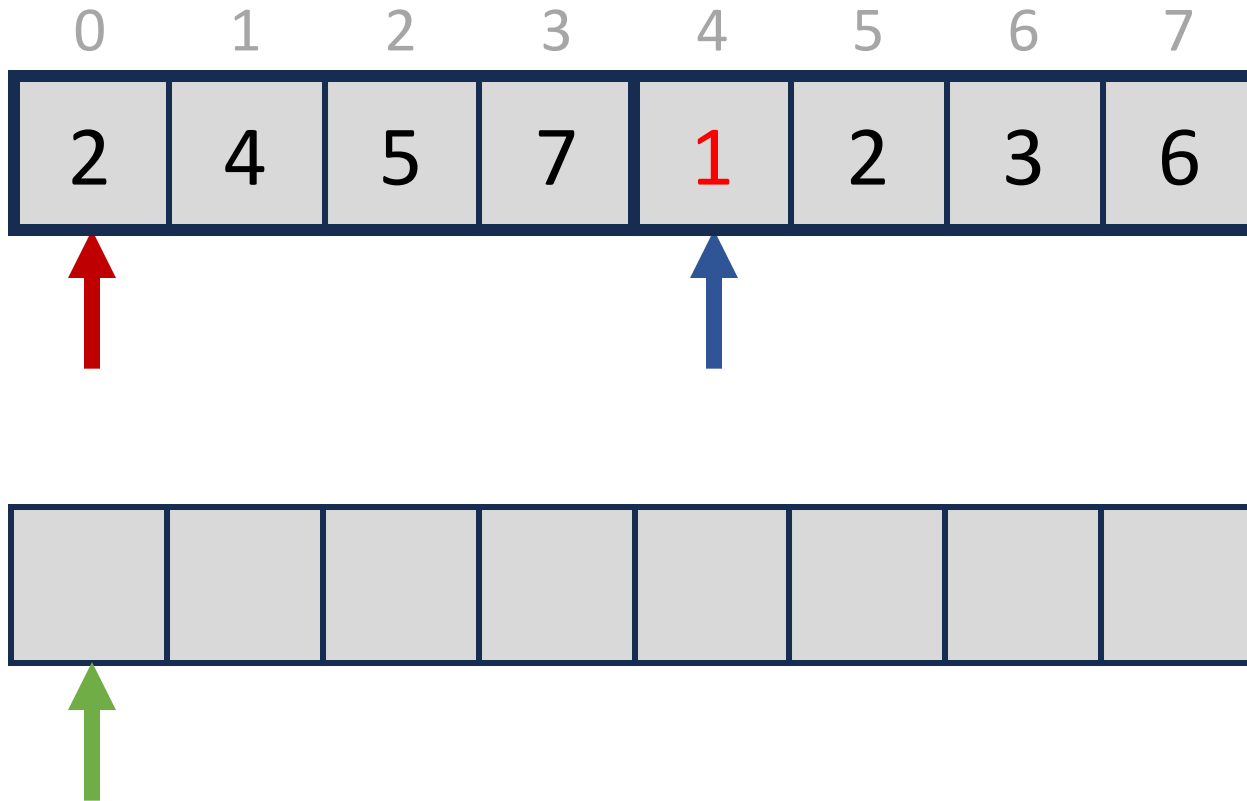
```
mergeSort(a, 0, 7):  
  mergeSort(a, 0, 3)  
  mergeSort(a, 4, 7)  
  merge(a, 0, 3, 7)
```

```
merge(a, 0, 3, 7):  
  merge into temp arr  
  copy back
```



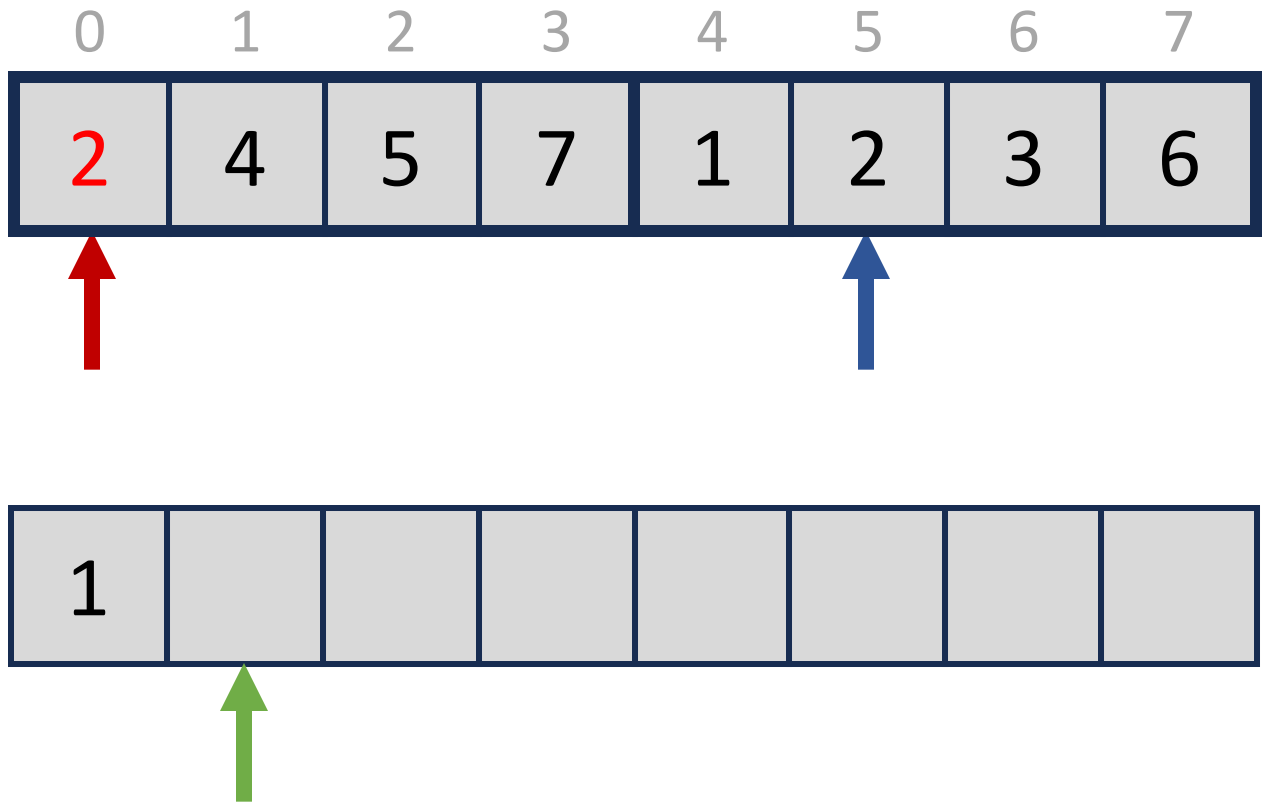
```
mergeSort(a, 0, 7):  
  mergeSort(a, 0, 3)  
  mergeSort(a, 4, 7)  
  merge(a, 0, 3, 7)
```

```
merge(a, 0, 3, 7):  
  merge into temp arr  
