Intro to data structure & algorithms

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What is an Algorithm?

An algorithm is a set of well-defined instructions to solve a particular problem.

ex. An algorithm to add two numbers:

- Take two number inputs.
- Add numbers using the + operator.
- Display the result.

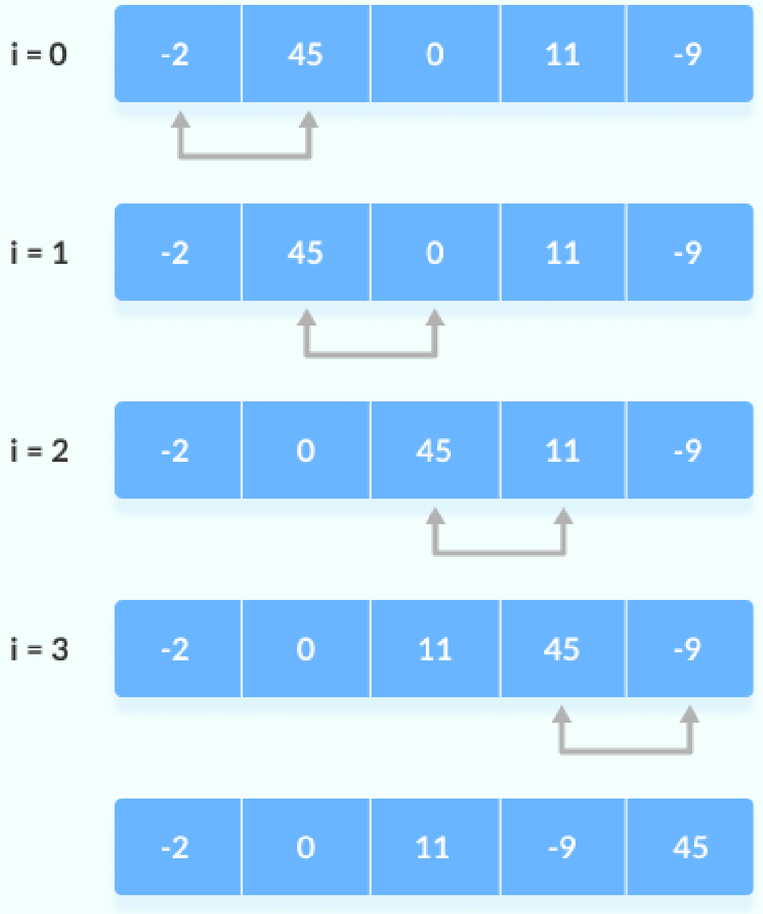
Sort & search algorithm

Sorting algorithms are a set of instructions that take an array or list as an input and arrange the items into a particular order.

Search algorithms are a set of instructions that take an array or list as an input and search for an item in it.

Bubble Sort Algorithm

Bubble sort is a sorting algorithm that compares two adjacent elements and swaps them until they are in the intended order.



