

Selection Sort

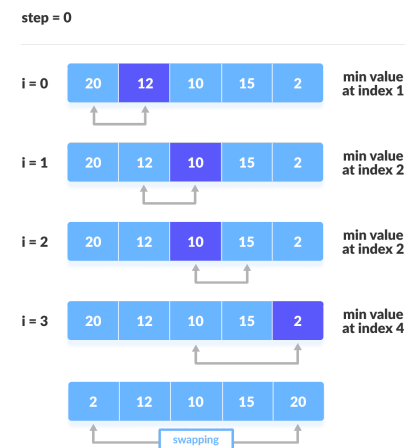
☰ Tags	Algorithm Elementary-Sorting_Algorithms Sorting
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🕒 Created time	@November 3, 2022 1:23 PM
🕒 Last edited time	@November 3, 2022 4:19 PM
⚙ Status	In progress
🔗 URL	
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Selection Sort algorithms sorts array by selecting the smallest element in the array and putting it in its correct position.

How it works?

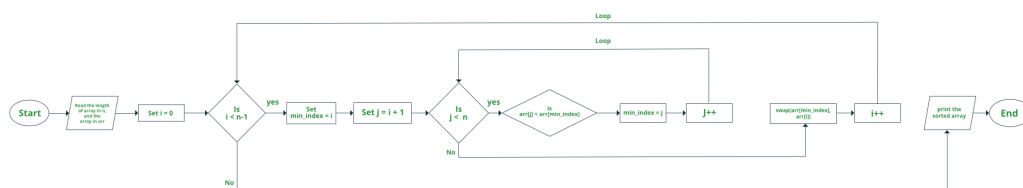
theoretically it divides the array in two part sorted part and unsorted. when the sorting starts sorted part has zero elements and unsorted part is from 0 to n-1 in each iteration we make a variable 'smallest-Index' set it to i and then start a nested loop from i+1 to sizeofArray in every iteration of the nested loop we compare arr[smallest-Index] with arr[nested-loop-iterator] which ever is smallest we set it to smallest-index so in the end

of we have the smallest element from the array swap it to arr[i] consider every element till i as sorted after each iteration sorted part grows and unsorted part shrinks by the time the loop ends we have a sorted array.



Space Complexity: $O(1)$ Because its in-place and doesn't use any other array for help

Average: $O(n^2)$ because of nested loop



Flowchart for Selection Sort

credit GeeksforGeeks

```
void selectionSort(vector<int>& arr, int n){
    for(int i = 0; i < n-1; i++){
        int LI = i; //lowest index
        for(int j = i+1; j < n; j++){
            LI = ((arr[j] < arr[LI])?j:LI);
        }
        swap(arr[i], arr[LI]);
    }
}
```