  copy back
```



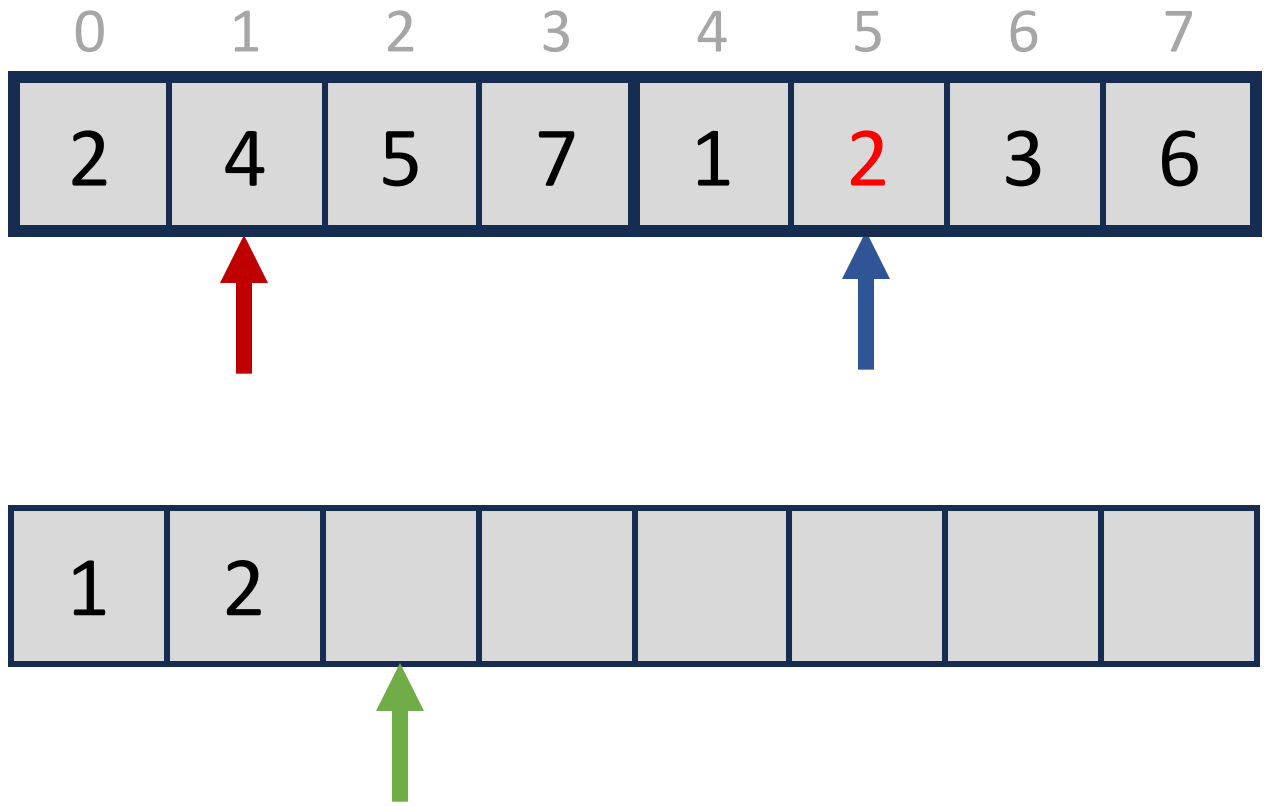
```
mergeSort(a, 0, 7):  
  mergeSort(a, 0, 3)  
  mergeSort(a, 4, 7)  
  merge(a, 0, 3, 7)
```

```
merge(a, 0, 3, 7):  
  merge into temp arr  
  copy back
```



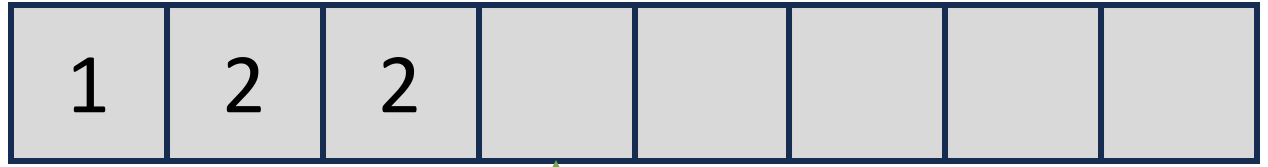
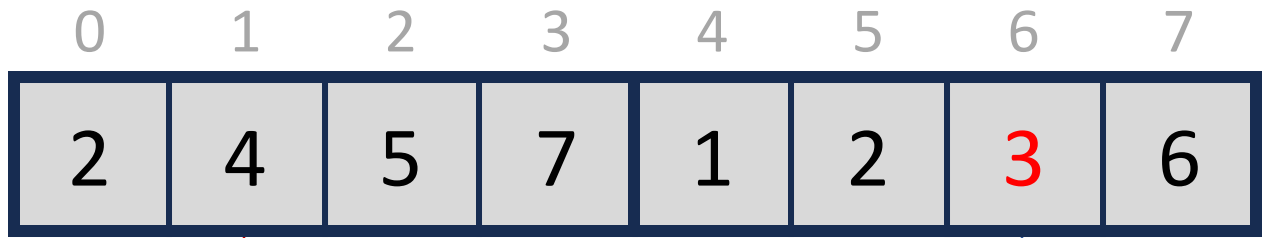
```
mergeSort(a, 0, 7):  
  mergeSort(a, 0, 3)  
  mergeSort(a, 4, 7)  
