University of Lincoln
School of Computer Science

CMP2801M – Advanced Programming
Workshop 1

Lecturer: Dr Lei Zhang

Prerequisite steps

1. Download Visual Studio 2019 Community Installer
   https://visualstudio.microsoft.com/downloads/
   Follow the instruction:
   https://docs.microsoft.com/en-us/cpp/build/vscpp-step-0-installation?view=vs-2019
2. Or Visual Studio Code with MSVC installation:
   https://code.visualstudio.com/docs/cpp/config-msvc

Tasks:

Task 1:

Create a C++ Console App Project, with only a main function for print "Hello World!" and count the character number (including 'space' and symbol) of "Hello World!"

Test Case:

Input: > task1.exe

Output: Hello World! 12

Task 2:

In this workshop, you will implement a simple substitution cipher with two function, encryption and decryption. The program receives 3 parameters from the console. The first parameter is the text you need to encrypt or decrypt. The second parameter is an integer value (i.e. the encryption flag), which is either 0 or 1. You will encrypt the text if this value is 0, or decrypt the text if this value is 1. Otherwise, you will do nothing. The third parameter is a positive integer value, which will be used as the key for the encryption algorithm.

The algorithm to encrypt each word is a well-known encryption technique called the Caesar cipher. This algorithm will replace each alphabetical character in the text with the by another character in the English alphabet, which is rotated a number of positions as determined by the key.

For example, if the word is "hello" and key is "1" then the output of encryption will "ifmmp". Here, the letters are shifted one position, so that h is replaced by i, e is replaced by f, and l's are replaced by m's and o is replaced by p.

Alternatively, if the word is "xyz" and the key is "2", then output will be "zab" (shifting y and z requires rotating the alphabet).

In general terms, if you want to encode the ith character of the alphabet with key k, you need to replace it with the (i+k)th character of the alphabet. If (i+k) is larger than 26, then you need

to continue counting from 1. For example if the letter is 'y' (i = 25) and key is 3, then i+k = 28. But result shall be 2, so that 'y' will replaced with 'b'.

You could convert a character to index on ASCII table.
Ref: https://en.cppreference.com/w/cpp/language/ascii

Test Case:
Input: > tesk2.exe hello 0 1
Output: ifmmp
Input: > tesk2.exe ifmmp 1 1
Output: hello
Input: > tesk2.exe abcxyz 0 2
Output: cdezab
Input: > tesk2.exe cdezab 1 2
Output: abcxyz