**ASSIGNMENT 2 – Sorting**

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| Topics |
| * Insertion sort * Merge sort |
| Readings |
| * CLRS, Chapter 1.2, 1.3 |
| Instructions | |
| 1. Select a **partner** and inform instructor who you will work with  2. Do the problems and answer the questions listed in the next section   * Keep in mind Guidelines on plagiarism.   3. Follow instructions for submitting your work.  PROBLEMS AND QUESTIONS | |
| Problems and Questions |
| Part A Analysis Framework (10 pts) |

**Algorithm SECRET (attached file)**

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| Part B Algorithm Tracking (10 pts) |

**Merge Sort Tracking (attached file)**

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| Part C Implementation (2\*40 = 80 pts) |

1. Implement the Insertion Sort algorithm as a Java method for sorting arrays of comparable generics. As a demo program, create a vocabulary (the list of words in alphabetical order) out of the given text file. Put this vocabulary in another text file.
2. Implement the Merge Sort algorithm as a Java method for sorting arrays of comparable generics. Do it with the modification: use Insertion Sort when the length of the array is 4 or less. A demo program: the same as in 1.

Make sure not to include punctuation marks (other than dashes inside the words) in the vocabulary entries.

Bonus (5 pts): determine and output running time for both sorting methods.

We could not figure out a function to write out the runtime process of each sorting method. However, we were able to approximate the functions analytically:

For insertion sort, we determined three possible outcomes: the best case {Ω(n^2)}, the general case{θ(n^2)}, and the worst case {O(n^2)}. This is general. But we concluded that the use of the insertion sort algorithm in our program is a general case (with the test of the numbers) and a best case with the dictionary. Why? We are using it to determine n < 4 operation.

For the merge sort, the general knowledge looks like this: Ω(n log(n)) for the best case, θ(n log(n)) for the average case, and O(n log(n)) for the worst case. We noticed that the use of the function is slower than insertion sort. And, it was even slower than the general case making it the worst case.

2. **Summary questions:**

a. What concepts did you have trouble with? What still confuses you?

b. Suggestions for improving this assignment in the future?

Help instructor help you

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| Submitting your work |

1. Make sure that your name(s) are in all your files.
2. If you have more than one file for your solution, make a .zip file for your project
3. In Blackboard, attach your solution file to the submission for this assignment.

GUIDELINES ON

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| Guidelines on Plagiarism in Computer Science |

Outlined in the Syllabus