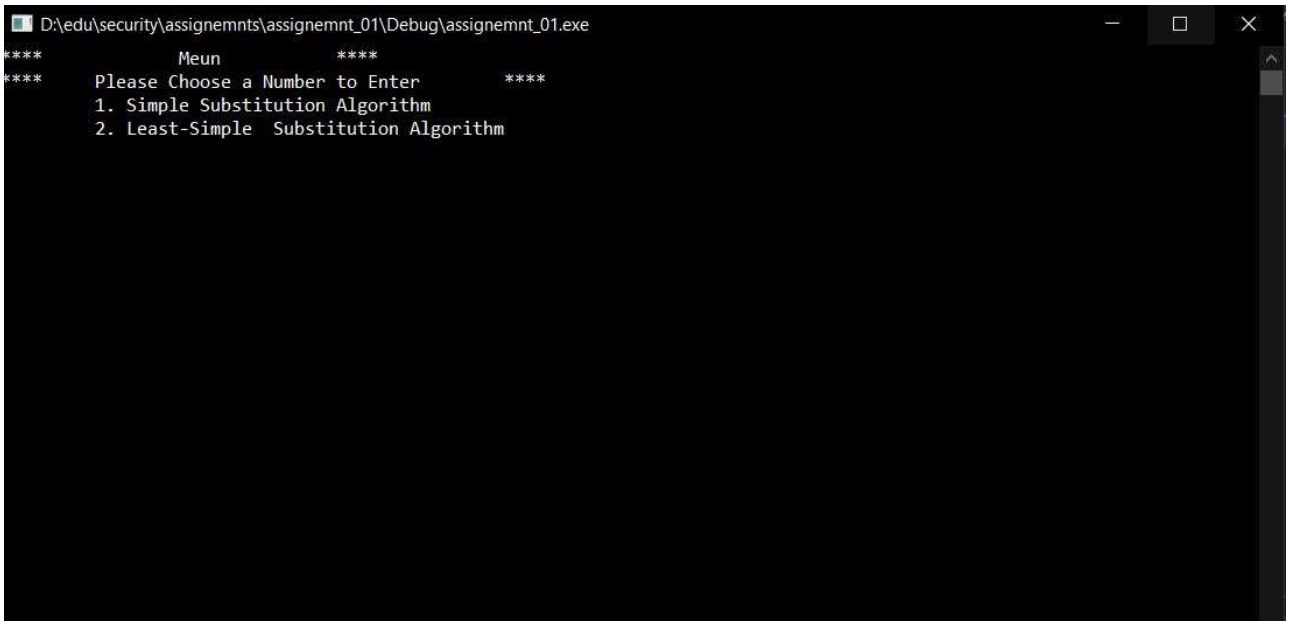
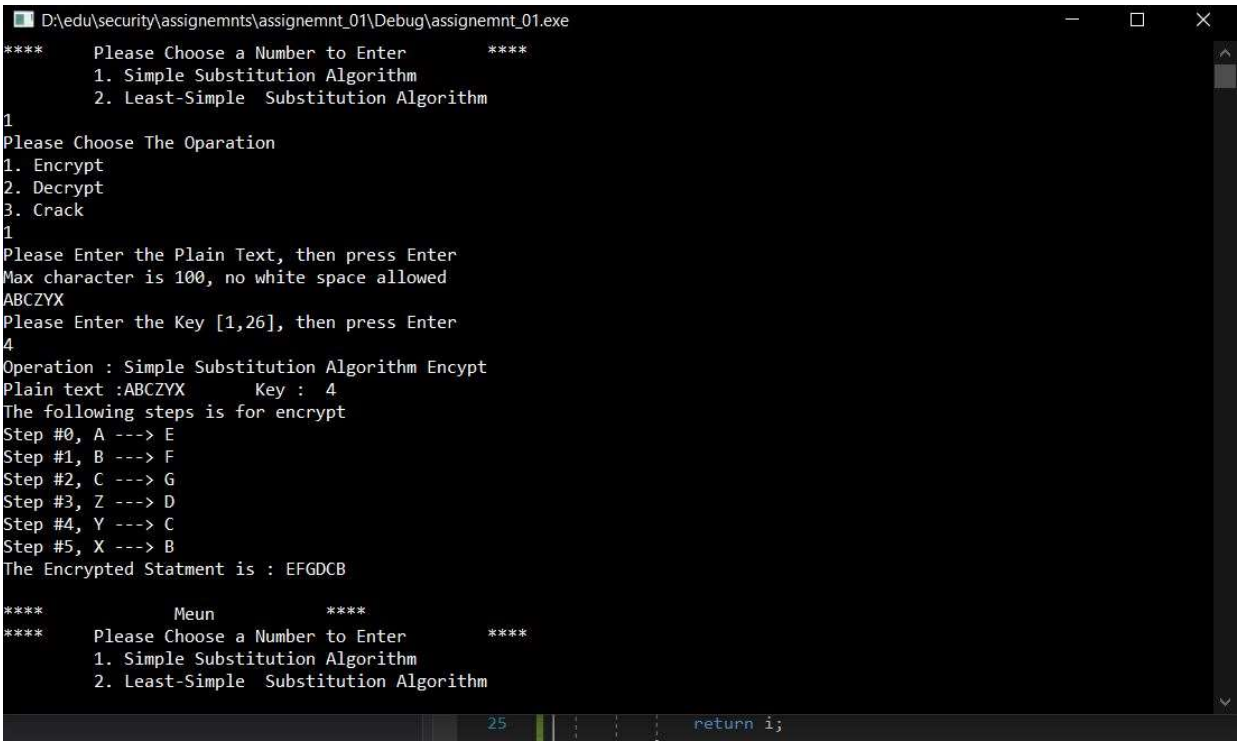
Student Name : Ali Abu Saleh **Student ID: 11611711**

