Data Structures Name -
Ch17Proj1 Recursion Project Paper

Ch. 17 Proj 1 – Recursion Project Paper & Presentation

Research a non-elementary example (i.e. not factorial, computing powers, etc.) of recursion in Java. Non-elementary examples of recursion are listed below. You must obtain Mr. Minich's approval of your topic before you begin to write your paper.

Write a one or two-page paper on your program and its particular use of recursion. Explain its role in computer science and any other interesting characteristics of the algorithm. Explain the overall space (i.e. memory) and time efficiency of the recursive algorithm versus the efficiency of an iterative version of the algorithm. Also, explain whether the algorithm can be implemented as a tail-recursive method or not. Mention the "Big O" efficiency of your algorithm if you find it in your research. This page will be graded on the detail and accuracy of your research as well as your ability to explain the example of recusion as clearly as possible.

On another page, neatly illustrate a non-trivial stack frame trace diagram of one or more method calls. This illustration should be easy for others to understand. This diagram will be graded on its neatness as well as its detail and accuracy.

On a separate bibliography page, cite all code segments, ideas, quotations, etc. that you used from your sources including Web site, textbooks, periodicals, etc. For each citation, list the author, web page URL address, and other pertinent information. You are expected to have supporting resources in your bibliography and sources will be checked. Plagiarism will result in a zero grade. Use the English Department's current approved bibliography format. Your bibliography will be graded on format as well as the variety, quality & accuracy of your sources.

Finally, write a Java program that uses a recursive method to illustrate your topic. Your program must follow our class Coding Standards and it must include ample documentation so that others can easily learn from the code. Save this project to a folder named Ch17Proj1 in your Ch17 folder.

You must also present your program, paper, & stack frame trace diagram to the class in a 3 – 5 minute oral presentation. This oral presentation will be graded on quality of material as well as your speaking skills.

Non-elementary examples of recursion:

- Selection & Insertion sorts
- Quicksort
- Merge sort
- Eight Queens
- generating all the possible permutations of a given set of characters
- greatest common divisor
- Four Color Theorem
- generating e (Euler's constant)
- Towers of Hanoi
- Binary search
- Koch snowflake (fractals)
- converting decimal numbers into binary

However, you may not use any topic or example that is explained in our textbook, lecture notes, or demo programs. Reserve your topic with Mr. Minich since no topic can be shared among two or more students!