

Algorithms & Data Structures CS 211

College of Science and Computer Engineering, Yanbu

TAIBAH UNIVERSITY



CS211

Algorithms & Data Structures

Lecture 6

1443 - 2021

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Chapter 7

Sorting Algorithms

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Objectives

- One of common way to teach the complexity of algorithm is to take sorting problem as an example.

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Objectives

- Bubble sort
- Selection sort
- Insertion sort
-

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Objectives

- Sorting algorithm receives a set of objects as input, and arranges this set of elements either in ascending or descending order.



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Objectives

- Objective
 - To arrange a list of elements in some order
- Unsorted array
 -
- Sorted in ascending order
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- Sorted in descending order
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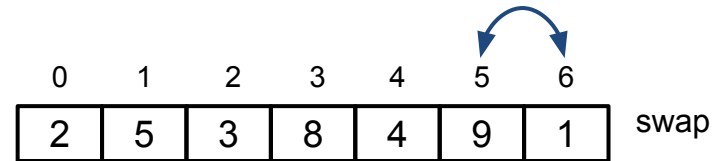
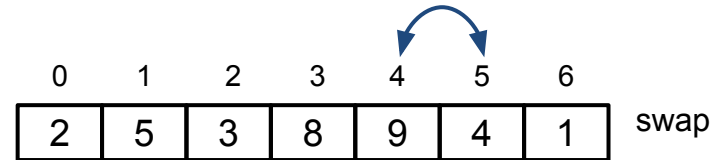
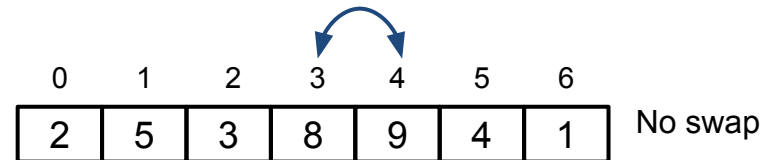
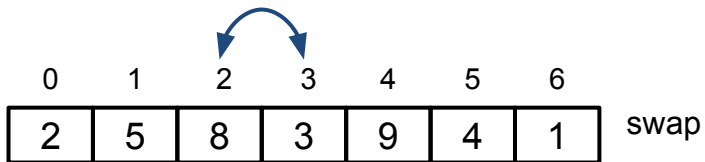
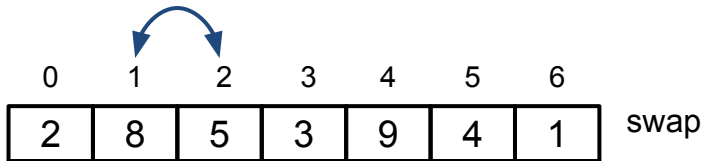
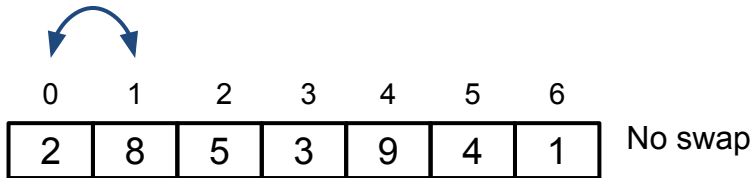
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Growth rates

Function	Name	
C	constant	
Log N	Logarithmic	
Log N	Log-squared	
N	Linear	
N log N		
N ²	Quadratic	
N ³	Cubic	
2 ^N	Exponential	

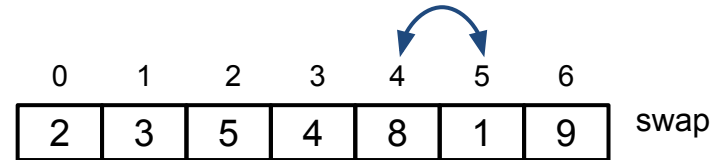
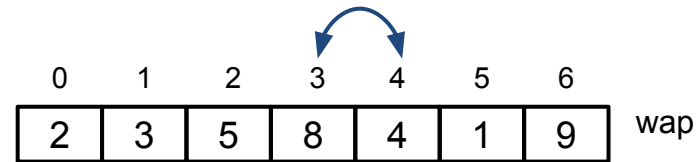
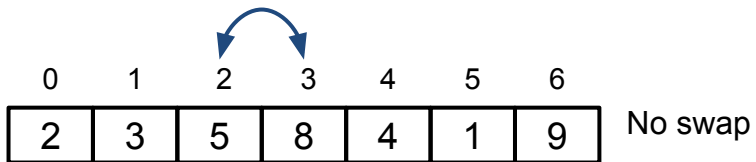
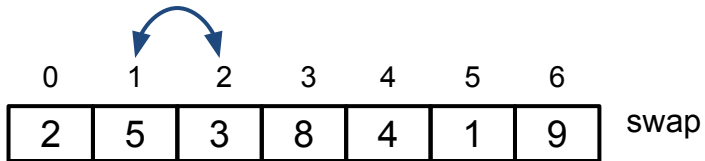
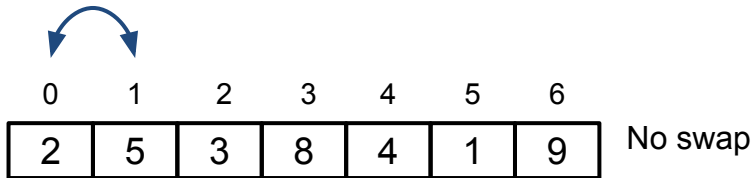
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Bubble sort