  merge(a, 0, 3, 7)
```

```
merge(a, 0, 3, 7):  
  merge into temp arr  
  copy back
```



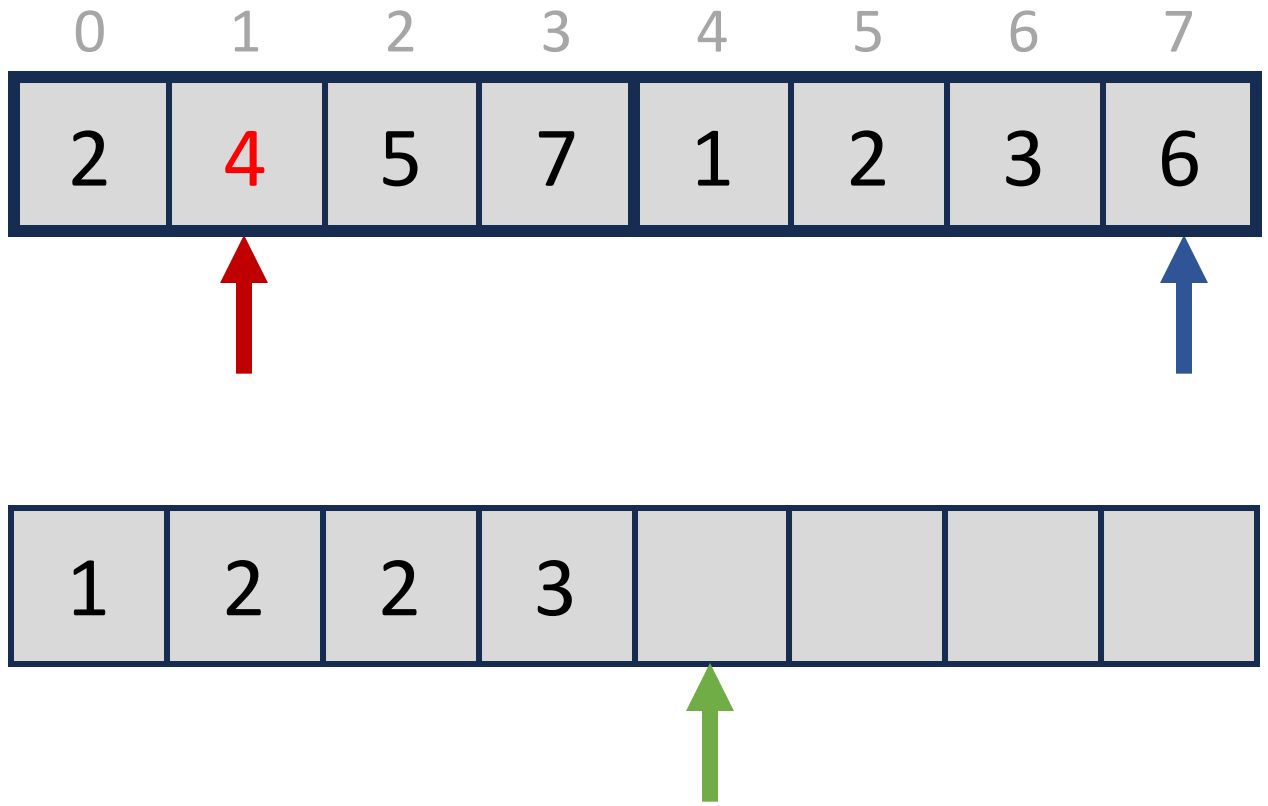
```
mergeSort(a, 0, 7):  
  mergeSort(a, 0, 3)  
  mergeSort(a, 4, 7)  
  merge(a, 0, 3, 7)
```

```
merge(a, 0, 3, 7):  
  merge into temp arr  
  copy back
```



```
mergeSort(a, 0, 7):  
  mergeSort(a, 0, 3)  
  mergeSort(a, 4, 7)  
  merge(a, 0, 3, 7)
