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/*Implement the following in Java:
Write a program for error detecting code using CRC-CCITT (16- bits).*/

import java.util.Scanner;
public class CRCDemoFinal {
    static String msg;
    static String genPoly = "100010000000100001";
    static char t[] = new char[128];
    static char cs[] = new char[128];
    static char g[] = new char[128];
    static int mlen,glen,x,c,flag=0,test;
    public static void main(String [] args)
    {
        Scanner in = new Scanner(System.in);

        System.out.println("Enter the message to be transferred");
        msg = in.nextLine();
        mlen = msg.length(); /* Length of the original message */
        for(int i=0;i<mlen;i++)
            t[i] = msg.charAt(i);

        System.out.println("Predefined Generator Polynomial is: " + genPoly);
        g = genPoly.toCharArray();
        glen = genPoly.length(); /* Length of Generator Polynomial */

        for(x=mlen;x<(mlen+glen-1);x++)
            t[x] = '0';

        System.out.println("Zero extended message is: "+ new String(t));

        crc(); /* Checksum computation */

        System.out.println("CheckSum is:" + new String(cs));

        /* Subtract the checksum from zero extended message which means
           we do simple "XORing" */
        for(x=mlen;x<(mlen+glen-1);x++)
            t[x] = cs[x-mlen];

        System.out.println("Final codeword generated is:"+ new String(t));

        System.out.println("\n\nTest Error detection 1(yes) 0(no) ? : ");
        test = in.nextInt();

        if(test==1)
        {
            System.out.println("Enter position where error is to inserted :
");
            x = in.nextInt();

            t[x] = (t[x]=='0')?'1':'0';
            System.out.println("Errorneous data :"+ new String(t));

        }
        crc();
        for(x=0;x<(glen-1); x++)
        {
            if(cs[x] == '1')

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        {
            flag =1;
            break;
        }

    }
    if(flag==1)
        System.out.println("Error was detected during transfer");
    else
        System.out.println("No Error Detected during transfer");
}

public static void crc()
{
    for(x=0; x<glen; x++)
        cs[x] = t[x];
    do
    {
        if(cs[0] == '1')
            xor();

        for(c=0; c<glen-1; c++)
        {
            cs[c] = cs[c+1];
        }
        cs[c] = t[x++];
    }while(x<=mlen+glen-1);

}

public static void xor()
{
    for(c=1; c<glen; c++)
        cs[c] = ((cs[c]==g[c])? '0' : '1');
}

}

```