CS1083 Assignment # 6 - Fall 2023

Due: Wednesday, 23 October before 4:00pm in the Desire2Learn dropbox. (See submission instructions below).

The purpose of this lab is to practice ObjectStreams and basic recursion.

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1. Hidden Message

Three .bin files have been provided on D2L named "File1.bin", "File2.bin", and "File3.bin". Each file has binary data that represents a secret message. These files are written to using ObjectOutputStreams. You must write 3 Java programs to decode each one of the given files; however, there are special instructions to decode each file.

To start, File1.bin contains all `char` data. Read in from this file and print the message to the terminal. Decoding File1.bin will provide instructions on how to decode File2.bin correctly. Then, decoding File2.bin will provide instructions for File3.bin. See the following link to the Java API for more information on reading in specific data types such as char, int, double, etc. with an ObjectInputStream (***search the Java API for ObjectInputStream for more information***)

To Submit:

1. Answer the question: Where and when is the secret meeting?
2. The three java files (in both the report and archive) for decoding File1.bin, File2.bin, and File3.bin.

2. Comparing Iteration to Recursion

In this question, you must calculate a series using iteration and then with recursion. You will compare the two to see which is faster. You may write both the iterative and recursive solutions in the same .java file.

Write a program that will read in an integer from user input and then perform both an iterative and recursive solution. Print the value calculated. The recursive solution may be a static method call. The series you will be calculating will be a new series (the CS1083 series) described below:

$$CS_n = CS_{n-1} + CS_{n-2} - CS_{n-3} + 1$$

$$\text{Where } CS_1 = 1,\ CS_2 = 2, \text{ and } CS_3 = 3$$

To calculate the time in seconds that it takes to calculate the series, we must learn about the static method call System.nanoTime(). ***Search this on the Java API for this method more information.***

To Time the Iterative Approach:

Get the current time before the loop begins and subtract it from the current time after the loop is finished. Print the result.

To Time the Recursive Approach:

Get the current time before the recursive method call and subtract it from the current time after the recursive method call. Print the result.

Reflection:

Complete the table below by filling in the time for empty cells for iterative and recursive and then answer the questions listed:

	Iterative	Recursive
n=10		
n=20		
n=30		
n=40		
n=50000		

1. What do you notice about the time comparison with low values of n?
2. What do you notice about the time comparison when the value of n increases? Why is this happening?

For this assignment, only an electronic submission is required.

Your electronic submission (submitted via Desire2Learn) will consist of two files:

i. A single pdf file containing your written answer to questions in parts 1 and 2, including the code for decoding the three files and for calculating the series.

   This written report should be prepared using a word processor. (Copy & paste your java source code & output into the report document and add appropriate headings.) The report document should then be stored as a SINGLE pdf file and submitted to the appropriate drop box on Desire2Learn. (This pdf will allow the marker to write comments directly on your work to give you better feedback.)

   Note: Please name this report as follows:
   YourName_As6_Report.pdf

ii. an archive file (.zip or .tar) that contains the three programs from question 1 and the one program from question 2

   Note: Please name this archive file as follows:
   YourName_As6_Archive.zip or **YourName_As6_Archive.tar**