Program: CPA2-4
Course: INFO-3138
Professor: Osam Ali-Ozkan (1st half May/June)
and Tony Haworth (2nd half July/Aug)
Project: #1 – Password Manager
Due Date: Sunday, June 5th, 2022 <u>by 11:59 pm</u>
Last Update: Monday, May 16th, 2022 *Renamed the class provided in the starting code to 'PasswordTester'*

To be completed in a Group with Max 2 Students!

Description

This project involves two aspects:

1. Create an JSON Schema describing the JSON format for a personal account's information as well as a valid JSON data file containing at least three accounts
2. Create a C# console program that reads the JSON file into an object and then allows the user to do the following operations:
   a. Add a new account, validated against the schema from step 1
   b. Delete a account
   c. Update any information for a account
   d. Display a listing of the information for all accounts in the data

   The program should also save the data in their current form to the JSON data file from step 1

Purpose

On completing this project you should be able to:

1. develop a JSON schema to validate a JSON data file
2. validate JSON data against a schema
3. incorporate logic to parse JSON and serialize objects to JSON into a useful program

Requirements

Part 1: JSON Schema

1. Create a JSON schema file that defines rules for password-related information for one online account in JSON format. Here are some specific requirements regarding your schema document:
   a. It should define a single account object
   b. The object should contain only the following properties (attribute-value pairs):

Account Object				
Property	**Explanation**	**Type**	**Required?**	**Format**
Description	A description of the online account	String	Yes	Any
UserId	User's identifier for logging-in	String	Yes	Any
LoginUrl	Web address of the account's log-in page	String	No	JSON Schema's *uri* format
AccountNum	The account number for the user's online account	String	No	Any
Password	Information related specifically to the password	Object	Yes	Contains properties list under *Password Object*

c. The Password object should contain only the following properties (attribute-value pairs):

Password Object				
Property	**Explanation**	**Type**	**Required?**	**Format**
Value	User’s password for logging-in	String	Yes	Any
StrengthNum	Indicates how secure the password is	Number	Yes	An integer in the range 0 to 100 inclusive
StrengthText	Indicates how secure the password is	String	Yes	Value must be one of the following: • “very weak” • “weak” • “good” • “strong” • “very strong”
LastReset	Date the password was last updated	String	No	Any

d. Include a sample valid JSON data file with your submission that includes at least three completely different account objects

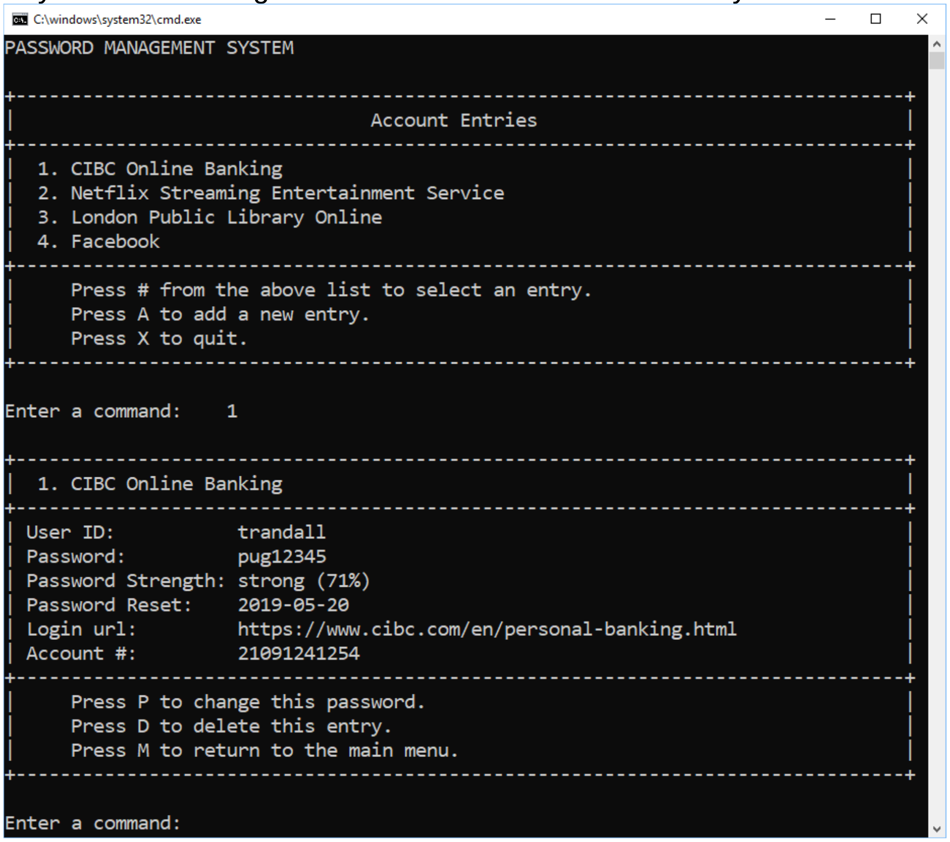
Though your schema should include both required and optional properties, it’s acceptable for your C# program in Part 2 to assign values to every property in every instance.

