

CS150-01 Assignment 7

Cryptogram

Date Assigned: Monday, November 15, 2004

Date Due: Wednesday, December 1, 2004

Points: 50 (40 for the program, 10 for the documentation)

1 Problem statement

For this assignment, you are to use an encryption algorithm to encode and decode files. Your program should allow the user to select one of the two options (encode or decode) and input the names of the input and output file. Your program should then either encode a plain text file, or decode an encrypted file.

The algorithm you will use is a monalphabetic encryption algorithm. The algorithm encrypts on letter pairs.

A two dimensional 5 x 5 array can be used to represent all 26 letters of the alphabet if I/J are combined into one spot. Using an encryption phrase such as CARPENTERS SQUARE, the array would look like the one below, where the phrase is inserted into the array (no letters repeated) followed by the remaining letters of the alphabet (no letters repeated).

C	A	R	P	E
N	T	S	Q	U
B	D	F	G	H
I/J	K	L	M	O
V	W	X	Y	Z

The plaintext letters should be paired up and one of the following four options will work:

1. The two letters are in the same row. For each letter advance in the row to the next letter allowing it to wrap around when the end of the row is reached. For example if the two letters were TU it would be encrypted to SN.
2. The two letters are in the same column. For each letter advance in the column to the next letter allowing it to wrap around when the end of the column is reached. For example if the two letters were GY the encrypted text would be MP.
3. The two letters are in different columns and different rows. Advance in the plaintext's first letter's row until the plaintext's second letter's column is reached and make that the first encrypted letter. Go to the row of the plaintext's second letter and move in this row to the column of the plaintext's first letter and make that letter the second encrypted letter. For example if the letters are SH then the encrypted letters would be UF.
4. The two letters are the same. If this occurs, advance in the row one letter, wrapping if necessary to obtain both encrypted letters.
5. The last possibility is that the second letter is a whitespace, in which case substitute the first letter by advancing in the row one letter.

Inputs: A file that contains the encryption phrase on one line followed by the text to be encoded or decoded

Outputs: A file containing the encryption phrase on one line followed by the encoded or decoded text

Note: Your program should replace all j's with i's when decrypting. The text will still be readable

This program is more difficult than previous assignments. Don't waste a week or you might not be able to finish! Also, when writing this program you should build and test as you code. For example, after you have written the function to find identifiers, test it on a sample file, then move on.

2 You need to do the following for this assignment

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1. Program Documentation

- (a) **Assignment Details and Introduction:** At the top of the page, write down the course number, assignment number, your name, my name, due date and submission date. After that, write one paragraph describing what your program does. Here you are restating the problem in your own words
- (b) **Problem Analysis:** Identify the input to your program, the output from your program, and any internal data in your program. You should also identify the data type and indicate whether it should be a variable or a constant.
- (c) **Algorithm:** Write out the steps that you'll need to do complete the program. Be as detailed as possible. It will help you write the program. When writing the steps of the algorithm, don't write any C++ code.
- (d) **Test Results:** These are solutions to the problem using some method other than your computer program. They are often done by hand, but could include experimental or other results. These results should be explicitly compared to those from the program to demonstrate that the program works. The number of specific cases done should be sufficient to prove beyond a reasonable doubt that the program works.

2. Program Implementation:

- (a) Write the C++ code then build and run it in Visual Studio .NET. Name your project "07CryptoPUN-etId", e.g. "07Cryptokhoj0332".
- (b) Make sure to comment your code.
- (c) Follow the coding standards. Use the coding standards that I handed out with the previous assignment.
- (d) Test the code as much as you can for different values to make sure it works.
- (e) Remember, code that does not build or run loses 70% of the points.

3 What to turn in

1. Turn in your program documentation to me in class on the day it's due. These should be hard copies. You may write them by hand or use a word processing program to generate them, but please make sure that they are neat and easy to read!
2. Turn in a hard copy of your code attached to the documentation. You must make sure that your code follows the coding standards in order for you to receive full credit.
3. Place your completed project folder in the CS150-01 Drop folder by 1pm on Wednesday, December 1. Anything turned in after that but before 1pm on Thursday, December 2, will be considered late and you will automatically lose 20% of the grade. Your project **MUST** be created in Visual Studio .NET, and you **MUST** submit the complete Visual Studio .NET project folder otherwise you will receive a zero on this assignment.