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FACULTY OF ENGINEERING

Data Structure & Algorithm

Lecture 4
Order Array: Bubble Sort

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Content

- Unordered Array
- Ordered array
  - Bubble Sort
  - Selection Sort
  - Insertion Sort
  - Quick Sort

Unordered Array

Unordered Array: Linear Search

- Linear Search is used with an unordered array
- Linear Search is checked value, we want to search with the value of the 1st element, 2nd element, 3rd element, and so on
- Thus, on average it would check about ½ of the number of arrays

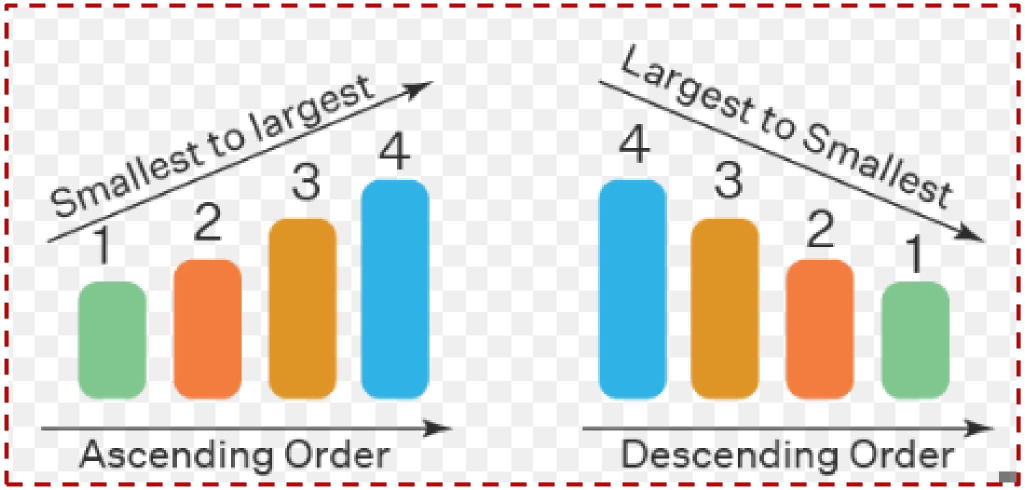
Unordered Array: Linear Search

- A simple approach is to do a linear search.
- The **time complexity** of the Linear search is O(n).
- Another approach to perform the same task is using Binary Search.

Ordered Array

Ordered array

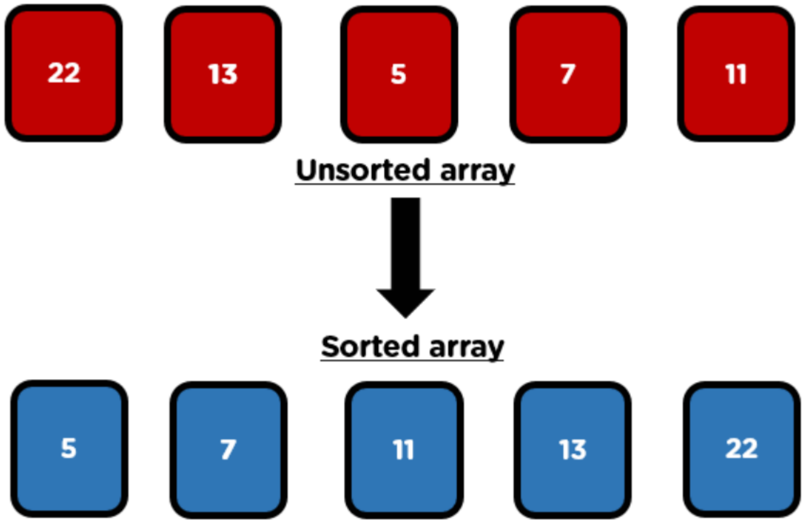
- Order array data is stored in ascending (or descending) key order



- Order array makes possible a fast way of searching for a data item

Ordered Array: Sorting

- is a concept in which the elements of an array are rearranged in a logical order.
- This order can be from lowest to highest or highest to lowest.
- Sorting an unsorted array problems such as searchin maximum element,



Ordered Array: Sorting Application

- Practical application
  - People by last name
  - Countries by population
  - Search engine results by relevance
  - Reduce the complexity of a problem, it is an important algorithm in Computer Science

Ordered Array: Why Sorting?

