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Practical: 4

**Aim:** Write a program to implement error detection and correction using HAMMING code concept. Make a test run to input data stream and verify error correction feature.

**Code:**

// hamming code

#include <bits/stdc++.h>

using namespace std;

int main(){

    cout<<"Enter the 4 data bits: ";

    int d[4];

    for(int i=0;i<4;i++){

        cin>>d[i];

    }

    int p1,p2,p3;

    p1=d[0]^d[1]^d[3];

    p2=d[0]^d[2]^d[3];

    p3=d[1]^d[2]^d[3];

    cout<<"The parity bits are: "<<p1<<" "<<p2<<" "<<p3<<endl;

    cout<<"The codeword is: "<<d[0]<<" "<<d[1]<<" "<<d[2]<<" "<<d[3]<<" "<<p1<<" "<<p2<<" "<<p3<<endl;

    cout<<"Enter the received codeword: ";

    int r[7];

    for(int i=0;i<7;i++){

        cin>>r[i];

    }

    int p1r,p2r,p3r;

    p1r=r[0]^r[1]^r[3]^r[4]^r[6];

    p2r=r[0]^r[2]^r[3]^r[5]^r[6];

    p3r=r[1]^r[2]^r[3]^r[6];

    cout<<"The received parity bits are: "<<p1r<<" "<<p2r<<" "<<p3r<<endl;

    int pos=p1r\*4+p2r\*2+p3r;

    if(pos==0){

        cout<<"No error"<<endl;

    }

    else{

        cout<<"Error at position: "<<pos<<endl;

        cout<<"Corrected codeword is: ";

        if(r[pos-1]==0){

            r[pos-1]=1;

        }

        else{

            r[pos-1]=0;

        }

        for(int i=0;i<7;i++){

            cout<<r[i]<<" ";

        }

    }

    return 0;

}

**Input:**

1 0 1 1

1 0 0 1 0 1 0

**Output:**

Enter the 4 data bits: 1 0 1 1

The codeword is: 1 0 1 1 0 1 0

The parity bits are: 0 1 0

Enter the received codeword: 1 0 0 1 0 1 0

The received parity bits are: 0 1 1

Error at position: 3

Corrected codeword is: 1 0 1 1 0 1 0