Скитала

**Цель работы**

Реализовать современными средствами алгоритм шифрования, используемый в древней Спарте. Ознакомиться с особенностями принципами блочного шифрования.

**Задание**

1. Реализовать современными средствами алгоритм шифрования, используемый в древней Спарте.

2. Реализовать обратную операцию расшифровки.

3. Улучшить алгоритм шифрования, так, чтобы можно было зашифровывать строки текста размером меньше, чем n\*m, дополняя их пробелами.

4. Улучшить алгоритм шифрования, так, чтобы можно было зашифровывать строки текста размером больше n\*m. Для этого разбить текст на блоки по n\*m символов и каждый из них шифровать отдельно. Результат склеить вместе. При необходимости дополнить последний блок пробелами.

5. Модифицировать код так, чтобы он работал теперь с содержимым текстовых файлов. Один содержит исходный текст, второй -- зашифрованный, третий -- результат расшифровки.

6. Зашифровать таким образом 5 разных файлов с текстом с разными ключами с ограничением 12<=n\*m<=36.

7. Дешифровать их, не зная ключа, путем перебора возможных размерностей матриц n\*m в диапазоне для n\*m от 12 до 36 и просмотра результатов дешифрования вручную. Для облегчения задачи случае получения в конце дешифруемого файла последовательности пробелов помечать его, как кандидат на правильный ключ.

**Результаты выполнения задания**

Код на python представлен ниже.

import numpy as np;

import itertools;

import time;

# преобразование строки в матрицу (n m) reshape

def matrixnew(str, column, row):

to\_array = [char for char in str]

matrix = np.reshape(to\_array, (column, row));

trans\_matrix = matrix.transpose();

#print(trans\_matrix);

concl=''

for i in range( len(trans\_matrix)):

for j in range(len(trans\_matrix[i])):

concl=concl+trans\_matrix[i][j];

return concl;

# шифрование строки

def encrypt(str, column, row):

strsecrypt ='';

if (len(str) > column\*row):

strs = [str[i:i+column\*row] for i in range(0, len(str), column\*row)]

#print(strs);

for strindex in strs:

#print(strindex);

if (len(strindex) < column\*row):

star =column\*row-len(strindex);

for i in range(0, star):

strindex=strindex+" ";

#print(strindex);

strecrypt= matrixnew(strindex, column, row);

#print(strecrypt);

else:

#print(strindex);

strecrypt= matrixnew(strindex, column, row);

#print(strecrypt);

strsecrypt = strsecrypt+strecrypt;

return strsecrypt;

# дешифрование

def decrypt(strecrypt, column, row):

strdeecrypt ='';

if (len(strecrypt) > column\*row):

strs = [strecrypt[i:i+column\*row] for i in range(0, len(strecrypt), column\*row)]

#print(strs);

for strindex in strs:

#print(strindex);

strdeecrypt = strdeecrypt + matrixnew(strindex, row, column);

return strdeecrypt;

def readFile(name):

file=open(name)

text = file.read()

file.close()

return text

def writeFile(text, name):

file=open(name, 'w')

file.write(text)

file.close()

# массив всевозможных пар ключей(n m) в диапазоне range(12,37):

def getKeys():

listed=[];

ls=[];

for a in range(12,37):

for i in range(2, a // 3):

if (a % i== 0):

ls.append(a)

listed= list(set(ls))

#print(listed);

keys\_m\_n =[]

for i in range(0, len(listed)):

primeNum = []

for num in range(1, listed[i]+1):

if(listed[i]%num==0):

if(num!=1 and num!=listed[i]):

primeNum.append(num)

