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Assignment No 2

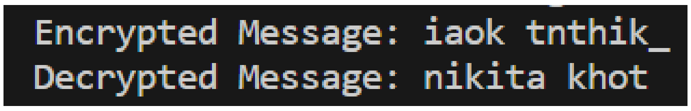
Study and implementation of Transposition Cipher Technique

1. Row Transposition technique

Code:

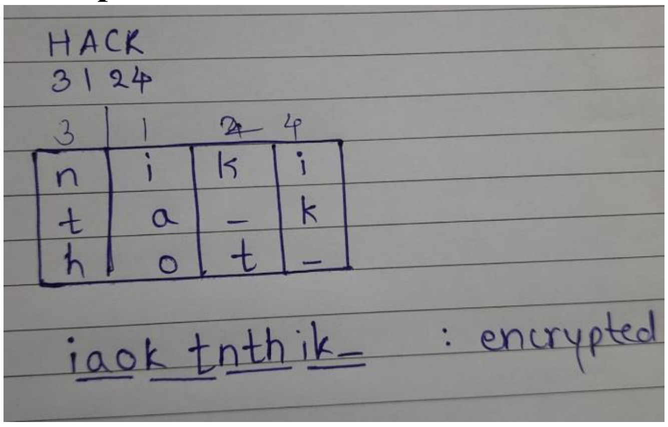
```cpp
// Assignment 2 b)
#include<bits/stdc++.h>
using namespace std;

string encryptMessage(string msg,string const key,map<int,int> keyMap)
{
    int row,col,j;
    string cipher = "";

    col = key.length();
    row = msg.length()/col;

    if (msg.length() % col)
        row += 1;

    char matrix[row][col];
    for (int i=0,k=0; i < row; i++)
    {
        for (int j=0; j<col; )
        {
            if(msg[k] == '\0')
            {
                matrix[i][j] = '_';
                j++;
            }

            if( isalpha(msg[k]) || msg[k]==' ')
            {
                /* Adding only space and alphabet into matrix*/
                matrix[i][j] = msg[k];
                j++;
            }
            k++;
        }
    }
    for (map<int,int>::iterator ii = keyMap.begin(); ii!=keyMap.end();
++ii)
    {
        j=ii->second;

        // getting cipher text from matrix column wise using permuted
key
        for (int i=0; i<row; i++)
        {
            if( isalpha(matrix[i][j]) || matrix[i][j]==' ' ||
matrix[i][j]=='_')
                cipher += matrix[i][j];
        }
    }

    return cipher;
}

// Decryption
string decryptMessage(string cipher,string const key,map<int,int>
keyMap)
{
    int col = key.length();

    int row = cipher.length()/col;
    char cipherMat[row][col];

    for (int j=0,k=0; j<col; j++)
        for (int i=0; i<row; i++)
            cipherMat[i][j] = cipher[k++];

    int index = 0;
    for( map<int,int>::iterator ii=keyMap.begin(); ii!=keyMap.end();
++ii)
        ii->second = index++;

    char decCipher[row][col];
    map<int,int>::iterator ii=keyMap.begin();
    int k = 0;
    for (int l=0,j; key[l]!='\0'; k++)
    {
        j = keyMap[key[l++]];
        for (int i=0; i<row; i++)
        {
            decCipher[i][k]=cipherMat[i][j];
        }
    }

    string msg = "";
    for (int i=0; i<row; i++)
    {
        for(int j=0; j<col; j++)
        {
            if(decCipher[i][j] != '_')
                msg += decCipher[i][j];
        }
    }
    return msg;
}

int main()
{
    string msg = "nikita khot";
    string key = "hack";
    map<int,int> keyMap;

    for(int i=0; i < key.length(); i++)
        keyMap[key[i]] = i;

    string cipher = encryptMessage(msg, key, keyMap);
    cout << "Encrypted Message: " << cipher << endl;
    cout << "Decrypted Message: " << decryptMessage(cipher, key,
keyMap) << endl;

    return 0;
}
```