- Fundamental to other algorithms
- Different algorithms have different asymptotic and constant-factor trade-offs
    - No single ‘best’ sort for all scenarios
    - Knowing one way to sort just isn’t enough
- Many approaches to sorting which can be used for other problems

Types of Sorting Techniques

- Bubble Sort
- Selection Sort
- Insertion Sort
- Quick Sort

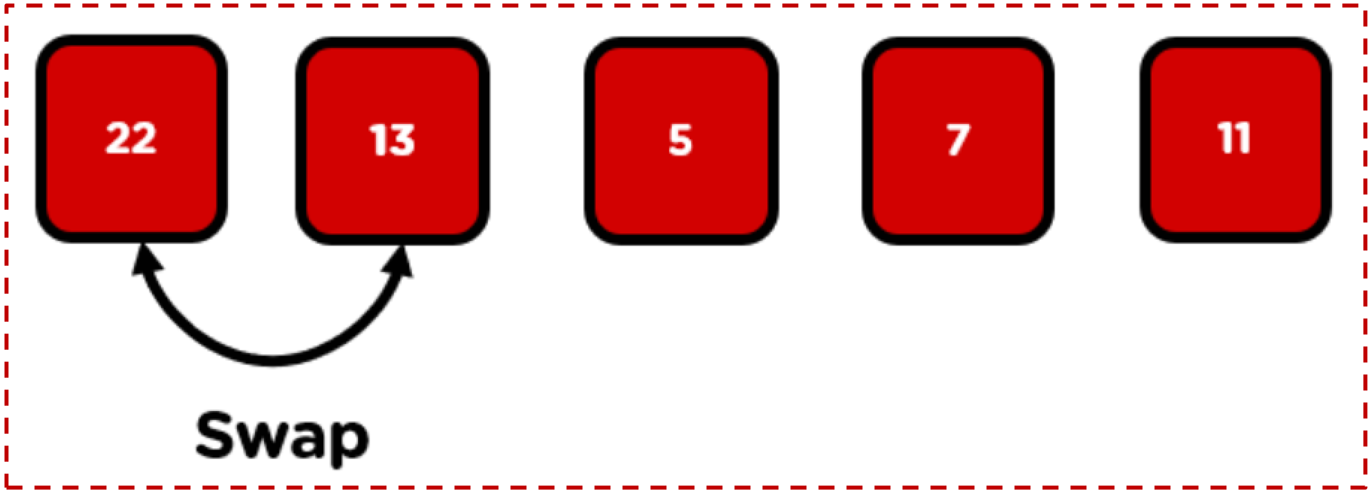
Bubble Sort

Bubble Sort

- Bubble sort is one of the most straightforward sorting algorithms.
- Comparing the first two elements of the array and checking if the first element is greater than the second element; if it is, we will swap those elements and move forward to the next element.

Bubble Sort

- If the first element is not greater than the second, then we don’t need to swap it.
- And this process will keep on repeating till the end of the array.

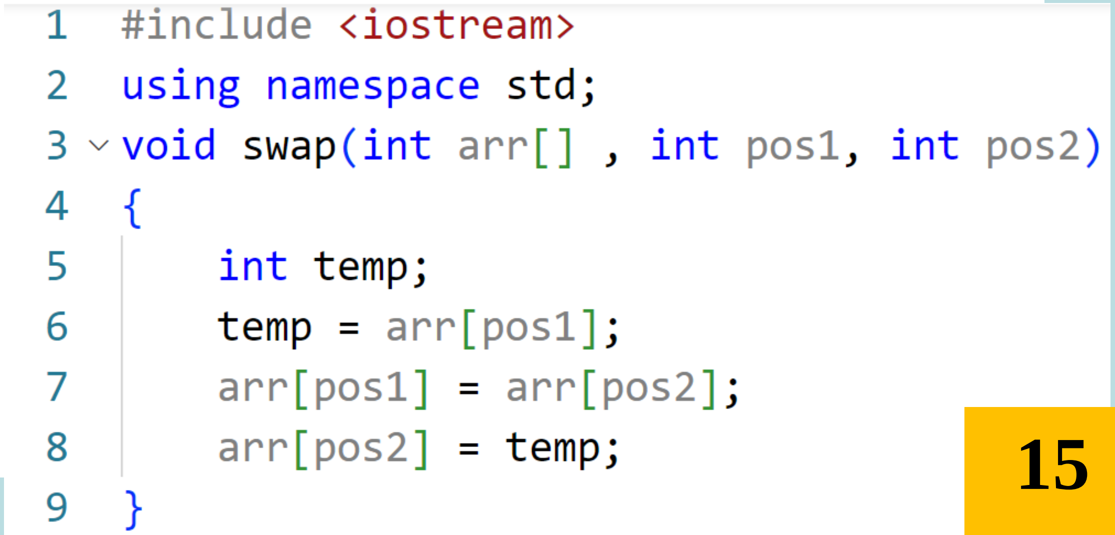


Sorting Array: Swap

int arr [] = {8, 15, 4, 3, 18, 7, 1, 4}

8	**15**	**4**	**3**	**18**	**7**	**1**	**18**

- Using the code below *swap*(***arr***, 2, 6) the array and show the ***arr*** after swap.



```
#include <iostream>
using namespace std;
void swap(int arr[] , int pos1, int pos2)
{
    int temp;
    temp = arr[pos1];
    arr[pos1] = arr[pos2];
    arr[pos2] = temp;
}
```

Bubble Sort

- What to do bubble sort array in C++?
- Write a tree step to descend the array.

W4 – Lab 4

Exercise

1. Create an array to store data of any type, you want (int, double, char, float,…)

2. Create a function to show elements of the array;

3. Create a function swap element of array between 2 position

4. Create a function to order array using Bubble Sort

   a) An ascending order

   b) A descending order

Thanks!