Runtime Analysis of Sorting Algorithms

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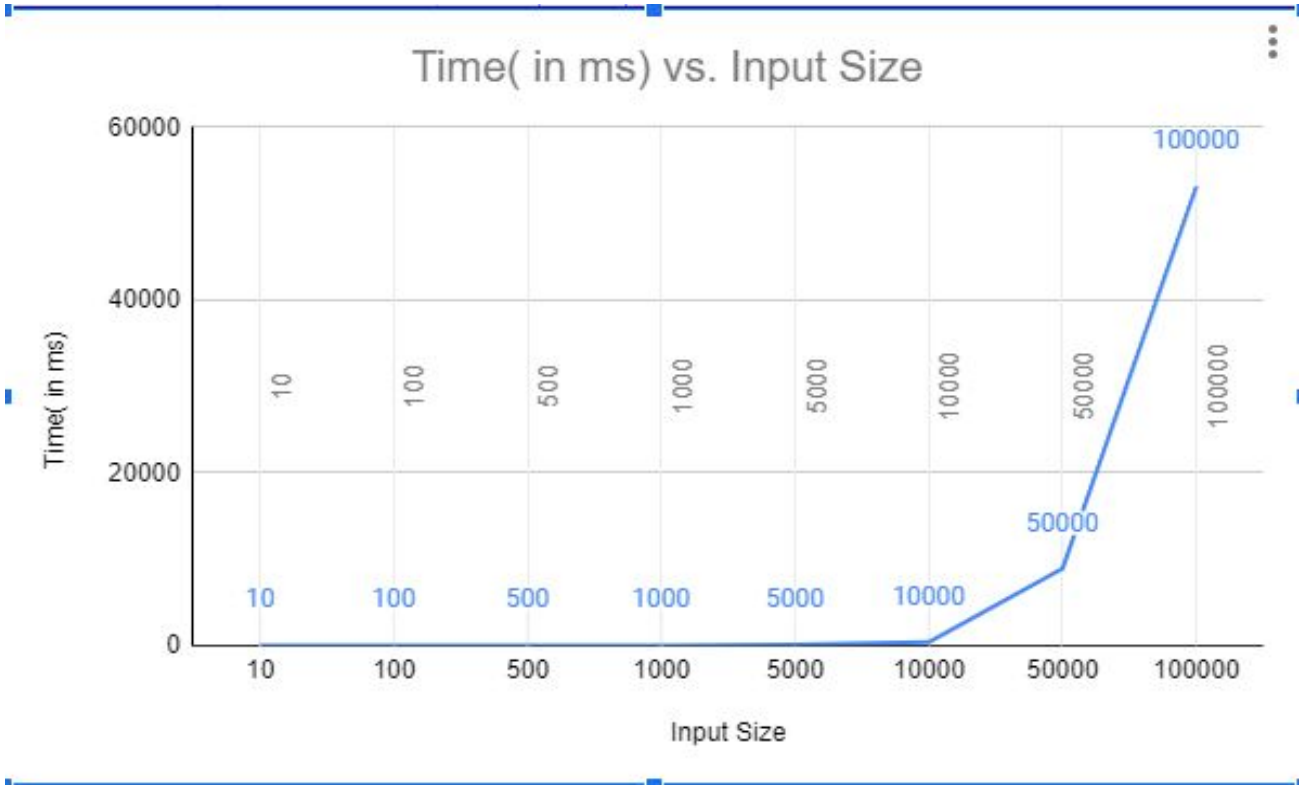
Code for Analysis

```
auto before=high_resolution_clock::now();
sort(arr,0,n);
auto after=high_resolution_clock::now();
auto duration =
duration_cast<milliseconds>(after-before);
cout<<"Time for"<<n<<"= "<<duration.count()<<endl;
```

Bubble Sort

- Worst Case : O(n^2)
- Best Case : O(n^2)

