

## CS1050 – Lab 10

Fall 2021

### Concepts to Practice

- Characters
- Strings
- Standard Library functions for characters
- Expand the prelab

### Submission Information

Submit this assignment by following the instructions given by your TA. SUBMIT ONLY the .c file (no a.out or executable file is required). All of the lab assignments must be submitted before the end of the lab using the lab code given by the TA.

Use the following submit command:

```
mucs submit <class> <assignment_type> <filename>
```

For example:

```
mucs submit 1050 lab10 lab10.c
```

### Description

For the lab assignment, you will implement a program that prints a particular string, encrypts this string and prints the encrypted version. Finally you will decrypt the encrypted string and print this decrypted string (which should be the same as the original string).

To get started on this lab, type the following while logged in to tc.rnet.missouri.edu:

```
cs1050start lab10
```

This command will create a directory called lab10. Go into that directory (“cd lab10”) and get a list of the files there (“ls -la”). Notice that there is a file called lab10.c. You can start editing this file to do your lab.

To encrypt a string, you will change each alphabetic character into another alphabetic character. You will change those characters by replacing them with characters that come 5 letters later in the alphabet. For example, you would replace ‘A’ with ‘F’. Be careful not to lose the correct upper/lower case. To decrypt a string, you must do the opposite (i.e., again only replace alphabetic characters but this time move backward in the alphabet – so, you would replace ‘F’ with ‘A’ for example).

**For final submission, you may only call printf() from main(), not from your Encrypt() function.**

### Honors Extension

Not too much “extension” this time. For honors students, use 99 as the “displacement” instead of 5. Be sure to consider the note under “Tips/Hints” about “wrapping around”.

## Functions You Must Write

You may write any functions you wish to implement this program, in **addition** to the following functions. However, you **must** implement the following:

- **void Encrypt(const char \* in, char \* out, int displacement)** – This function takes a string and encrypts it by shifting each alphabetic character by displacement (as described above). The resultant encrypted string is put into the parameter called out.

## Tips / Hints

- Print **a lot** while developing. You may want to print the string, the character you are currently looking at, the proposed character you will change it to when encrypting, etc. This will help you understand what is happening in your program when something goes wrong.
- If my test string is too long or hard, consider starting with a shorter string. Just comment out my string, and add a short one of your own like “Hello World”. If you can make things work with that much, maybe you can make it work with anything.
- Notice that my test string is “multi-line”. It has a backslash at the end of each line, which is C’s way of saying that the string continues on the next line. I could have put the whole string on one line and it would work just the same, but it would be harder to read.
- Notice that some parts of the test string have multiple spaces, newlines, punctuation, and other special characters. This is intentional.
- **If you try to go past the later characters in the alphabet, you should “wrap around”.** For example, if you go 5 characters beyond ‘W’ you get ‘B’ (i.e., ‘X’, ‘Y’, ‘Z’, ‘A’, ‘B’).

## Non-honors Sample Output

jimr@JimRArea51:~/CS1050/FS2021/labs/lab10\$ ./a.out

\*\*\*\*\*

\* Cleartext: \*

Haven't felt right in a week

And I'm thinning out

And it hurts bad

I gotta get back

Hot head and dreamless sleep

I could just slip down

And on the wrong track

I gotta get back

I wanna spend the entire year

Just face down

And on my own time

I wanna waste mine

And spend the rest of it asking myself

"Is this who you are?"

And I don't know

It just feels gross

I don't think there's anything wrong

I don't think there's anything wrong

And I don't think there's anything wrong

I don't think there's anything wrong

Sunlight on the back of my arms

Just thins me out

To a different time

I wanna waste mine

"\?

- Snail Mail

\*\*\*\*\*

\*\*\*\*\*

\* CipherText using 5: \*

Mfajs'y kjqy wnlmy ns f bjpp

Fsi N'r ymnssnsl tzy

Fsi ny mzwyx gfi

N ltyyf lyy gfhp

Mty mjfi fsi iwjfrqjxx xqjju

N htzqi ozxy xqnu itbs

Fsi ts ymj bwtsl ywfhp

N ltyyf lyy gfhp

N bfssf xujsi ymj jsynwj djfw

Ozxy kfhj itbs

Fsi ts rd tbs ynrj

N bfssf bfxyj rnsj

Fsi xujsi ymj wjxy tk ny fxpns lrdxjqk

"Nx ymnx bmt dtz fwj?"

Fsi N its'y pstb

Ny ozxy kjjqx lwtxx

N its'y ymns ymjwj'x fsdymns1 bwts1

N its'y ymns ymjwj'x fsdymns1 bwts1

Fsi N its'y ymns ymjwj'x fsdymns1 bwts1

N its'y ymns ymjwj'x fsdymns1 bwts1

Xzs qnlmy ts ymj gfhp tk rd fwrx

Ozxy ymnsx rj tzy

Yt f inkkjwjsy ynrj

N bfssf bfxyj rnsj

"\?

