SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)

COIMBATORE-35

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

19ITB201 - DESIGN AND ANALYSIS OF ALGORITHMS

Quick sort

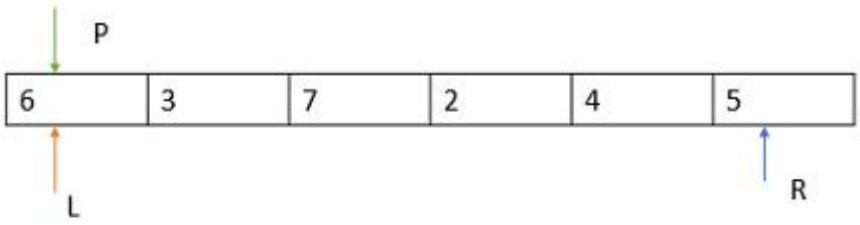
It is a divide and conquer algorithm.

- Step 1 − Pick an element from an array, call it as pivot element.
- Step 2 − Divide an unsorted array element into two arrays.
- Step 3 − If the value less than pivot element come under first sub array, the remaining elements with value greater than pivot come in second sub array.

Consider an example given below, wherein

- P is the pivot element.
- L is the left pointer.
- R is the right pointer.

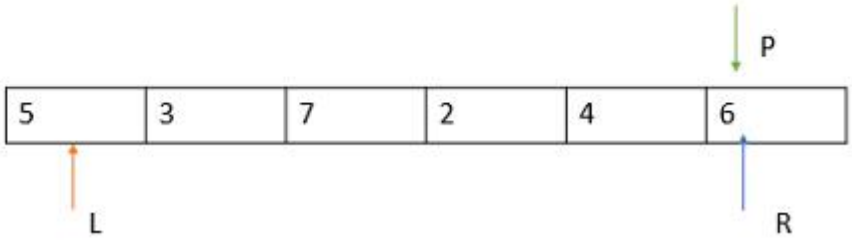
The elements are 6, 3, 7, 2, 4, 5.



Case 1: P=6 {Right side P is greater and Left side of is Leese}

Is P<R => 6<5 {wrong}

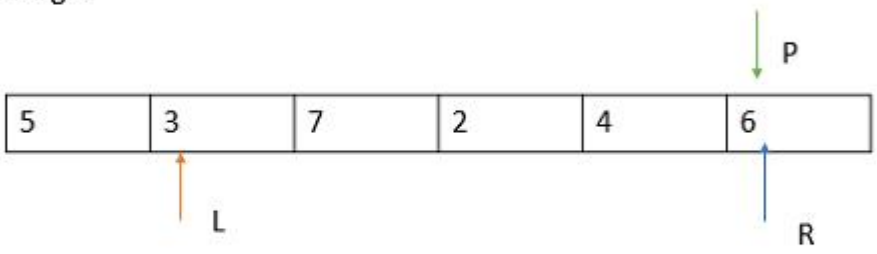
So, swap P with R



Case 2: P=6 , L=5 {Right side P is greater and Left side of is Lesser}

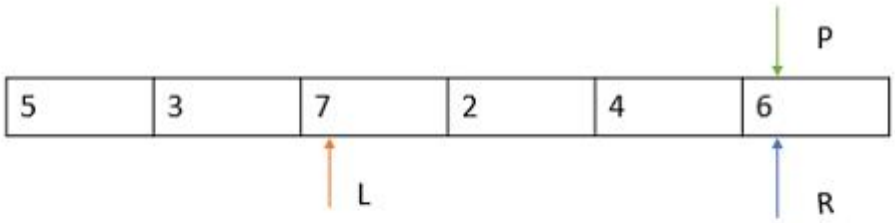
Is P>L => 6> 5 {right}
Move L towards right

Case 3:



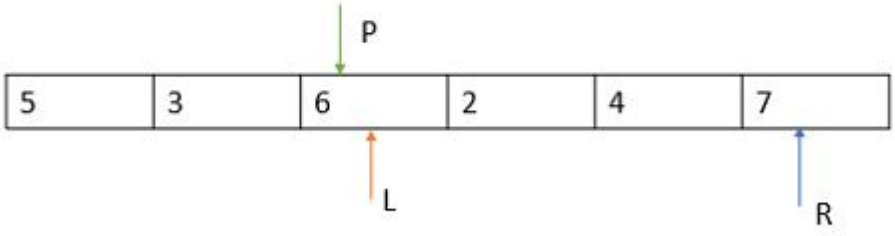
Is P>L, 6>3, Yes
So, move L towards right

Case 4:



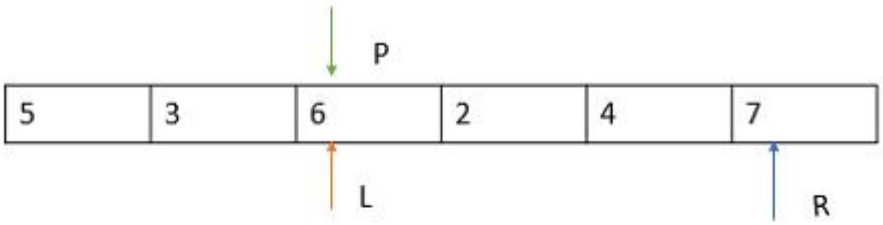
Is P>L => 6> 7 {wrong}
then swap P and L

