

INTRO

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Selection Sort

- Select the minimum and swap it.
- after each iteration minimum element is shifted to the left.

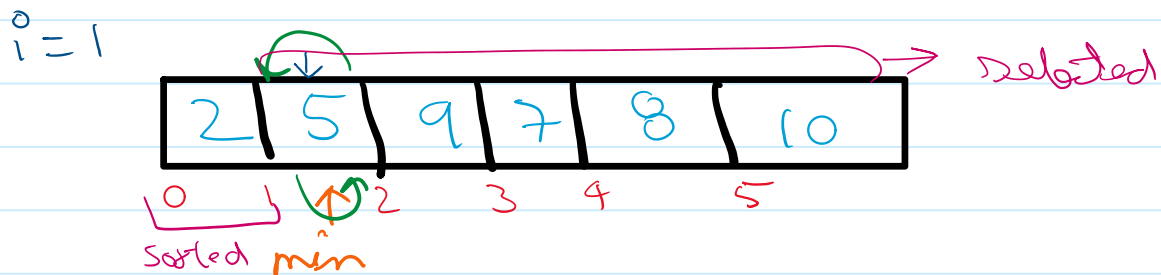
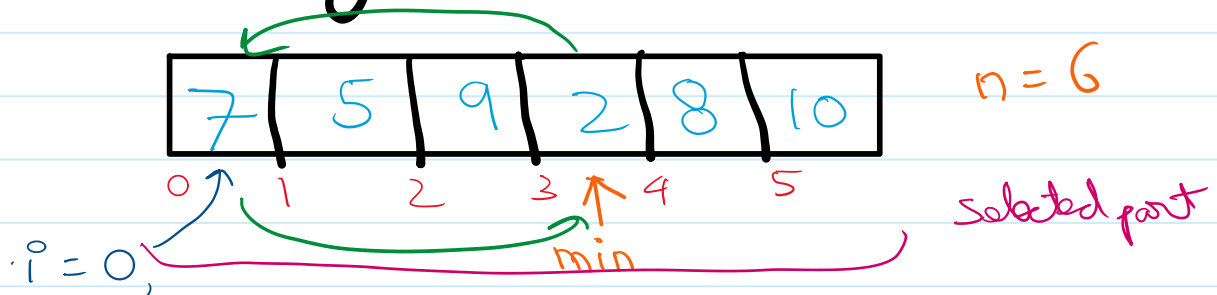
Example:

| | | | | | | | |
|----|---|-----|----|----|---|---|----|
| 25 | 2 | 100 | 50 | 39 | 5 | 0 | 90 |
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

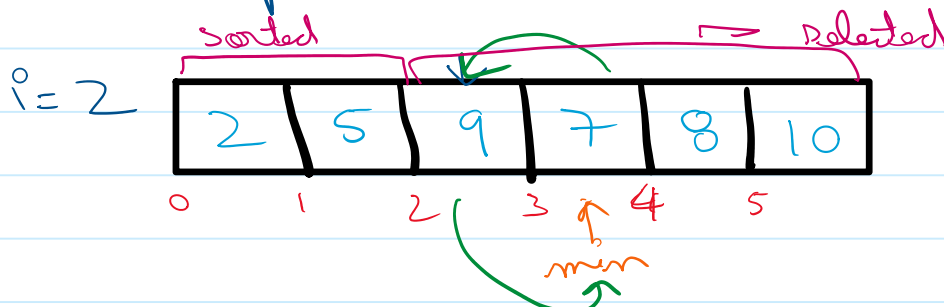
Algorithm:

- Select the range, from $0 \Rightarrow n-1$, containing all the elements, (using a for loop)
- in each iteration, select the minimum element from range of the unsorted array.
- Swap the minimum element with the first element of the selected range.
- after each iteration you will find the array is sorted upto the selected range.

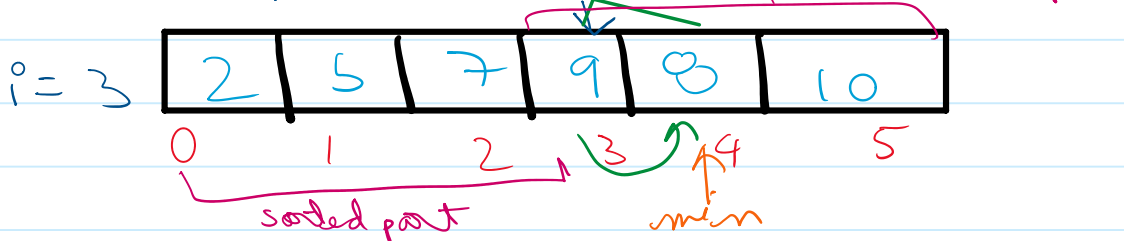
Dry Run:



\rightarrow swap 5 with 2



\rightarrow swap 7 with 9

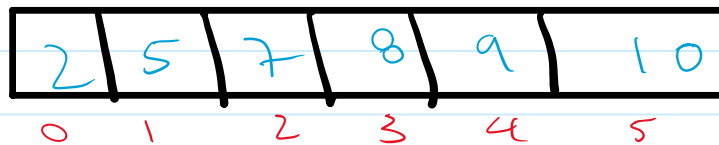


\rightarrow swap 8 with 9

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Diagram illustrating the array state after the 4th iteration of Insertion Sort. The array contains the elements [2, 5, 7, 8, 9, 10] at indices 0 to 5. The elements from index 0 to 3 (2, 5, 7, 8) are marked as the "Sorted part" with a purple bracket. The element 9 at index 4 is being inserted into the sorted part. A green arrow shows the insertion point at index 3, and an orange arrow points to the current position of 9 at index 4.

→ swap 9 with 9



→ Stop the iteration

Pseudo Code:

```
for (i = 0; i <= n - 2) {
    mini = i
    for (j = i; j <= n - 1) {
        if (arr[j] < arr[mini])
            mini = j;
    }
    swap(arr[mini], arr[i]);
}
```

CODE:

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C++

→ function with, input array and array size:

```
void selectionSort(vector<int> &arr, int n)
{
    // outer loop
    for (int i = 0; i <= n - 2; i++)
    {
        int minIndex = i;
        // inner loop to find minimum element
        for (int j = i; j <= n - 1; j++)
        {
            if (arr[j] < arr[minIndex])
                minIndex = j;
        }
        // swap minimum with starting index of selected array
        int temp = arr[minIndex];
        arr[minIndex] = arr[i];
        arr[i] = temp;
    }
}
```

$$T.C = O(n^2)$$