Program Structures and Algorithms – Assignment 3
Spring 2023 (SEC – 3)

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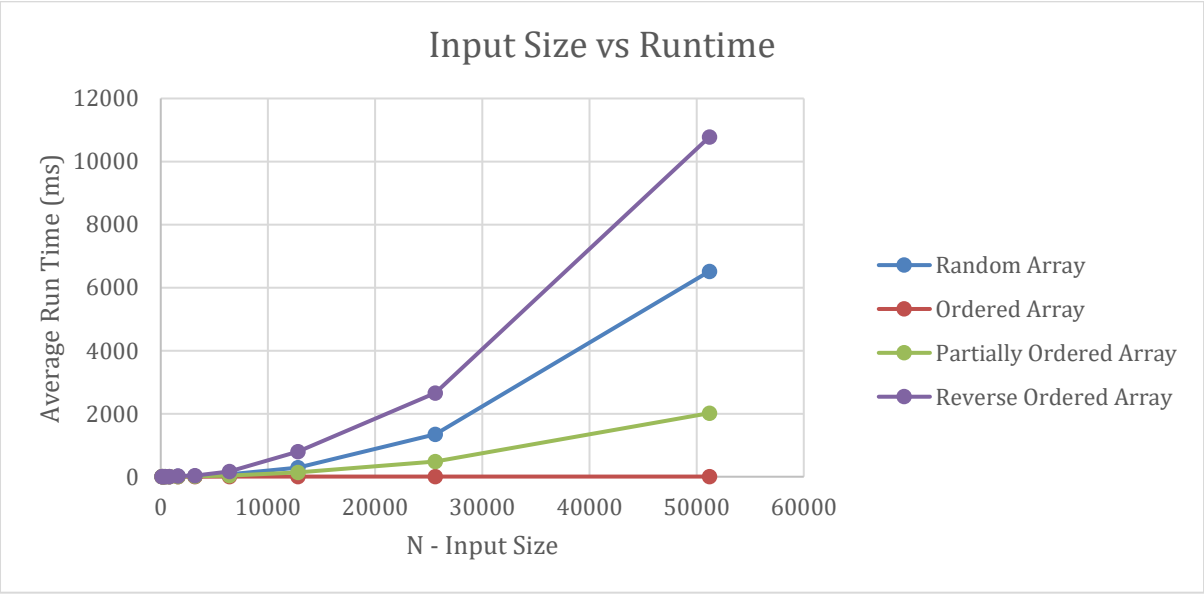
Task:
To implement the timer functions, insertion sort and benchmark the insertion sort on various type of array inputs.

Conclusion for growth based on 4 types of inputs:

- **Random array (average case)**: The elements are randomly placed, so on average it will take $O(n^2)$ time for the algorithm to sort the array.
- **Ordered array (best case)**: The elements are already in the correct order, so the algorithm will perform the best in this case, with a time complexity of $O(n)$.
- **Partially ordered array**: The elements are partially sorted, which means that some elements are in the correct order, while others are not. In this case, the time complexity will be between $O(n)$ and $O(n^2)$ depending on how many elements are already in the correct order.
- **Reverse-ordered array (worst case)**: The elements are in the opposite order of what they should be. In this case, the algorithm will take the longest to sort the array, with a time complexity of $O(n^2)$ since it will have to swap every element in the array multiple times to sort it.

Code:
Submitted to GitHub Repository: https://github.com/sharunkumar-ks/INFO6205/pull/2/files

Graphical Representation:
Complete data is available in the **Insertion Sort Benchmark.xlsx** file.



Unit Test Screenshots:

Note: I have run the unit tests in GitHub Codespaces environment as my personal laptop is a bit slow

Codespaces Link: https://sharunkumar-ks-potential-space-palm-tree-5jj5pprrggphp6vr.github.dev/