Part 2: C# Program

1. Create a *Windows Desktop Console App* in C# for the *.NET Framework* that does the following:
   a. If the application’s JSON file already exists, reads this and deserializes it to create a collection (such as a *List<Account>*) of account objects in memory. If the file doesn’t exist, creates an empty collection.
   b. Shows the user a menu of the following command options:
      i. List all fields for a selected *account* element
      ii. Add a new *account* object to the collection with the user providing values for all required fields, except the *StrengthNum* and the *StrengthText* fields (which will be assigned values using the *PasswordTester* class included with the starting code) and the *LastReset* field (which should be assigned the system date).
      iii. Delete any *account* object from the collection.
      iv. Change the password stored within a selected *account* element and simultaneously update the *StrengthNum*, *StrengthText* and *LastReset* values (again, this last value should be assigned the current system date)
   c. If the user adds an account or modifies the password of an existing account, the account object should be validated against your schema. If the new account information fails the validation test, the user should validation informed that the information entered is invalid and they should be prompted to re-input the required information.
   d. The updated collection of account objects should be written to the JSON file.

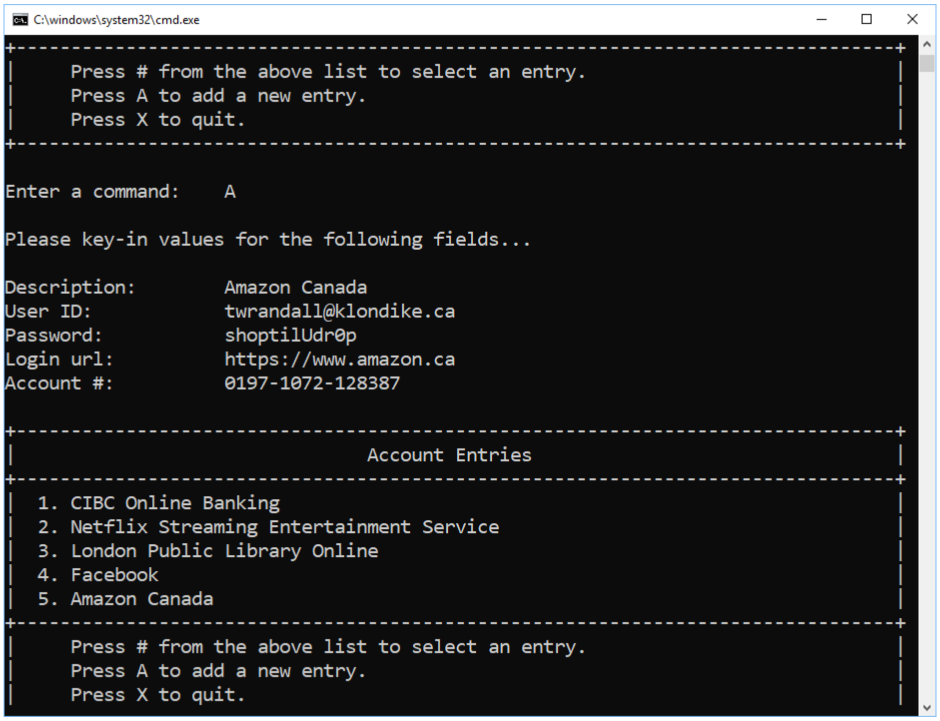
NOTE: Some starting code has been provided that should simplify this part of the project (Project 1 Starting Code). This includes the Password helper class, which can be used for assigning the password strength. You will need to provide the code that navigates, manipulates and validates the account data

