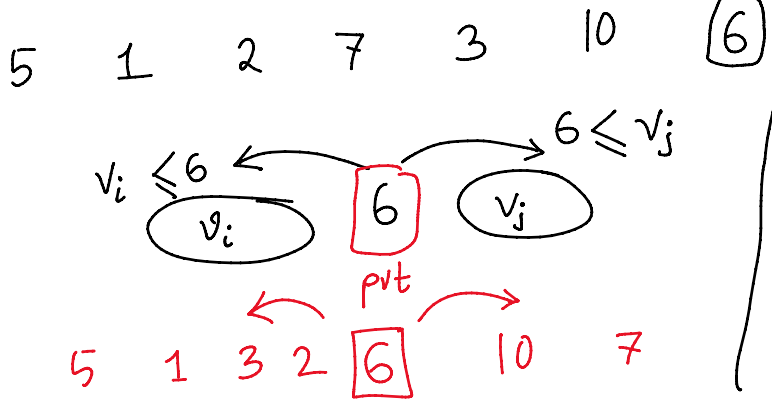


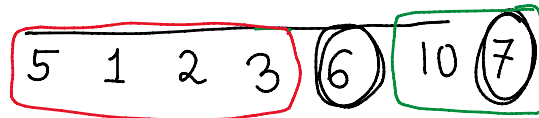
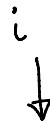
Quick Sort →  $O(N \log_2 N)$  → Comparison based sorting  
 Algo  
 →  $O(N^2)$  → 0.000000000... 1%

Quick Partition

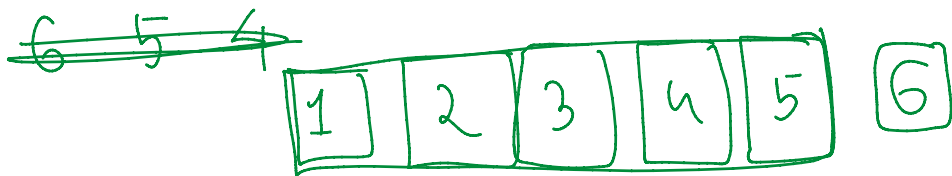
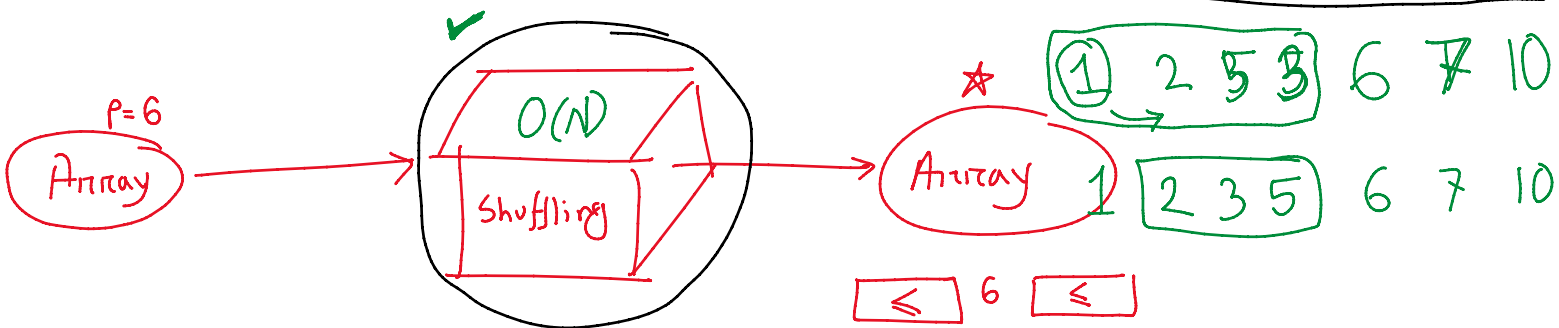


