



**PES UNIVERSITY**  
(Established under Karnataka Act No. 16 of 2013)  
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**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

<b>Course Title: Problem Solving with C Laboratory</b>		
<b>Course code: UE19CS152</b>		
<b>Semester : II Sem</b>	<b>Section: G</b>	<b>Team Id: 4</b>
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## PROJECT REPORT

**Problem Statement:** Encrypting the contents of a file using a user-provided keyword and password protecting the file after either generating a password or classifying a user-provided password

### Description:

- **Encryption using Caesar mechanism**
  - Encryption is done by taking a keyword and plaintext (text to be encrypted).
  - Each letter of the keyword is converted to a number where A is 0, B is 1 and so on (**not** case-sensitive).
  - Each letter of plaintext is then encrypted using Caesar encryption by taking an individual letter from keyword as key and each character in the plaintext has a different key.
  - In case the length of the keyword is lesser than the length of the plain text, it goes back to the first letter of the keyword and continues encrypting.
  - Caesar encryption is shifting a particular letter by x places. For example, if the key is 4 and the letter is A, the final letter will be E.
  - In case the key is greater than 26 (total no. of letters), the program corrects this as moving a letter by 28 places (for example) is the same as moving a letter by 2 places.
  - This encryption is applied to a file containing text and the contents of the file are encrypted.
- **Password Generation**
  - Password generation is done by taking a randomly generated string containing upper-case letters, lower-case letters, numbers and special characters.
  - The length of the password is randomly generated.

- Every fourth letter is of the same type, i.e., upper-case, lower-case, etc.
- Each letter is randomly chosen by finding the modulus of a randomly-generated number and a number specific to the type of character (26 for letters, 10 for numbers, etc.).
- At the end, this password is then finally shuffled randomly.
- **Password Classification**
  - Password classification is done on the number of upper-case letters, lower-case letters, numbers and special characters.
  - The more type of characters and the more random they are, the higher the strength of the password.
  - The strength is assessed by counting the number of characters of each type.
- **Decryption**
  - The decryption is done by taking the same keyword used in the encryption algorithm.
  - Instead of moving ahead by x places as in the encryption algorithm, it moves back x places giving back the original content of the text.

## C-Concepts Used

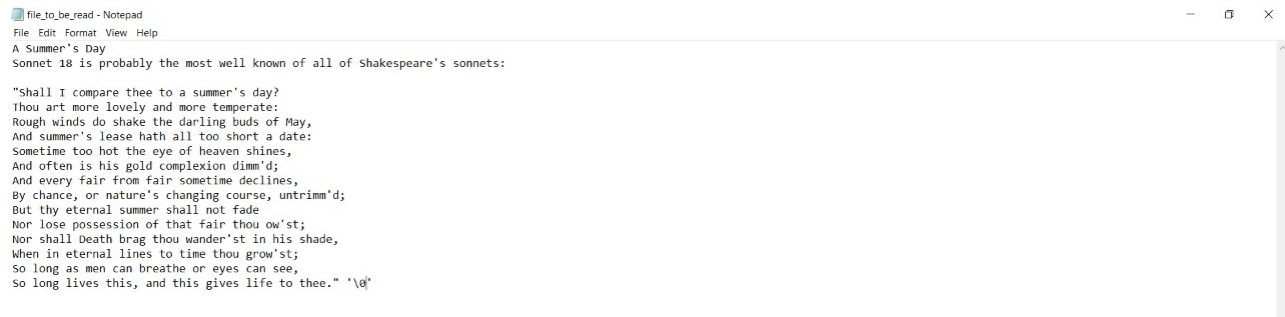
- **Functions:**
  - Isalpha from ctype.h
  - Strlen from string.h
  - rand from stdlib.h
  - srand from stdlib.h
  - time() from time.h
  - RAND\_MAX definition from stdlib.h
  - Fgetc and fputc from stdlib.h
  - Fflush() from stdio.h
- Usage of multiple files (.c and .h files)
- Pointers and arrays
- Dynamic memory allocation
- Random generation
- File handling

## Learning Outcome

- Learning how encryption and decryption works.
- Learning the simple method of how passwords are classified based on the types of characters it has in it.
- Used the above knowledge to generate strong passwords.
- Learned how to read to and write from files.
- Learned how to use random generating functions to get desired values.
- Learning about new libraries like time.h and ctype.h.

