Day 2

6.Hill Cipher

Program

#include <stdio.h>

#include <string.h>

#include <ctype.h>

void hillCipherEncrypt(char \*plainText, char \*keyMatrix) {

int i, j, k, len = strlen(plainText);

int key[2][2], plain[2], cipher[2];

for (i = 0, k = 0; i < 2; i++) {

for (j = 0; j < 2; j++, k++) {

key[i][j] = keyMatrix[k] - 'A';

}

}

for (i = 0; i < len; i += 2) {

plain[0] = plainText[i] - 'A';

plain[1] = plainText[i + 1] - 'A';

cipher[0] = key[0][0] \* plain[0] + key[0][1] \* plain[1];

cipher[1] = key[1][0] \* plain[0] + key[1][1] \* plain[1];

cipher[0] %= 26;

cipher[1] %= 26;

printf("%c%c", cipher[0] + 'A', cipher[1] + 'A');

}

}

int main() {

char plainText[100], keyMatrix[5];

printf("Enter plaintext (uppercase alphabets only): ");

scanf("%s", plainText);

printf("Enter 2x2 key matrix (uppercase alphabets only): ");

scanf("%s", keyMatrix);

if (strlen(plainText) % 2 != 0 || strlen(keyMatrix) != 4) {

printf("Plaintext and key matrix lengths must be even and 4 characters, respectively.\n");

return 1;

}

for (int i = 0; i < strlen(plainText); i++) {

if (!isupper(plainText[i])) {

printf("Invalid characters in plaintext. Use uppercase alphabets only.\n");

return 1;

}

}

for (int i = 0; i < 4; i++) {

if (!isupper(keyMatrix[i])) {

printf("Invalid characters in the key matrix. Use uppercase alphabets only.\n");

return 1;

}

}

printf("Ciphertext: ");

hillCipherEncrypt(plainText, keyMatrix);

printf("\n");

return 0;

}

Output:

