Computer Networks
Assignment 4

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Converting Input Data Bits to Transmission Data Bits:

```cpp
/*
   Author : KRHero
   IDE: VSCode
*/

#include <bits/stdc++.h>

using namespace std;



int main(){
   cout<<"Please enter Input Code:-"<<endl;
   string s;
   cin >> s;
   int n = s.size();
   int pCount = ceil(log2(n+1));
   vector<int> parityBits(pCount,0);

   vector<int> res;
   int p = 1;
   int idxParity = 0,idxInput = 0;
   res.push_back(0);
   while(p<=parityBits.size()+n){
       if(__builtin_popcount(p)==1){
           res.push_back(parityBits[idxParity++]);
       }else{
           res.push_back((s[idxInput++]-'0'));
       }
       p++;
   }
   for(int i = 1;i<res.size();i++){
       int x = res[i];
       int pos = i+1;
       int j = 1;
       //if(__builtin_popcount(i)==1) continue;
       while(pos>0){
           if(pos%2==1){
```

```
                res[j] ^= x;
            }
            j*=2;
            pos>>=1;
        }
    }
    vector<int> ans;
    for(int i = 1;i<res.size();i++) ans.push_back(res[i]);

cout<<"--------------------------------------------------------------------------------"<<endl
;
    cout<<"Input Code:- ";
    cout<<s<<endl;
    cout<<"Input Code Size:- "<<s.size()<<endl;

cout<<"--------------------------------------------------------------------------------"<<endl
;
    cout<<"Transmitted Code:- ";
    for(auto i: ans) cout<<i;
    cout<<endl;
    cout<<"Transmitted Code Size:- "<<ans.size()<<endl;



}
```

Output:

```
krhero@hellblazer:/mnt/0FB812900FB81290/BTech/Assignments/3rd_Year/CN/Assignment_4$ g++ Transmission.cpp
krhero@hellblazer:/mnt/0FB812900FB81290/BTech/Assignments/3rd_Year/CN/Assignment_4$ ./a.out
Please enter Input Code:-
10011010
--------------------------------------------------------------------------------
Input Code:- 10011010
Input Code Size:- 8
--------------------------------------------------------------------------------
Transmitted Code:- 011100101010
Transmitted Code Size:- 12
```

Code for Detection and Corrections:

```cpp
/*
   Author : KRHero
   IDE: VSCode
*/

#include <bits/stdc++.h>

using namespace std;



int main(){
   cout<<"Enter a Test Hamming Code:- "<<endl;
   string s;
   cin >> s;
   int m = s.size();
   vector<int> arr;
   arr.push_back(0);
   for(auto i: s) arr.push_back(i-'0');

   int idx = 0;
   int cnt = 1;
   while(cnt<=pow(log2(m+1),2)){
       int parity = 0;
       for(int i = 1;i<arr.size();i++){
           if((i&cnt)!=0) parity ^= arr[i];
       }
       if(parity) idx += cnt;
       cnt *= 2;
   }
   arr[idx] = arr[idx]==1?0:1;
   vector<int> ans;
   for(int i = 1;i<arr.size();i++) ans.push_back(arr[i]);

   cout<<"Input Hamming Code:- "<<s<<endl;
   cout<<"Error Position:- "<<idx<<endl;
   cout<<"Corrected Hamming Code:- ";
   for(auto i: ans) cout<<i;
   cout<<endl;

}
```

Output:

```
krhero@hellblazer:/mnt/0FB812900FB81290/BTech/Assignments/3rd_Year/CN/Assignment_4$ ./a.out
Enter a Test Hamming Code:-
011100101011
Input Hamming Code:- 011100101011
Error Position:- 12
Corrected Hamming Code:- 011100101010
```