

Insertion Sort

Sequence
→ Unsorted →

3 2 5 7 4

- We will divided it into two sub-list

3 | 2 5 7 4
"Sorted" "Unsorted List"

As the Algorithm starts, we will take the item in the very Left position of the unsorted sequence

3 | 2 5 7 4

- And move it into the sorted sub list

3 2 | 5 7 4

- Once it's in the sorted sub list we will compare the value to the value of its Left

3 2 | 5 7 4

If the value is higher, then we change position of these two items

3 2 | 5 7 4
↻
2 3 | 5 7 4

- We will continue down the sorted sub list doing this over and over until we find an item that is not higher than the item we're trying to sort

2 3 5 | 7 4

iteration 2

✓

2 3 5 7 | 4

iteration 3

2 3 5 ⑦ ④

2 3 ⑤ ④ 7

2 3 4 5 7

2 ③ ④ 5 7

~ Confirmed that $4 > 3$

2 3 4 5 7

Python Code:

```
def insertion_sort(list_a):
    indexing_length = range(1, len(list_a))
    for i in indexing_length:
        value_to_sort = list_a[i]

        while list_a[i-1] > value_to_sort and i > 0: # python allows negative indexing
            list_a[i], list_a[i-1] = list_a[i-1], list_a[i]
            i = i - 1
    return list_a

print(insertion_sort([2,12,123,122,42,312,42,124,9,10,1,2,3,45,9,0]))
```

Merge Sort

Quick Sort