# Output Screenshots:

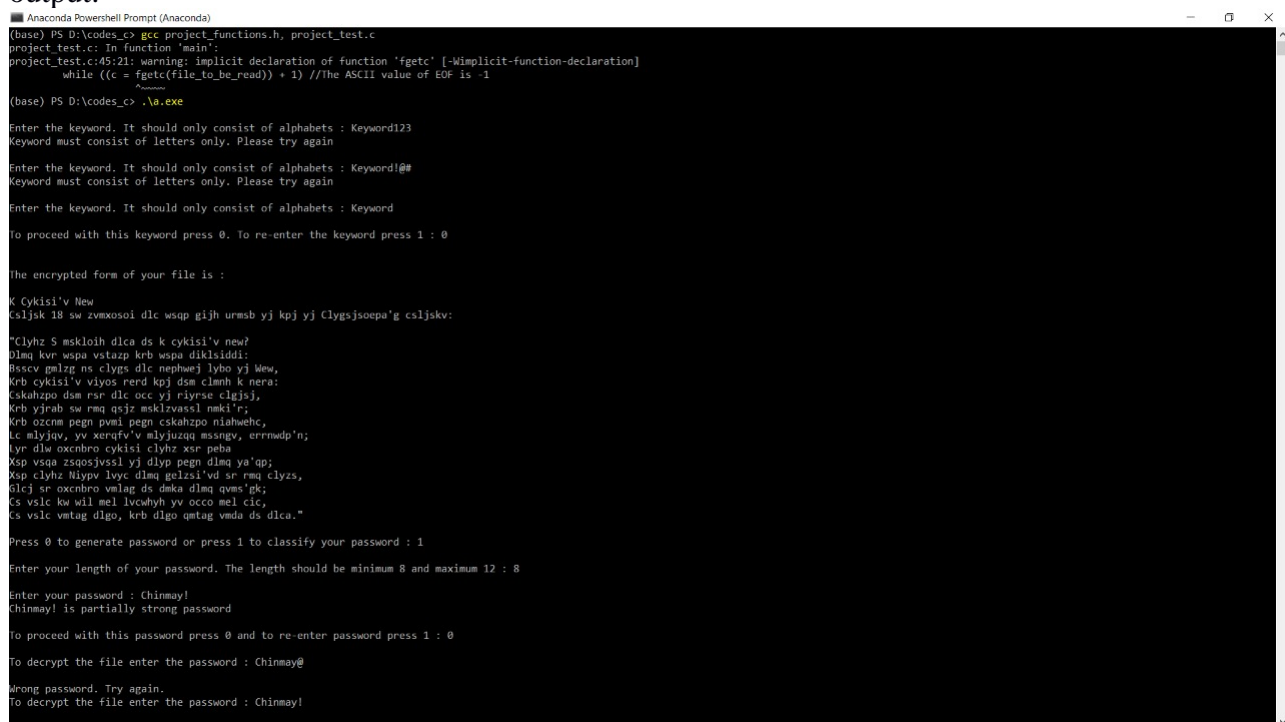
This is the file which holds the content to be encrypted.



```
file_to_be_read - Notepad
File Edit Format View Help
A Summer's Day
Sonnet 18 is probably the most well known of all of Shakespeare's sonnets:

"Shall I compare thee to a summer's day?
Thou art more lovely and more temperate:
Rough winds do shake the darling buds of May,
And summer's lease hath all too short a date:
Sometime too hot the eye of heaven shines,
And often is his gold complexion dimm'd;
And every fair from fair sometime declines,
By chance, or nature's changing course, untrimm'd;
But thy eternal summer shall not fade
Nor lose possession of that fair thou ow'st;
Nor shall Death brag thou wander'st in his shade,
When in eternal lines to time thou grow'st;
So long as men can breathe or eyes can see,
So long lives this, and this gives life to thee." '\0'
```

