CSC 415 Fall 2018

Assignment 1 – Application Development
Due: Tuesday September 18, 2018 by 11:59 p.m.
Grade: 50 points as per the rubric.

You must design and develop the solution for this assignment **individually**. General questions about the requirements, design and programming concepts, or compile error messages may be asked publicly in class. Specific questions about your design or code should be addressed to me directly in person after class, or during my office hours, or via email. Seeking assistance from, or providing assistance to, other students is a violation of TCNJ's Academic Integrity policy.

Objective:
The purpose of this assignment is for students to learn and gain experience in a new language, by implementing a program to meet specific requirements.

Requirements:
Assume that you are a software engineer at GF Software Solutions, Inc., and that your company has been awarded a contract to develop an application that will let the user know which parking lots are likely to have open spaces at a given time. The algorithm is eventually expected to be general enough to be used in a variety of organizations, but to help you understand the problem better, focus on the TCNJ campus and the specific constraints present here.

All TCNJ faculty, staff, and students are given car parking decals that indicate the lots in which they can park. Visitors, contractors, etc. are given parking permits / passes that enable them to park in certain lots on the specified days. An upraised parking gate is not an indication that parking is permitted, but sometimes unauthorized cars are found to be parked in that lot. Ticketing for "no decal displayed" is suspended during certain periods, such as the summer or winter breaks.

Using **Ruby**, implement a prototype of an application where the user can input the day and time that he or she is on campus, and get information about which lot(s) are more likely to have open spots, given the constraints. Additional constraints could be implemented in a later iteration.

The program must ask the user for the following:

- Names of the files that contain data about the parking lots, see below for details.
- Day of the week or date the user wants to park
- Time of day the user wants to park

File 1: Parking Lot Constraints (parking_lot_constraints.csv)
Columns:
Parking Lot Name: String
Permissions Mon through Thurs 2:30am to 5:00 am: List of Strings
Permissions Mon through Fri 5:00am to 4:00pm: List of Strings
Permissions Mon through Thurs 4:00pm to 2:30am: List of Strings
Permissions Fri through Sun 4:00pm to 9:00pm: List of Strings
Dates Lot Will be Closed: List of Strings
Dates Tickets Are Not Relevant: List of Strings

File 2: Historical Parking (historical_parking.csv)
Columns:
Parking Lot Name: String
Capacity: String
Date: String
Time: String
Number of Spots Taken: String

The program must then read data from the file, run the algorithm, and output the list of lots with an estimate of open spots.

The intent of the assignment is for you to demonstrate your ability to learn a new language (in this case, Ruby), and implement a solution to a problem using this language. Therefore, you cannot use any built-in algorithms, or algorithms / code you find from other sources. You must implement your own data structures and associated methods, and any search or sort algorithms you might need. You must give consideration to time and space complexity, and use appropriate data structures and implement efficient algorithms.

You should create your own data files for development and testing purposes. You may want to have at least one file with a small amount of data for initial testing. I will provide sample files for testing purposes closer to the due date, and you will be expected to demonstrate that your program works successfully with these.

Useful resources to learn Ruby:

- **`lynda.com`** – Free with your TCNJ id and password; https://www.lynda.com/portal/tcnj.
- **`codecademy.com`** – a good place to start is https://www.codecademy.com/learn/ruby.
- **`http://ruby-doc.org/`** – Documentation for the Ruby programming language.

Follow good programming practices to ensure that your program is modular, secure, reliable and efficient. **All source code files must be documented with maintenance information.** You must also document your code well to explain functionality and design decisions. Some general guidelines for programs and documentation are posted on the Canvas page "Guidelines for Programs" at https://tcnj.instructure.com/courses/1559549/pages/guidelines-for-programs for your reference.

Use the virtual machine (VM) assigned to you on the TCNJ cluster to host and run the program.

After the due date has passed, I will set up appointment slots for you to demonstrate and explain your program to me, to ensure that it is complete and works correctly to meet the requirements.

Deliverables:

Submit in Canvas in the "**Assignment 1**" dropbox:

- All the source code files for this project.
- A file called "readme.pdf" that specifies:
  - The full pathname for the project on the VM.
  - Instructions for running the program.
  - Known bugs, issues or limitations.

Label each document with your name and assignment number.