2. Here are some examples of what your program's user interface could look like. Your-user interface can be entirely different as long as it achieves the same functionality.



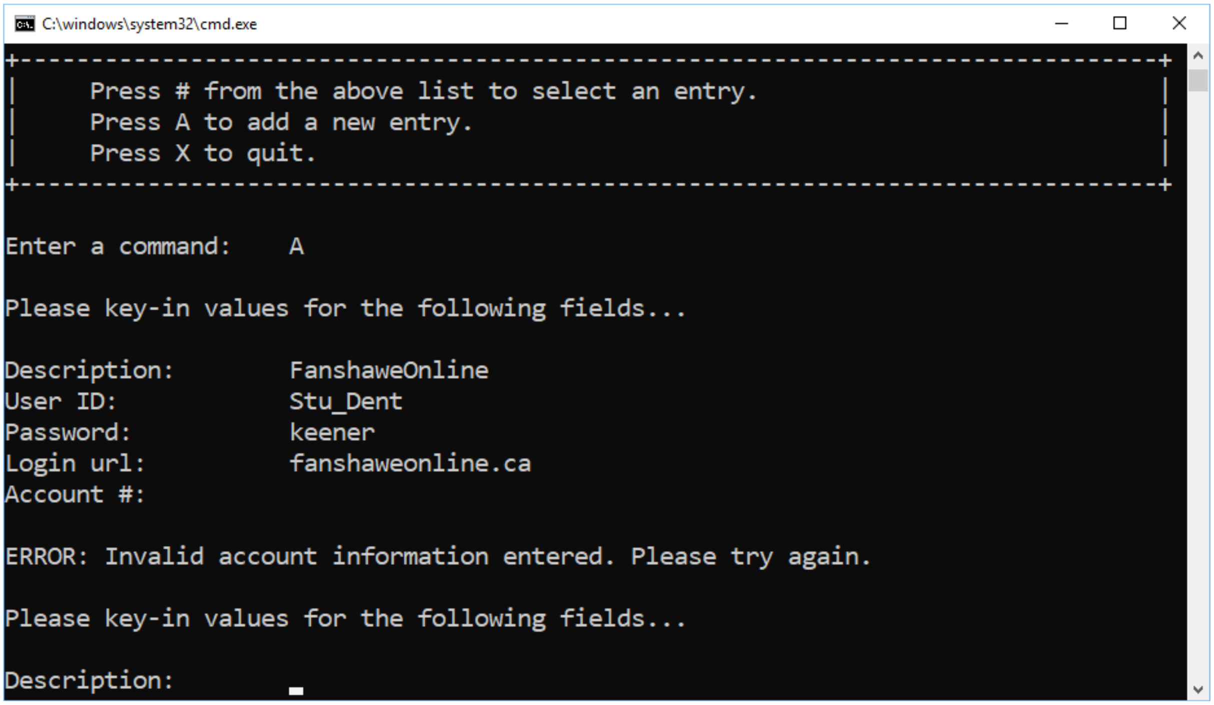
```
PASSWORD MANAGEMENT SYSTEM

+--------------------------------------------------------------------------------+
|                                 Account Entries                                |
+--------------------------------------------------------------------------------+
|  1. CIBC Online Banking                                                        |
|  2. Netflix Streaming Entertainment Service                                    |
|  3. London Public Library Online                                               |
|  4. Facebook                                                                   |
+--------------------------------------------------------------------------------+
|     Press # from the above list to select an entry.                            |
|     Press A to add a new entry.                                                |
|     Press X to quit.                                                           |
+--------------------------------------------------------------------------------+

Enter a command:    1

+--------------------------------------------------------------------------------+
|  1. CIBC Online Banking                                                        |
+--------------------------------------------------------------------------------+
| User ID:           trandall                                                    |
| Password:          pug12345                                                    |
| Password Strength: strong (71%)                                                |
| Password Reset:    2019-05-20                                                  |
| Login url:         https://www.cibc.com/en/personal-banking.html               |
| Account #:         21091241254                                                 |
+--------------------------------------------------------------------------------+
|     Press P to change this password.                                           |
|     Press D to delete this entry.                                              |
|     Press M to return to the main menu.                                        |
+--------------------------------------------------------------------------------+

Enter a command:
```