Output:



```
Encrypted Message: iaok tnthik_
Decrypted Message: nikita khot
```

Example:



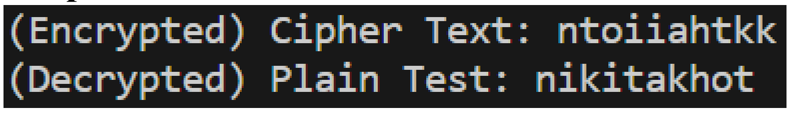
2. Rail Fence Cipher technique

Code:

```
#include <bits/stdc++.h>
using namespace std;
string encryptRailFence(string text, int key)
{
    char rail[key][(text.length())];
    int i, j;
    for (i=0; i < key; i++)
    {
        for (j = 0; j < text.length(); j++)
            rail[i][j] = '\n';
    }
    bool dir_down = false;
    int row = 0, col = 0;
    for (i=0; i < text.length(); i++)
    {
        if (row == 0 || row == key-1)
            dir_down = !dir_down;
        rail[row][col++] = text[i];
        dir_down ? row++ : row--;
    }
    string result;
    for (i=0; i < key; i++)
        for (j=0; j < text.length(); j++)
            if (rail[i][j]!='\n')
                result.push_back(rail[i][j]);
    return result;
}
string decryptRailFence(string cipher, int key)
{
    char rail[key][cipher.length()];
    int i, j;
    for (i=0; i < key; i++)
        for (j=0; j < cipher.length(); j++)
            rail[i][j] = '\n';
    bool dir_down;
    int row = 0, col = 0;
    for (i=0; i < cipher.length(); i++)
    {
        if (row == 0)
            dir_down = true;
        if (row == key-1)
            dir_down = false;
```

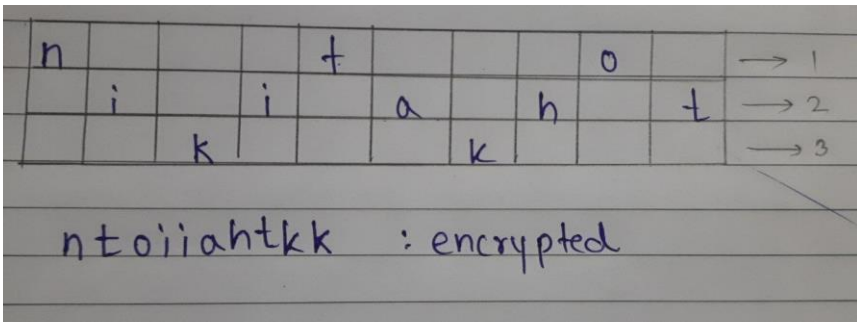
```cpp
        rail[row][col++] = '*';
        dir_down?row++ : row--;
    }
    int index = 0;
    for (i=0; i<key; i++)
        for (j=0; j<cipher.length(); j++)
            if (rail[i][j] == '*' && index<cipher.length())
                rail[i][j] = cipher[index++];
    string result;
    row = 0, col = 0;
    for (i=0; i< cipher.length(); i++)
    {
        if (row == 0)
            dir_down = true;
        if (row == key-1)
            dir_down = false;
        result.push_back(rail[row][col++]);
        dir_down?row++: row--;
    }
    return result;
}
int main()
{
    string plain_text = "nikitakhot";
    int key = 3;
    string cipher_text, decrypted_text;
    cipher_text = encryptRailFence(plain_text, key);
    cout << "(Encrypted) Cipher Text: " << cipher_text << endl;
    decrypted_text = decryptRailFence(cipher_text, key);
    cout << "(Decrypted) Plain Test: " << decrypted_text << endl;
    return 0;
}
```

Output:



```
(Encrypted) Cipher Text: ntoiiahtkk
(Decrypted) Plain Test: nikitakhot
```

Example:


n
t
o
→ 1
i
i
a
h
t
→ 2
k
k
→ 3
ntoiiahtkk : encrypted