

Quick Sort

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Quick Sort

Quick sort is like bubble and insertion sort but it is more efficient.

The quick sort worst case scenario is $O(n^2)$ just like insertion and bubble sort.

But it acts like $n(n\log n)$.

How it works:

Array = [6,5,1,3,8,4,7,9,2]

1st step:

- Take the **last element** of the array.
- **Name** the last element of the array **pivot**.

2nd step:

- We'll **look** at the **least element** of the array(which is called the **wall**).
- We'll **look** at the **first element** of the array(which is the **current element**).

3rd step:

- **Look** into **all** the **elements** in the array(**except the pivot**).
- **Put** all the elements **smaller** than the pivot onto the **left hand** side of the **Wall**.
- **Put** all the elements **larger** than the pivot onto the **right hand** side of the **Wall**.
- Then **put** the **pivot** in **between** where it is **smaller** than most elements and **larger** than some.

1. First element

- So, call the **6** (first element).
- Then we check if **6** is smaller than **2**(pivot).
- Leave **6** where it is.

[6,5,1,3,8,4,7,9,2]

2. Second element

- So, call the **5** (second element).
- Then we check if **5** is smaller than **2**(pivot).
- Leave **5** where it is.

[6,5,1,3,8,4,7,9,2]

3. Third element

- So, call the **1** (third element).
- Then we check if **1** is smaller than **2**(pivot).
- Swap **1** with the first element **6**.
- Move **1** to the left hand side of the wall.

(the blue line is the **wall**).

[1|5,6,3,8,4,7,9,2]

4. Now we assume that we checked all the elements of the array (if it is smaller than 2).

- So we **leave** them all on the **right side** of the **wall**.
- Now we put the **pivot** in **between** the **1** and the right hand side of the wall.

[1|2,6,3,8,4,7,9,5]

5. Now the current pivot is **5** (since it is at the end of the array).

- We move the **wall** in between **2** and the **unsorted** elements of the array since both are sorted.

[1, 2|6,3,8,4,7,9,5]

6. Now we check if **6** is smaller than **5**.

- Keep **6** where it is.

[1, 2|6,3,8,4,7,9,5]

7. Now we check if **3** is smaller than **5**.

- put **3** left side of the wall.

[1, 2,3|6,8,4,7,9,5]

8. Now we check if **8** is smaller than **5**.

- Leave **8** as it is.

[1, 2,3|6,8,4,7,9,5]

9. Now we check if **4** is smaller than **5**.

- swap the positions of **4** and **6**.
- move **4** on the left hand side of the wall.

[1, 2, 3, 4 | 8, 7, 6, 9, 5]

10. Now we swap **8** with **5**. (**current** with the **pivot**)

[1, 2, 3, 4, 5, 7, 6, 9, 8]

new Array = [1, 2, 3, 4, 5, 7, 6, 9, 8]