*Figure 1 – **Shows all menu options***



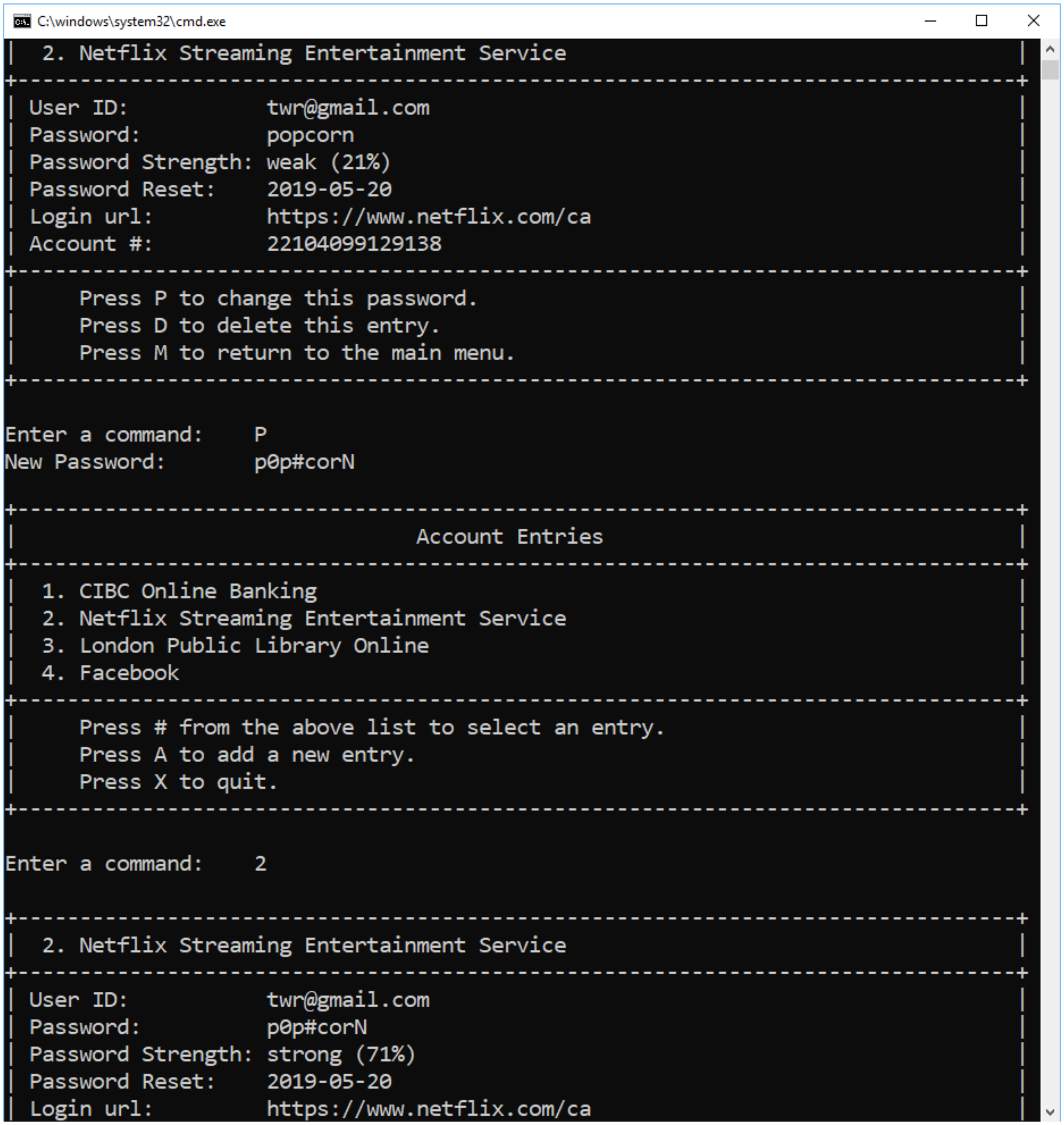
```
+--------------------------------------------------------------------------------+
|     Press # from the above list to select an entry.                            |
|     Press A to add a new entry.                                                |
|     Press X to quit.                                                           |
+--------------------------------------------------------------------------------+

Enter a command:    A

Please key-in values for the following fields...

Description:        Amazon Canada
User ID:            twrandall@klondike.ca
Password:           shoptilUdr0p
Login url:          https://www.amazon.ca
Account #:          0197-1072-128387

+--------------------------------------------------------------------------------+
|                                 Account Entries                                |
+--------------------------------------------------------------------------------+
|  1. CIBC Online Banking                                                        |
|  2. Netflix Streaming Entertainment Service                                    |
|  3. London Public Library Online                                               |
|  4. Facebook                                                                   |
|  5. Amazon Canada                                                              |
+--------------------------------------------------------------------------------+
|     Press # from the above list to select an entry.                            |
|     Press A to add a new entry.                                                |
|     Press X to quit.                                                           |
```

