COSC 2306
Data Programming

Sort

Insertion Sort

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Insertion Sort

- Insertion sort
  - Strategy
    - Partition the array into two regions: sorted and unsorted
    - Take each item from the unsorted region and insert it into its correct order in the sorted region

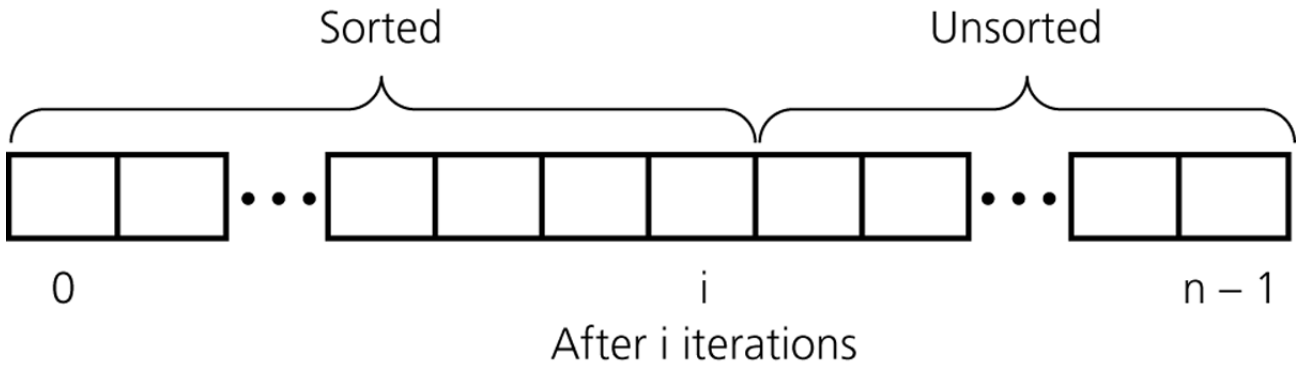
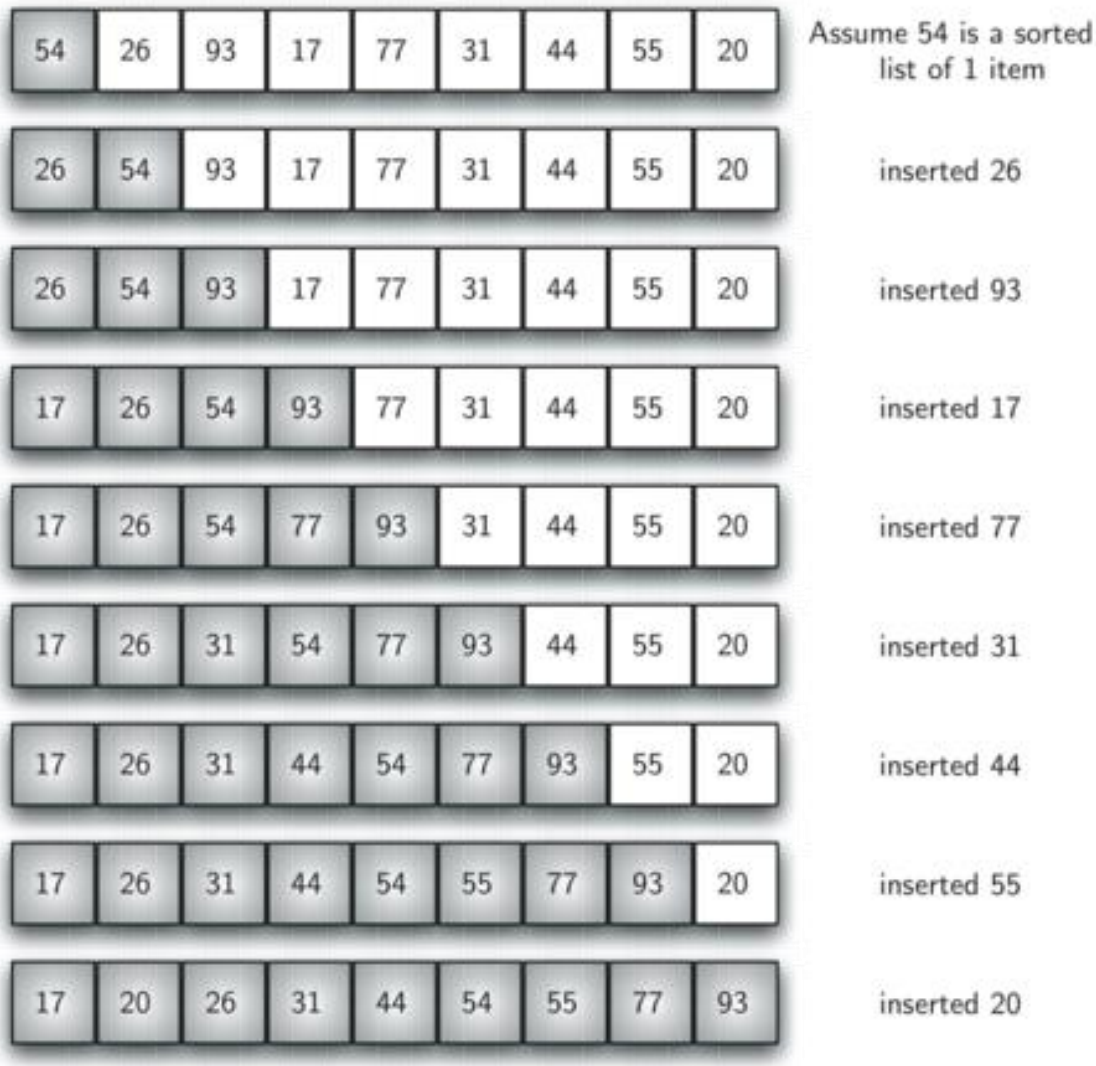


Figure 10-6

An insertion sort partitions the array into two regions

Insertion Sort



Insertion sort coding

Pass	Comparisons
1	0
2	1
3	2
...	...
$n-1$	n - 2

Need a nested for loop structure

Need swap code: if a > b, swap a and b

```
if (a > b):
    temp = a
    a = b
    b = temp
```

```
if (a > b):
    a, b = b, a
```

Need a variable to reference the position of the current value for insertion

Insertion sort coding

```
def insertion_sort(a_list):
    for index in range(1, len(a_list)): #index of pass
        current_value = a_list[index]
        position = index
        while position > 0 and a_list[position - 1] > current_value:
            #index of comparison during insertion
            a_list[position] = a_list[position - 1]
            position = position - 1
        a_list[position] = current_value

a_list = [54, 26, 93, 17, 77, 31, 44, 55, 20]
insertion_sort(a_list)
print(a_list)
```