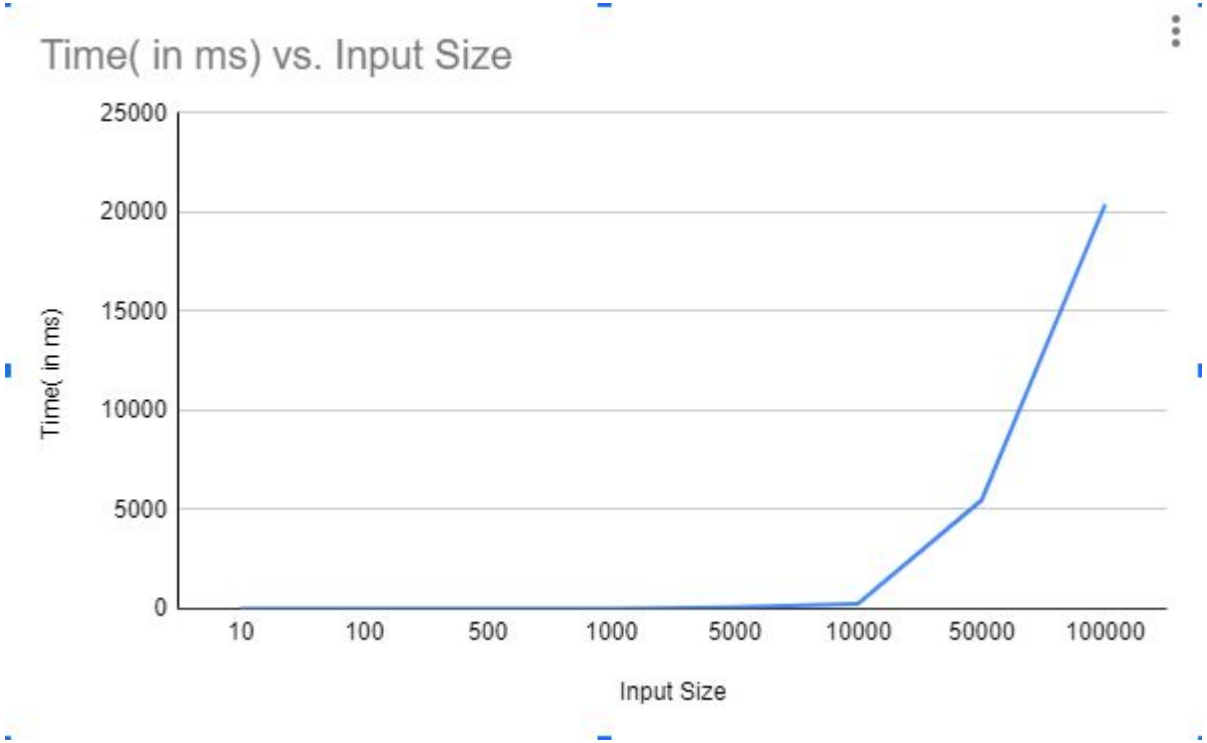
```
Time for 10 = 0
Time for 100 = 0
Time for 500 = 0
Time for 1000 = 3
Time for 5000 = 98
Time for 10000 = 394
Time for 50000 = 8922
Time for 100000 = 53129
```



Insetion Sort

- Worst Case : O(n^2)
- Best Case : O(n)

