Final Project

This assignment demonstrates your understanding of the concepts from the CMIS 141 class. This homework consists of 1 programming assignment worth 25 points.

Before attempting this project, be sure you have completed all of the reading assignments, hands-on labs, discussions, and assignments to date.

1. (25 points) Design a Java application that will read a file containing data related to the US. Crime statistics from 1994-2013. The description of the file is shown below. The application should provide statistical results on the data including:

a. Population growth in percentages from each consecutive year (e.g. 1994-1995 calculation is ((262803276 - 260327021)/260327021)*100 = 0.9512%, 1995-1996 would be ((265228572 - 262803276)/262803276)*100 = 0.9229%)
b. Years where the maximum and minimum Murder rates occurred.
c. Years where the maximum and minimum Robbery rates occurred.
d. Total percentage change in Motor Vehicle Theft between the years 1998 and 2012.
e. Two (2) additional crime statistics results you add to enhance the application functionality.

The following are some design criteria and specific requirements that need to be addressed:

a. Use command line arguments to send in the name of the US Crime Data file.
b. You are not allowed to modify the Crime.csv Statistic data file included in this assignment.
c. Use arrays and Java classes to store the data. (Hint: You can and should create a USCrimeClass to store the fields. You can also have an Array of US Crime Objects.)
d. Your design should include multiple classes to separate the functionality of the application.
e. You should create separate methods for each of the required functionality. (e.g. getMaxMurderYear() will return the Year where the Murder rate was highest.)
f. A user-friendly and well-organized menu should be used for users to select which data to return. A sample menu is shown in run example. You are free to enhance your design and you should add additional menu items and functionality.
g. The menu system should be displayed at the command prompt, and continue to redisplay after results are returned or until Q is selected. If a user enters an invalid menu item, the system should redisplay the menu with a prompt asking them to enter a valid menu selection
h. The application should keep track of the elapsed time (in seconds) between once the application starts and when the user quits the program. After the program is exited, the application should provide a prompt thanking the user for trying the US Crime Statistics program and providing the total time elapsed.

Here is sample run:

```
java TestUSCrime Crime.csv
```

```
********** Welcome to the US Crime Statistical Application **************************

Enter the number of the question you want answered.  Enter ‘Q’ to quit the program :

1.   What were the percentages in population growth for each consecutive year from 1994 – 2013?
2.   What year was the Murder rate the highest?
3.   What year was the Murder rate the lowest?
4.   What year was the Robbery rate the highest?
5.   What year was the Robbery rate the lowest?
6.   What was the total percentage change in Motor Vehicle Theft between 1998 and 2012?
7.   What was [enter your first unique statistic here]?
8.   What was [enter your second unique statistic here]?
Q.   Quit the program

Enter your selection: 2

The Murder rate was highest in 1994

Enter the number of the question you want answered.  Enter ‘Q’ to quit the program :

1.   What were the percentages in population growth for each consecutive year from 1994 – 2013?
2.   What year was the Murder rate the highest?
3.   What year was the Murder rate the lowest?
4.   What year was the Robbery rate the highest?
5.   What year was the Robbery rate the lowest?
6.   What was the total percentage change in Motor Vehicle Theft between 1998 and 2012?
7.   What was [enter your  first unique statistic here]?
8.   What was [enter your second unique statistic here]?
Q.   Quit the program

Enter your selection: 5

The Robbery rate was lowest in 2013

Enter the number of the question you want answered.  Enter ‘Q’ to quit the program :

1.   What were the percentages in population growth for each consecutive year from 1994 – 2013?
2.   What year was the Murder rate the highest?
3.   What year was the Murder rate the lowest?
4.   What year was the Robbery rate the highest?
5.   What year was the Robbery rate the lowest?
6.   What was the total percentage change in Motor Vehicle Theft between 1998 and 2012?
7.   What was [enter your  first unique statistic here]?
8.   What was [enter your second unique statistic here]?
Q.   Quit the program

Enter your selection: Q

Thank you for trying the US Crimes Statistics Program.

Elapsed time in seconds was: 32
```

Grading Rubric:

The following grading rubric will be used to determine your grade:

Attribute	Exceeds	Meets	Does not meet
Design (5 points)	(5 points) Exhibits proper use of parameters, and selection of data types all of the time. Employs correct and appropriate use of programming structures (loops, conditionals, classes etc.) all of the time. Efficient algorithms used all of the time.	(3-4 points) Exhibits proper use of parameters, and selection of data types most of the time. Employs correct and appropriate use of programming structures (loops, conditionals, classes etc.) most of the time. Efficient algorithms used most of the time.	(0-2 points) Rarely exhibits proper use of parameters, and selection of data types. Rarely employs correct and appropriate use of programming structures (loops, conditionals, classes etc.) Poorly structured and inefficient algorithms.
Functionality (10 points)	(9-10 points) Extra effort was apparent through the addition of significant and additional functionality beyond the scope of the assignment.	(7-8 points) Program fulfills most functionality. Most requirements were fulfilled. Screen captures provided demonstrating the successful compiling and running of the program.	(0-6 points) Program does not fulfill functionality. Few requirements were fulfilled.
Test cases (5 points)	(5 points) Test cases provide comprehensive coverage of all code paths. Discussion of run-time errors included.	(3-4 points) Test cases provide coverage of most code paths. Test cases results well documented providing pass/fail results for each test case.	(0-2 points) No or insufficient test cases Minimal supporting evidence provided to verify testing actually took place.
Java Style Guide (5 points)	(5 points)	(3-4 points) Header comments include filename,	(0-2 points)

	Code impeccably neat and well-organized. Extensive In-line comments providing additional insight into code design and functionality	author, date and brief purpose of the program. In-line comments used to describe major functionality of the code. Meaningful variable names and prompts applied. Class names are written in UpperCamelCase. Variable names are written in lowerCamelCase. Constant names are in written in All Capitals. Braces use K&R style**.**	Code rarely follows recommended Java style guide

Submission requirements:

Your deliverables include all Java files (.java) and a single word (or PDF) document. The Java files should be named appropriately for your applications. Your word document should include screen shots showing the successful compiling and running of each application, and a detailed description of the test plan for each application. The test plan should include the input, expected output, actual output and if the test case passed or failed. Submit your files to the Final Project assignment area no later than the due date listed in the calendar.

US Crimes Data Description:

The attached Comma delimited file, named Crime.csv contains US Crime data from 1994 – 2013. The first line in the file contains the field names. (Note: Do not modify this file in anyway. You should use it as is for input for your application)

The US Crime data were obtained from this Web Site:

https://www.fbi.gov/about-us/cjis/ucr/crime-in-the-u.s/2013/crime-in-the-u.s.-2013/tables/1tabledatadecoverviewpdf/table_1_crime_in_the_united_states_by_volume_and_rate_per_100000_inhabitants_1994-2013.xls#overview