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import java.io.File;

import java.io.FileNotFoundException;

import java.util.Scanner;

public class Veitech {

    static String[][] veitechG1Matrix = { { "AB~C", "ABC", "~ABC", "~AB~C" }, { "A~B~C", "A~BC",
"~A~BC", "~A~B~C" } };

    static String[][] veitechG2Matrix = { { "AB", "BC", "~AB" }, { "A~B", "~BC", "~A~B" } };

    static String[] veitechG2Matrix2 = { "A~C", "AC", "~AC", "~A~C" };

    public static void main(String[] args) throws FileNotFoundException {

        File text = new File("C:\\eclipse-workspace\\MyJavaProj\\src\\input.txt");

        // Creating Scanner instnace to read File in Java

        Scanner scanner = new Scanner(text);

        String result = "";

        int[][] binaryVal;

        // Reading each line of file using Scanner class

        while (scanner.hasNextLine()) {

            String line = scanner.nextLine();

            binaryVal = hexToBinary(line);

            result = evaluteG4(binaryVal);

            result = append(result,evaluteG2(binaryVal));

            result = append(result,evaluteG1(binaryVal));

            System.out.println(" Input : " + line + " Out Put : " + result);

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    }

}

private static int[][] hexToBinary(String hex) {
    String hexString = "0123456789ABCDEF";

    int[][] ret = new int[hex.length()][4];

    for (int i = 0; i < hex.length(); i++) {
        char c = hex.charAt(i);
        int num = hexString.indexOf(c);
        String str = Integer.toBinaryString(num);
        str = String.format("%1$" + 4 + "s", str).replace(' ', '0');

        //System.out.println("Binary String " + str);
        for (int j = 0; j < str.length(); j++) {
            ret[i][j] = Character.getNumericValue(str.charAt(j));
        }
    }
    return ret;
}

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private static String evaluateG1(int[][] binaryVal) {
    //System.out.println(" evaluateG1 input :");
    //print(binaryVal);
    String retVal = "";
    for (int i = 0; i < 2; i++) {
        for (int j = 0; j < 4; j++) {

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        if (binaryVal[i][j] == 1) {
            retVal = append(retVal , veitechG1Matrix[i][j]);
            binaryVal[i][j]=0;
        }
    }
}
//System.out.println(" evaluateG1 output :" + retVal);
return retVal;
}

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private static String evaluateG2(int[][] binaryVal) {
    //System.out.println(" evaluateG2 input :");
    //print(binaryVal);
    String retVal = "";
    for (int i = 0; i < 2; i++) {
        for (int j = 0; j < 3; j++) {
            if (binaryVal[i][j] == 1 && binaryVal[i][j + 1] == 1) {
                retVal = append(retVal , veitechG2Matrix[i][j]);
                binaryVal[i][j] = 0;
                binaryVal[i][j + 1] = 0;
            }
        }
    }
}
for (int i = 0; i < 1; i++) {
    for (int j = 0; j < 4; j++) {
        if (binaryVal[i][j] == 1 && binaryVal[i+1][j] == 1) {
            retVal = append(retVal , veitechG2Matrix2[j]);
        }
    }
}

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        binaryVal[i][j] = 0;
        binaryVal[i+1][j] = 0;

    }

}

if(binaryVal[0][0] == 1 && binaryVal[0][3] == 1) {
    retVal = append(retVal , "B~C");
    binaryVal[0][0] = 0;
    binaryVal[0][3] = 0;
}

if(binaryVal[1][0] == 1 && binaryVal[1][3] == 1) {
    retVal = append(retVal , "~B~C");
    binaryVal[1][0] = 0;
    binaryVal[1][3] = 0;
}

//System.out.println(" evaluateG2 output :" + retVal);
return retVal;
}

private static String evaluateG4(int[][] binaryVal) {
    //System.out.println(" evaluateG4 input :");
    //print(binaryVal);
    String retVal = "";
    if (binaryVal[0][0] == 1 && binaryVal[0][1] == 1 && binaryVal[0][2] == 1 &&
binaryVal[0][3] == 1) {
        retVal = append(retVal, "B");
    }
}

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        binaryVal[0][0] = 0;
        binaryVal[0][1] = 0;
        binaryVal[0][2] = 0;
        binaryVal[0][3] = 0;
    }
    if (binaryVal[1][0] == 1 && binaryVal[1][1] == 1 && binaryVal[1][2] == 1 &&
binaryVal[1][3] == 1) {
        retVal = append(retVal, "~B");
        binaryVal[1][0] = 0;
        binaryVal[1][1] = 0;
        binaryVal[1][2] = 0;
        binaryVal[1][3] = 0;
    }
    if (binaryVal[0][0] == 1 && binaryVal[0][1] == 1 && binaryVal[1][0] == 1 &&
binaryVal[1][1] == 1) {
        retVal = append(retVal, "A");
        binaryVal[0][0] = 0;
        binaryVal[0][1] = 0;
        binaryVal[1][0] = 0;
        binaryVal[1][1] = 0;
    }
    if (binaryVal[0][1] == 1 && binaryVal[0][2] == 1 && binaryVal[1][1] == 1 &&
binaryVal[1][2] == 1) {
        retVal = append(retVal, "C");
        binaryVal[0][1] = 0;
        binaryVal[0][2] = 0;
        binaryVal[1][1] = 0;
        binaryVal[1][2] = 0;
    }
}
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        if (binaryVal[0][2] == 1 && binaryVal[0][3] == 1 && binaryVal[1][2] == 1 &&
binaryVal[1][3] == 1) {
            retVal = append(retVal, "~A");
            binaryVal[0][2] = 0;
            binaryVal[0][3] = 0;
            binaryVal[1][2] = 0;
            binaryVal[1][3] = 0;
        }
        if (binaryVal[0][0] == 1 && binaryVal[0][3] == 1 && binaryVal[1][0] == 1 &&
binaryVal[1][3] == 1) {
            retVal = append(retVal, "~C");
            binaryVal[0][0] = 0;
            binaryVal[0][3] = 0;
            binaryVal[1][0] = 0;
            binaryVal[1][3] = 0;
        }
        //System.out.println(" evaluateG4 output :" + retVal);
        return retVal;
    }

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private static String append(String appendTo, String strToAppend) {
    if (null != strToAppend & !strToAppend.isBlank()) {
        if (!appendTo.isBlank()) {
            return appendTo + "+" + strToAppend;
        } else {
            return appendTo + strToAppend;
        }
    }
    return appendTo;
}

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}  
  
private static void print(int[][] arr) {  
    for (int i = 0; i < arr.length; i++) {  
        for (int j = 0; j < arr[i].length; j++) {  
            System.out.print(arr[i][j]);  
            System.out.print("\t");  
        }  
        System.out.println("\n");  
    }  
}  
}
```