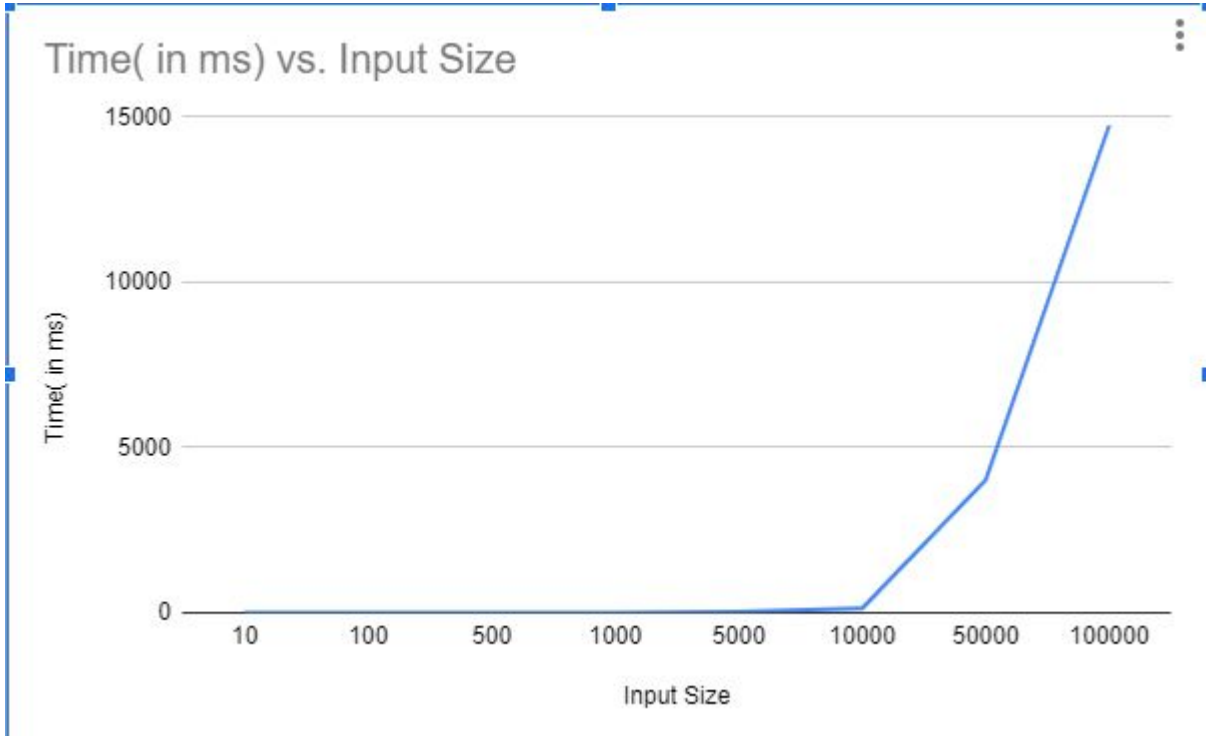
```
Time for 10 = 0
Time for 100 = 0
Time for 500 = 0
Time for 1000 = 2
Time for 5000 = 59
Time for 10000 = 239
Time for 50000 = 5465
Time for 100000 = 20382
```



Selection Sort

- Worst Case : O(n^2)
- Best Case : O(n^2)

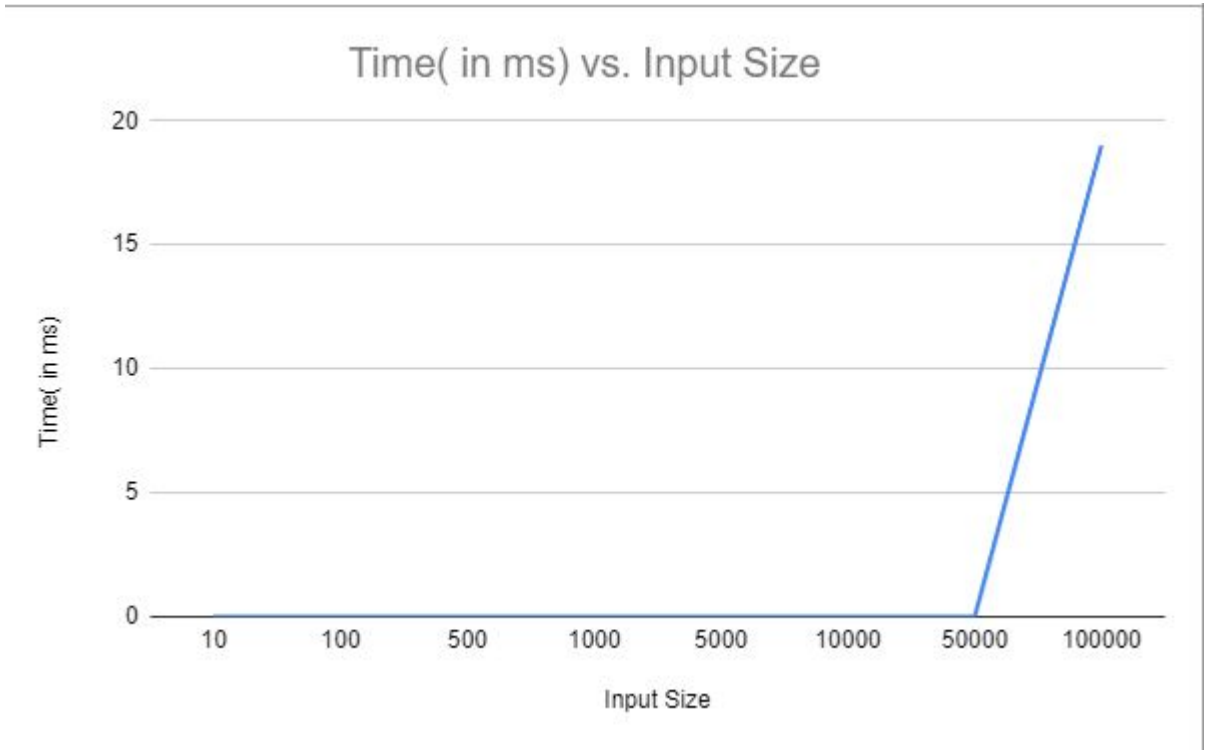
```
Time for 10 = 0
Time for 100 = 0
Time for 500 = 0
Time for 1000 = 0
Time for 5000 = 34
Time for 10000 = 132
Time for 50000 = 4012
Time for 100000 = 14738
```



