Project 5

Due March 13, 2015 at 11:55 PM

You will be working alone for this project. **This specification may change at any time for additional clarification.** You should avoid using existing source code as a primer that is currently available on the Internet. You **must** specify in your comments of the file any sources of code that you have viewed to help you complete this project. All class projects will be submitted to MOSS to determine if students have excessively collaborated. Excessive collaboration, or failure to list external code sources will result in the matter being transferred to Student Judicial Affairs.

1. You will be writing a Python module to handle encryption and decryption of text files. Your module must implement a class called CaesarCipher and must be able to be loaded as both a module and run as a standalone script. Below is a further description of the requirements of the module. Name your file **caesar.py**.
    a. Place a comment at the top of your file as follows:
    ```
    #
    # Name: Your Name
    # ID  : Your Student ID
    # Date: Today's Date
    #
    ```
    b. The CaesarCipher class must have a function called ClearAll that takes no parameters and clears both the decrypted text and encrypted text. For example if MyCaesarCipher is a CaesarCipher, then `MyCaesarCipher.ClearAll()`
    c. The CaesarCipher class must have functions called PrintEncrypted and PrintDecrypted that take no parameters and prints the encrypted and decrypted text respectively. For example if MyCaesarCipher is a CaesarCipher, then a call to PrintDecrypted would be: `MyCaesarCipher.PrintDecrypted()`
    The CaesarCipher class must have functions called Encrypt and Decrypt that take in a single parameter that is the shift amount and encrypts the decrypted text or decrypts the encrypted text respectively. A modified Caesar Cipher will be used to encrypt/decrypt the text. You can read more about Caesar Ciphers at http://en.wikipedia.org/wiki/Caesar_cipher. The difference with the cipher that you will be implementing is that is uses digits 0 – 9, upper case letters and lower case letters. This leads to 62 different characters instead of 26. The order of characters is 0 – 9, A – Z, and then a – z. The shift amount must be between 1 and 61 inclusively, and shift amounts of 26 and 36 are invalid. If an invalid shift value is input, the associated function must return False. If the source text (encrypted text for Decrypt and decrypted text for Encrypt) is empty, the associated function must return False. If the encryption or decryption succeeds, the function should return True. If MyCaesarCipher is a

CaesarCipher, then a call to Encrypt with ShiftAmount would be:
`MyCaesarCipher.Encrypt(ShiftAmount)`

d. The CaesarCipher class must have functions called LoadEncryptedFile and LoadDecryptedFile that take in a single parameter that is the filename of the file to load. LoadEncryptedFile and LoadDecryptedFile load the encrypted text and the decrypted text respectively from a file. The other text (encrypted text for LoadDecryptedFile and decrypted text for LoadEncryptedFile) should be set to empty. If MyCaesarCipher is a CaesarCipher, then a call to LoadEncryptedFile with filename 'Encrypted.txt' would be:
`MyCaesarCipher.LoadEncryptedFile('Encrypted.txt')`

e. The CaesarCipher class must have functions called SaveEncryptedFile and SaveDecryptedFile that take in a single parameter that is the filename of the file to save. SaveEncryptedFile and SaveDecryptedFile save the encrypted text and the decrypted text respectively to a file. If the associated text is empty the function must return False, if the function successfully saves the text to file it must return True. If MyCaesarCipher is a CaesarCipher, then a call to SaveEncryptedFile with filename 'Encrypted.txt' would be:
`MyCaesarCipher.SaveEncryptedFile('Encrypted.txt')`

f. Additional functions **may** be added to the CaesarCipher class that the student finds useful. **(THIS IS NOT A REQUIREMENT)**

2. When your module is run as a script, it will operate in two different modes. If no command line arguments are input, then the script enters menu mode. If more than 1 command line argument (anything other than script name) is provided during the run of the script it enters single run mode.

a. Menu mode provides an interactive menu to access an instance of CaesarCipher. Each command is a simple interface to each of the function calls. Below is the menu and command input. The appendix shows a run of each command:

```
C Clear All
L Load Encrypted File
R Read Decrypted File
S Store Encrypted File
W Write Decrypted File
O Output Encrypted Text
P Print Decrypted Text
E Encrypt Decrypted Text
D Decrypted Encrypted Text
Q Quit
-------------------------
Enter Choice>
```

b. Single run mode takes in the command line arguments and operates depending upon the number and values of the arguments. If two additional command line arguments are input, the first argument is interpreted as the shift value; the second is the source file. If the shift value is less than zero it is assumed that the source file is an encrypted

file. In this case the file should be loaded and decrypted using the absolute value of the shift value; the decrypted text should then be printed to the screen. If the shift value is greater than zero it is assumed that the source file is a decrypted file. In this case the file should be loaded and encrypted using the shift value; the encrypted text should then be printed to the screen. If a third argument is provided it is assumed to be the destination file. The encrypted (or decrypted) text should be saved to the destination file instead of printed to the screen. If the shift value is not an integer, or if the value is an invalid value a syntax error should be output. If only the shift value is provided a syntax error should be output. The syntax error should be:

```
Invalid syntax: caesar shift infile [outfile]
```

3. **EXTRA CREDIT:**
    a. Add the ability of LoadEncryptedFile and LoadDecryptedFile to detect if the file exists before trying to open the file. The functions must return False if the file does not exist, or if the loaded file is empty. If the file exists and it is loaded properly, then the function should return True.
    b. Add a function called DetermineShift to CaesarCipher that does not take any parameters. DetermineShift returns a list of three most likely shift values for the encrypted text in CaesarCipher.
    c. Add the ability of the single run mode to take in a shift value of zero. This will load the filename provided as if it was an encrypted file. The DetermineShift function will be called and the top three most likely keys will be printed to the screen.

