# SYSTEMS AND ALGORITHMS

SORTING ALGORITHMS AND ANALYSIS

## 1. MEASURE EXECUTION TIME:

The time is measured in microseconds

| n | 1000 | 5000 | 10000 | 50000 |
|---|---|---|---|---|
| Run 1 | 2010 | 43860 | 152356 | 4022374 |
| Run 2 | 2016 | 40825 | 164887 | 4002637 |
| Run 3 | 2018 | 47352 | 137905 | 4024698 |
| Run 4 | 2014 | 33619 | 143178 | 4118674 |
| Run 5 | 3123 | 31186 | 173623 | 4163904 |

Table 1: Selection Sort

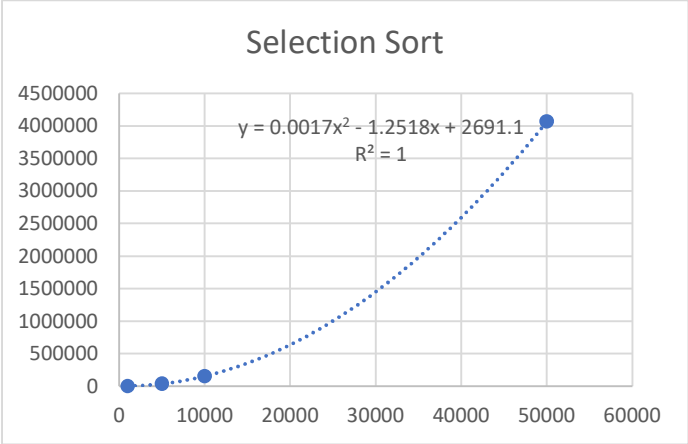
| n | 1000 | 5000 | 10000 | 50000 |
|---|---|---|---|---|
| Run 1 | 1313 | 25060 | 111088 | 2630523 |
| Run 2 | 5899 | 27810 | 105578 | 2641301 |
| Run 3 | 2614 | 25833 | 110059 | 2651295 |
| Run 4 | 2011 | 27625 | 94427 | 2688705 |
| Run 5 | 2019 | 28325 | 100462 | 2688672 |

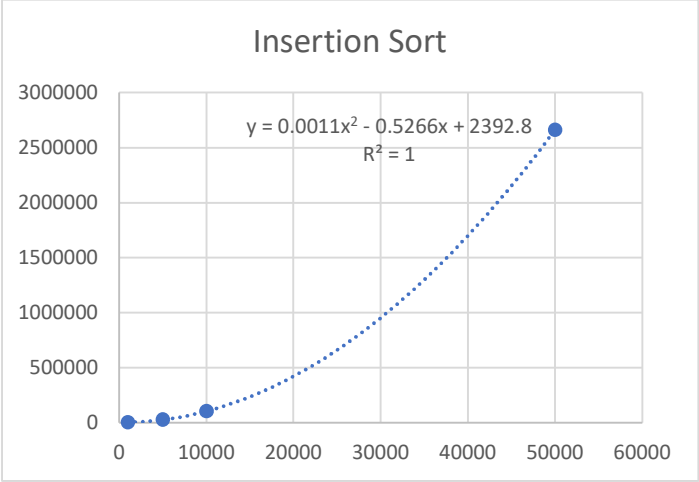
Table 2: Insertion Sort

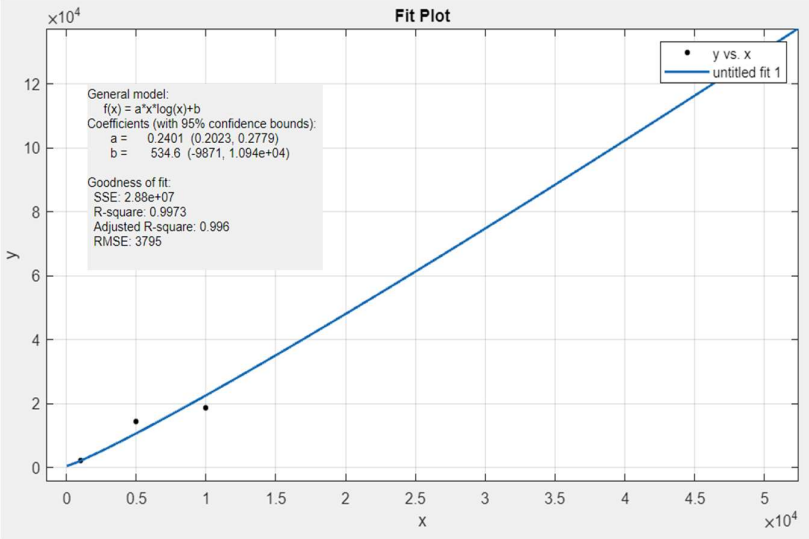
| n | 1000 | 5000 | 10000 | 50000 |
|---|---|---|---|---|
| Run 1 | 1853 | 17826 | 21913 | 126549 |
| Run 2 | 3735 | 10772 | 15728 | 125174 |
| Run 3 | 4027 | 12707 | 17965 | 142903 |
| Run 4 | 0 | 14050 | 15772 | 126929 |
| Run 5 | 1142 | 16482 | 22102 | 132589 |

Table 3: Merge Sort

# IDENTIFY COMPLEXITY EXPRESSIONS:




All the above graphs have x axis representing the size of input (n) and y axis representing the time taken in microseconds (t)

## INPUT SIZE LIMITS

Using the above complexity expressions obtained experimentally, we find that the input size for execution time to be 5 minutes (=3*10^8 microseconds) is as follows:

| Sorting Algorithm | Input Size |
|---|---|
| Selection sort | 420450 |
| Insertion sort | 522470 |
| Merge sort | 153000000 |