Now, running the program and allowing the user to enter their own password gives the following output:



```
Anaconda Powershell Prompt (Anaconda)
(base) PS D:\codes_c> gcc project_functions.h, project_test.c
project_test.c: In function 'main':
project_test.c:45:21: warning: implicit declaration of function 'fgetc' [-Wimplicit-function-declaration]
   while ((c = fgetc(file_to_be_read)) + 1) //The ASCII value of EOF is -1
                     ^~~~~~
(base) PS D:\codes_c> .\a.exe

Enter the keyword. It should only consist of alphabets : Keyword123
Keyword must consist of letters only. Please try again

Enter the keyword. It should only consist of alphabets : Keyword!@#
Keyword must consist of letters only. Please try again

Enter the keyword. It should only consist of alphabets : Keyword

To proceed with this keyword press 0. To re-enter the keyword press 1 : 0

The encrypted form of your file is :

K Cykisi'v New
cljsk 18 sw zmxosoi dlc wsaq gijh urnsb yj kpj yj Clygsjsoepa'g csljskv:

"Clyhz S mskloih dica ds k cykisi'v new?
Dlmq kvv wspa vstazp krb wspa diklsiddi:
Bsscv pelzg ns clygs dlc nephaej lybo yj Wew,
krb cykisi'v vlyos red kj dsm dlmh k nera:
cskzhzp dsm rar dlc occ yj rlyrese clgjsj,
krb yjrab sw rmq qsjz msklzavsl nmki'r;
krb ozcm pgnv pvmi pgnv cskahzp niahwehc,
lc mlyjqv, yv xerafv'v mlyjuzq mssngv, errndp'n;
lyr dlv oxcnbro cykisi clyhz xsr peba
Xsp vsae zsnosvsl yj dlyp pgnv dlmq ya'ag;
Xsp clyhz Mlypv lycv dlmq gelzi'vd sr rmq clyzs,
glcj sr oxcnbro vmlag ds dmka dlmq qvms'pk;
Cs vslc kw wil mel lvcwhyh yvocco mel cic,
Cs vslc vmlag dipo, krb dipo qmtag vmda ds dica."

Press 0 to generate password or press 1 to classify your password : 1

Enter your length of your password. The length should be minimum 8 and maximum 12 : 8

Enter your password : Chinmay!
Chinmay! is partially strong password

To proceed with this password press 0 and to re-enter password press 1 : 0

To decrypt the file enter the password : Chinmay@

Wrong password. Try again.
To decrypt the file enter the password : Chinmay!
```



```
Anaconda Powershell Prompt (Anaconda)
Wrong password. Try again.
To decrypt the file enter the password : Chinmay!

The decrypted form of your file is :

'\0'A Summer's Day
Sonnet 18 is probably the most well known of all of Shakespeare's sonnets:

"Shall I compare thee to a summer's day?
Thou art more lovely and more temperate:
Rough winds do shake the darling buds of May,
And summer's lease hath all too short a date:
Sometime too hot the eye of heaven shines,
And often is his gold complexion dimm'd;
And every fair from fair sometime declines,
By chance, or nature's changing course, untrimm'd;
But thy eternal summer shall not fade
Nor lose possession of that fair thou ow'st;
Nor shall Death brag thou wander'st in his shade,
When in eternal lines to time thou grow'st;
So long as men can breathe or eyes can see,
So long lives this, and this gives life to thee."
(base) PS D:\codes_c> _
```