```

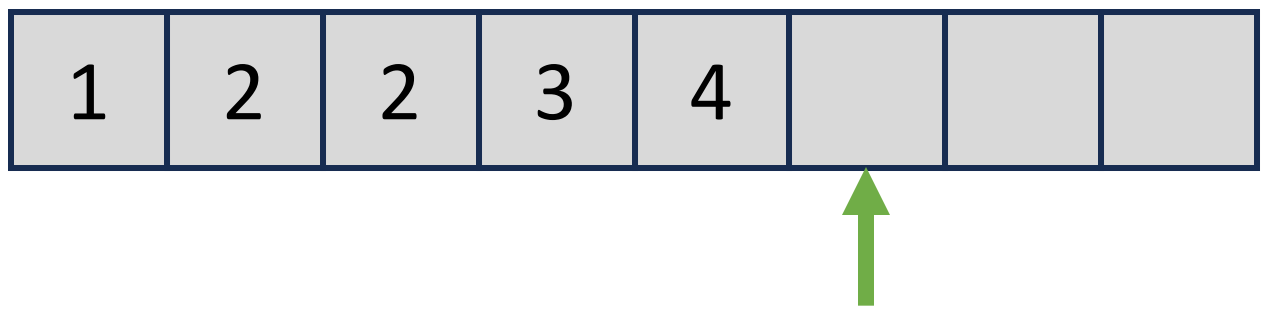
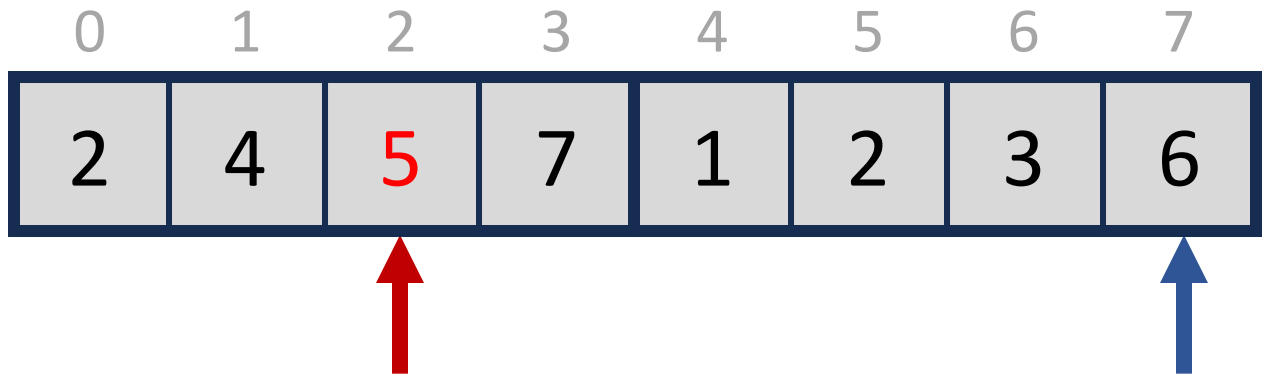
```
merge(a, 0, 3, 7):  
  merge into temp arr  
  copy back
```





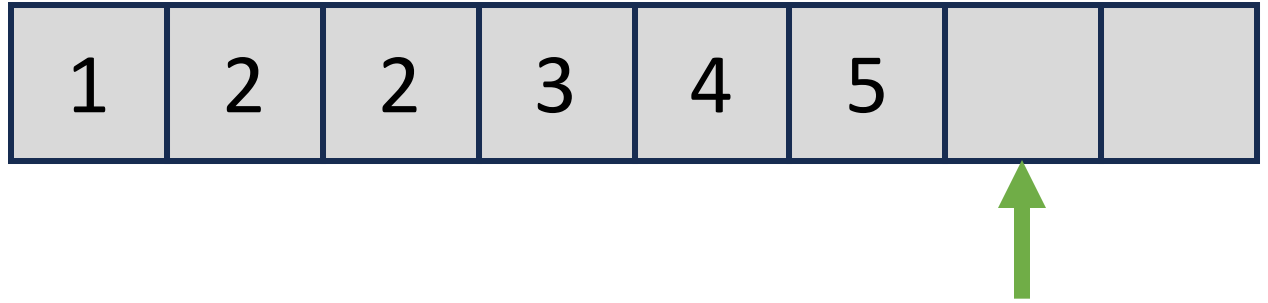
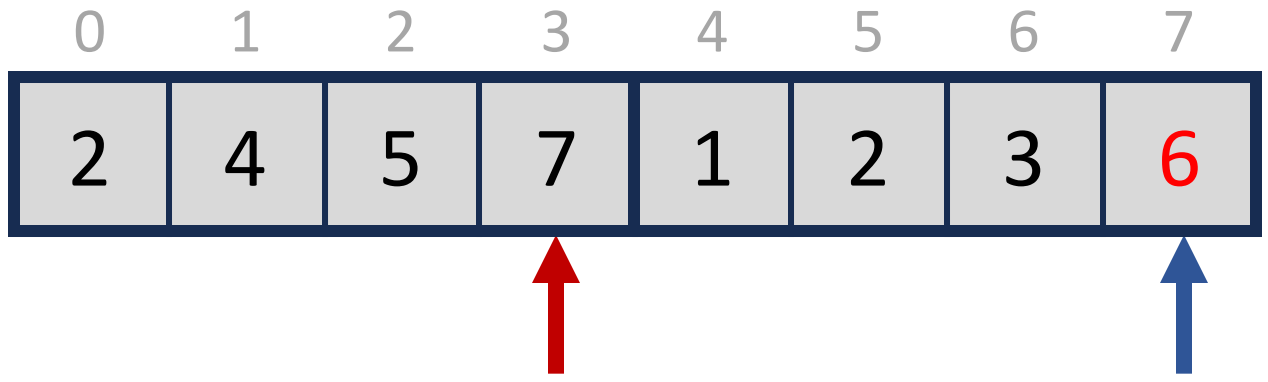
```
mergeSort(a, 0, 7):  
  mergeSort(a, 0, 3)  
  mergeSort(a, 4, 7)  
  merge(a, 0, 3, 7)
```

```
merge(a, 0, 3, 7):  
  merge into temp arr  