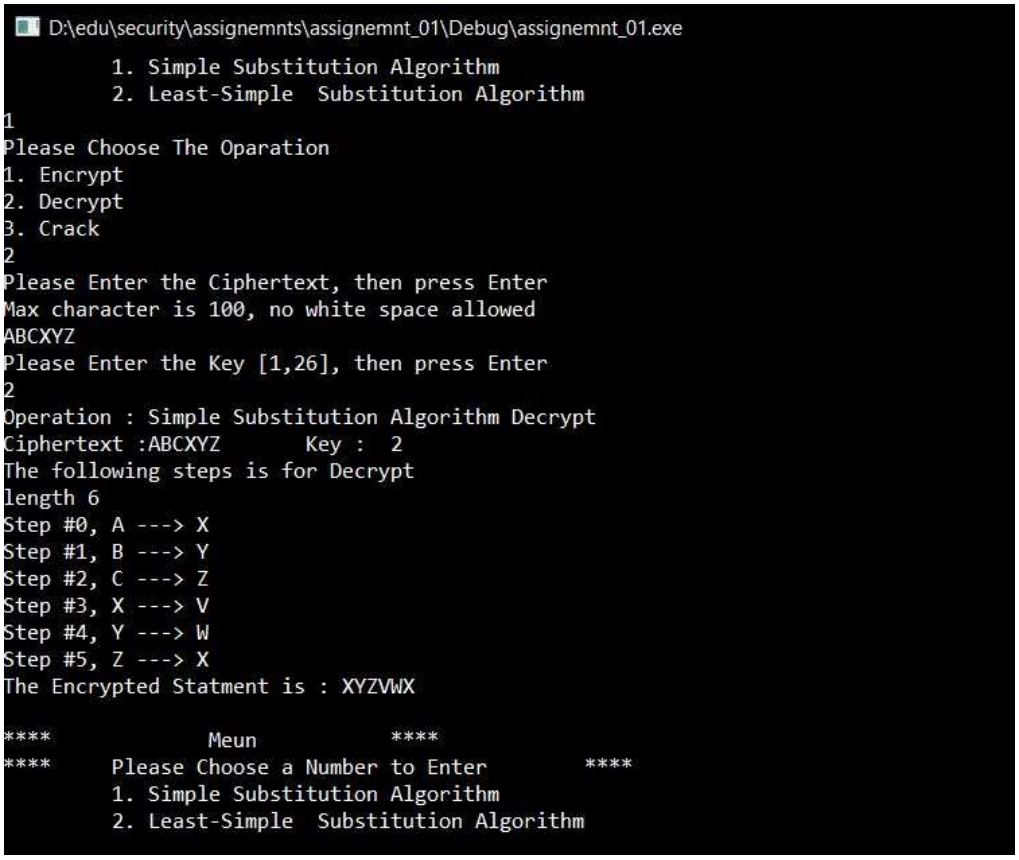
- **Main menu**



- **Algorithm Number 1 (Simple Substitution)**
  - **Mode Encrypt**



- **Mode Decrypt**



- **mode Crack.**

```
****              Meun            ****
****     Please Choose a Number to Enter        ****
         1. Simple Substitution Algorithm
         2. Least-Simple  Substitution Algorithm
1
Please Choose The Oparation
1. Encrypt
2. Decrypt
3. Crack
3
Please Enter the Ciphertext, then press Enter
Max character is 100, no white space allowed
ABC
If the Key is : 1       The exprected Statment is ZAB
If the Key is : 2       The exprected Statment is XZA
If the Key is : 3       The exprected Statment is WXZ
If the Key is : 4       The exprected Statment is VWX
If the Key is : 5       The exprected Statment is UVW
If the Key is : 6       The exprected Statment is TUV
If the Key is : 7       The exprected Statment is STU
If the Key is : 8       The exprected Statment is RST
If the Key is : 9       The exprected Statment is QRS
If the Key is : 10      The exprected Statment is PQR
If the Key is : 11      The exprected Statment is OPQ
If the Key is : 12      The exprected Statment is NOP
If the Key is : 13      The exprected Statment is MNO
If the Key is : 14      The exprected Statment is LMN
If the Key is : 15      The exprected Statment is KLM
If the Key is : 16      The exprected Statment is JKL
If the Key is : 17      The exprected Statment is IJK
If the Key is : 18      The exprected Statment is HIJ
If the Key is : 19      The exprected Statment is GHI
If the Key is : 20      The exprected Statment is FGH
If the Key is : 21      The exprected Statment is EFG
If the Key is : 22      The exprected Statment is DEF
If the Key is : 23      The exprected Statment is CDE
If the Key is : 24      The exprected Statment is BCD
If the Key is : 25      The exprected Statment is ABC
If the Key is : 26      The exprected Statment is ZAB
****              Meun            ****
****     Please Choose a Number to Enter        ****
         1. Simple Substitution Algorithm
         2. Least-Simple  Substitution Algorithm
```

- **Algorithm Number 2**

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

  - **Mode Encrypt**
    - **Step 1**

```
****     Please Choose a Number to Enter       ****
         1. Simple Substitution Algorithm
