AP Computer Science Weekly Project 30 pts

Weekly Project 12
Runtime Analysis

Background:

This lab is more about collecting data than actually programming. You have learned about multiple sorting/searching algorithms and their efficiencies. In this lab, you will collect data about the actual running time for the algorithms to get real data to compare to our theoretical big O estimates. On Schoology, I have provided you with a Stopwatch class. You should look through the code to try to understand how it works. You can work with a partner or individually for this lab.

Assignment:

1. First generate random data in order to run the algorithms. Note that for Binary Search, you will need to generate random **sorted** data. Do not try to generate random data then sort it. It will take too long.

2. Create (or reuse) code for each of the search (linear and binary) and sorting (selection, bubble, insertion and merge) algorithms.

3. Use the provided Stopwatch class to run your algorithms on the generated random data. Record the times in the provided lab report.

Let's look at Linear Search for an example. You should present your data in the following format.

Number of Elements	**Times through**	**Total Time**	**Average Time**
10000	50	7243	7243 / 50 = 144.86
100000	50	73512	73512 / 50 = 1470.24

Note that we need a good measure of average. Thus, for each entry you should run the algorithm enough times to feel like your average is fairly consistent. (Note that my data is entirely made up, so do not trust it.)

4. Complete the lab report already included for you on Schoology. You should present **graphs** of the data using Excel (or some other plotting program) and use your graphs to estimate how long it will take to run the algorithm on one trillion data points. You should give a thorough discussion about how these algorithms rank in efficiency based on your collected data and graphs.

How to Submit:

Submit your lab report printed <u>on paper</u> to me. ALSO submit your lab report and all code zipped to Schoology. If you work with a partner, then you only will need to submit one project for the two of you. Make sure both names are on the project if you work with a partner!