21st Feb

21 February 2022 21:11

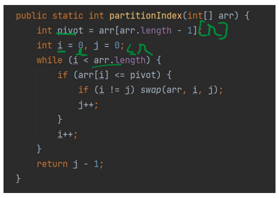
Quick Sort:-

Partition Index:-

$$\begin{array}{ccccc} 0 & 1 & 2 & 3 & 4 \\ 2, & 1, & 4, & 5, & 6 \end{array}, \; \underline{p = 5}$$

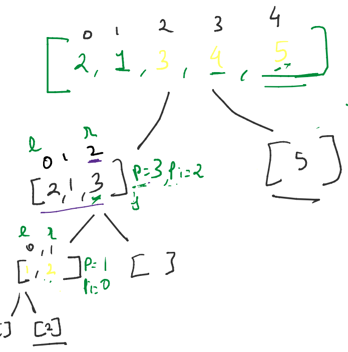
j i

j - 1



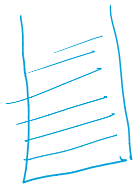
```java
public static int partitionIndex(int[] arr) {
    int pivot = arr[arr.length - 1];[r]
    int i = 0, j = 0; l  ≤r
    while (i < arr.length) {
        if (arr[i] <= pivot) {
            if (i != j) swap(arr, i, j);
            j++;
        }
        i++;
    }
    return j - 1;
}
```

$$\begin{array}{ccccc} 0 & 1 & 2 & 3 & 4 \\ 2, & 1, & 5, & 3, & 4 \end{array} \quad p = 4, \underline{pi = 3}$$



(l, pi - 1)

(pi + 1, r)



```
                0    arr.length - 1
void  QS(arr, l,  r   ){
    if(l ≥ r) return;
    Pi = PartitionIndex(arr, l, r)
    QS(arr, l, Pi-1);
    QS(arr, Pi+1, r);
}
```

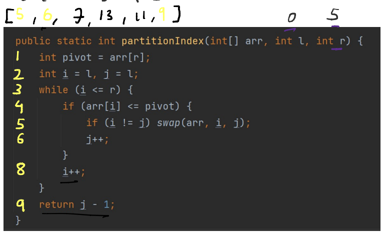
Pivot= 6 , r = 5

$i = \cancel{0}\,\cancel{1}\,\cancel{2}\,\cancel{3}\,\cancel{4}\,\cancel{5}\,6$

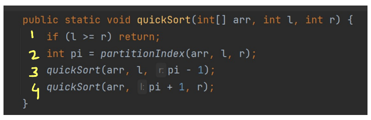
$j = \cancel{0}\,\cancel{1}\,2$

$$\begin{array}{cccccc} 0 & 1 & 2 & 3 & 4 & 5 \\ 5, & 6, & 7, & 13, & 11, & 9 \end{array}$$

0 5



```java
public static int partitionIndex(int[] arr, int l, int r) {
1   int pivot = arr[r];
2   int i = l, j = l;
3   while (i <= r) {
4       if (arr[i] <= pivot) {
5           if (i != j) swap(arr, i, j);
6           j++;
        }
8       i++;
    }
9   return j - 1;
}
```



```java
public static void quickSort(int[] arr, int l, int r) {
  1 if (l >= r) return;
  2 int pi = partitionIndex(arr, l, r);
  3 quickSort(arr, l, r: pi - 1);
  4 quickSort(arr, l: pi + 1, r);
}
```

l	r	pi	
~~4~~	~~4~~		~~1~~ ~~2~~ ~~3~~ ~~4~~
~~4~~	~~5~~	~~4~~	1
~~3~~	~~2~~		~~1~~
~~1~~	~~1~~		1
~~0~~	~~0~~		~~1~~ ~~2~~ ~~3~~ ~~4~~
~~0~~	~~1~~	~~1~~	~~1~~ ~~2~~ ~~3~~ 4
~~0~~	~~2~~	~~2~~	~~1~~ ~~2~~ ~~3~~ ~~4~~
~~0~~	5	3	

$$\begin{array}{cccccc} 0 & 1 & 2 & 3 & 4 & 5 \\ 9, & 10, & 17, & 25, & 31, & 46 \end{array}$$

p=25, Pi= 3

P=17, Pi=2

P=10, Pi=1

P=31 Pi=4

T.C = n log(n)

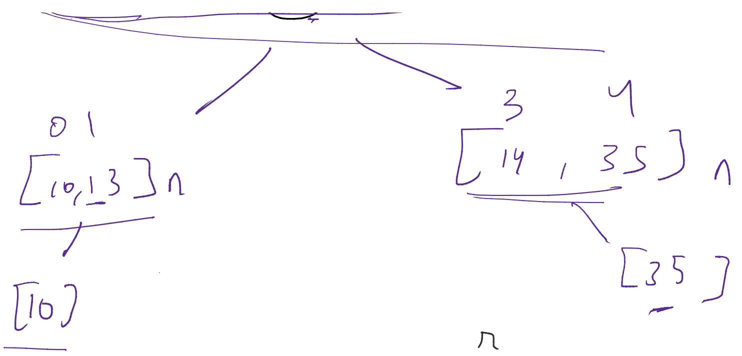
S.C = O(1)