"print(primeNum)"

com\_set = itertools.combinations(primeNum, 2)

for couple in com\_set:

if couple[0]\*couple[1]==listed[i]:

reverse\_couple=(couple[1], couple[0])

keys\_m\_n.append(couple)

keys\_m\_n.append(reverse\_couple)

return keys\_m\_n

# поиск ключа для дешифрования и расчет времени на это

def decryptGetKeys(text, encrypttext, n\_m):

start = time.perf\_counter()

exp=len(text)-len(encrypttext)

for i in n\_m:

if(len(encrypttext)%(i[0]\*i[1])==0):

decrypttext = decrypt(encrypttext, i[0], i[1]);

if(decrypttext[:exp] == text):

stop = time.perf\_counter();

filename ="newDecrypttext.txt"

writeFile(decrypttext, filename)

print( "Text ", stop-start)

nm=getKeys();

print(nm)

text1=readFile('C:/Users/29\_06/pythoncode/informsafe/text1.txt')

print(len(text1));

m1 = 4 #число столбцов

n1 = 6 # число строк

encrypted1 = encrypt(text1, m1, n1)

#print(len(encrypted1));

writeFile(encrypted1, 'C:/Users/29\_06/pythoncode/informsafe/text1encrypted.txt')

decrypted1 = decrypt(encrypted1, m1, n1)

writeFile(decrypted1, 'C:/Users/29\_06/pythoncode/informsafe/text1endecrypted.txt')

newdecrypted1 = decryptGetKeys(text1, encrypted1, nm)

#print(newdecrypted1)

text2=readFile('C:/Users/29\_06/pythoncode/informsafe/text2.txt')

print(len(text2));

m2 = 3 #число столбцов

n2 = 6 # число строк

encrypted2 = encrypt(text2, m2, n2)

#print(encrypted2);

writeFile(encrypted2, 'C:/Users/29\_06/pythoncode/informsafe/text2encrypted.txt')

decrypted2 = decrypt(encrypted2, m2, n2)

writeFile(decrypted2, 'C:/Users/29\_06/pythoncode/informsafe/text2endecrypted.txt')

newdecrypted1 = decryptGetKeys(text2, encrypted2, nm)

#print(newdecrypted1)

text3=readFile('C:/Users/29\_06/pythoncode/informsafe/text3.txt')

print(len(text3));

m3 = 4 #число столбцов

n3 = 3 # число строк

encrypted3 = encrypt(text3, m3, n3)

#print(encrypted3);

writeFile(encrypted3, 'C:/Users/29\_06/pythoncode/informsafe/text3encrypted.txt')

decrypted3 = decrypt(encrypted3, m3, n3)

writeFile(decrypted3, 'C:/Users/29\_06/pythoncode/informsafe/text3endecrypted.txt')

newdecrypted1 = decryptGetKeys(text3, encrypted3, nm)

#print(newdecrypted1)

text4=readFile('C:/Users/29\_06/pythoncode/informsafe/text4.txt')

print(len(text4));

m4 = 4 #число столбцов

n4 = 8 # число строк

encrypted4 = encrypt(text4, m4, n4)

#print(encrypted4);

writeFile(encrypted4, 'C:/Users/29\_06/pythoncode/informsafe/text4encrypted.txt')

decrypted4 = decrypt(encrypted4, m4, n4)

writeFile(decrypted4, 'C:/Users/29\_06/pythoncode/informsafe/text4endecrypted.txt')

newdecrypted1 = decryptGetKeys(text4, encrypted4, nm)

#print(newdecrypted1)

text5=readFile('C:/Users/29\_06/pythoncode/informsafe/text5.txt')

print(len(text5));

m5 = 4 #число столбцов

n5 = 3 # число строк

encrypted5 = encrypt(text5, m5, n5)

#print(encrypted5);

writeFile(encrypted5, 'C:/Users/29\_06/pythoncode/informsafe/text5encrypted.txt')

decrypted5 = decrypt(encrypted5, m5, n5)

writeFile(decrypted5, 'C:/Users/29\_06/pythoncode/informsafe/text5endecrypted.txt')

newdecrypted1 = decryptGetKeys(text5, encrypted5, nm)

#print(newdecrypted1)

Перебор значений ключей с ограничением 12<=n\*m<=36

Функция def getKeys():