Optimized Bubble Sort Algorithm

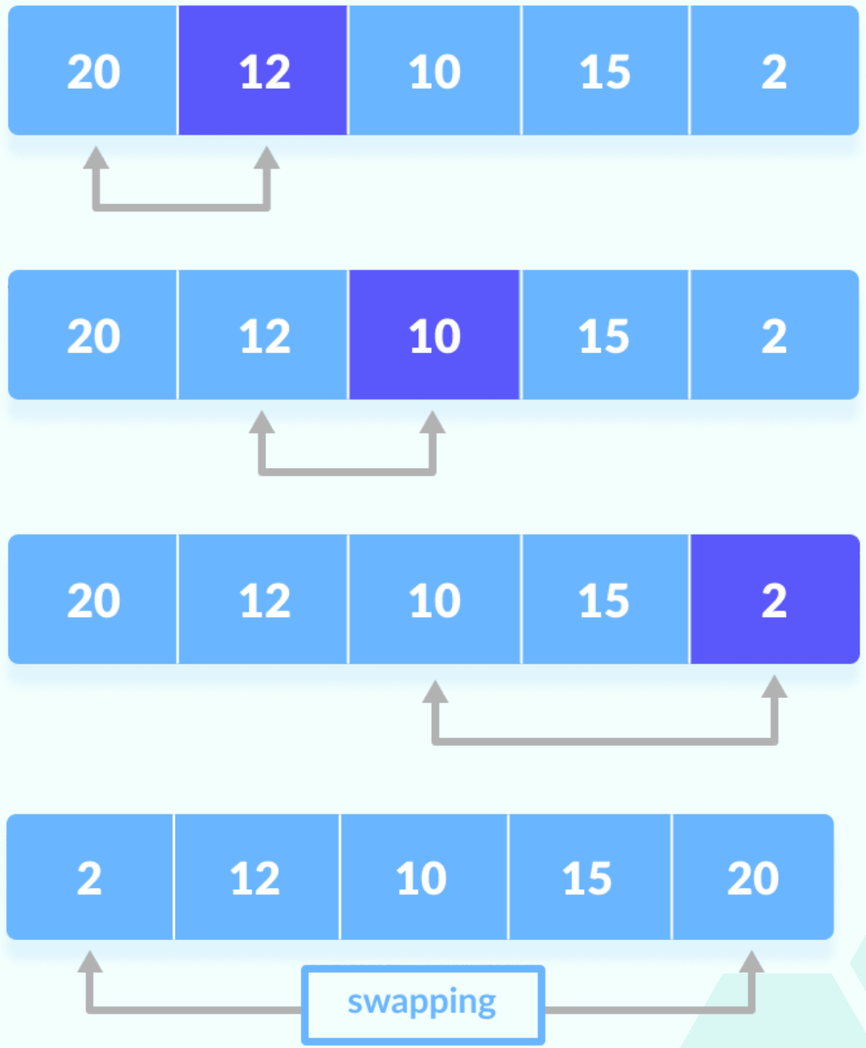
In Bubble Sort algorithm, all the comparisons are made even if the array is already sorted. This increases the execution time.

To solve this, we can introduce an extra variable swapped. The value of swapped is set true if there occurs swapping of elements. Otherwise, it is set false.

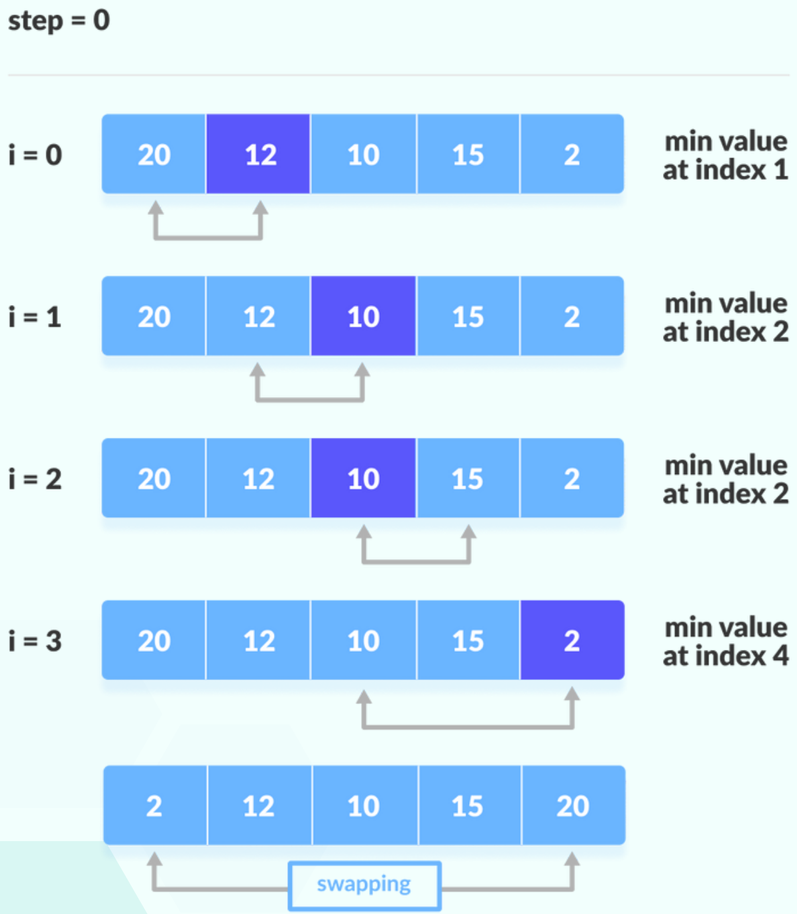
After an iteration, if there is no swapping, the value of swapped will be false. This means elements are already sorted and there is no need to perform further iterations.

