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Course: CS112 - Structured Programming

Assignment #2 – Task 1

# My GitHub Profile Link:

https://github.com/adhamhamdy333

```cpp
1   /*
2       Vignere Cipher
3
4       This program implements the Vignere Cipher encryption and decryption methods.
5       In Vignere Cipher, a keyword is repeatedly added character by character to each alphabetic letter in the original message.
6       The addition is carried out using the ASCII codes for each of the characters, modulo 26 (the number of letters in the alphabet),
7       and the result is added to the code for the letter 'A' in the ASCII code sequence.
8
9       Author: Adham Hamdy Hamed Abdulhameid
10      ID: 20230043
11      Date: 1:08 PM, 3/11/24, 1 Ramadan
12  */
13
14  #include <iostream>
15  #include <string>
16  #include <cctype>
17  using namespace std;
18
19  // Function to convert characters in the given string to uppercase
20  void upperCase(string &text)
21  {
22      for (int i = 0; i < text.size(); i++) {
23          if (isalpha(text[i]))
24              text[i] = toupper(text[i]);
25      }
26  }
27
28  // Function to validate user input choice
```

# Basic Operations that can be done on GitHub and how to do them.

1- Repository:
   a. Remote Repository
      i. In the upper-right corner of any page, select (+) symbol, then click new repository.

   b. Local Repository
      i. Create a new folder with a specific name and assign it as your local repository and then from Cmder clone the remote repository in your local repository.
         1. Go to your remote repository in github then copy its link and using Cmder with command "git clone <repo's link>" it's done.

2- Commit (Similar to saving a file that's been edited)
   a. Local
      i. Firstly, add or edit the file in your local folder then, using Cmder with command "git add <file>" after adding the file now we are in Staging Area, we can commit it to local repo. using command "git commit -m "message describes what happened."" it's done.
   b. Remote
      i. To make commit simply you edit the file in the remote repository then apply changes.

3- Push
   a. To push your changes to the remote repository using Cmder with command "git push <RemoteName> <BranchName>"
      i. To know what branch you're working on right now using Cmder with command "git branch" and also for remote name "git remote -v".

4- Pull
   a. After changes are committed on the remote repository if you already have a clone from the repository on your pc you only need to open Cmder then with command "git pull <RemoteName>" now it's done.

5- Pull Request
   a. To make a pull request on GitHub, fork the repository, clone it to your local machine, create a new branch for your changes, and make the edits. Commit your changes, push the branch to your forked repository, and then open a pull request from your branch to the original repository, providing a descriptive message of your changes.

Vignere Cipher Algorithm

DEFINE upperCase Function: Function to upper case the string.

1- Takes the string with reference.
2- Loops on the string if the character is alphabetic change its upper case else, ignore it.

DEFINE checkInput Function: Function to check the choice of the user from the menu.

1- Takes the string with reference.
2- While the string's size > 1 (which mean that the input its not a single character) print an exclamation message to the user and reinput the choice.
3- While the string is not a digit and is not one of [1, 2, 3] print an exclamation message to the user and reinput the choice.

DEFINE checkMessage Function: Function to check the inputted plain text from the user if it exceeded 80 characters or not.

1- Takes the string with reference.
2- While the string's size > 80 characters print an exclamation message to the user and reinput the plain text.

DEFINE checkKey Function: Function to check if the inputted Keyword exceeded 8 characters or not and its all alphabetical or not.

1- Takes the string with reference.
2- While the string's size > 8 characters print an exclamation message to the user and reinput the keyword.
3- Loops on the string to check its all alphabetical or not, if not, print an exclamation message to the user and reinput the keyword.

DEFINE vignereCipher Function:

1- Takes the plain text & keyword with reference.
2- CALL checkMessage with plain text string as argument and checkKey with keyword as argument.
3- CALL upperCase for both plain text & keyword.
4- Assign variable keyIndx to zero.
5- Loops on plain text if the character is alphabetical.
    a. Assign the messageIndx variable to the addition of the ascii of the current character of plain text & and the ascii of the keyword of index (keyIndx) mod 26.
    b. Assign the current character of plain text to the character that follows 'A' by messageIndx.
    c. Assign keyIndx to keyIndx + 1.
    d. Check if keyIndx = keyword's size
        i. If true assign keyIndx to zero. (reset keyIndx)
    e. At the end the message is finally encrypted.

DEFINE vignereDecipher Function:

1- Takes the encrypted text & keyword with reference.
2- CALL checkMessage with decrypted text string as argument and checkKey with keyword as argument.
3- CALL upperCase for both encrypted text & keyword.
4- Assign variable keyIndx to zero.
5- Loops on encrypted text if the character is alphabetical.
    a. Assign the messageIndx variable to the subtraction between the ascii of the current character of plain text & and the ascii of the keyword of index (keyIndx) + 26 all of mod 26.
    b. Assign the current character of encrypted text to the character that follows 'A' by messageIndx.
    c. Assign keyIndx to keyIndx + 1.
    d. Check if keyIndx = keyword's size

       i.  If true assign keyIndx to zero. (reset keyIndx)

e.  At the end the message is finally decrypted.