[(2, 6), (6, 2), (3, 4), (4, 3), (2, 7), (7, 2), (3, 5), (5, 3), (2, 8), (8, 2), (2, 9), (9, 2), (3, 6), (6, 3), (2, 10), (10, 2), (4, 5), (5, 4), (3, 7), (7, 3), (2, 11), (11, 2), (2, 12), (12, 2), (3, 8), (8, 3), (4, 6), (6, 4), (2, 13), (13, 2), (3, 9), (9, 3), (2, 14), (14, 2), (4, 7), (7, 4), (2, 15), (15, 2), (3, 10), (10, 3), (5, 6), (6, 5), (2, 16), (16, 2), (4, 8), (8, 4), (3, 11), (11, 3), (2, 17), (17, 2), (5, 7), (7, 5), (2, 18), (18, 2), (3, 12), (12, 3), (4, 9), (9, 4)]

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Название файла | Количество символов | Время, занятое на перебор ключей алгоритмом | Правильный вариант ключа | Номер правильного варианта ключа среди перебираемых |
| text1 | 1167 | 0.129198 | (4, 6) | 27 |
| text2 | 889 | 0.0662309 | (3, 6) | 13 |
| text3 | 1153 | 0.042461 | (4, 3) | 4 |
| text4 | 1672 | 0.015029 | (4, 8) | 45 |
| text5 | 776 | 0.012048 | (4, 3) | 4 |

**Выводы**

В результате выполнения данной лабораторной работы был на практике изучен алгоритм шифрования Скитала. Был произведен взлом шифра путем перебора всех возможных значений, а также собрана информация о времени, которое было затрачено на взлом.

**Приложение**

Для удобства вместо “Улучшить алгоритм шифрования, так, чтобы можно было зашифровывать строки текста размером меньше, чем n\*m, дополняя их пробелами.” дополнено не пробелами, а «%».

**text1:**

When your phone connects to the web, prying eyes can snoop on every site you visit. To protect your privacy, put a virtual private network, or VPN,

between your phone and the internet. Instead of connecting directly to a website, you’ll connect to your VPN’s servers, which will then route you to

the page. This will hide your browsing from prying eyes, but it can also slow down the speed at which pages load. However, its benefits override this quibble.

For example, because a VPN can connect to servers anywhere in the world, it will let you visit a video portal or a news site as if you were in a different

country—which will allow you to access different content as a result. Of course, security is still the main reason to download a VPN to your phone. Any

connections you make will receive secure encryption, so nobody can look at your online activity. This is particularly important on public WiFi networks

like the ones in hotels or coffee shops, where anyone else can get on the same network. Using a VPN makes it much harder for the owners of the network,

your internet service provider (ISP), or anyone else to follow you around the internet.

**Зашифрованный текст:**

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x,bFa lomberpe. lc eeauVnesP ceNct o acnt ano rwisshne e rartvnehey e ,itw l oilyrt ol ludwe vaoai lsvp iiootdrr et a ay ssoni ueti wefws erae e rc deoiinunftn f

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**text2:**

Part 1 explored why, as a project manager, business analysis skills are important and why you might

want to expand your business analysis knowledge and credentials. Part 2 explores the basics of business

analysis, giving you a look at the knowledge areas of business analysis, highlighting the commonalities

with a number of knowledge areas of project management.

The Business Analysis Body of Knowledge, or BABOK, is the Business Analysis Standard of the International

Institute of Business Analysts (IIBA). The Guide to the Project Management Body of Knowledge, or PMBOK

Guide, is the Project Management Standard of the Project Management Institute (PMI). The BABOK has 6

Knowledge Areas, whereas the PMBOK contains 10 Knowledge Areas. Here is a high level review of the

BABOK Knowledge Areas, plus brief discussion of commonalities with Knowledge Areas of the PMBOK Guide.