[17, 10, 35, 14, 13] => [10, 13, 14, 17, 35]

[10, 13, $\boxed{17}$, 35, 14] n n=5

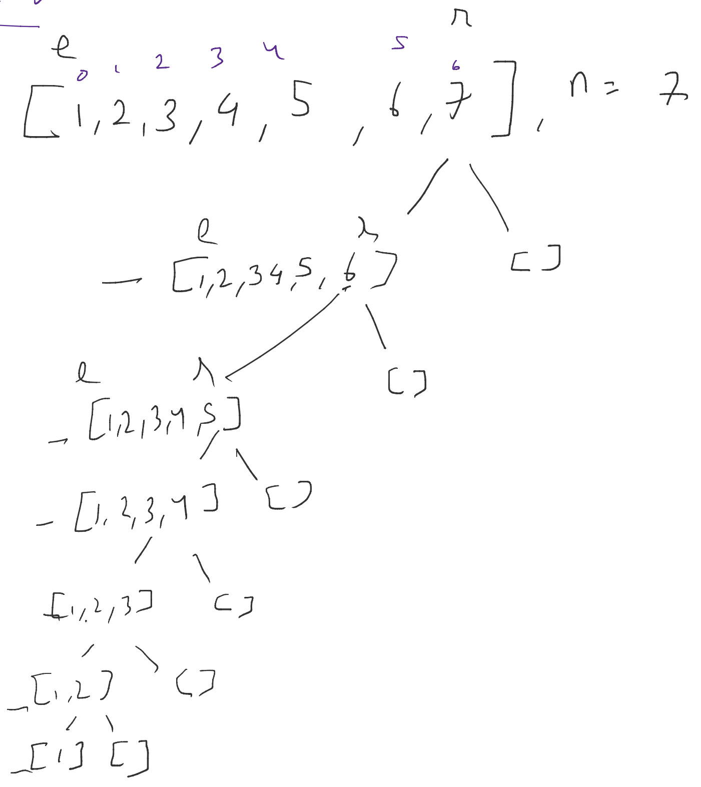
2 4

log(n) x n = n log(n)



$\log(n) \times n = n\log(n)$

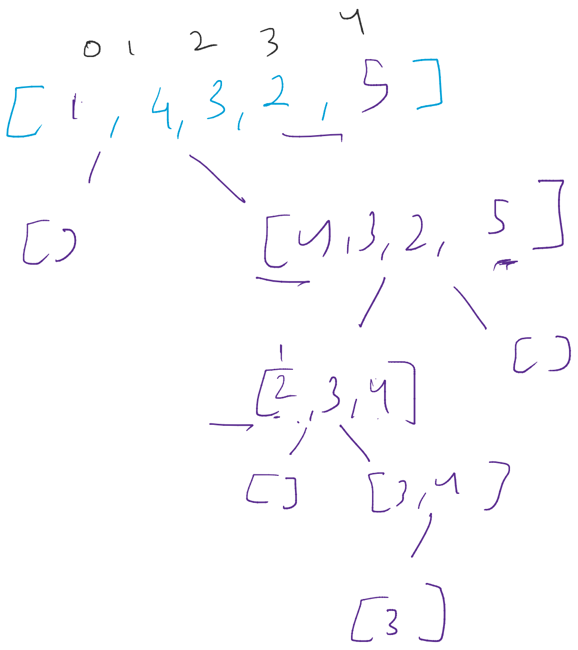
$2 + 2 = \underline{4} \simeq 5$



$n \times n = n^2$

$$\cfrac{\cfrac{\cfrac{n}{2}}{2}}{2}$$

$) = 1$



$n \times n = \underline{n^2}$

2-D Array :-

2-D Array :-

$$ans\left[\begin{array}{ccccc} 0 & 1 & 2 & 3 & 4 \\ 10, & 20, & 30, & 40, & 50 \end{array}\right]$$

$$ans = \begin{array}{c|c} & \begin{array}{ccccc} 0 & 1 & 2 & 3 & 4 \end{array} \xrightarrow{} \\ \hline 0 & [1, 2, 3, 4, 5] \\ 1 & [6, 7, 8, 9, 10] \\ 2 & [11, 12, 13, 14, 15] \\ 3 \downarrow & [16, 17, 18, 19, 20] \end{array}$$

↑↓ row

$\longrightarrow$ col $\longleftarrow$

sout(ans[0][2])

<data_type>[ ][ ] <name>= new <data_type>[4][5]