*Figure 2 – **Demonstrates adding an account***



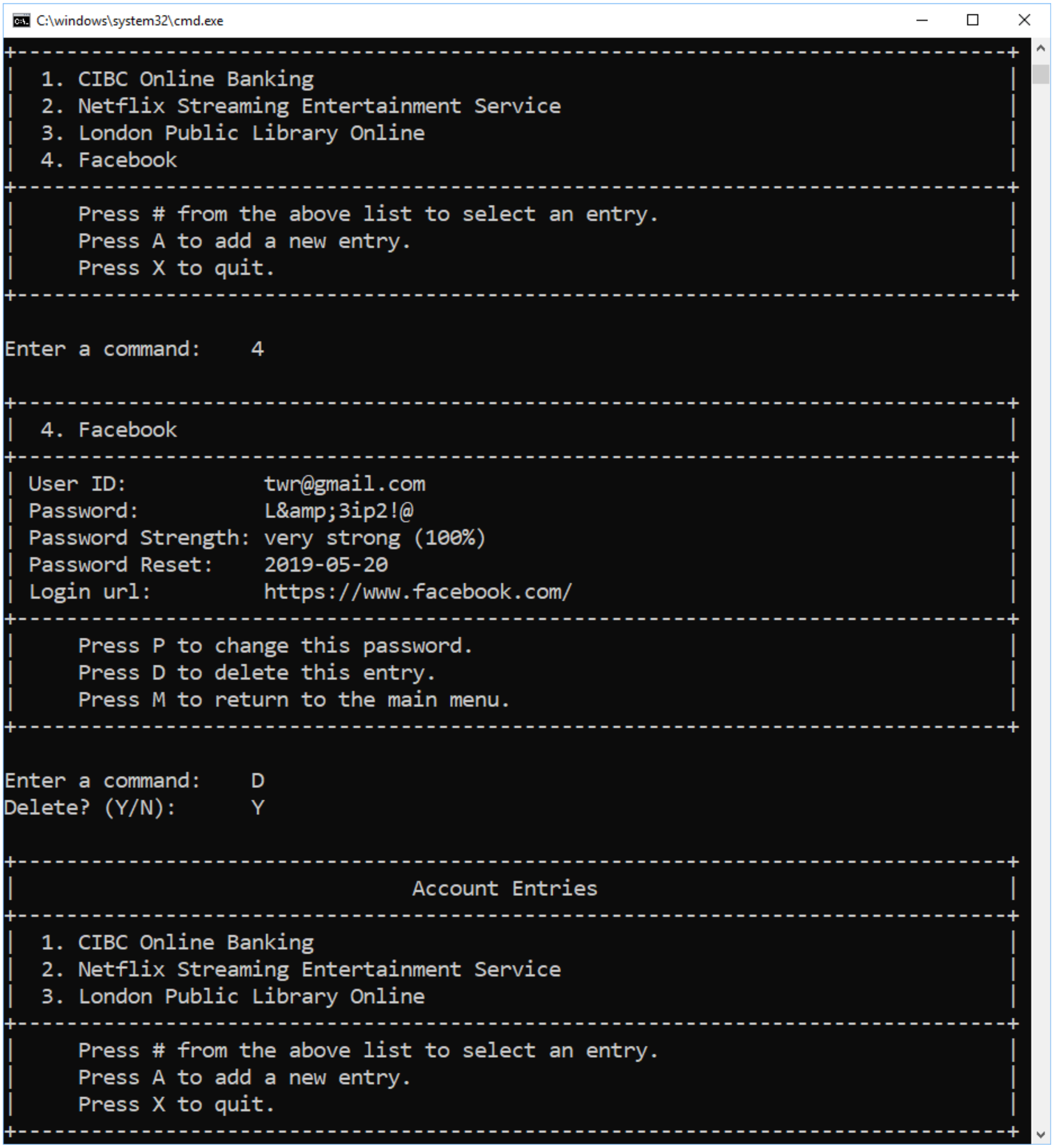
```
+----------------------------------------------------------------------------------+
|     Press # from the above list to select an entry.                              |
|     Press A to add a new entry.                                                  |
|     Press X to quit.                                                             |
+----------------------------------------------------------------------------------+

Enter a command:    A

Please key-in values for the following fields...

Description:        FanshaweOnline
User ID:            Stu_Dent
Password:           keener
Login url:          fanshaweonline.ca
Account #:

ERROR: Invalid account information entered. Please try again.

Please key-in values for the following fields...

Description:
```