$arr[i] \leq pvt$

pvt = 6



$i + 1 = \text{pvt element's sorted position}$



$O(N)$

$N \cdot N = N^2$

$\frac{N + 1}{2} \approx N$

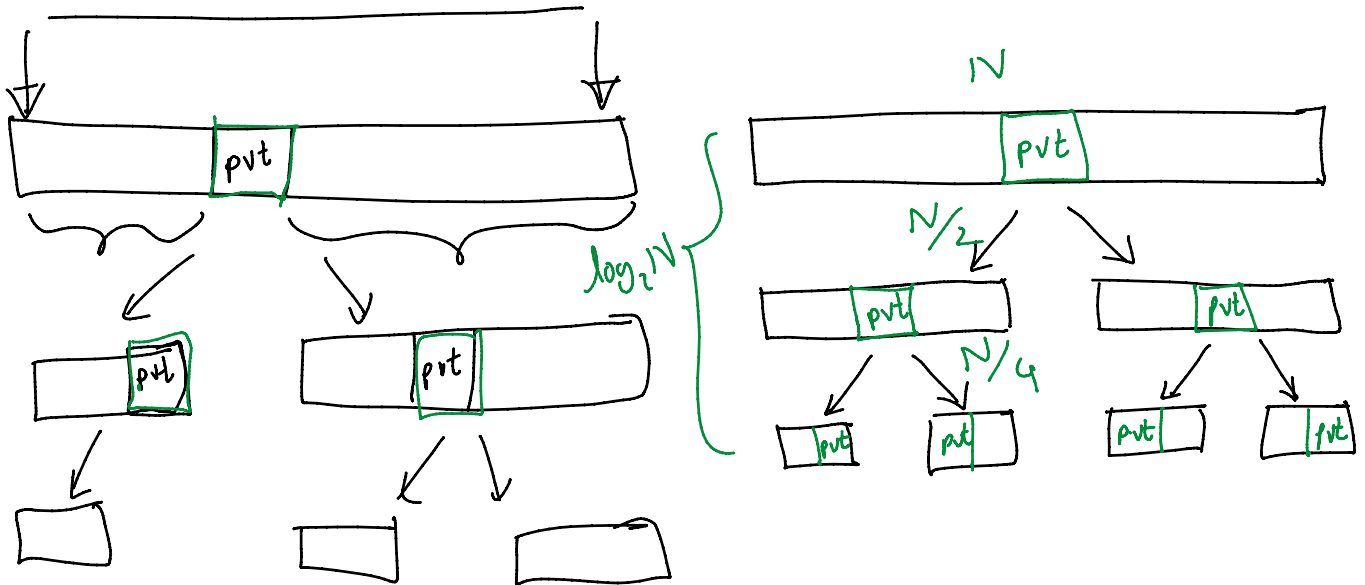
|||||

$6 \cdot O(N)$

6 + 5 + 4 + 3 + 2 + 1 =  $\frac{6 \cdot 7}{2} = \frac{N \cdot (N+1)}{2} \approx N^2$

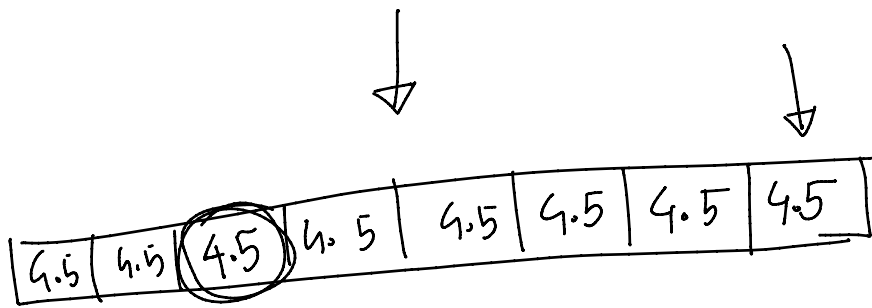
$$6 + 6 + 6 + 6 + 6 + 6 = 6 \cdot 6 = N^2$$

$$6 + 6 + 6 + 6 + 6 + 6 = 6 \cdot 6 = N^2$$



1 2 3 4 5 6 7 8

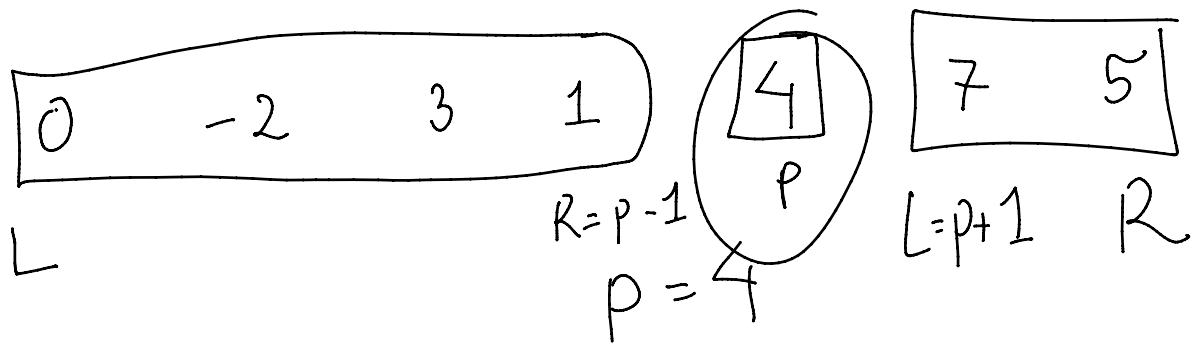
1 ~ 8



$$k = \cancel{1} \cancel{2} \cancel{7} 3$$

$$\frac{1 + 2 + 3 + 4 + 5 + 6 + 7 + 8}{8}$$

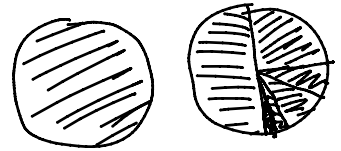
7 -2 0 5 3 1 4



$$N \rightarrow \frac{N}{2} \rightarrow \frac{N}{4} \rightarrow \frac{N}{8} \rightarrow \frac{N}{16} \rightarrow \dots \rightarrow 1$$

$$N + \frac{N}{2} + \frac{N}{4} + \frac{N}{8} + \frac{N}{16} + \dots$$

$$= N \left( \underline{1 + \frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \frac{1}{16} + \dots} \right)$$



$$= N \cdot 2$$

$$= 2N \sim O(N)$$