- Xsfnq Rfnq

\*\*\*\*\*

\*\*\*\*\*

\* Decrypted CipherText: \*

Haven't felt right in a week

And I'm thinning out

And it hurts bad

I gotta get back

Hot head and dreamless sleep

I could just slip down

And on the wrong track

I gotta get back

I wanna spend the entire year

Just face down

And on my own time

I wanna waste mine

And spend the rest of it asking myself

"Is this who you are?"

And I don't know

It just feels gross

I don't think there's anything wrong

I don't think there's anything wrong

And I don't think there's anything wrong

I don't think there's anything wrong

Sunlight on the back of my arms

Just thins me out

To a different time

I wanna waste mine

"\?

- Snail Mail

\*\*\*\*\*

## Honors Sample Output

jimr@JimRArea51:~/CS1050/FS2021/labs/lab10\$ ./a.out

\*\*\*\*\*

\* Cleartext: \*

Haven't felt right in a week  
And I'm thinning out  
And it hurts bad  
I gotta get back

Hot head and dreamless sleep  
I could just slip down  
And on the wrong track  
I gotta get back

I wanna spend the entire year  
Just face down  
And on my own time  
I wanna waste mine

And spend the rest of it asking myself  
"Is this who you are?"  
And I don't know  
It just feels gross

I don't think there's anything wrong  
I don't think there's anything wrong  
And I don't think there's anything wrong  
I don't think there's anything wrong

Sunlight on the back of my arms  
Just thins me out  
To a different time  
I wanna waste mine  
"\?

- Snail Mail

\*\*\*\*\*

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\* CipherText using 99: \*

Cvqzi'o azgo mdbco di v rzzf  
Viy D'h ocidiidib jpo  
Viy do cpmon wvy  
D bjoov bzo wvxf

Cjo czvy viy ymzvghgzn ngzzk  
D xjpgy epno ngdk yjri  
Viy ji ocz rmjib omvxf  
D bjoov bzo wvxf

D rviiv nkziy ocz ziodmz tzvm  
Epno avxz yjri  
Viy ji ht jri odhz  
D rviiv rvnoz hdiz

Viy nkziy ocz mzno ja do vnfdib htnzga  
"Dn ocdn rcj tjp vmz?"  
Viy D yji'o fijr  
Do epno azzgn bmjnn

D yji'o ocdif oczmz'n vitocdib rmjib

D yji'o ocdif oczmz'n vitocdib rmjib  
Viy D yji'o ocdif oczmz'n vitocdib rmjib  
D yji'o ocdif oczmz'n vitocdib rmjib

Npigdbco ji ocz wvxf ja ht vmhn  
Epno ocдин hz jpo  
Oj v ydaazmzio odhz  
D rviiv rvnoz hdiz  
"\"?

- Nivdg Hvdg

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\*\*\*\*\*

\* Decrypted CipherText: \*

Haven't felt right in a week  
And I'm thinning out  
And it hurts bad  
I gotta get back

Hot head and dreamless sleep  
I could just slip down  
And on the wrong track  
I gotta get back

I wanna spend the entire year  
Just face down  
And on my own time  
I wanna waste mine

And spend the rest of it asking myself  
"Is this who you are?"  
And I don't know  
It just feels gross

I don't think there's anything wrong  
I don't think there's anything wrong  
And I don't think there's anything wrong  
I don't think there's anything wrong

Sunlight on the back of my arms  
Just thins me out  
To a different time  
I wanna waste mine  
"\"?

- Snail Mail

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## Guidelines for Grading Lab 10

### 40 Points Possible

#### General

*If your program does not compile or produce any input/output (I/O) because most of the source code is commented out then your lab will receive a grade of ZERO POINTS. Further, if your program does not actually follow the specifications, but merely prints out lines that make it appear to follow the specifications, you will receive a grade of ZERO POINTS.* For partial credit your C program must not only compile but also produce some valid I/O that meets the lab specifications.

You program is expected to have a comment header at the top that includes your name, pawprint, the course you are taking, and the lab that you are solved (e.g., “Lab 10”). Your code should be nicely indented. You may not use any global variables. **You will lose up to 20 points if you do not meet these basic requirements.**

**5 points:** You pass my CLEARTXT symbolic constant directly to your encrypt() function from main().

**5 points:** The variable that holds the encrypted text (the output parameter) is declared in main().

**5 points:** The variable that holds the decrypted text (the output parameter) is declared in main() (the encrypted variable can be re-used for this purpose if you like).

**10 points:** Encrypt() works correctly and its printed output matches the appropriate (honors or non-honors as the case may be) sample encrypted text.

**5 points:** Case (upper or lower as appropriate) is preserved throughout the encryption and decryption process.

**10 points:** Decryption works correctly and its printed output matches the sample decrypted text (which is same as the original CLEARTXT in content).