

## Cipher Overview

### Rail fence:

Rail fence also known as zigzag cipher it's form of transposition cipher where you put the letters in rails. In encryption each letter is written downwards until it reaches the bottom rail then go top until it reaches the top and repeat it until you finish the plaintext then read the first row then the second row until you reach the bottom row after that you will get the ciphertext.

In decryption we write the first letters in the first row then go down then write the rest of letters depending on the text length and the rows, you can look at the method on how to know how many letters in each row in the slides.

## Used Data Structure

There is no data structure were used.

I tried to keep it as easy as possible, so I only used data types (Integers, Strings, and Booleans).

## Error handling

The program will run smoothly if you do everything the right way, but if the user enters a wrong format (%@~ etc..) the program will loop until the correct format is entered.

## Code

### Encoding

```
public static String encrypt(String p, int key) {
    // key 2
    if(key == 2) {
        for(int i = 0 ; i < p.length(); ) {
            r1 += p.charAt(i++);
            if(i == p.length())
                break;
            r2 += p.charAt(i++);
        } // for assigning the letters for each row

        result = r1+r2; // for adding rows to result
    } // end of key 2
    // key 3
    else {
        for(int i = 0 ; i < p.length(); ) {
            r1 += p.charAt(i++);
            if(i == p.length())
                break;
            r2 += p.charAt(i++);
            if(i == p.length())
                break;
            r3 += p.charAt(i++);
            if(i == p.length())
                break;
            r2 += p.charAt(i++);
        }
    }
}
```

```

        }// for assigning the letters for each row

        result = r1+r2+r3;// for adding rows to result
    }// end of key 3
    return result;
}

```

## Decoding

```

public static String decrypt(String p, int key) {
    String reverseR3 = "";
    int odd = 0;
    int mult4 = 0;
    // key 2
    if(key == 2) {

        if(p.length()%2 == 1)
            odd = 1; // Checking if it's an odd length

        for(int i = 0 ; i < p.length()/2 + odd; i++) {
            r1 += p.charAt(i);

            if(i == p.length()/2)
                break;

            r2 += p.charAt(i + p.length()/2 + odd);
        }// for assigning the letters for each row

        for(int i = 0 ; i < r1.length() ; i++) {
            result += r1.charAt(i);
            if(r2.length() == i)
                break;
            result += r2.charAt(i);
        }// for adding rows to result

    }// end of key 2

    // key 3
    else {
        if(p.length()%4 == 0)
            mult4 = 1; // checking if the length is multiple of
4

        for(int i = 0 ;
r1.length()+r2.length()+reverseR3.length() != p.length(); i++) {
            r1 += p.charAt(i);

```

```

        if(r1.length()+r2.length()+reverseR3.length() ==
p.length())
            break;

        r2 += p.charAt(i + p.length()/4 + 1 + i - mult4);
        if(r1.length()+r2.length()+reverseR3.length() ==
p.length())
            break;

        reverseR3 += p.charAt(p.length() - i - 1);
        if(r1.length()+r2.length()+reverseR3.length() ==
p.length())
            break;

        r2 += p.charAt(i + p.length()/4 + 2 + i - mult4);

    }// for assigning the letters for each row

    for(int i = reverseR3.length() - 1; i >= 0; i--)
    {
        r3 = r3 + reverseR3.charAt(i);
    }// for reversing row 3

    for(int i = 0 ; result.length() != p.length() ; i++) {
        result += r1.charAt(i);
        if(result.length() == p.length())
            break;

        result += r2.charAt(i+i);
        if(result.length() == p.length())
            break;

        result += r3.charAt(i);
        if(result.length() == p.length())
            break;

        result += r2.charAt(i+1+i);
    }// for adding rows to result

    }// end of key 3
    return result;
}

```

## Case Examples

### Rail Fence Cipher

#### Your Example

**Plaintext:** Thank you for using my program it is an honor that my program is being used by you

#### Enciphering

Key 2:

```
Rail Fence cipher
Choose from the list below
1- Encrypt
2- Decrypt
3- exit
1
Enter how many rows only enter 2 or 3
2
Enter the plaintext using only letters
Thank you for using my program it is an honor that my program is being used by you
Done
Ciphertext: Takofrsmporntsnootampomsenubyuhnyuouigrgailahnrhtyrgaibigsdyo

T a k o f r s n m p o r a m t i s a n o o t h a t m y p o r a m s e n u s e b y y o u
h n y u o u i g y r g a i i a h n o r h t y r o g a i b i g s d y o u

Closing program...
Thank you for using my program
```