As shown in the next set of output, the user chooses the option to generate a password:

```
Anaconda Powershell Prompt (Anaconda)
(base) PS D:\codes_> gcc project_functions.h, project_test.c
project_test.c: In function 'main':
project_test.c:45:21: warning: implicit declaration of function 'fgetc' [-Wimplicit-function-declaration]
    while ((c = fgetc(file_to_be_read)) + 1) //The ASCII value of EOF is -1
                    ^~~~~~

(base) PS D:\codes_> .\a.exe

Enter the keyword. It should only consist of alphabets : Key

To proceed with this keyword press 0. To re-enter the keyword press 1 : 0

The encrypted form of your file is :

K Cykwip'c New
cslxir 18 sw zvmlezc dlc wsqd gijv umgr yj kpj yj Clyuiqziybi'q csxirc:

"Clyvp $ mskzepo dlico ds k cykwip'c new?
dlme kvr wspo vstopw krb wspo dikzipkxc:
Bssq! gmlnw ns clyui dlc nepvmlq lybc yj Wew,
Krb cykwip'c viyci rerr kpj dsm clmbx k nero:
cskoxgwi dsm rsr dlc occ yj riyfil clgxiq,
Krb yjror sw rmq asjn mskzpcmmx mmb'h;
Krb ozetb pegb puma pegb cskoxgwi niaamlow,
Kc mlyxgc, yv xerevc'c mlyxgkx mshbc, errbmkw'h;
lyr dlw oxchryv cykwip clyvp xsr pebo
Xsp vsqo zsqciqcmx yj dlyd pegb dlme ya'qd;
Xsp clyvp Niydl lvyq dlme gelnip'cx sr rmq clyni,
dlcx sr oxchryv vmlow ds dmko dlme qvmt'wr;
Cs vslo kw wil mel lyckoxo yv occc mel clc,
Cs vslo vmlow dlgt, krb dlgt qmtow vmdo ds dlico."

Press 0 to generate password or press 1 to classify your password : 0

The generated password is : j22Gj43RP
To proceed with this password press 0 and to re-enter password press 1 : 1

The generated password is : 1* @FF2@
To proceed with this password press 0 and to re-enter password press 1 : 1

The generated password is : lQcX00%40ARP0
To proceed with this password press 0 and to re-enter password press 1 : 1

The generated password is : @j$78*%lMqrF
To proceed with this password press 0 and to re-enter password press 1 : 1

The generated password is : &d@p40hSII
To proceed with this password press 0 and to re-enter password press 1 : 1

The generated password is : &l4lbr5n5X*K
To proceed with this password press 0 and to re-enter password press 1 : 1
```

```
Anaconda Powershell Prompt (Anaconda)
The generated password is : @Zha395id4tE
To proceed with this password press 0 and to re-enter password press 1 : 1

The generated password is : 9apv*4@*V@
To proceed with this password press 0 and to re-enter password press 1 : 1

The generated password is : 07UZxpX
To proceed with this password press 0 and to re-enter password press 1 : 0

To decrypt the file enter the password : 07UZxpX

The decrypted form of your file is :

'\0'A Summer's Day
Sonnet 18 is probably the most well known of all of Shakespeare's sonnets:

"Shall I compare thee to a summer's day?
Thou art more lovely and more temperate:
Rough winds do shake the darling buds of May,
And summer's lease hath all too short a date:
Sometime too hot the eye of heaven shines,
And often is his gold complexion dimm'd;
And every fair from fair sometime declines,
By chance, or nature's changing course, untrimm'd;
But thy eternal summer shall not fade
Nor lose possession of that fair thou ow'st;
Nor shall Death brag thou wander'st in his shade,
When in eternal lines to time thou grow'st;
So long as men can breathe or eyes can see,
So long lives this, and this gives life to thee."
(base) PS D:\codes_c>
```

When the user is allowed to choose their own password, the classifier comes into play as it checks the types of characters in the password and then based on that, it determines whether the password is a strong one or a weak one.

The password generator generates a strong password that holds all kinds of characters.

The next use-case shows how the user is blocked on typing in the wrong password four times:

```
Anaconda Powershell Prompt (Anaconda)
(base) PS D:\codes_c> .\a.exe

Enter the keyword. It should only consist of alphabets : aachsasv
To proceed with this keyword press 0. To re-enter the keyword press 1 : 0

The encrypted form of your file is :

A Suotw'k Daa
Sopwet 18 is prqisbds thg moua wens knqdf of aln of Shcrwshyarg'z sopwetk:

"Shcsd I coowsrw thgl to a suotw'k daa?
Thqb arv motl loxldy anf motl teowwsne:
Rownz wipkk do shcrw thg datsany bufz of Mas,
Anf suotw'k lczw have aln toq shgl a davi:
Soolliey toq hov thg eyg of heccon shkuws,
Anf ofvlf is hlu gonk coowdepon diot'v;
Anf evgyq faky frqt faky soolliey deesamm,
By chcuue, or navbj'e'k chcuif'a cowpye, unvyame'x;
Uuv thg etgyfad suotw shcsd nov fafl
Not loal pouwekcon of thea faky thqb ow'uaz;
Not shcsd Decaz brcn thqb wapke'kn in hlu shckw,
Wngu in etgyfad lipk to tiol thqb grqd'kt;
So lopn as mep cap brghlw or eygz cap seg,
So lopn lixk thkz, anf thkz gixk lihl to thgl."

Press 0 to generate password or press 1 to classify your password : 1

Enter your length of your password. The length should be minimum 8 and maximum 12 : 8

Enter your password : Chinmay!
Chinmay! is partially strong password

To proceed with this password press 0 and to re-enter password press 1 : 0

To decrypt the file enter the password : Chinnahaseag

Wrong password. Try again.
To decrypt the file enter the password : chdjsndjsj

Wrong password. Try again.
To decrypt the file enter the password : nchsksis854

Wrong password. Try again.
To decrypt the file enter the password : jdisns582

Wrong password. Try again.
You entered wrong password four times. You have been blocked !!!
(base) PS D:\codes_c>
```

**Explanation:**

There is one file at the beginning which holds the content that has to be encrypted. On running the program, a new file is created which holds the encrypted form of the data and then if the user wishes to decrypt the file by entering the right password, another file is created which holds the decrypted data.

**Name and Signature of the Faculty**