  copy back
```



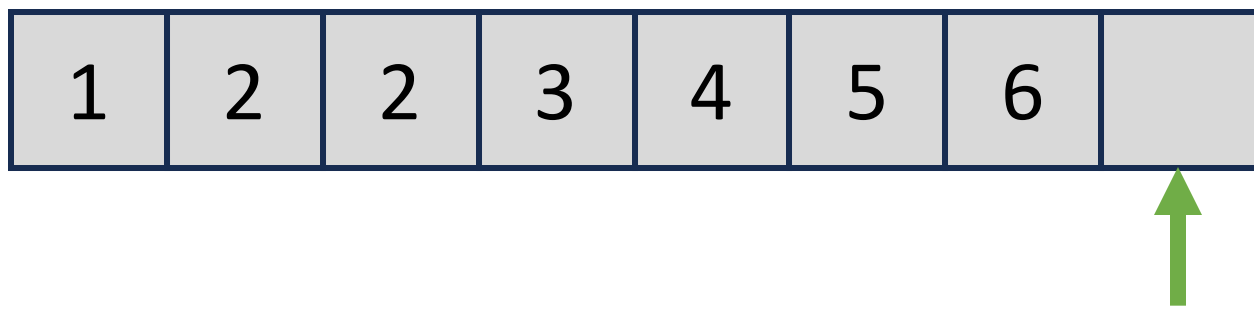
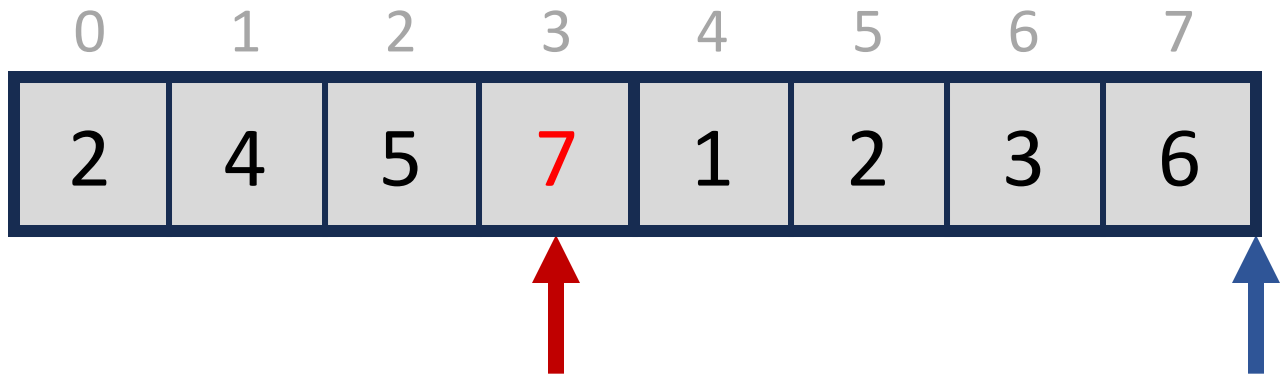
```
mergeSort(a, 0, 7):  
  mergeSort(a, 0, 3)  
  mergeSort(a, 4, 7)  
  merge(a, 0, 3, 7)
```

```
merge(a, 0, 3, 7):  
  merge into temp arr  
  copy back
```



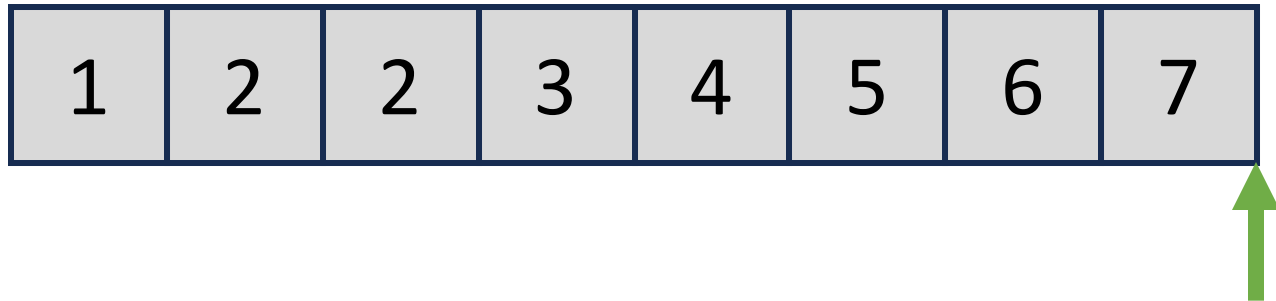
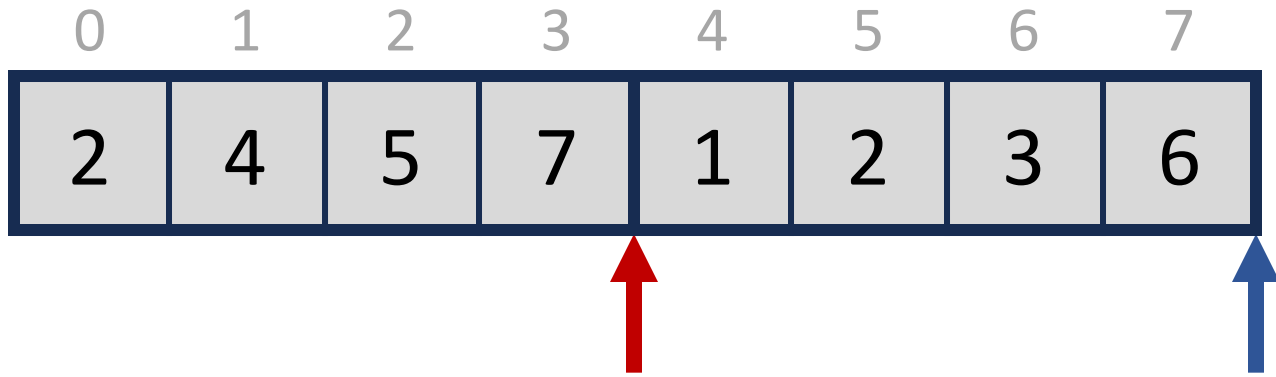
```
mergeSort(a, 0, 7):  
  mergeSort(a, 0, 3)  
  mergeSort(a, 4, 7)  
  merge(a, 0, 3, 7)
```

```
merge(a, 0, 3, 7):  
  merge into temp arr  
  copy back
```



```
mergeSort(a, 0, 7):  
  mergeSort(a, 0, 3)  
  mergeSort(a, 4, 7)  
  merge(a, 0, 3, 7)
```

```
merge(a, 0, 3, 7):  
  merge into temp arr  
  copy back
```



```
mergeSort(a, 0, 7):  
  mergeSort(a, 0, 3)  
  mergeSort(a, 4, 7)  
  merge(a, 0, 3, 7)
```

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

```
merge(a, 0, 3, 7):  
  merge into temp arr  
  copy back
```

1	2	2	3	4	5	6	7
---	---	---	---	---	---	---	---

```
mergeSort(a, 0, 7):  
  mergeSort(a, 0, 3)  
  mergeSort(a, 4, 7)  
  merge(a, 0, 3, 7)
```

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

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