Student Name (NUID: Your Id)

INFO 6205

Program Structures & Algorithms

Fall 2020

Assignment No.2

- **Task: InsertionSort**
- **Output** : **$T=(N)^2$**
- **Relationship conclusion**

  Through the experimental analysis, after 1000 repeated experiments of insertion sorting method to eliminate the systematic error of the computer, the experimental results show that in the worst case, that is, in the case of reverse order, every time n is doubled, t increases nearly 4 times, so the worst case conforms to the time complexity O (n ^ 2). In the average case, that is, in Random's experiment, every time n is doubled, t increases nearly 4 times, which means that the average time complexity O (n ^ 2) is also met. The time complexity O (n ^ 2) is also obeyed in partial order experiments. In addition, in the ideal case, that is, in the ordered experiment, every time n doubles, t doubles, which is in line with the ideal time complexity O (n).
- **Evidence to support relationship**

Insert sort is executed 1000 times

N	Ordered	Partially-Ordered	Random	Reverse-Ordered
500	0.004	0.09	0.352	0.661
1000	0.006	0.646	1.343	2.629
2000	0.01	1.337	5.361	10.597
4000	0.02	5.392	21.715	42.374
8000	0.048	23.504	89.367	169.226

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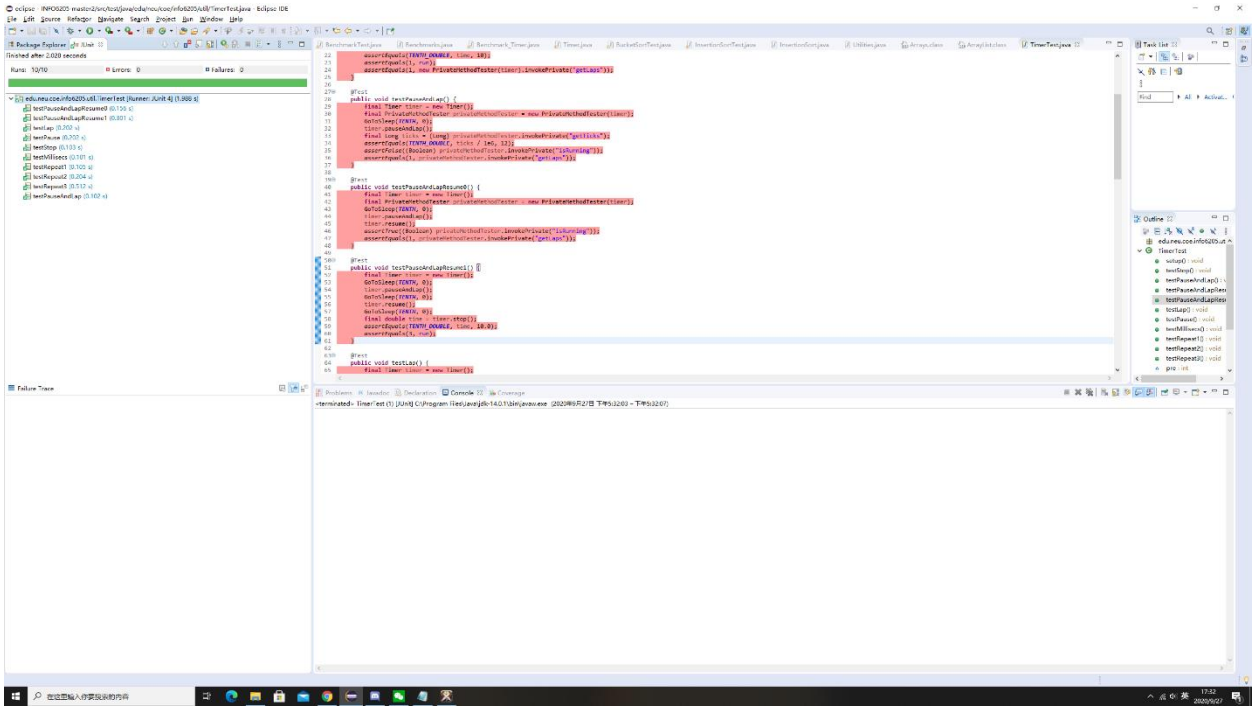
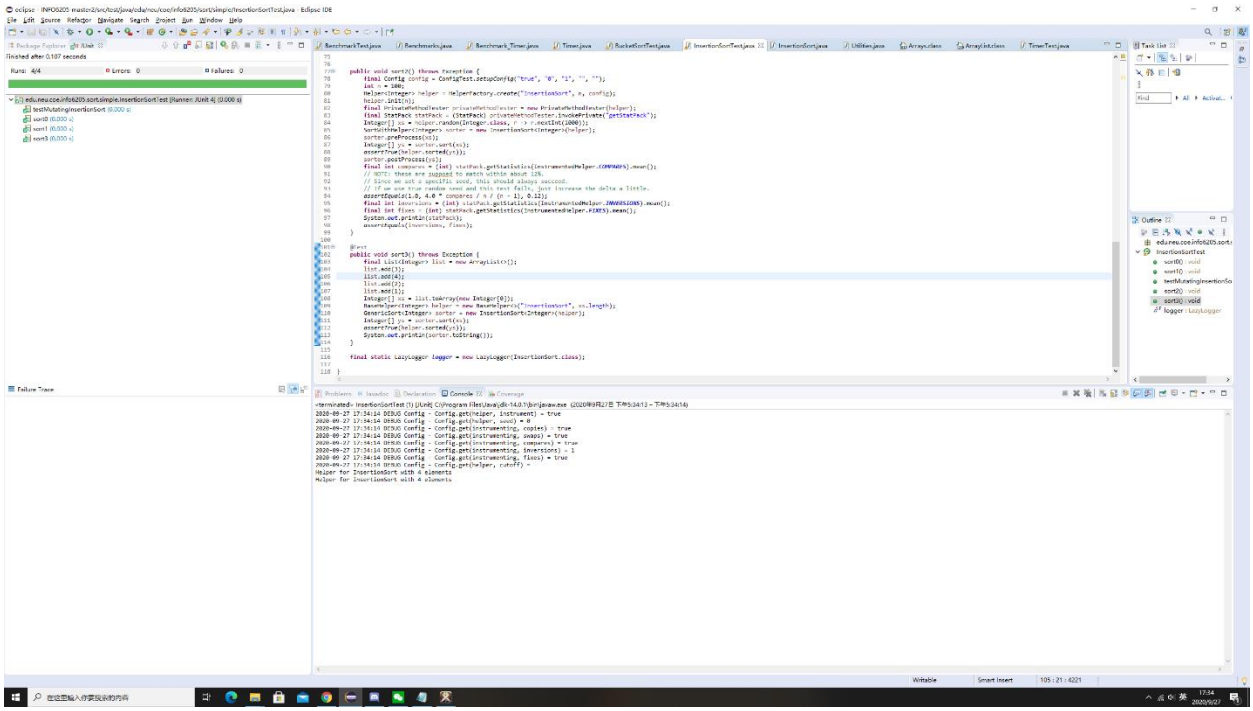
- **Screenshot of Unit test passing**





