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Program Structures & Algorithms
Fall 2021
Assignment No. 2

- **Tasks performed in the assignment:**
  - Task 1: Implemented all the three methods of the Timer class.
  - Task 2: Implemented Insertion Sort Program and verified all test cases.
  - Task 3: Wrote code to benchmark the Insertion Sort Program using the implemented timer methods in the Timer.java class.
  - Understood the helper function and in and outs of how to write generic functions.
  - Learned Git using bash (reset repo, setup repo, change origin, etc)

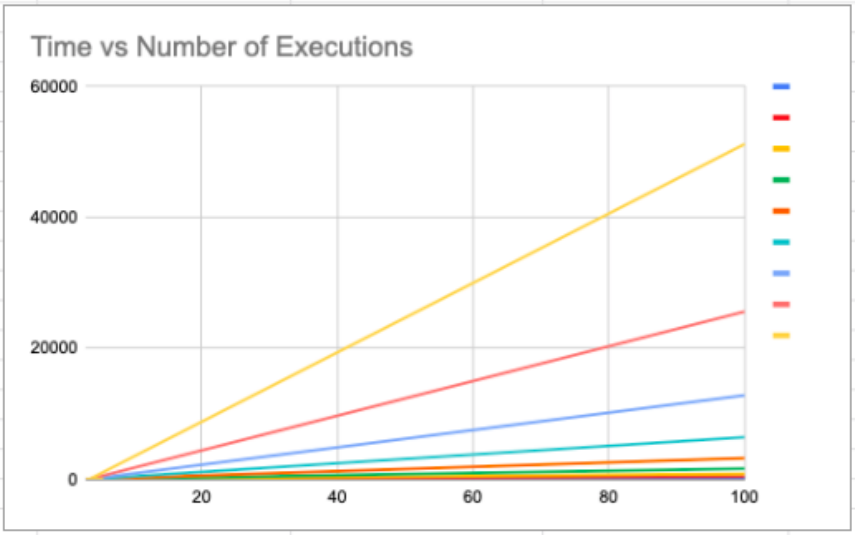
- **Relationship Conclusion:**

Quadratic Linear Increase in Time vs Number of Elements is Observed.

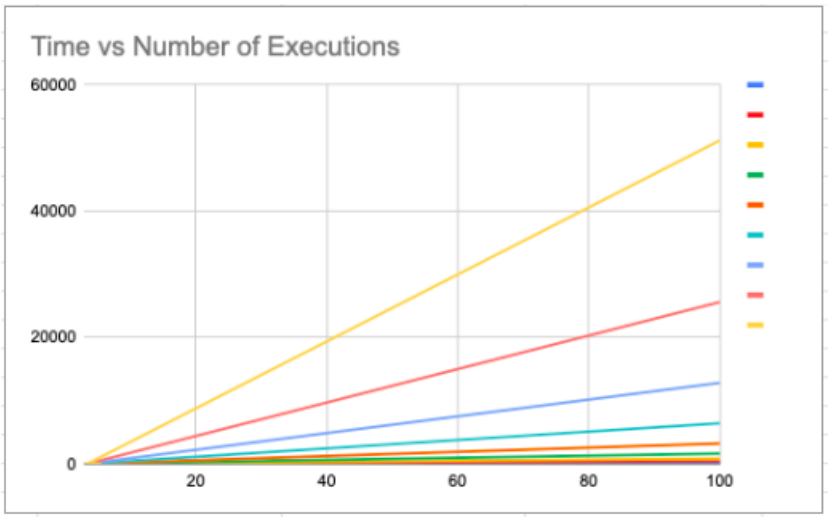
- **Evidence to support conclusion:**
  - The insertion sort is a O(N 2) sorting technique hence as the number of elements in the array (doubling applied), the time taken to work on the data is quadrupled.

- **Output:**

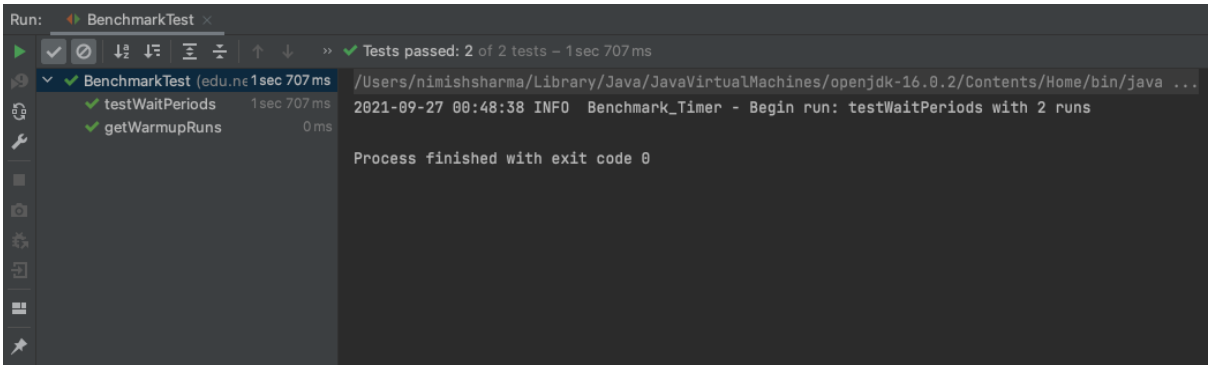
Size of the Array (N)	Benchmark (Random Arrangement)	Benchmark (Ordered Arrangement)	Benchmark (Partial-Ordered Arrangement)	Benchmark (Reverse-Ordered Arrangement)
100	3.5	5.4	3.3	3
200	1.4	1.5	1.9	1.6
400	11.6	1.8	1.1	1.5
800	1.3	0.9	0.7	1.2
1600	1.1	1.1	1.1	8.8
3200	2.1	2.1	1	1
6400	1	0.6	0.7	1
12800	2.7	3.9	1.3	1.9
25600	1.7	1.4	0.9	0.8
51200	0.7	1.6	0.6	0.7



- **Graphical Representation:**



- **Unit Test Result:**
  - **Benchmark Tests:**



  - **Insertion Sort Tests:**