

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 ($2 \leq \text{len}(K) \leq 15$). 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 \rightarrow 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 ($2 \leq \text{len}(K) \leq 15$), 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

```
p1_input.txt x
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.
```

Input

hello

Output File

```
p1_output.txt x
Tipe Ghvls Hbvypf, h htwnniye dzcncssrj gayopba ee Pozxhzck Yytjldvthf. Hpddpxp
ssy gzygpwepba iqccyxd, l qoewwsuktyu tmoesyq wpta lpc kpxs l rpwnziyertbn
kclrl. Htdvlecesuio mia hpesytysk, Wlcoo lte hoi mzcw htho vpysdio gwncs,
dsloiyu nytoougq qfvq accmiddyw lyr wipcg. Hw ess mmylz lblx owtczojlp,
Ghvls'g tietqbpzfg wvpaoyeetcu fpmoti pgwkiye. Goi nzbxyprsk ilnv jsynswx,
xlgaictbn xsp wuxctqhtpg vj ess zymusjx. Ess lblx rhc lcfpzpo, ouh Dlfhl qlqlh
te kpxs ncujtosugp. Hvlr ess yidfzaw hpfl vpwshwpo, o ziyds vj lnqvawwzlxpba
aldvlh zgsy lpc oz wsp gha l cstecvoipp tawvzgstiye tysx evl qtohlvx. Doyes'd
gascj plglxs h xpdhhqpyh as cpgpbtbjj, acccmr hoee dsaflnyz gzfzk fp dhltatbn
wezblw ez gbgnggz. lpc xvcysf myddpvpo vlv nwozwxhlw lyr zlzqhwp o hoi
ecouwqzfteetj1 tzhsy sq oskmnlhpsy lbk llcr dscv.
```

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.

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 ($2 \leq \text{len}(K) \leq 15$), 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 htwniye dznscssrj gayopba ee Pozxhzck Yytjlvdthf. Hpddpxp
ssy gzygpwepba iqqcyxd, l qoewwsuktyu tmoesyq wpta lpc kpxs l rpwnziyertbn
kclrl. Htdvlecesuio mia hpesytysk, Wlcoo lte hoi mzcwv htho vpysdio gwnsc,
dslotyu nytoougq qfvq accmiddyw lyr wipcg. Hw ess mmylz lblx owtczojlpo,
Ghvls'g tietqbpzfg wvpaoyetcu fnoti pgwkiye. Goi nzbxytcsk ilnv jsynswx,
xlgaictbn xsp wuxctqhtpg vj ess zymusjx. Ess lblx rhc lcfzpo, 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 xpdhghpyh as cpgpbtbj, accmyr hoee dsaflnyz gzfkz fp dhltatbn
wezblw ez gbgngpz. Lpc xvycysf myddpvpo vlv nwozwxhlw lyr zlzqhwpv hoi
ecouwqzfteetj1 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.

- xxxxxxxx_hw_w11.zip
 - xxxxxxxx_hw_01.cpp
 - xxxxxxxx_hw_02.cpp

xxxxxxx 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

```
sample_case_input.txt x
hello
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.
```

- **Screen Output**

```
sample_case_output.txt x
Tipe Ghvls Hbvypf, h htwnniye dznscssrj gayopba ee Pozxhzck Yytjlvdthf. Hpddpxp
ssy gzygpwepba iqqcyxd, l qoewwsuktyu tmoesyq wpta lpc kpxs l rpwnziyertbn
kclrl. Htdvlecesuio mia hpesyqtysk, Wlcoo lte hoi mzcwv htho vpysdio gwnsc,
dslotyu nytoougp qfvq accmiddcyw lyr wipcg. Hw ess mmylz lblx owtczojlp,
Ghvls'g tietqbpzfg wvpaoyeetcu fpmoti pgwkiye. Goi nzbxyprsk ilnv jsynswx,
xlgaictbn xsp wuxctqhgtpg vj ess zymusjx. Ess lblx rhc lcfzpo, ouh Dlfhl qlqlh
te kpxs ncujtosugp. Hvlr ess yidfzaw hpfl vpwshwpo, o ziyds vj lmqvawwzlxpba
alldvlh zgsy lpc oz wsp gha l cstevoipp tawvzgstiye tysx evl qtohlvx. Doyes'd
gascj plglxs h xpdhhqpyh as cpgpptpbji, acccmr hoee dsaflnyz gzfzk fp dhltatbn
wezblw ez gbgnggz. Lpc xvycysf myddpvpv vlv nwozwxhlw lyr zlzqhwpv hoi
ecouwqzfteetj1 tzhsy sq oskmnlhpsy lbk llcr dscv.
```

- **Problem 2.2**

- **User Input**

```
sample_case_input.txt x
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,
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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.
Tipe Ghvls Hbvypf, h htwnniye dznscssrj gayopba ee Pozxhzck Yytjlvdthf. Hpddpxp
ssy gzygpwepba iqqcyxd, l qoewwsuktyu tmoesyq wpta lpc kpxs l rpwnziyertbn
kclrl. Htdvlecesuio mia hpesyqtysk, Wlcoo lte hoi mzcwv htho vpysdio gwnsc,
dslotyu nytoougp qfvq accmiddcyw lyr wipcg. Hw ess mmylz lblx owtczojlp,
Ghvls'g tietqbpzfg wvpaoyeetcu fpmoti pgwkiye. Goi nzbxyprsk ilnv jsynswx,
xlgaictbn xsp wuxctqhgtpg vj ess zymusjx. Ess lblx rhc lcfzpo, ouh Dlfhl qlqlh
te kpxs ncujtosugp. Hvlr ess yidfzaw hpfl vpwshwpo, o ziyds vj lmqvawwzlxpba
alldvlh zgsy lpc oz wsp gha l cstevoipp tawvzgstiye tysx evl qtohlvx. Doyes'd
gascj plglxs h xpdhhqpyh as cpgpptpbji, acccmr hoee dsaflnyz gzfzk fp dhltatbn
wezblw ez gbgnggz. Lpc xvycysf myddpvpv vlv nwozwxhlw lyr zlzqhwpv hoi
ecouwqzfteetj1 tzhsy sq oskmnlhpsy lbk llcr dscv.
```

- **Screen Output**

hello