         2. Least-Simple  Substitution Algorithm
2
Please Choose The Oparation
1. Encrypt
2. Decrypt *I did it to test my code*
1
**********       Least-Simple  Substitution Algorithm Encryption       **********

Please Enter the Plaintext to analyise using English letter frequency analysis, then press Enter
Notes:
*Max 500 character is allowed
*No space is allowed*
INEIRPENTAGOPEINEUTWSYAATRDIOITWKOLPTHMINRHCAOLANOEATHDANRBATHDAETWRHCUTXOLGTFFTCEATHDKRHCATHDUNMINEAETRAFORWRHCNOITHDUNEINESBRCANTVEURHCAFYIUTRITFRIINEOMAIESAGSREDFELOSEUENTVEOYSGNTILOSAOPEOLYATSEOYIOLFSETINTHD
TWWOLYATSELTIHONYSSMATRDINEGTSBEHIESINEMINTHKEDNRPPYGNLOSINTITWOTLOLFSETDINEUTWSYAATRDRAUNTIUEGNRELWMHEEDBEBBESTHDVRHECTSFEARDEATSEVESMCOODRHDEEDHOURLMOYSESETDMOMAIESADETSUEGTHFECRHIOLEED
The letter frequency analysis is based on the following table
**********       **********       **********
   Letter : E          T      A      I      O      N      S      R      H      D      L      U      C      M      F      Y      W      G      P      B      V      K      X      Q      J
          Z
Frequency : 12.02      9.1    8.12   7.68   7.31   6.95   6.28   6.02   5.92   4.32   4.98   2.88   2.71   2.61   2.3    2.11   2.09   2.03   1.82   1.49   1.11   0.69   0.17   0.11   0.1
        0.07
My algorithm will replace the letter as this (asending) according to Frequency array
J      I      C      A      X      S      E      Y      V      D      K      W      B      Q      T      Z      R      H      F      M      P      N      U      L      G      O
               ******* Analysis ********      t
Letter A Counts: 28      freq =0.0703518
Letter B Counts: 6       freq =0.0150754
Letter C Counts: 10      freq =0.0251256
Letter D Counts: 21      freq =0.0527638
Letter E Counts: 51      freq =0.128141
Letter F Counts: 10      freq =0.0251256
Letter G Counts: 8       freq =0.0201005
Letter H Counts: 22      freq =0.0552764
Letter I Counts: 28      freq =0.0703518
Letter J Counts: 0       freq =0
Letter K Counts: 3       freq =0.00753769
Letter L Counts: 15      freq =0.0376884
Letter M Counts: 10      freq =0.0251256
Letter N Counts: 26      freq =0.0653266
Letter O Counts: 27      freq =0.0678392
Letter P Counts: 6       freq =0.0150754
Letter Q Counts: 0       freq =0
Letter R Counts: 24      freq =0.0603015
Letter S Counts: 25      freq =0.0628141
```