Case5 :



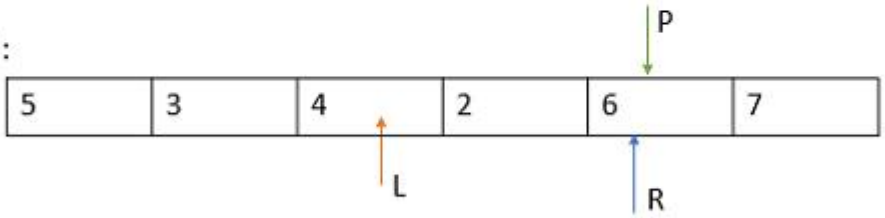
Is P<R => 6<7, => Yes
Decrement R

Case 6:



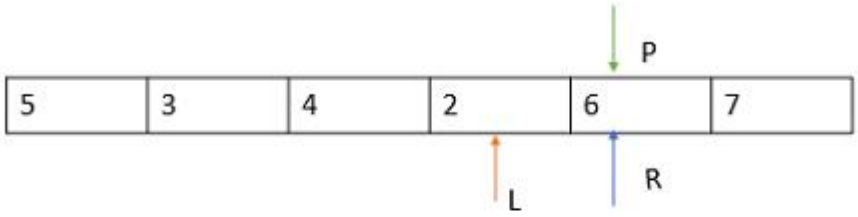
Is P<R => 6<4 {wrong}
then swap

Case 7 :



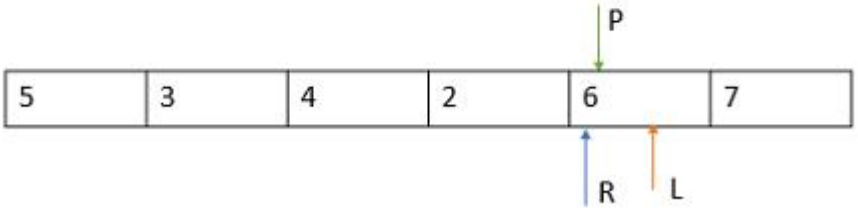
Is P>L => 6>4, => Yes
Move L to right

Case 8:



Is P>L => 6>2 {right}
move L to right

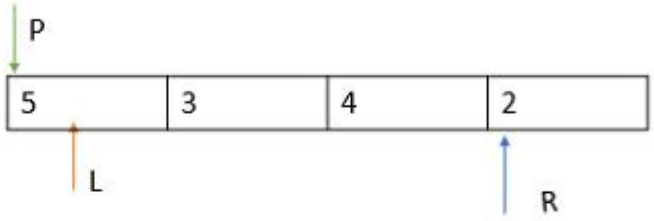
Case 9 :



Now,

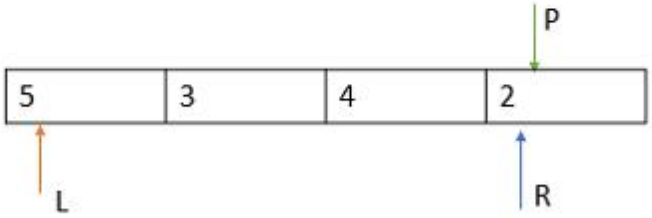
- The pivot is in fixed position.
- All the left elements are less.
- The right elements are greater than pivot.
- Now, divide the array into 2 sub arrays left part and right part.
- Take left partition apply quick sort.

Case 1:

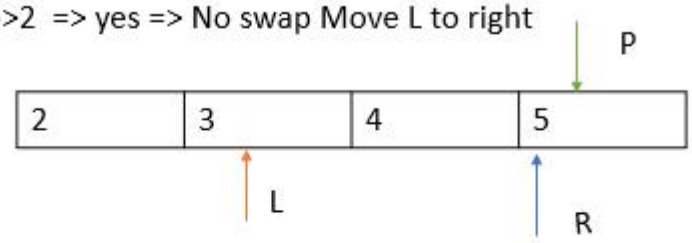


Is P<R => 5<2 {wrong} so, swap

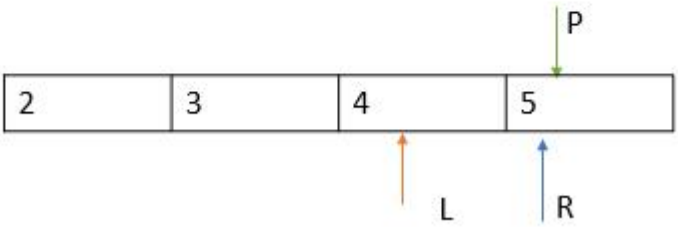
Case 2 :



Case 3: is P>L => 5>2 => yes => No swap Move L to right



Case 4: Is P> L => 5>3 => Yes => No swap => Move L to right



Now,

- The pivot is in fixed position.
- All the left elements are less and sorted
- The right elements are greater and are in sorted order.
- The final sorted list is combining two sub arrays is 2, 3, 4, 5, 6, 7