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INFO 6205

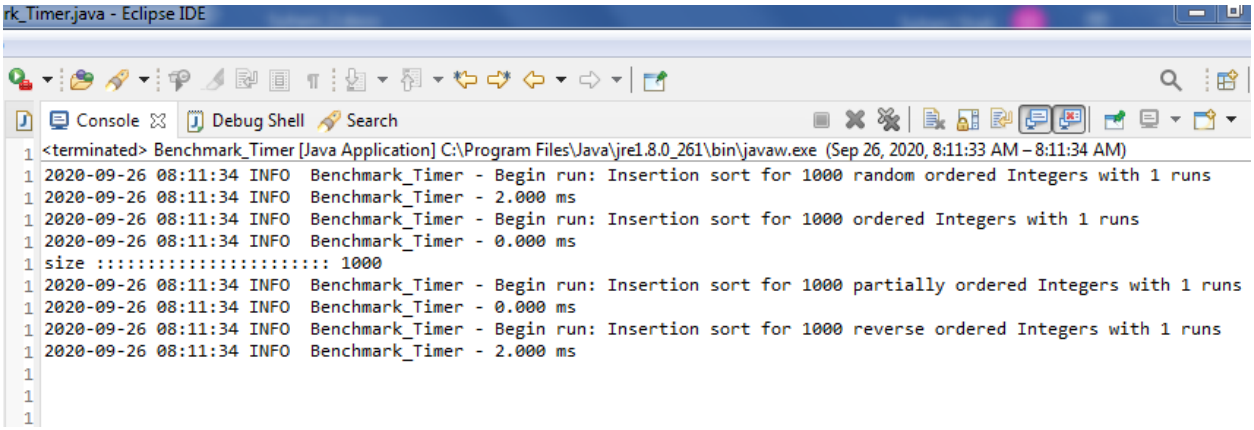
Program Structures & Algorithms

Fall 2020

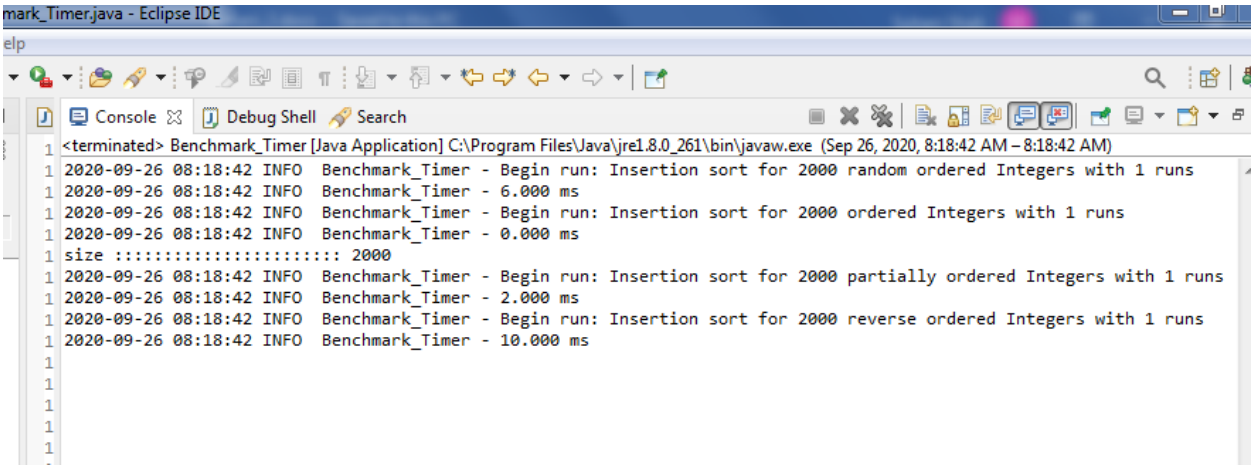
Assignment No.2

Insertion sort (PART2 and PART3)