Key 3:

```
Rail Fence cipher
Choose from the list below
1- Encrypt
2- Decrypt
3- exit
1
Enter how many rows only enter 2 or 3
3
Enter the plaintext using only letters
Thank you for using my program it is an honor that my program is being used by you
Done
Ciphertext: Tkfsmosotmomeubuhnyuouigrgailahnrhtyrgaibigsdyoaoonprntnoapsrney

T h n k y o f o u s i n g m y p o r a m i t i s a n h o n o r t h a t m y p o r a m i s b e i n g u s e d b y y o u
a n y o u o r u n g p o r a m i t i a n o o r h a t m y p o r a m i s b i n g u s e d y y o u

Closing program...
Thank you for using my program
```

#### Deciphering

Key 2:

```
Rail Fence cipher
Choose from the list below
1- Encrypt
2- Decrypt
3- exit
2
Enter how many rows only enter 2 or 3
2
Enter the ciphertext using only letters
Takofrsmporntsnootampomsenubyuhnyuouigrgailahnrhtyrgaibigsdyo
Done
Plaintext: Thankyouforusingmyprogramitisanhonorthatmyprogramisbeingusedbyyou

T a k o f r s n m p o r a m t i s a n o o t h a t m y p o r a m s e n u s e b y y o u
h n y u o u i g y r g a i i a h n o r h t y r o g a i b i g s d y o u

Closing program...
Thank you for using my program
```

Key 3:

```
Rail Fence cipher
Choose from the list below
1- Encrypt
2- Decrypt
3- exit
2
Enter how many rows only enter 2 or 3
3
Enter the ciphertext using only letters
Tkfsmosotmomeubuhnyuouigrgailahnrhtyrgaibigsdyoaoonprntnoapsrney
Done
Plaintext: Thankyouforusingmyprogramitisanhonorthatmyprogramisbeingusedbyyou

T h n k y o f o u s i n g m y p o r a m i t i s a n h o n o r t h a t m y p o r a m i s b e i n g u s e d b y y o u
a n y o u o r u n g p o r a m i t i a n o o r h a t m y p o r a m i s b i n g u s e d y y o u

Closing program...
Thank you for using my program
```

### *Instructor's example*

**Plaintext:** this is a secret message

#### Enciphering

Key 2:

```
Rail Fence cipher
Choose from the list below
1- Encrypt
2- Decrypt
3- exit
1
Enter how many rows only enter 2 or 3
2
Enter the plaintext using only letters
this is a secret message
Done
Ciphertext: tiiaertesghssscemsae

t   i   i   a   s   e   r   t   e   s   s   a   g   e
 h   s   s   s   c   e   m   s   a   e

Closing program...
Thank you for using my program
[
```

Key 3:

```
Rail Fence cipher
Choose from the list below
1- Encrypt
2- Decrypt
3- exit
1
Enter how many rows only enter 2 or 3
3
Enter the plaintext using only letters
this is a secret message
Done
Ciphertext: tietsghssscemsaeiareg

t       i       e       t       s
 h   s   s   s   c   e   m   s   a   e
    i       a       r       e       g

Closing program...
Thank you for using my program
```

## Deciphering

Key 2:

```
Rail Fence cipher
Choose from the list below
1- Encrypt
2- Decrypt
3- exit
2
Enter how many rows only enter 2 or 3
2
Enter the ciphertext using only letters
tiiaertesghssscemsae
Done
Plaintext: thisisasecretmessage

t   i   i   a   e   r   t   e   s   s   g
h   s   s   s   c   e   m   s   a   e

Closing program...
Thank you for using my program
```

Key 3:

```
Rail Fence cipher
Choose from the list below
1- Encrypt
2- Decrypt
3- exit
2
Enter how many rows only enter 2 or 3
3
Enter the ciphertext using only letters
tietsghssscemsaeiareg
Done
Plaintext: thisisasecretmessage

t       i       e       t       s
h   s   s   s   c   e   m   s   a   e
    i       a       r       e       g

Closing program...
Thank you for using my program
```