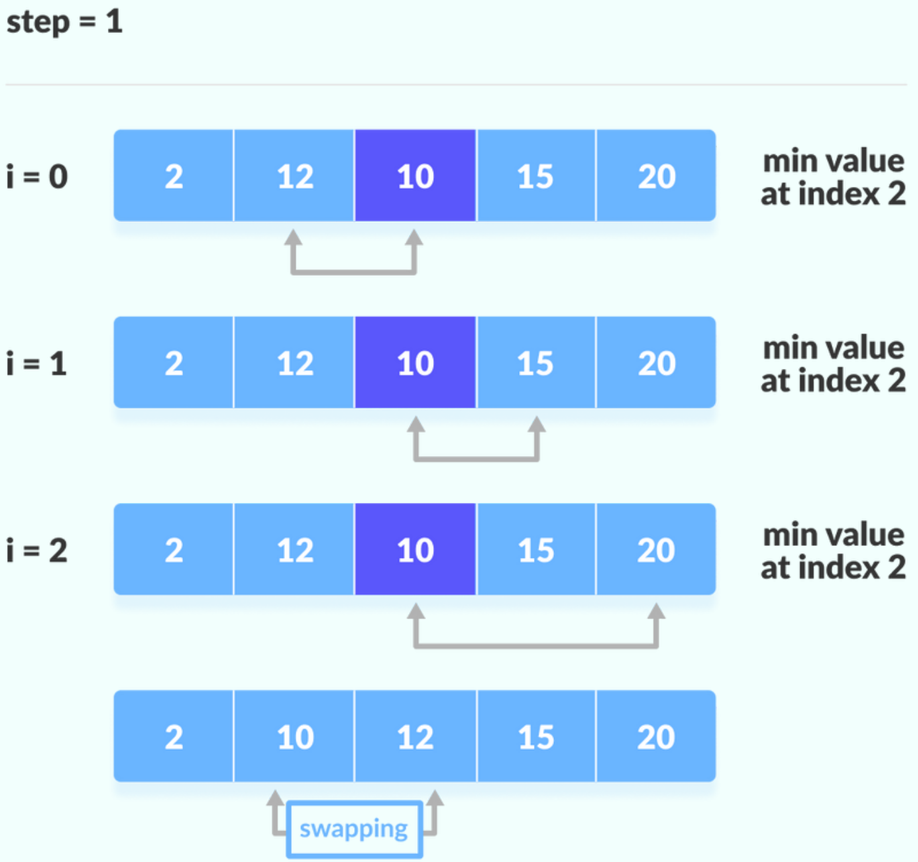
Selection Sort Algorithm

- Set the first element as minimum.
- Compare minimum with the second element. If the second element is smaller than minimum, assign the second element as minimum.
- The process goes on until the last element.
- After each iteration, minimum is placed in the front of the unsorted list.