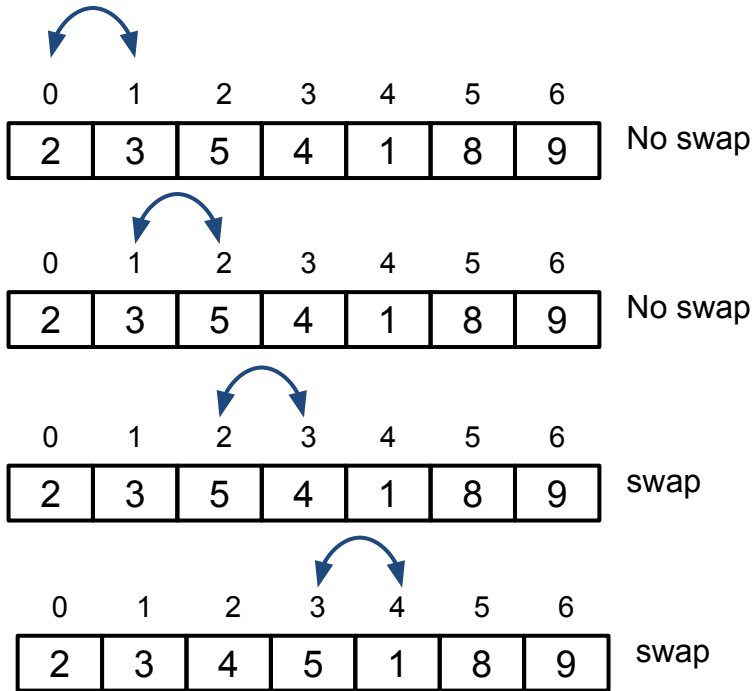
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Bubble sort



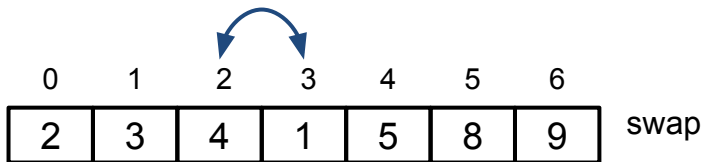
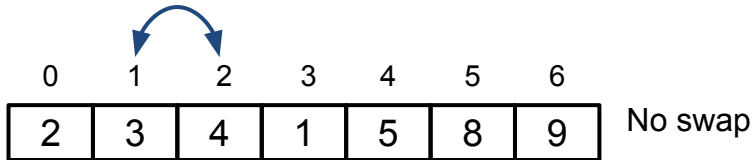
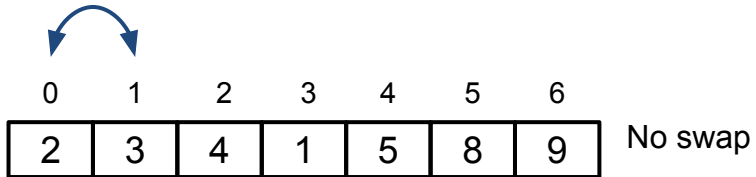
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Bubble sort



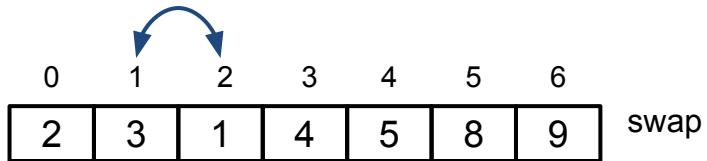
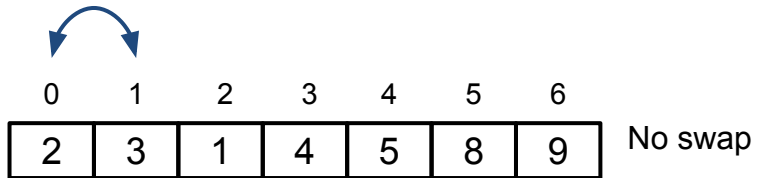
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Bubble sort



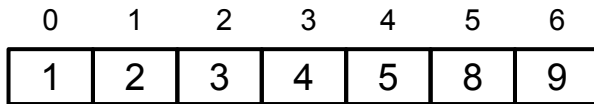
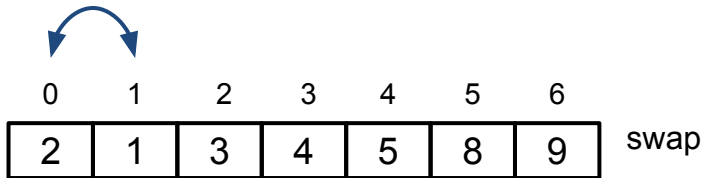
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Bubble sort



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Bubble sort



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Bubble sort

One of the simplest sorting algorithm is called bubble sort. The idea is to compare two consecutive items, swap them if they are in reverse order, and repeat.

Input: An array A of n numbers $A \leftarrow \{x_1, \dots, x_n\}$

Output: sorted A

```
1: for  $i \leftarrow 1$  to  $n - 1$  do
2:   for  $j \leftarrow 2$  to  $n - i$  do
3:     if  $A_{j-1} > A_j$  then
4:       swap  $A_{j-1}$  and  $A_j$ 
5:     end if
6:   end for
7: end for
```