**Зашифрованный текст:**

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**Расшифрованный текст:**

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**text3:**

While there are clear commonalities between the BABOK and PMBOK Knowledge Areas, each has its own

uniqueness when explored in depth. An orientation to project management versus business analysis is

a clear distinction. For example, it is the project manager’s job to ensure that the scope is well

defined. It might be a business analyst who is delegated that responsibility as part of the team. Or,

it could be a small enough project where the project manager defines the scope and even gathers the

detailed requirements. In such a situation, you could say that the project manager is playing multiple

roles.Given these commonalities, it is not surprising that business analysis training, including business

analysis certification exam prep, often qualifies for Professional Development units (PDUs) to maintain

Project Management Professional (PMP) certification. Part 3, the last of this series of articles,

explores the relationship between business analysis and project management – and most important what

that means to you, and examines why you, as a project manager, might want to consider business analysis

certification.

**Зашифрованный текст:**

Wltrhehei e a e rcacelromniematsoli bwnhee etet BOa AKnPB dMB oeOKwdKnlgerse e,aAa chai stoh swnuqn nue

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certification

.%%%%%%%%%%%

**text4:**

As of 31 March 2022, PMI has started the phased process of retiring or "sunsetting", the PMBOK® Guide

– Sixth Edition. Stakeholders may continue to purchase print copies through retailers and resellers,

but only while supplies last. Once the stock is depleted, PMI will not reprint additional copies of

the Sixth Edition.

However, we know that many professionals, especially those preparing for the CAPM® exam still refer to

and use the Sixth Edition in their daily work. Therefore, we are maintaining several different ways

stakeholders can access the content for the foreseeable future.

PMI members can download a free PDF of the edition and non-members will be able to purchase it in an

eBook format, both in English and other languages currently supported. Stakeholders can gain digital

access to the PMBOK® Guide –Sixth Edition content via PMIstandards+™. PMI members can access it free,

and non-members can access it via a monthly subscription. The Sixth Edition will remain available through

select Library Subscription Services where prior licensing agreements are in place.

The PMBOK® Guide – Seventh Edition carries the ANSI-accredited Standard for Project Management, so we

recommend syllabi be based on this edition. But please note, after the evaluation of the content, select

concepts from the Sixth Edition are still viable project management practices. For example, we recognize

and support the Process Groups Model outlined in the Sixth Edition as one of several valid and reliable

models. Therefore, we are developing a new resource dedicated to supporting the Process Groups Model, with

plans to announce it later this year.

**Зашифрованный текст:**

A 0 sM2h a2aor,sfc hPs3 Mt12Iar potprfeho dacr seetesthdsie risn nugPgn"M s,Boe OrttK thВ"ie® вhnGЂ .u“E i dSdSiteita

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eBook format, both in English and other languages currently supported. Stakeholders can gain digital

access to the PMBOK® Guide –Sixth Edition content via PMIstandards+™. PMI members can access it free,

and non-members can access it via a monthly subscription. The Sixth Edition will remain available through

select Library Subscription Services where prior licensing agreements are in place.

The PMBOK® Guide – Seventh Edition carries the ANSI-accredited Standard for Project Management, so we

recommend syllabi be based on this edition. But please note, after the evaluation of the content, select

concepts from the Sixth Edition are still viable project management practices. For example, we recognize

and support the Process Groups Model outlined in the Sixth Edition as one of several valid and reliable

models. Therefore, we are developing a new resource dedicated to supporting the Process Groups Model, with

plans to announce it later this year.%%%%%%%%%%%%%%%%%%%%%%%%%%

**text5:**

A Guide to the Project Management Body of Knowledge (PMBOK® Guide) is PMI’s flagship publication and

is a fundamental resource for effective project management in any industry. Over the years, business

has changed considerably, but projects remain critical drivers of business success.

The book includes The Standard for Project Management. The standard is the foundation upon which the vast

body of knowledge builds, and the guide serves to capture and summarize that knowledge. The PMBOK® Guide

– Seventh Edition is available in English, Arabic, French, German, Italian, Korean, Brazilian Portuguese,

Russian and Spanish in all formats and in Simplified Chinese electronically. In addition in December,

the print version will be available in Simplified Chinese.

**Зашифрованный текст:**

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**Расшифрованный текст:**

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