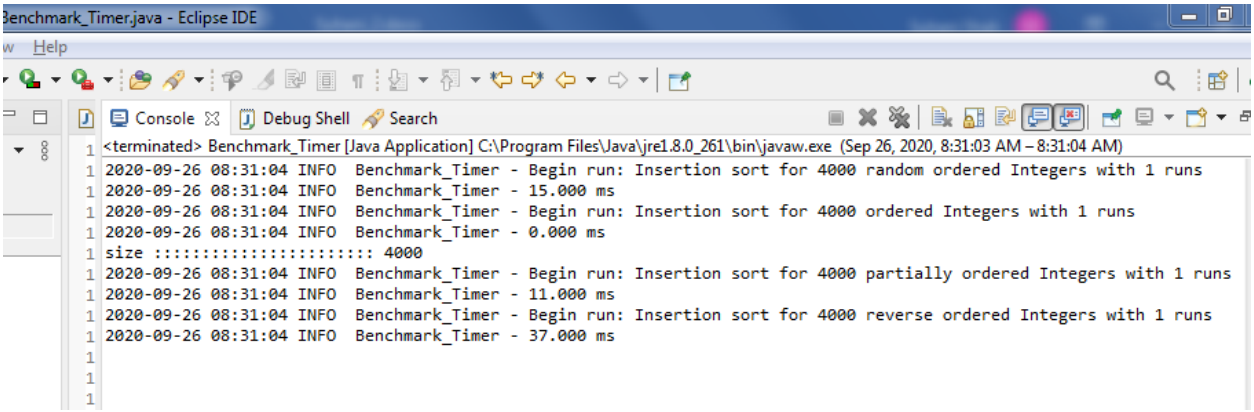
1. Console output for 1000 elements



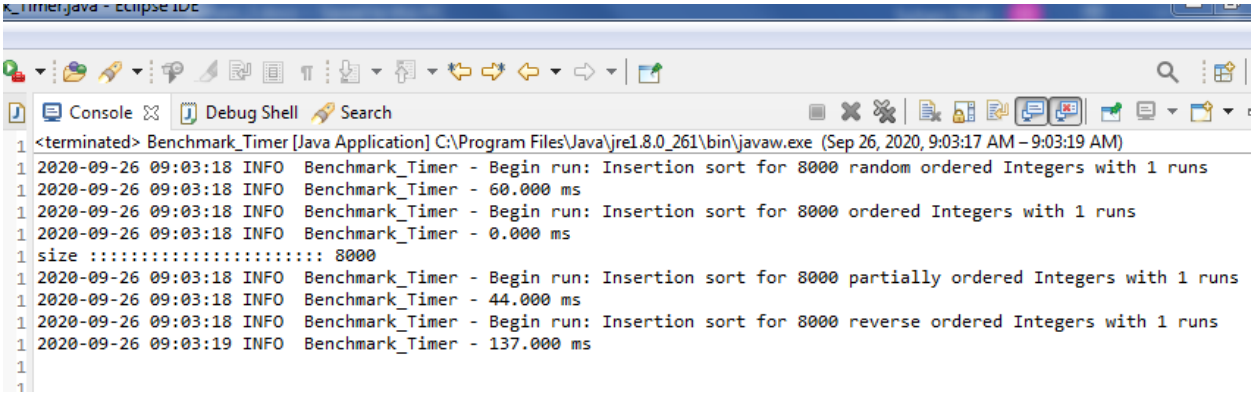
2. Console output for 2000 elements



3. Console output for 4000 elements



4. Console output for 8000 elements

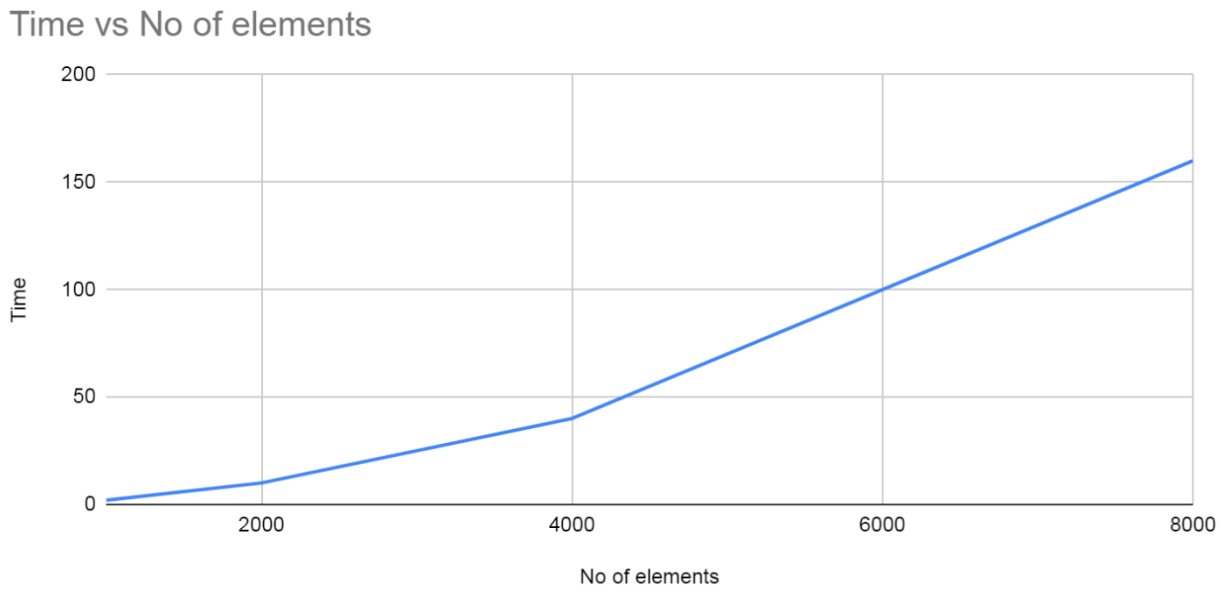


- Insertion sort takes liner time for ordered array i.e. O(n)
- For 1000 elements, it takes ~0.01 ms
- For 2000 elements, it takes ~0.02 ms
- For 4000 elements, it takes ~0.04 ms and so on.