Figure 3 – ***Demonstrates adding an account and getting a validation error***
(Login url doesn’t use proper JSON Schema uri format)



```
|  2. Netflix Streaming Entertainment Service                                 |
+-----------------------------------------------------------------------------+
| User ID:            twr@gmail.com                                           |
| Password:           popcorn                                                 |
| Password Strength:  weak (21%)                                              |
| Password Reset:     2019-05-20                                              |
| Login url:          https://www.netflix.com/ca                              |
| Account #:          22104099129138                                          |
+-----------------------------------------------------------------------------+
|     Press P to change this password.                                        |
|     Press D to delete this entry.                                           |
|     Press M to return to the main menu.                                     |
+-----------------------------------------------------------------------------+

Enter a command:    P
New Password:       p0p#corN

+-----------------------------------------------------------------------------+
|                               Account Entries                               |
+-----------------------------------------------------------------------------+
|  1. CIBC Online Banking                                                     |
|  2. Netflix Streaming Entertainment Service                                 |
|  3. London Public Library Online                                            |
|  4. Facebook                                                                |
+-----------------------------------------------------------------------------+
|     Press # from the above list to select an entry.                         |
|     Press A to add a new entry.                                             |
|     Press X to quit.                                                        |
+-----------------------------------------------------------------------------+

Enter a command:    2

+-----------------------------------------------------------------------------+
|  2. Netflix Streaming Entertainment Service                                 |
+-----------------------------------------------------------------------------+
| User ID:            twr@gmail.com                                           |
| Password:           p0p#corN                                                |
| Password Strength:  strong (71%)                                            |
| Password Reset:     2019-05-20                                              |
| Login url:          https://www.netflix.com/ca                              |
```

