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**Program Structures & Algorithms**

**Fall 2021**

**Assignment No. 2**

* **Task (List down the tasks performed in the Assignment)**

1. Implement three methods of a class called Timer.
2. Implement InsertionSort (in the InsertionSort class) by simply looking up the insertion code used by Arrays. sort.
3. Implement the main program (or you could do it via your unit tests) to run the following benchmarks: measure the running times of this sort, using four different initial array ordering situations: random, ordered, partially-ordered, and reverse-ordered.

* **Relationship Conclusion:**

|  |  |
| --- | --- |
| **Array** | **Order of Growth** |
| **Random Array** |  |
| **Partially Sorted Array** |  |
| **Reverse Array** |  |
| **Ordered array** |  |

* **Evidence to support the conclusion:**

1. **Output (Snapshot of Code output in the terminal)**

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1. **Graphical Representation(Observations from experiments should be tabulated and analyzed by plotting graphs(usually in excel) to arrive on the relationship conclusion)**

图表, 折线图

描述已自动生成

**Line chart with Time and n(Length of the array)**

The line chart shows how time grows with n(Length of the array) on different arrays (Random array, partially sorted array, ordered array, and reverse array). As n grows, the time cost grows. The reversed array needs the most time to sort and the random array is the second.

图表, 折线图

描述已自动生成

**Log-log graph with time and n**

The log-log graph shows the relationship between log(time) and log(n) using four different arrays. To figure out the order of growth, and are drawn in the graph.

By comparing and line for random array, partially sorted array and reverse the array, it can be found that they have a similar slope. So the order of growth for random array, partially sorted array, and reverse array is . Similarly, comparing y = x and the line for the ordered array, it can be found that they have a similar slope. So the order of growth for an ordered array is .

* **Unit tests result:(Snapshot of successful unit test run)**
* **Graphical user interface, text

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