Therefore, Order of growth is liner for ordered array in insertion sort.

- Insertion sort takes on average N^2/4 time for average and worst case.
- When the array of 1000 elements is in reverse order then it takes ~2.5 ms (N^2/4 = (1000*1000)/4)
- For 4000 elements, insertion sort takes ~10ms (N^2/4 = (4000*4000)/4)
- Partially sorted array also takes N^2/4 time if half of the array is sorted but the other half of the array is in reverse order. In that case N becomes 1000 for 2000 elements because we need to sort only half elements.

Graph of insertion sort for worst case (Reverse ordered or random ordered array)



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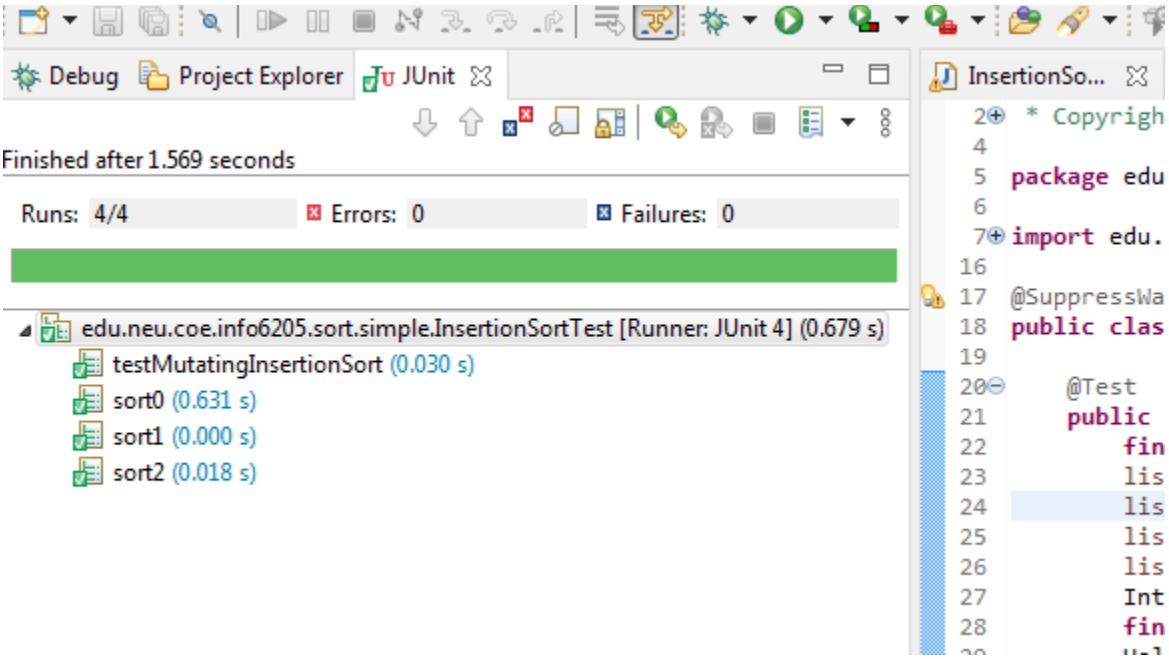
Unit test output of InsertionsortTest.java



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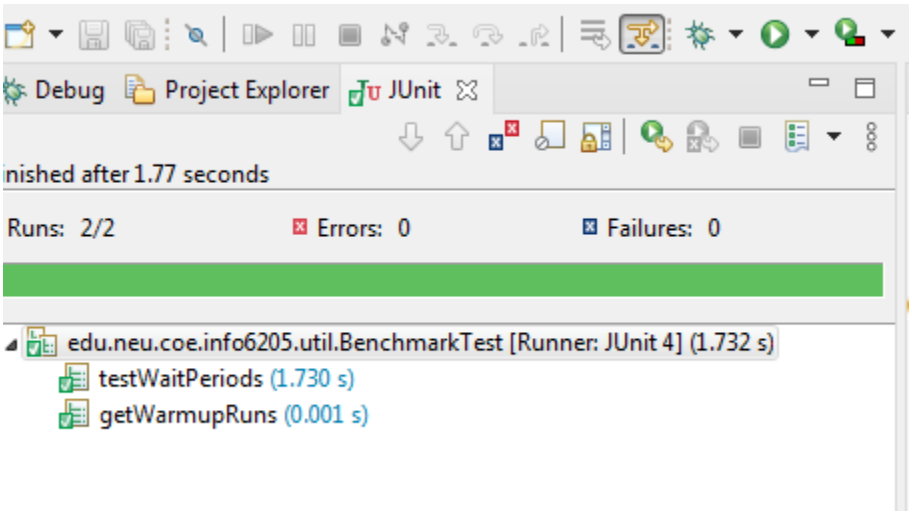
Unit test output of BenchmarkTest.java



Unit test output of TimerTest.java