Figure 4 – ***Demonstrates changing a password***



```
+--------------------------------------------------------------------------------+
|  1. CIBC Online Banking                                                        |
|  2. Netflix Streaming Entertainment Service                                    |
|  3. London Public Library Online                                               |
|  4. Facebook                                                                   |
+--------------------------------------------------------------------------------+
|     Press # from the above list to select an entry.                            |
|     Press A to add a new entry.                                                |
|     Press X to quit.                                                           |
+--------------------------------------------------------------------------------+

Enter a command:    4

+--------------------------------------------------------------------------------+
|  4. Facebook                                                                   |
+--------------------------------------------------------------------------------+
| User ID:           twr@gmail.com                                               |
| Password:          L&amp;3ip2!@                                                |
| Password Strength: very strong (100%)                                          |
| Password Reset:    2019-05-20                                                  |
| Login url:         https://www.facebook.com/                                   |
+--------------------------------------------------------------------------------+
|     Press P to change this password.                                           |
|     Press D to delete this entry.                                              |
|     Press M to return to the main menu.                                        |
+--------------------------------------------------------------------------------+

Enter a command:    D
Delete? (Y/N):      Y

+--------------------------------------------------------------------------------+
|                                Account Entries                                 |
+--------------------------------------------------------------------------------+
|  1. CIBC Online Banking                                                        |
|  2. Netflix Streaming Entertainment Service                                    |
|  3. London Public Library Online                                               |
+--------------------------------------------------------------------------------+
|     Press # from the above list to select an entry.                            |
|     Press A to add a new entry.                                                |
|     Press X to quit.                                                           |
+--------------------------------------------------------------------------------+
```

Figure 5 – ***Demonstrates deleting an account***

Grading Scheme

Projects will be evaluated as follows:

Item	Marks
Part 1 – JSON Schema	
Schema is a syntactically-correct JSON Schema	2
Includes all the required fields and no extra fields	2
Correctly validates an account object, especially the following features: • Correctly requires all required properties and does not require optional properties • Assigns the correct type to all properties • Applies additional constraints to property values where this has been specified (*LoginUrl*, *Password.StrengthNum*, *Password.StrengthText*)	10
Submitted sample valid JSON data file with at least three different accounts	2
Part 2 – C# Program	
Converts and displays account/password output for all accounts stored in the JSON data file.	5
Allows the user to add a new account and populate it with data	5
Allows the user to select an existing account object and modify the password	5
Allows the user to select and delete an existing account object	2
Uses the *PasswordTester* class provided to populate the password strength properties of an account object	2
Uses the system date/time to populate the password reset property of an account object	1
Uses the JSON schema from Part 1 to correctly validate user inputs and prevents any invalid data from being written to the JSON data file	5
Converts and saves account/password data in the program's memory to the JSON data file.	5
Handles exceptions that may occur when converting the data to or from JSON or when reading to or writing from the JSON file	2
User interface gives clear prompts for all user-operations	2
TOTAL	50

Submit

Via the link on the *Project 1* dropbox in FanshaweOnline an archive (ZIP) file of a Visual Studio solution containing:

1. Your JSON schema file
2. Your one valid JSON data file
3. A Visual Studio solution for your C# *Password Manager* program

When I open your solution in Visual Studio I should be able to see your schema file, both your JSON files and your complete C# project in the Solution Explorer window.

Submit your project on time!

The late submission policy for this project is that you will lose 10% if your project is less than 1 day (< 24 hours) late. You will lose an additional 10% for each additional day up to a maximum of 5 days or 50%. Projects received later than five days after the submission deadline will receive any marks.

Submit your own work and *keep it to yourself*!

You must not submit code written by another student or obtained from another source. You must not share your code with another student. These activities are academic offenses. If you cheat, you may get a mark of zero. Repeat offenses carry even more severe penalties such as receiving an F grade or being expelled. However, students *are* encouraged to share ideas and to work together on practice exercises since this enhances the learning process. Just make sure to submit your own code and benefit from having made the effort on your own!

Project Corrections

If any corrections or changes are necessary they will be posted to the course web site and you will be notified of any changes in class. It is your responsibility to check the site periodically for changes to the project. Additional resources relating to the project may also be posted.