

Array, Searching and Sorting

Eddy

For private learning purpose only

Array

What is array?

A variable that can stored more than one value.

Example:

```
cars = ["Ford", "Volvo", "BMW"]
```

Array vs List vs Tuple

List	Array	Tuple
List is mutable	Array is mutable	Tuple is immutable
A list is ordered collection of items	An array is ordered collection of items	A tuple is an ordered collection of items
Item in the list can be changed or replaced	Item in the array can be changed or replaced	Item in the tuple cannot be changed or replaced
List can store more than one data type	Array can store only similar data types	Tuple can store more than one data type

Example:

Array	List	Tuple
<code>cars = ["Ford", "Volvo", "BMW"]</code>	<code>list = ["abc", 34, True]</code>	<code>tuple = ("apple", "banana", "pie")</code>

Searching

What is searching?

An algorithm that used for finding or retrieving an elements where it stored.

Kinds of Searching

Linear Search

0	1	2	3	4	5	6	7	8
70	40	30	11	57	41	25	14	52

↑
 $K \neq 40$

0	1	2	3	4	5	6	7	8
70	40	30	11	57	41	25	14	52

↑
 $K \neq 30$

0	1	2	3	4	5	6	7	8
70	40	30	11	57	41	25	14	52

↑
 $K \neq 11$

0	1	2	3	4	5	6	7	8
70	40	30	11	57	41	25	14	52

↑
 $K \neq 57$

0	1	2	3	4	5	6	7	8
70	40	30	11	57	41	25	14	52

↑
 $K = 41$

Binary Search

	0	1	2	3	4	5	6
Search 50	11	17	18	45	50	71	95
	L=0	1	2	M=3	4	5	H=6
50 > 45 Take 2 nd half	11	17	18	45	50	71	95
	0	1	2	3	L=4	M=5	M=6
50 < 71 Take 1 st half	11	17	18	45	50	71	95
	0	1	2	3	L=4 M=4		
50 found at position 4	11	17	18	45	50	71	95
					done		

Sorting

What is sorting?

Rearrange a given list or array of elements according to a comparison for each elements.

Kinds of Sorting

Bubble Sort

First pass

7	6	4	3
---	---	---	---



6	7	4	3
---	---	---	---



6	4	7	3
---	---	---	---



6	4	3	7
---	---	---	---

Second pass

6	4	3	7
---	---	---	---



4	6	3	7
---	---	---	---



4	3	6	7
---	---	---	---

Third pass

4	3	6	7
---	---	---	---



3	4	6	7
---	---	---	---

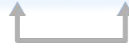
Selection Sort

step = 0

i = 0

20	12	10	15	2
----	----	----	----	---

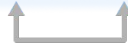
min value
at index 1



i = 1

20	12	10	15	2
----	----	----	----	---

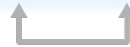
min value
at index 2



i = 2

20	12	10	15	2
----	----	----	----	---

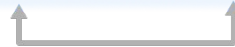
min value
at index 2



i = 3

20	12	10	15	2
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min value
at index 4



2	12	10	15	20
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swapping

Quick Sort