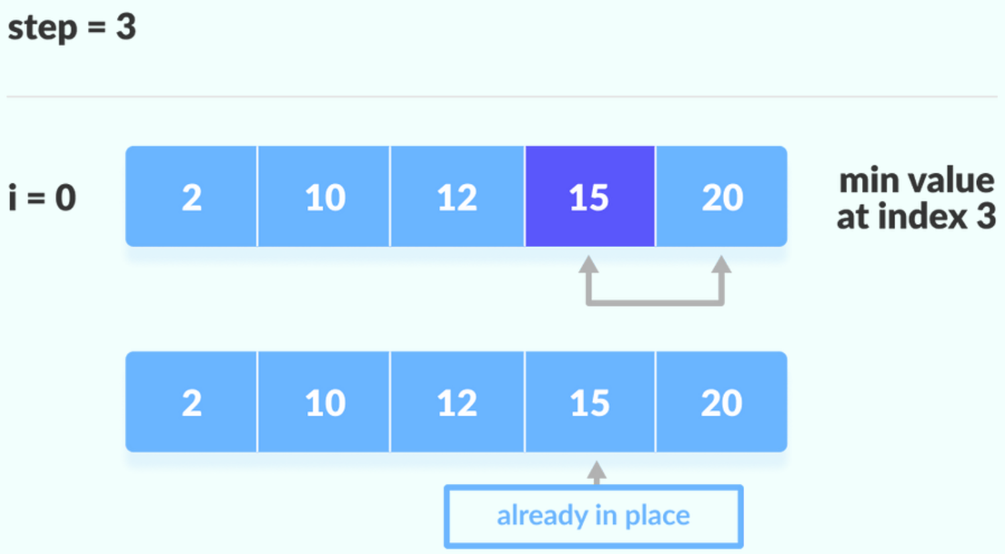


Selection Sort Algorithm





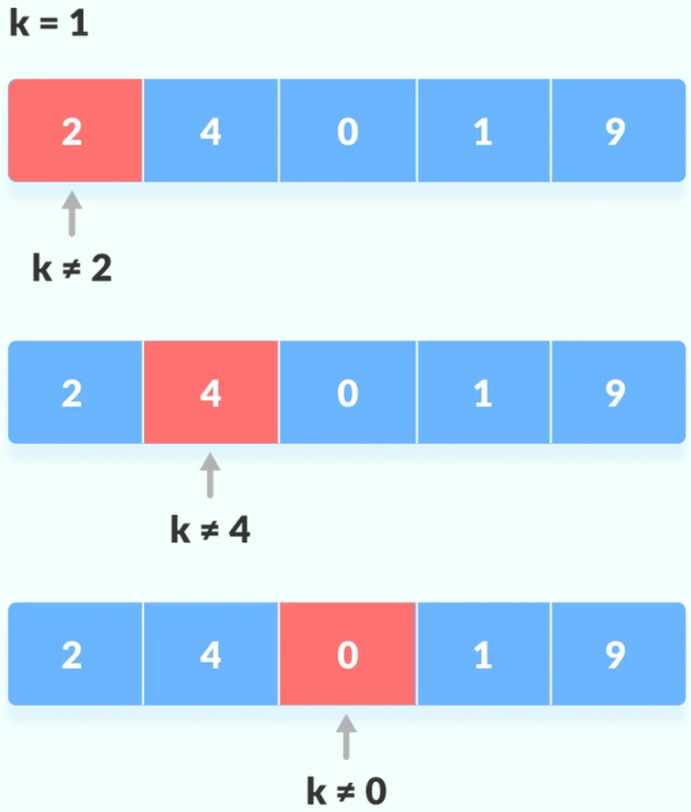
Selection Sort Algorithm



Linear Search

Linear search is a sequential searching algorithm where we start from one end and check every element of the list until the desired element is found. It is the simplest searching algorithm.

Using for searching operations in smaller arrays.



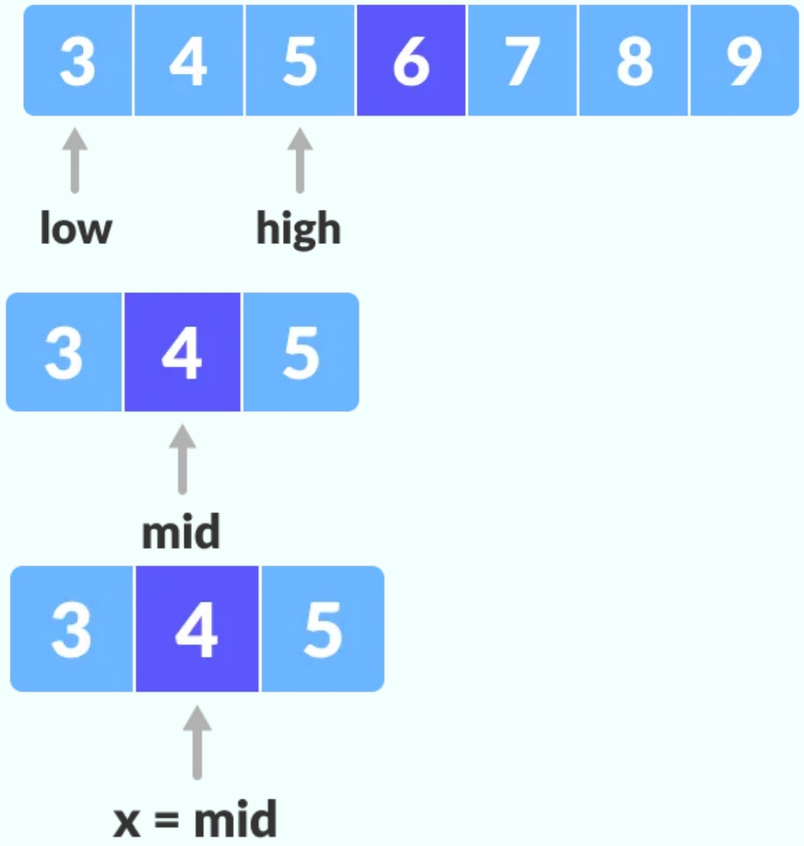
Binary Search

Binary search can be implemented only on a sorted list of items. If the elements are not sorted already, we need to sort them first.

