

**Write C++ program for storing binary number using doubly linked lists. Write functions-**

**a) To compute 1's and 2's complement**

**b) Add two binary numbers**

**CODE:-**

```
#include <bits/stdc++.h>
#include <iostream>
#include <math.h>
using namespace std;

char flip(char c) {return (c == '0')? '1': '0';}

void addTwoBinaryNumbers()
{
    long bn1, bn2;
    int i=0, r=0;
    int sum[20];
    cout << "Addition of two binary numbers:\n";
    cout << " Enter the 1st binary number: ";
    cin >> bn1;
    cout << " Enter the 2nd binary number: ";
    cin >> bn2;
    while (bn1 != 0 || bn2 != 0)
    {
        sum[i++] = (int)((bn1 % 10 + bn2 % 10 + r) % 2);
        r = (int)((bn1 % 10 + bn2 % 10 + r) / 2);
        bn1 = bn1 / 10;
        bn2 = bn2 / 10;
    }
    if (r != 0) {
        sum[i++] = r;
    }
    --i;
    cout << " The sum of two binary numbers is: ";
    while (i >= 0) {
        cout << (sum[i--]);
    }
    cout << ("\n");
    cout << ("\n\n");
}

void printOneAndTwosComplement()
{
    string bin;
    cout << "Enter A Binary Number:" << endl;
    cin >> bin;
    int n = bin.length();
    int i;

    string ones, twos;
    ones = twos = "";

    for (i = 0; i < n; i++)
        ones += flip(bin[i]);

    twos = ones;
    for (i = n - 1; i >= 0; i--)
    {
        if (ones[i] == '1')
            twos[i] = '0';
    }
}
```

```

        else
        {
            twos[i] = '1';
            break;
        }
    }

    if (i == -1)
        twos = '1' + twos;

    cout << "1's complement: " << ones << endl;
    cout << "2's complement: " << twos << endl;
    cout << "\n\n";
}

int main()
{
    int ch;
    while(true)
    {
        cout << "1. Addition Of Two Binary Numbers.\n";
        cout << "2. Ones And Twos Complement Of A Binary Number.\n";
        cout << "3. Exit.\n";
        cout << "Enter Your Choice: " << endl;
        cin >> ch;

        switch(ch)
        {
            case 1:
                addTwoBinaryNumbers();
                break;
            case 2:
                printOneAndTwosComplement();
                break;
            case 3:
                exit(0);
            default:
                cout << "Please Enter A Valid Input!";
        }
    }
    return 0;
}

```

**OUTPUT:-**

```

student@studentcomp:~$ g++ binary0.cpp -o ab
student@studentcomp:~$ ./ab
1. Addition Of Two Binary Numbers.
2. Ones And Twos Complement Of A Binary Number.
3. Exit.
Enter Your Choice:
1
Addition of two binary numbers:
Enter the 1st binary number: 1010
Enter the 2nd binary number: 1000
The sum of two binary numbers is: 10010

1. Addition Of Two Binary Numbers.
2. Ones And Twos Complement Of A Binary Number.
3. Exit.
Enter Your Choice:
2
Enter A Binary Number:
1001
1's complement: 0110
2's complement: 0111

1. Addition Of Two Binary Numbers.
2. Ones And Twos Complement Of A Binary Number.
3. Exit.
Enter Your Choice:
3
student@studentcomp:~$

```