    - **Step 2**

```
using the letter frequency analysis array , sort the letters according to the frequecy
The asending order of frequency is ( High to Low)
Letter at position 0is :E
Letter at position 1is :T
Letter at position 2is :I
Letter at position 3is :A
Letter at position 4is :O
Letter at position 5is :N
Letter at position 6is :S
Letter at position 7is :R
Letter at position 8is :H
Letter at position 9is :D
Letter at position 10is :L
Letter at position 11is :U
Letter at position 12is :Y
Letter at position 13is :M
Letter at position 14is :F
Letter at position 15is :C
Letter at position 16is :W
Letter at position 17is :G
Letter at position 18is :P
Letter at position 19is :B
Letter at position 20is :V
Letter at position 21is :K
Letter at position 22is :X
Letter at position 23is :Z
Letter at position 24is :Q
Letter at position 25is :J
Letter is I, position in freq array is 2 ,replace with C
Letter is N, position in freq array is 5 ,replace with S
```

- **Step 3**

```
Letter is I, position in freq array is 2 ,replace with C
Letter is O, position in freq array is 4 ,replace with X
Letter is L, position in freq array is 10 ,replace with K
Letter is E, position in freq array is 0 ,replace with J
Letter is E, position in freq array is 0 ,replace with J
Letter is D, position in freq array is 9 ,replace with D
The Encrypted Statement is :
CSJCYFJSIAHXFJCSJWIREBAAIYDCXCIRNXKFIVQCSYVZAXKASXJAIVDASYMAIVDAJIRYVZWIUXKHITTIZJAIVDNYVZAIVDWSQCSJAJIYATXYRYVZSXCIVDWSJCSJEMYZASIPJWYVZATBCWIYCITYCCSJXQACJEAHEYJDTJKXEJWJSIPJXBEHSICKXEAXFJXKBAIEJXBCXKTEJICSIV
DIRRXKBAIEJKICVXSBEEQAIYDCSJHIEMJVCJECSJQCSIVNJDSYFFBHSKXECSICIRXIKXKTEJIDCSJWIREBAAIYDYAWSICWJHSYJKRQVJJDMJMMJEIVDPYVJZIETJAYDJAIEJPJEQZXXDYVDJJDVXWYKQXBEJEJIDQXQACJEADJIEWJHIVTJZYVCXKJJD
****          Meun          ****
****     Please Choose a Number to Enter        ****
```

