Runtime Complexity of Selection Sort

Selection sort makes the same number of comparisons as the bubble sort. However one advantage that selection sort have is, that the number of swaps done, to sort an array of n element, will always be n.

Worst Case, Average Case and Best Case

Input Array => 10, 9, 8, 7, 6, 5, 4, 3, 2 ,1

1st Iteration => 9 Comparisons (**1**, 9, 8, 7, 6, 5, 4, 3, 2 ,10)

2nd Iteration => 8 Comparisons (**1, 2**, 8, 7, 6, 5, 4, 3, 9 ,10)

3rd Iteration => 7 Comparisons (**1, 2, 3**, 7, 6, 5, 4, 8, 9 ,10)

4th Iteration => 6 Comparisons (**1, 2, 3, 4**, 6, 5, 7, 8, 9 ,10)

5th Iteration => 5 Comparisons (**1, 2, 3, 4, 5**, 6, 7, 8, 9 ,10)

6th Iteration => 4 Comparisons (**1, 2, 3, 4, 5, 6**, 7, 8, 9 ,10)

7th Iteration => 3 Comparisons (**1, 2, 3, 4, 5, 6, 7**, 8, 9 ,10)

8th Iteration => 2 Comparisons (**1, 2, 3, 4, 5, 6, 7, 8**, 9 ,10)

9th Iteration => 1 Comparison (**1, 2, 3, 4, 5, 6, 7, 8, 9** ,10)

f(n) = (n-1) + (n-2) + (n-3) + … + 3 + 2 + 1 = n(n-1)/2

Worst Case Complexity = $O(n^2)$

Average Case Complexity = $\theta(n^2)$

Best Case Complexity = $\Omega(n^2)$

Space Complexity = O(1)