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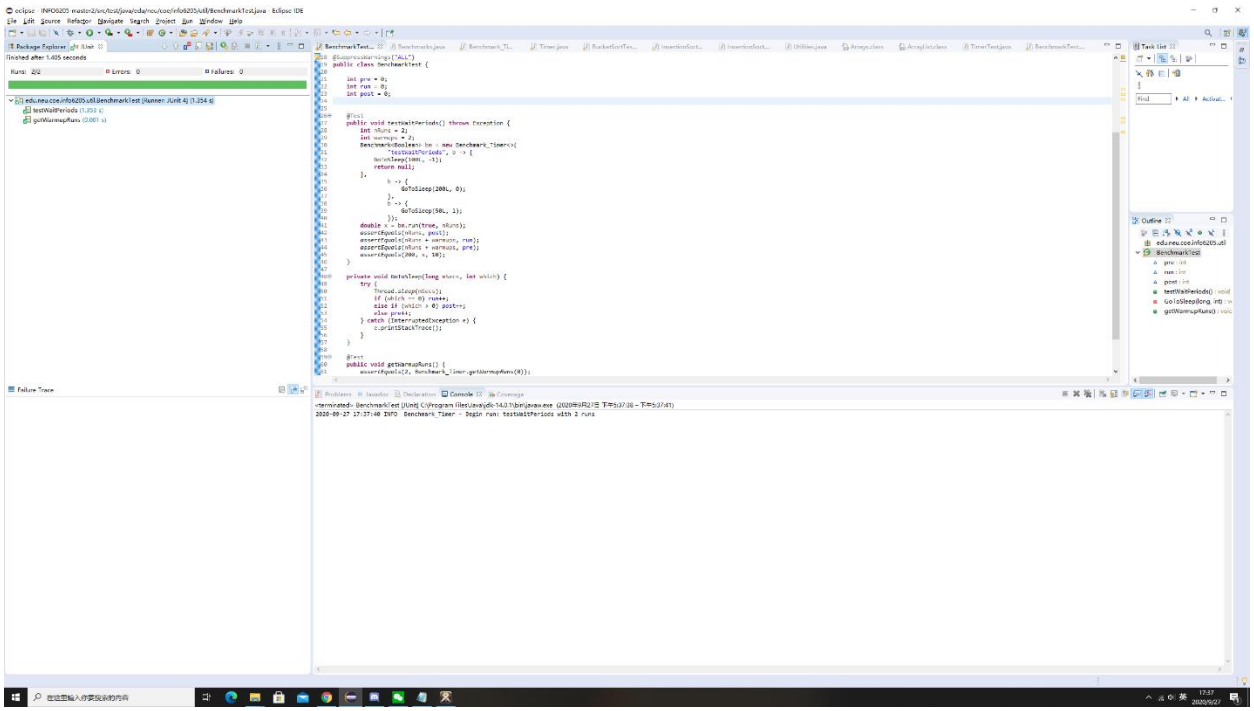