- **Decrypt Mode**
  - **Step 1**

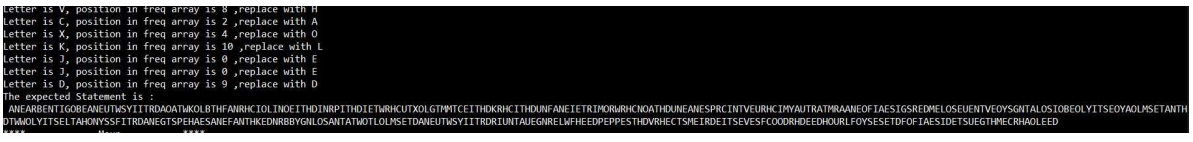
```
****          Meun          ****
****     Please Choose a Number to Enter        ****
         1. Simple Substitution Algorithm
         2. Least-Simple  Substitution Algorithm
2
Please Choose The Oparation
1. Encrypt
2. Decrypt *I did it to test my code*
2
**********       Least-Simple  Substitution Algorithm Deryption         **********

Please Enter the Ciphertext try to find the text using English letter frequency analysis, then press Enter
Notes:
*Max 500 character is allowed
*No space is allowed*
CSJCYFJSIAHXFJCSJWIREBAAIYDCXCIRNXKFIVQCSYVZAXKASXJAIVDASYMAIVDAJIRYVZWIUXKHITTIZJAIVDNYVZAIVDWSQCSJAJIYATXYRYVZSXCIVDWSJCSJEMYZASIPJWYVZATBCWIYCITYCCSJXQACJEAHEYJDTJKXEJWJSIPJXBEHSICKXEAXFJXKBAIEJXBCXKTEJICSIVD
IRRXKBAIEJKICVXSBEEQAIYDCSJHIEMJVCJECSJQCSIVNJDSYFFBHSKXECSICIRXIKXKTEJIDCSJWIREBAAIYDYAWSICWJHSYJKRQVJJDMJMMJEIVDPYVJZIETJAYDJAIEJPJEQZXXDYVDJJDVXWYKQXBEJEJIDQXQACJEADJIEWJHIVTJZYVCXKJJD
       **** Algorithm :Least-Simple  Substitution Algorithm ****
       **** using letter frequency analysis ****
```

- **Step 2**

```
Computing the Count for each letter as follows
Letter A Counts: 28      freq =0.0703518
Letter B Counts: 10      freq =0.0251256
Letter C Counts: 28      freq =0.0703518
Letter D Counts: 21      freq =0.0527638
Letter E Counts: 25      freq =0.0628141
Letter F Counts: 6       freq =0.0150754
Letter G Counts: 0       freq =0
Letter H Counts: 8       freq =0.0201005
Letter I Counts: 42      freq =0.105528
Letter J Counts: 51      freq =0.128141
Letter K Counts: 15      freq =0.0376884
Letter L Counts: 0       freq =0
Letter M Counts: 6       freq =0.0150754
Letter N Counts: 3       freq =0.00753769
Letter O Counts: 0       freq =0
Letter P Counts: 4       freq =0.0100503
Letter Q Counts: 10      freq =0.0251256
Letter R Counts: 9       freq =0.0226131
Letter S Counts: 26      freq =0.0653266
Letter T Counts: 10      freq =0.0251256
Letter U Counts: 1       freq =0.00251256
Letter V Counts: 22      freq =0.0552764
Letter W Counts: 12      freq =0.0301508
Letter X Counts: 27      freq =0.0678392
Letter Y Counts: 24      freq =0.0603015
Letter Z Counts: 10      freq =0.0251256
using the letter frequency analysis, sort the letters according to the frequecy
Letter is C, position in freq array is 2 ,replace with A
Letter is S, position in freq array is 5 ,replace with N
Letter is J, position in freq array is 0 ,replace with E
Letter is C, position in freq array is 2 ,replace with A
Letter is Y, position in freq array is 7 ,replace with R
Letter is F, position in freq array is 19 ,replace with B
Letter is J, position in freq array is 0 ,replace with E
Letter is S, position in freq array is 5 ,replace with N
Letter is I, position in freq array is 1 ,replace with T
Letter is A, position in freq array is 3 ,replace with I
Letter is H, position in freq array is 17 ,replace with G
Letter is X, position in freq array is 4 ,replace with O
Letter is F, position in freq array is 19 ,replace with B
Letter is J, position in freq array is 0 ,replace with E
```

- **Step 3**



Note : I used the same text to encrypt and decrypt to test the analysis.