Quick Sort

- Worst Case : O(n^2)
- Best Case : O(n*Log(n))

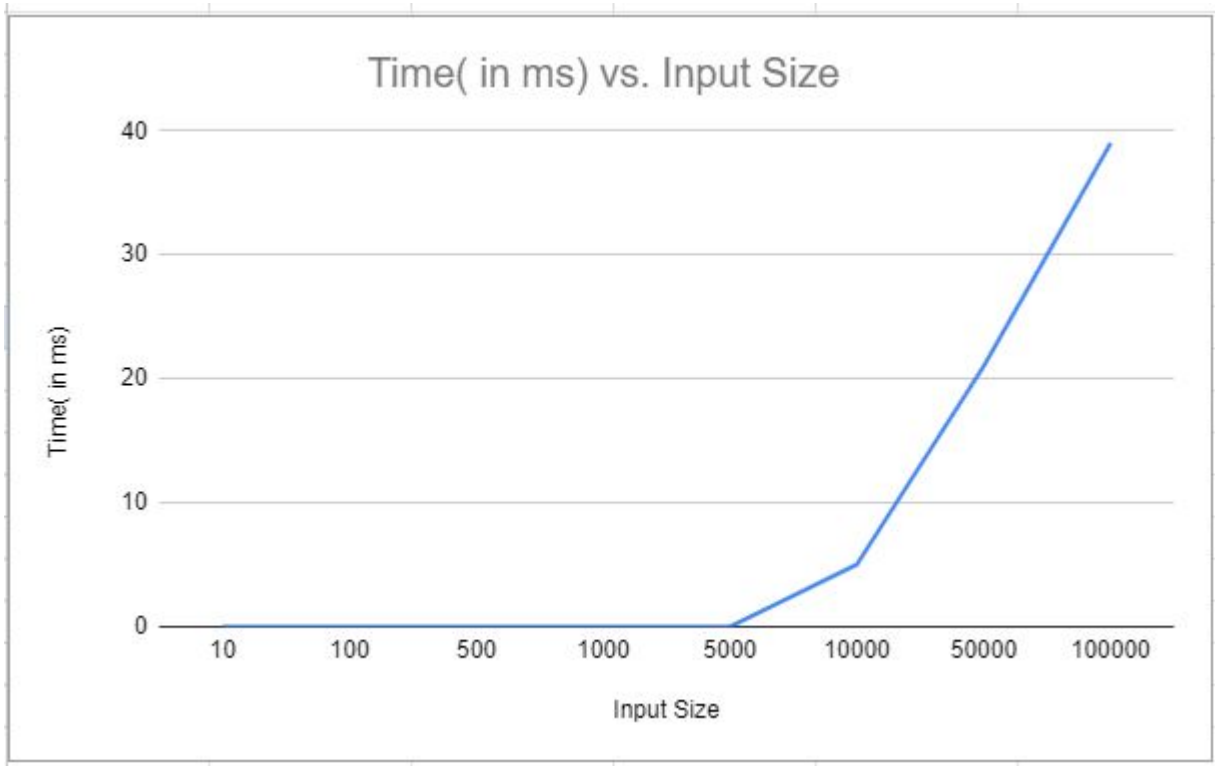
```
Time for 10 = 0
Time for 100 = 0
Time for 500 = 0
Time for 1000 = 0
Time for 5000 = 0
Time for 10000 = 0
Time for 50000 = 0
Time for 100000 = 19
```



