Introduction to Computers and Programming

Homework 11

2023/11/21

1. Deadline

You have one week to complete the homework. Hand in your homework via E3 before 2023/11/28 23:55. Please finish your homework as soon as possible. In addition, make sure that your code can be executed on Visual Studio Community 2019. We will use Visual Studio for grading.

2. Problems

2.1 Vigenère Cipher(50%)

In this problem, you'll be working with the Vigenère Cipher, a classical encryption method developed by Blaise de Vigenère in the 16th century. Unlike some simpler ciphers, Vigenère introduces the concept of a keyword for more secure encryption. Your task is to encrypt a given message using the Vigenère Cipher.

First, take a keyword K as user input (2 ≦ len(K) ≦ 15). You need to read the content from the "p1_input.txt" and implement the Vigenère Cipher with the keyword K. Subsequently, you are required to generate a new text file named "p1_output.txt" containing the resulting ciphertext. You need to handle boundary issues and skip non-alphabetic characters.

There is an example:

keyword: hello → h(+7), e(+4), l(+11), l(+11), o(+14)

plaintext	I		l	o	v	e		c	o	d	i	n	g	!
keyword	+7		+4	+11	+11	+14		+7	+4	+11	+11	+14	+7	
ciphertext	P		p	z	g	s		j	s	o	t	b	n	!

Input
- **User input**
  - A string K (2 ≦ len(K) ≦ 15), there is no space and all letters are in lowercase.
- **File input**
  - A text file named "p1_input.txt".

Output
- **File output**
  - A text file named "p1_output.txt" .

Example 1

Input File

Input

hello

Output File

2.2 Decrypting Vigenère Cipher(50%)

There are two input files, "p2_input_plaintext.txt" and "p2_input_ciphertext.txt" which contain the plaintext and ciphertext respectively; you need to identify what the keyword is.
Note that, the characteristics of the keyword are the same as in problem 2.1, and you should find the shortest keyword, meaning the keyword will not have a situation like 'hellohello'.

Input
- **File input**
  - A "p2_input_plaintext.txt" file containing the plaintext.
  - A "p2_input_ciphertext.txt" file containing the ciphertext.

Output
Print out the keyword K on the screen ($2 \leqq len(K) \leqq 15$), there is no space and all letters are in lowercase.

Example 1
Input

- **File input**

```
p2_input_plaintext.txt    ×

Meet Sarah Turner, a diligent psychology student at Eastwood University. Despite
her consistent efforts, a challenging midterm left her with a discouraging
grade. Disheartened but determined, Sarah hit the books with renewed vigor,
seeking guidance from professors and peers. As the final exam approached,
Sarah's meticulous preparation became evident. She conquered each concept,
mastering the intricacies of the subject. The exam day arrived, and Sarah faced
it with confidence. When the results were released, a sense of accomplishment
washed over her as she saw a remarkable improvement from the midterm. Sarah's
story became a testament to resilience, proving that setbacks could be stepping
stones to success. Her journey inspired her classmates and showcased the
transformative power of dedication and hard work.
```

```
p2_input_ciphertext.txt    ×

Tipe Ghvls Hbvypf, h htwwniye dzcnscssrj gayopba ee Pozxhzck Yytjlvdthf. Hpddpxp
ssy gzygpwepba iqqcyxd, l qoewwsuktyu tmoesyq wpta lpc kpxs l rpwnziyertbn
kclrl. Htdvlecesuio mia hpesyqtysk, Wlcoo lte hoi mzcrw htho vpysdio gwnsc,
dslotyu nytoougp qfvq accmiddcyw lyr wipcg. Hw ess mmylz lblx owtczojlpo,
Ghvls'g tietqbpzfg wvpaoyeetcu fpnoti pgwkiye. Goi nzbxypcsk ilnv jsynswx,
xlgaictbn xsp wuxctqhgtpg vj ess zymusjx. Ess lblx rhc lcfpzpo, ouh Dlfhl qlqlh
te kpxs ncujtosugp. Hvlr ess yidfzaw hpfl vpwshwpo, o ziyds vj lnqvqawwzlxpba
aldvlh zgsy lpc oz wsp gha l cstecvoipp tawvzgstiye tysx evl qtohlvx. Doyes'd
gascj plglxs h xpdhhqpyh as cpgpptpbji, acccmyr hoee dsaflnyz gzfzk fp dhltatbn
wezblw ez gbgnpgz. Lpc xvycysf myddpvpo vlv nwozwxlhlw lyr zlzhqhwpo hoi
ecouwqzfteetjl tzhsy sq oskmnlhpsy lbk llcr dscv.
```

Output

hello

3. Submission format
Your submission should follow the format below, or you might get some penalty for the wrong
format.
- xxxxxxxxx_hw_w11.zip
  - xxxxxxxxx_hw_01.cpp
  - xxxxxxxxx_hw_02.cpp

xxxxxxxxx is your student ID

4. Appendix
- You can use this website to verify the results.
  - Vigenère cipher: Encrypt and decrypt online - cryptii
- About Vigenère Cipher
  - Vigenère cipher - Wikipedia

5. Online Judge
- **Problem 2.1**
  - **User Input**

○ **Screen Output**

● **Problem 2.2**
  ○ **User Input**

○ **Screen Output**
hello