BITFLIP

Aim:

To design and develop a cipher technique for encrypting plain text to obtain cipher text and decrypting cipher text to obtain original plain text.

Objective:

Develop a UI which allows to encrypt data by generating a random key and also decrypts the encrypted message using the same key.

Input Specimen:

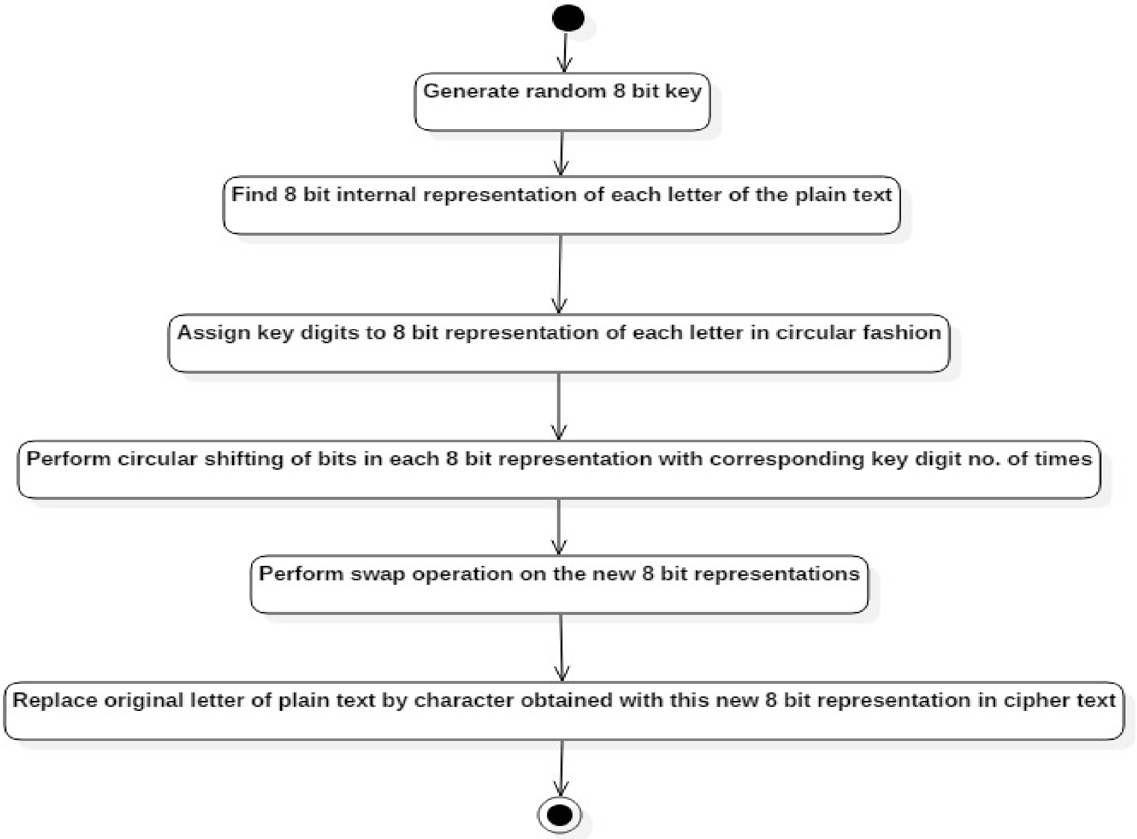
- Input for encryption: Any Plain text to be encrypted
- Input for decryption: Cipher text and 8 bit key used in encryption process

Experimental Setup:

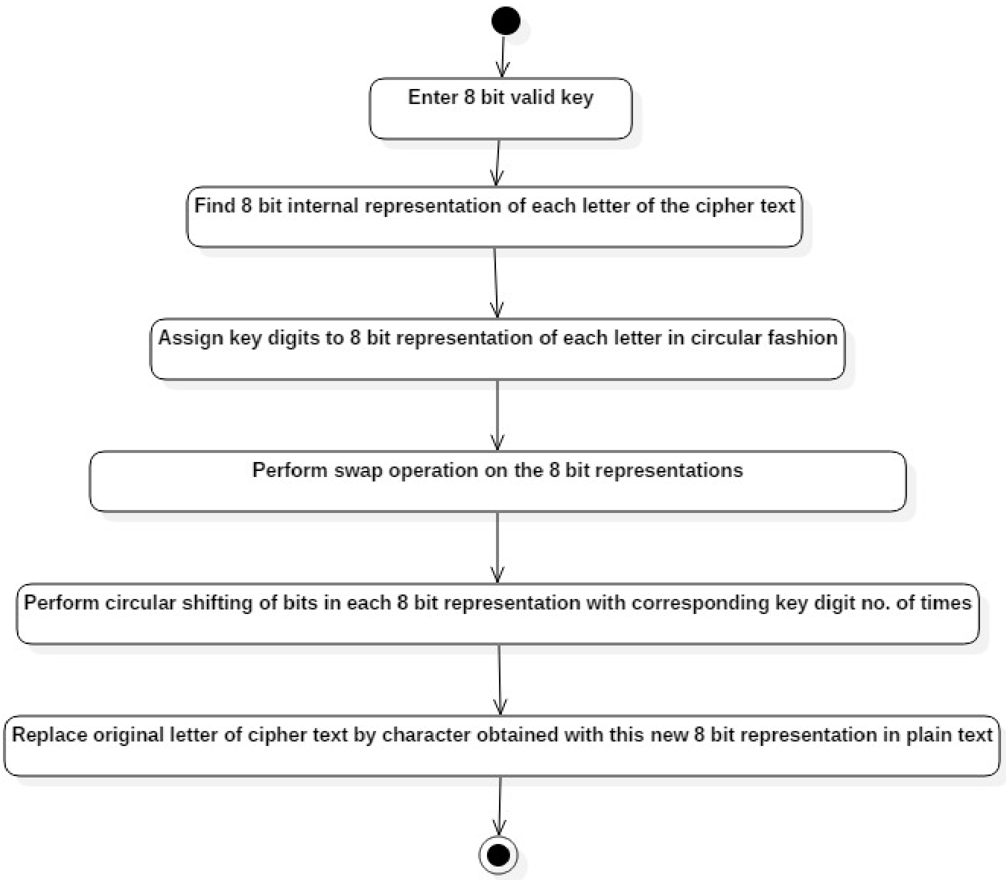
- Encryption Steps:
  - i. A random 8-bit key is generated which each key represents a value
  - ii. Find 8-bit internal representation of each letter of the plain text
  - iii. Assign the key digits to the 8-bit internal representation of each letter of the plain text computed in step ii. in circular fashion
  - iv. Perform circular shifting of bits in each 8-bit representation with corresponding key digit number of times
  - v. Perform the Swap operation on the bits representation in Step iv
  - vi. Character obtained from this new 8 bit representation will be used to replace/encrypt the plain text

- Decryption Steps:
  - i. Use the 8-bit key generated in encryption process
  - ii. Find 8-bit internal representation of each letter of the cipher text
  - iii. Assign the key digits to the 8-bit internal representation of each letter of the plain text computed in step ii. in circular fashion
  - iv. Perform the Swap operation on the bits representation
  - v. Perform circular shifting of bits in each new 8-bit representation with corresponding key digit number of times
  - vi. Character obtained from this new 8 bit representation will be used to replace/decrypt the cipher text

Diagram:


Generate random 8 bit key
Find 8 bit internal representation of each letter of the plain text
Assign key digits to 8 bit representation of each letter in circular fashion
Perform circular shifting of bits in each 8 bit representation with corresponding key digit no. of times
Perform swap operation on the new 8 bit representations
Replace original letter of plain text by character obtained with this new 8 bit representation in cipher text

Encryption Process


Enter 8 bit valid key
Find 8 bit internal representation of each letter of the cipher text
Assign key digits to 8 bit representation of each letter in circular fashion
Perform swap operation on the 8 bit representations
Perform circular shifting of bits in each 8 bit representation with corresponding key digit no. of times
Replace original letter of cipher text by character obtained with this new 8 bit representation in plain text

Decryption Process

Observation:

- Input size is directly proportional to time taken for completion of the process
- Parallelism approach helps in reducing time.
- Key generation randomness and manipulation of bits using Swap and circular shift increases randomness in security of the process

Conclusion:

- BitFlip cipher was designed and implemented using Java with aim at manipulation of the data at bit level to increase data security
- Main two operations used in this cipher technique are “SWAP” operation and “Circular Shift” operation
- Random key generation important feature as it adds into randomness as how data gets manipulated and transformed.