Merge Sort

- Worst Case : O(n*logn(n)
- Best Case : O(n*log(n))

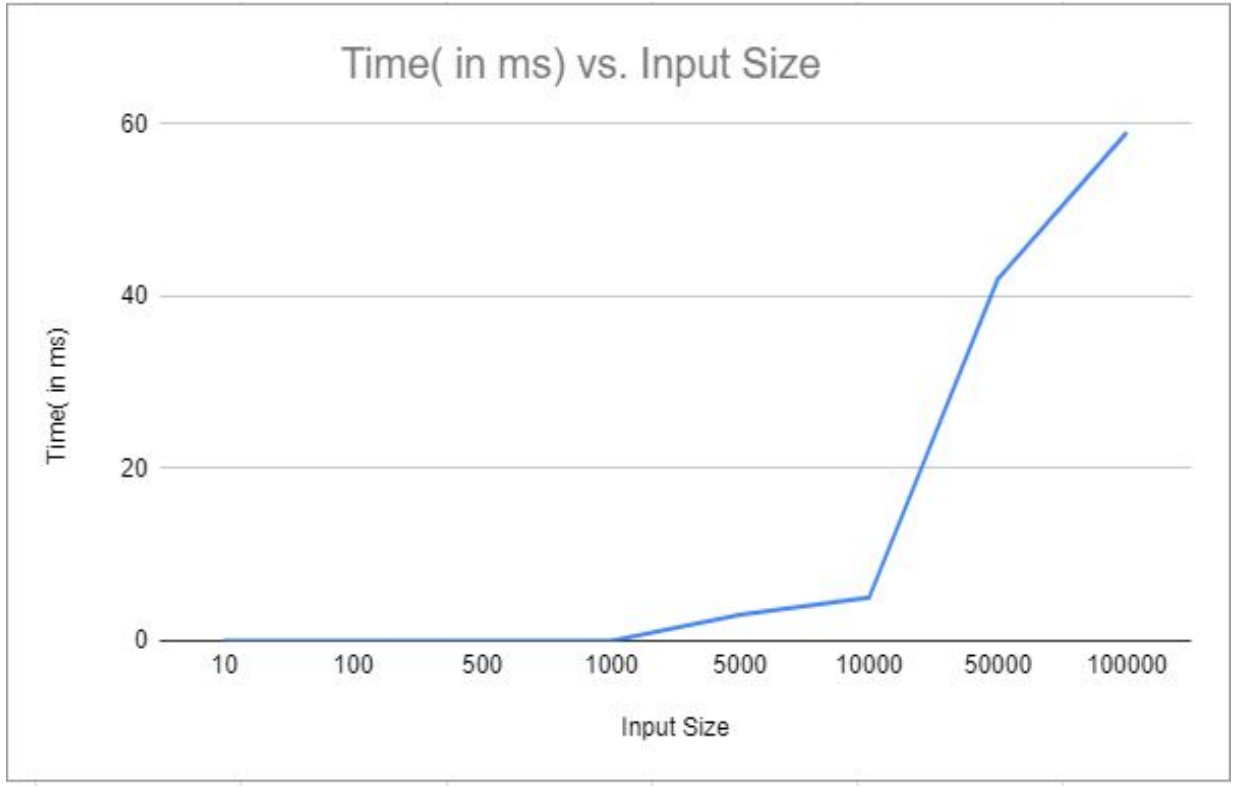
```
Time for 10 = 0
Time for 100 = 0
Time for 500 = 0
Time for 1000 = 0
Time for 5000 = 0
Time for 10000 = 5
Time for 50000 = 21
Time for 100000 = 39
```