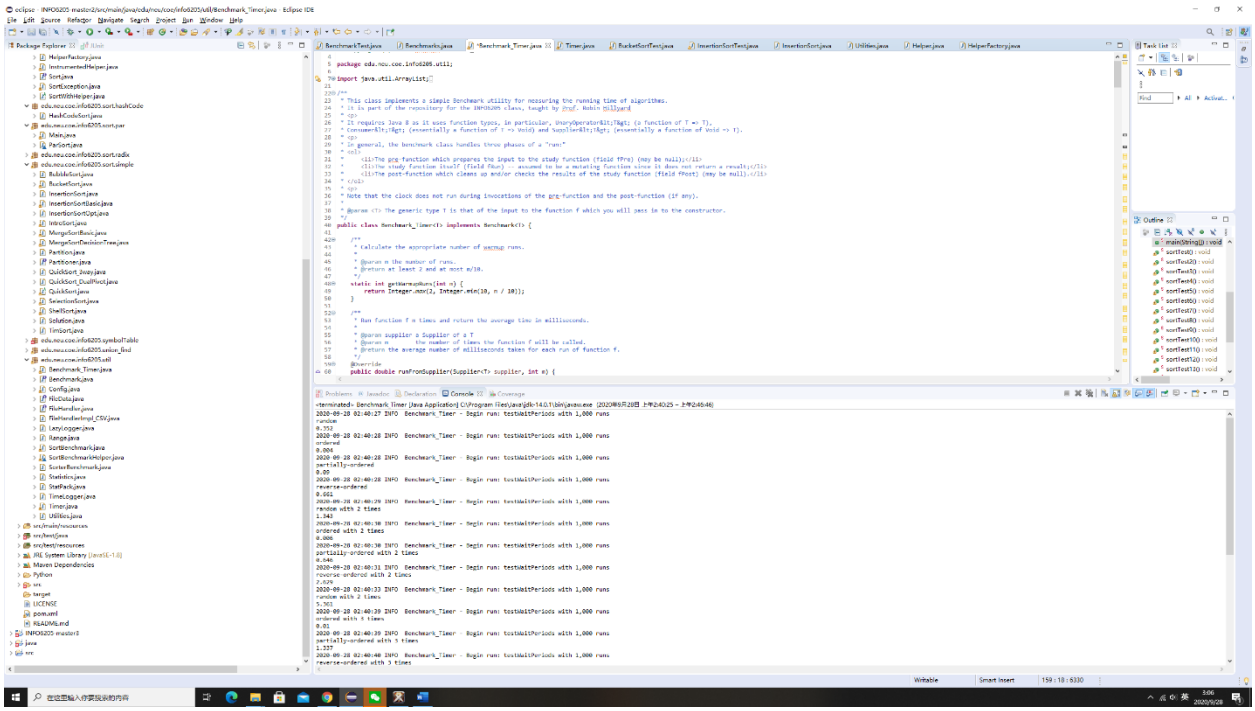

The main of the test is in the benchmark_ Timer