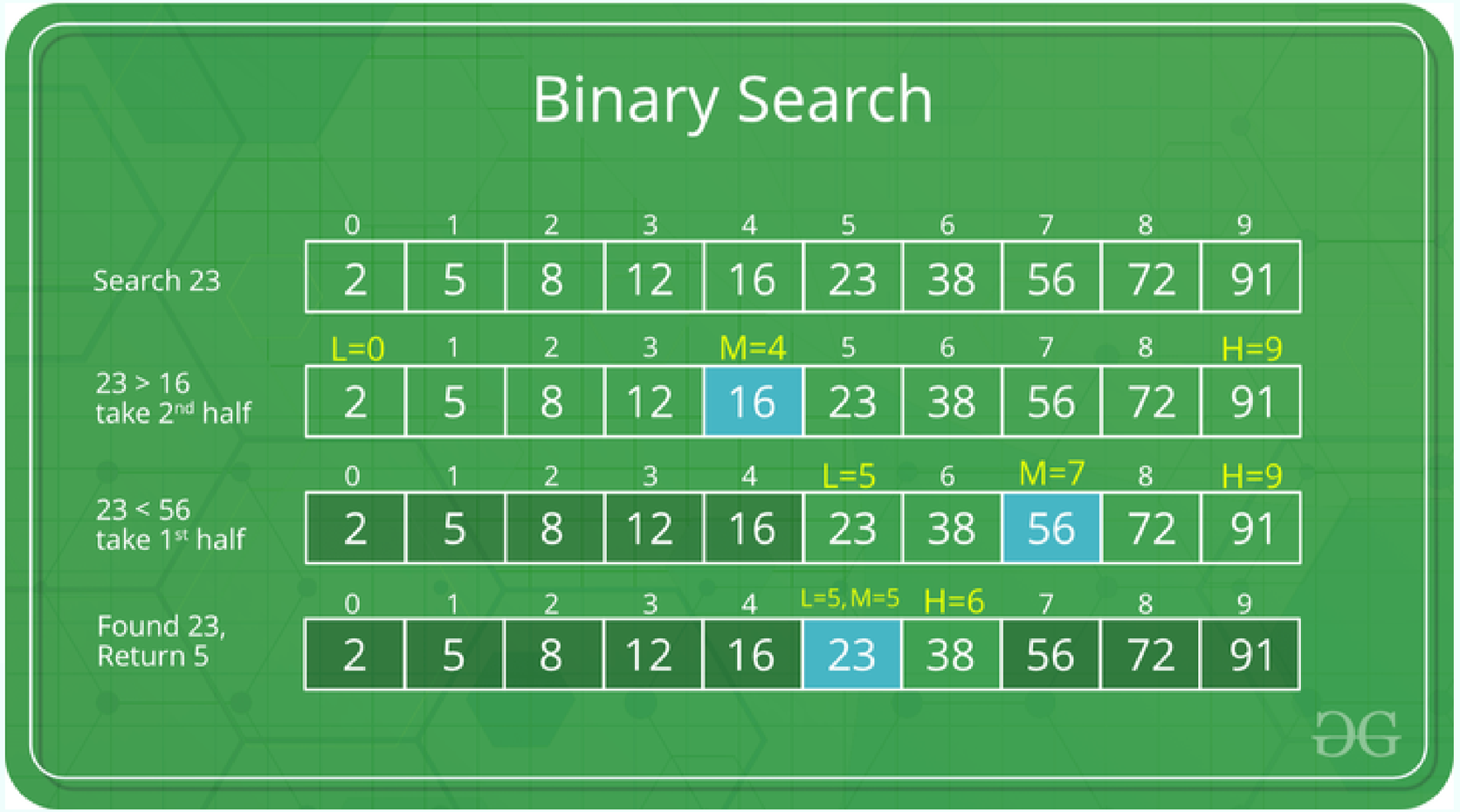
It can be implemented in two ways which are discussed below.

- Iterative Method
- Recursive Method

Binary Search



Binary Search



Question and Answer

Thank You