Heap Sort

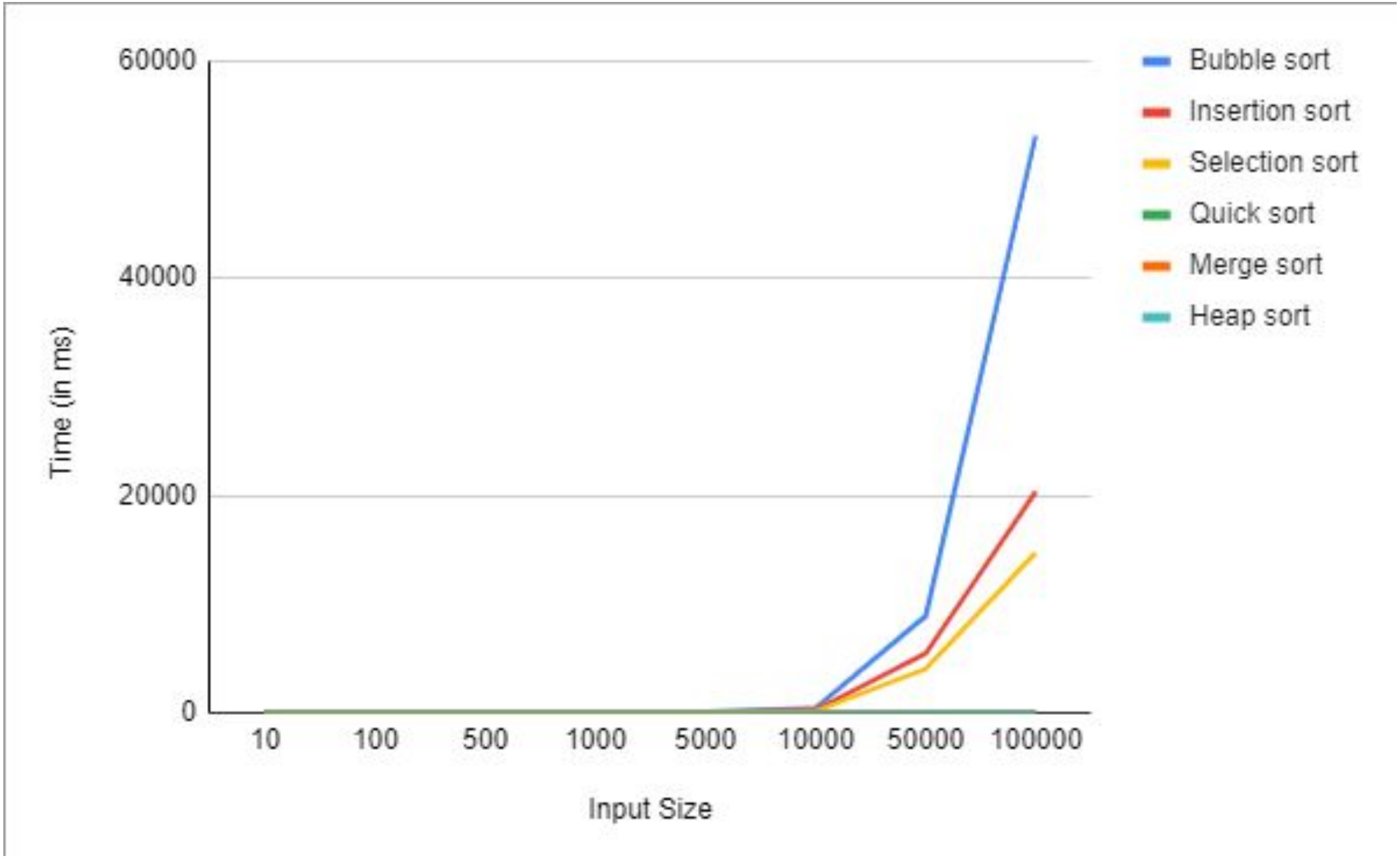
- Worst Case : O(n*log(n)
- Best Case : O(n*log(n))

```
Time for 10 = 0
Time for 100 = 0
Time for 500 = 0
Time for 1000 = 0
Time for 5000 = 3
Time for 10000 = 5
Time for 50000 = 42
Time for 100000 = 59
```



INPUT SIZE VS TIME(in ms)

Input Size	Bubble sort	Insertion sort	Selection sort	Quick sort	Merge sort	Heap sort
10	0	0	0	0	0	0
100	0	0	0	0	0	0
500	0	0	0	0	0	0
1000	3	2	0	0	0	0
5000	98	59	34	0	0	3
10000	394	239	132	0	5	5
50000	8922	5465	4012	0	21	42
100000	53129	20382	14738	19	39	59


60000
40000
20000
0
Time (in ms)
10
100
500
1000
5000
10000
50000
100000
Input Size
Bubble sort
Insertion sort
Selection sort
Quick sort
Merge sort
Heap sort