In [2]:

```
def detectError(arr, nr):
    n = len(arr)
    res = 0
    for i in range(nr):
        val = 0
        for j in range(1, n + 1):
            if(j & (2**i) == (2**i)):
                val = val ^ int(arr[-1 * j])
        res = res + val*(10**i)
    return int(str(res), 2)
```

In [3]:

```
def calcRedundantBits(m):
    for i in range(m):
        if(2**i >= m + i + 1):
            return i
```

In [4]:

```
def posRedundantBits(data, r):
    j = 0
    k = 1
    m = len(data)
    res = ''
    for i in range(1, m + r+1):
        if(i == 2**j):
            res = res + '0'
            j += 1
        else:
            res = res + data[-1 * k]
            k += 1
    return res[::-1]
```

In [5]:

```
def calcParityBits(arr, r):
    n = len(arr)
    for i in range(r):
        val = 0
        for j in range(1, n + 1):
            if(j & (2**i) == (2**i)):
                val = val ^ int(arr[-1 * j])
        arr = arr[:n-(2**i)] + str(val) + arr[n-(2**i)+1:]
    return arr
```

In [8]:

```
while True:
  option=int (input('Press 1 for generating hamming code \nPress 2 for finding error in ham
  if option == 1:
    data = input("Enter data to be transferred:")
    m = len(data)
    r = calcRedundantBits(m)
    arr = posRedundantBits(data, r)
    arr = calcParityBits(arr, r)
    print("Data transferred is=" + arr)
  elif option == 2:
    data = input("Enter the HammingCode:")
    m = len(data)
    r = calcRedundantBits(m)
    correction = detectError(data, r)
    if correction !=0:
        print("The position of error is=",correction)
    else:
        print("No Error")
  else :
    break
```

```
Press 1 for generating hamming code
Press 2 for finding error in hamming code
Press 3 to exit  Enter your choice:--
1
Enter data to be transferred:1001
Data transferred is=1001100
Press 1 for generating hamming code
Press 2 for finding error in hamming code
Press 3 to exit  Enter your choice:--
2
Enter the HammingCode:1001101
The position of error is= 1
Press 1 for generating hamming code
Press 2 for finding error in hamming code
Press 3 to exit  Enter your choice:--
2
Enter the HammingCode:1001100
No Error
Press 1 for generating hamming code
Press 2 for finding error in hamming code
Press 3 to exit  Enter your choice:--
3
```