Appendix

```
C Clear All
L Load Encrypted File
R Read Decrypted File
S Store Encrypted File
W Write Decrypted File
O Output Encrypted Text
P Print Decrypted Text
E Encrypt Decrypted Text
D Decrypted Encrypted Text
Q Quit
--------------------------
Enter Choice> c
C Clear All
L Load Encrypted File
R Read Decrypted File
S Store Encrypted File
W Write Decrypted File
O Output Encrypted Text
P Print Decrypted Text
E Encrypt Decrypted Text
D Decrypted Encrypted Text
Q Quit
--------------------------
Enter Choice> r
Enter Filename> decrypted.txt
C Clear All
L Load Encrypted File
R Read Decrypted File
S Store Encrypted File
W Write Decrypted File
O Output Encrypted Text
P Print Decrypted Text
E Encrypt Decrypted Text
D Decrypted Encrypted Text
Q Quit
--------------------------
Enter Choice> p
We hold these truths to be self-evident, that all men are
created equal, that they are endowed by their Creator with
certain unalienable Rights, that among these are Life,
Liberty and the pursuit of Happiness
C Clear All
L Load Encrypted File
R Read Decrypted File
S Store Encrypted File
W Write Decrypted File
```

```
O Output Encrypted Text
P Print Decrypted Text
E Encrypt Decrypted Text
D Decrypted Encrypted Text
Q Quit
-------------------------
Enter Choice> e
Enter Shift Amount> 5
C Clear All
L Load Encrypted File
R Read Decrypted File
S Store Encrypted File
W Write Decrypted File
O Output Encrypted Text
P Print Decrypted Text
E Encrypt Decrypted Text
D Decrypted Encrypted Text
Q Quit
-------------------------
Enter Choice> o
bj mtqi ymjxj ywzymx yt gj xjqk-j0nijsy, ymfy fqq rjs fwj
hwjfyji jvzfq, ymfy ymj3 fwj jsit1ji g3 ymjnw Hwjfytw 1nym
hjwyfns zsfqnjsfgqj Wnlmyx, ymfy frtsl ymjxj fwj Qnkj,
Qngjwy3 fsi ymj uzwxzny tk Mfuunsjxx
C Clear All
L Load Encrypted File
R Read Decrypted File
S Store Encrypted File
W Write Decrypted File
O Output Encrypted Text
P Print Decrypted Text
E Encrypt Decrypted Text
D Decrypted Encrypted Text
Q Quit
-------------------------
Enter Choice> s
Enter Filename> encrypted.txt
C Clear All
L Load Encrypted File
R Read Decrypted File
S Store Encrypted File
W Write Decrypted File
O Output Encrypted Text
P Print Decrypted Text
E Encrypt Decrypted Text
D Decrypted Encrypted Text
Q Quit
```

```
-------------------------
Enter Choice> c
C Clear All
L Load Encrypted File
R Read Decrypted File
S Store Encrypted File
W Write Decrypted File
O Output Encrypted Text
P Print Decrypted Text
E Encrypt Decrypted Text
D Decrypted Encrypted Text
Q Quit
-------------------------
Enter Choice> p

C Clear All
L Load Encrypted File
R Read Decrypted File
S Store Encrypted File
W Write Decrypted File
O Output Encrypted Text
P Print Decrypted Text
E Encrypt Decrypted Text
D Decrypted Encrypted Text
Q Quit
-------------------------
Enter Choice> l
Enter Filename> encrypted.txt
C Clear All
L Load Encrypted File
R Read Decrypted File
S Store Encrypted File
W Write Decrypted File
O Output Encrypted Text
P Print Decrypted Text
E Encrypt Decrypted Text
D Decrypted Encrypted Text
Q Quit
-------------------------
Enter Choice> o
bj mtqi ymjxj ywzymx yt gj xjqk-j0nijsy, ymfy fqq rjs fwj
hwjfyji jvzfq, ymfy ymj3 fwj jsit1ji g3 ymjnw Hwjfytw 1nym
hjwyfns zsfqnjsfgqj Wnlmyx, ymfy frtsl ymjxj fwj Qnkj,
Qngjwy3 fsi ymj uzwxzny tk Mfuunsjxx
C Clear All
L Load Encrypted File
R Read Decrypted File
```

```
S Store Encrypted File
W Write Decrypted File
O Output Encrypted Text
P Print Decrypted Text
E Encrypt Decrypted Text
D Decrypted Encrypted Text
Q Quit
--------------------------
Enter Choice> d
Enter Shift Amount> 5
C Clear All
L Load Encrypted File
R Read Decrypted File
S Store Encrypted File
W Write Decrypted File
O Output Encrypted Text
P Print Decrypted Text
E Encrypt Decrypted Text
D Decrypted Encrypted Text
Q Quit
--------------------------
Enter Choice> p
We hold these truths to be self-evident, that all men are
created equal, that they are endowed by their Creator with
certain unalienable Rights, that among these are Life,
Liberty and the pursuit of Happiness
C Clear All
L Load Encrypted File
R Read Decrypted File
S Store Encrypted File
W Write Decrypted File
O Output Encrypted Text
P Print Decrypted Text
E Encrypt Decrypted Text
D Decrypted Encrypted Text
Q Quit
--------------------------
Enter Choice> q
```