Exp NO. 6 21/08/2024

AIM:-

Write a program to implement error detection and correction using Hamming Code concept. Make a test run to input the data stream.

STUDENT OBSERVATION:-

CODE:-

```
import java.util.Scanner;
public class HammingCode {
  public static void charToBinary(char ch, int[] binary){
    for(int i=3; i>=0; i--){
      binary[i] = ch & 1;
      ch >>= 1;
    }
  }
public static void main(String[] args){
    Scanner sc = new Scanner(System.in);
    int[] databits = new int[4];
    int[] hammingCode = new int[7];
    int parity1, parity2, parity4;
    System.out.println("Enter a String: ");
    String inputString = sc.next();
    charToBinary(inputString.charAt(0), databits);
    hammingCode[2] = databits[0];
    hammingCode[4] = databits[1];
    hammingCode[5] = databits[2];
    hammingCode[6] = databits[3];
```

```
parity1 = hammingCode[2] ^ hammingCode[4] ^ hammingCode[6];

parity2 = hammingCode[2] ^ hammingCode[5] ^ hammingCode[6];

parity4 = hammingCode[4] ^ hammingCode[5] ^
          hammingCode[6];

hammingCode[0] = parity1;
hammingCode[1] = parity2;
hammingCode[3] = parity4;

System.out.println("Calculated Hamming Code: ");
for(int i=0; i<7; i++){
   System.out.print(hammingCode[i]); }
System.out.println();
System.out.print("Enter the position to simulate
   error (0-6) or -1 for no error: ");
int errorPos = sc.nextInt();
if(errorPos != -1){
  hammingCode[errorPos] = 1 - hammingCode[errorPos];
  System.out.print("Hamming code with error: ");
  for(int i=0; i<7; i++){
    System.out.print(hammingCode[i]); }
    System.out.println(); }
```

```
int c1 = hammingCode[0] ^ hammingCode[2] ^
         hammingCode[4] ^ hammingCode[6];
int c2 = hammingCode[1] ^ hammingCode[2] ^
         hammingCode[5] ^ hammingCode[6];
int c4 = hammingCode[3] ^ hammingCode[4] ^
         hammingCode[5] ^ hammingCode[6];
int error = c1*1 + c2*2 + c4*4;
if(error==0){
  System.out.println("No error detected");}
else{
  System.out.println("Error detected at position: "
                     +(error-1));
  hammingCode[error-1] = 1-hammingCode[error-1];
  System.out.print("Corrected Hamming Code: ");
  for(int i=0; i<7; i++){
    System.out.print(hammingCode[i]);
  }
  System.out.println();
}
scanner.close();
}
}
```

Output:-

Enter a string : abcd

Calculated Hamming code: 1101001

Enter the position to stimulate error (0-6), or

-1 for no error: 2

Hamming code with error : 1111001

Error detected at position : 2

Corrected Hamming code : 1101001

==Code Execution Successful===

RESULT:-

Therefore, program is executed successfully to implement error detection and correction using Hamming code concept and output is verified

14/9/24