

Add two numbers without using arithmetic operators

Write a function Add() that returns sum of two integers. The function should not use any of the arithmetic operators (+, ++, -, -, .. etc).

Sum of two bits can be obtained by performing XOR (^) of the two bits. Carry bit can be obtained by performing AND (&) of two bits.

Above is simple **Half Adder** logic that can be used to add 2 single bits. We can extend this logic for integers. If x and y don't have set bits at same position(s), then bitwise XOR (^) of x and y gives the sum of x and y. To incorporate common set bits also, bitwise AND (&) is used. Bitwise AND of x and y gives all carry bits. We calculate (x & y) << 1 and add it to x ^ y to get the required result.

```
#include<stdio.h>
```

```
int Add(int x, int y)
{
    // Iterate till there is no carry
    while (y != 0)
    {
        // carry now contains common set bits of x and y
        int carry = x & y;

        // Sum of bits of x and y where at least one of the bits is not set
        x = x ^ y;

        // Carry is shifted by one so that adding it to x gives the required sum
        y = carry << 1;
    }
    return x;
}
```

```
int main()
```



```

{
    printf("%d", Add(15, 32));
    return 0;
}

```

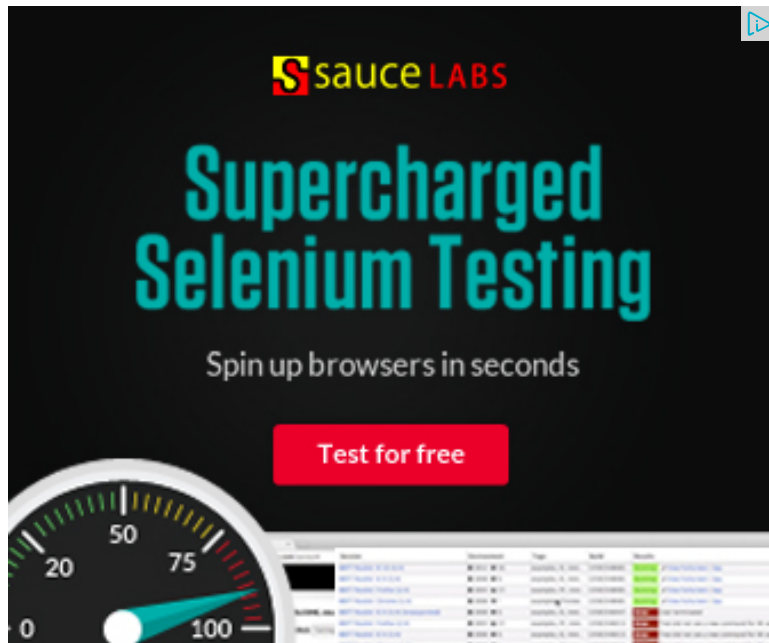
Following is recursive implementation for the same approach.

```

int Add(int x, int y)
{
    if (y == 0)
        return x;
    else
        return Add( x ^ y, (x & y) << 1);
}

```

Please write comments if you find anything incorrect, or you want to share more information about the topic discussed above.



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Patil • 6 months ago

How to make Substraction of two numbers without using any arithmetic opera

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fox_3 → Patil • a month ago

```
int sub(int x,int y)
```

```
{
y=add(~x,1);
x=add(x,y);
return x;
}
```

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hiya83 → Patil • 2 months ago

Correct me if I am wrong, but I think this will work?

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```
int subtract(int x, int y)
{
    if (y == 0)
        return x;

    int sub = x ^ y;
    int sub_carry = (sub & y) << 1;
    return subtract(sub, sub_carry);
}
```

^ | v • Reply • Share ›



fox_3 → hiya83 • a month ago

You lost the complete logic.

^ | v • Reply • Share ›



toxic_inside • 10 months ago

//This code will work for both positive and negative integers..

```
#include<stdio.h>

int main()
{
    int a=7,b=-6,flag;

    if(a>0)
    {
        for(flag=0;flag<a;flag++)
            b++;
    }
}
```

705



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```

- (void)
{
    for(flag=0;flag>a;flag--)
        b--;
}

printf("the output is: %d",b);

}

```

3 ^ | v • Reply • Share ›



Rafi Kamal → toxic_inside • 4 months ago

isn't increment operation is an arithmetic operation?

3 ^ | v • Reply • Share ›



Anil Chowdary Raavi • 10 months ago

give me the reciprocal example....i will give the answer

^ | v • Reply • Share ›



Aritra Dutta • 10 months ago

excellent one!

^ | v • Reply • Share ›



Arjun • 10 months ago

```

#include
#include
int main()
{
    int a,b,flag;
    printf("enter 2 no.s: ");
    scanf("%d %d",&a,&b);

```

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```
if(a>0)
{
for(flag=0;flag<a;flag++)
b++;
}
else if(aa;flag--)
b--;
}
printf("the output is: %d",b);
getch();
}
```

1 ^ | v • Reply • Share ›



arjun • 10 months ago

```
#include
#include
int main()
{
int a,b,flag;
printf("enter 2 no.s: ");
scanf("%d %d",&a,&b);
if(a>0){
for(flag=0;flag<a;flag++)
b++;
}
else if(aa;flag--)
b--;
}
printf("the output is: %d",b);
getch();
}
```



Amol Korade · 10 months ago

nice program...

^ | v · Reply · Share ›



Ruthwik Ram · 11 months ago

cn u send me reciprocal of two numbers by using c.

^ | v · Reply · Share ›



Vishal Bose · a year ago

nice program

^ | v · Reply · Share ›



Dambigan Subramani · a year ago

nice program...

^ | v · Reply · Share ›



Amit · a year ago

```
/* Paste your code here (You may delete these lines if not writing c)
int add(int a, int b) {
    if (b == 0) return a;
    int sum = a ^ b;
    int carry = (a & b) << 1;
    return add(sum, carry);
}
```

1 ^ | v · Reply · Share ›



sanjana → Amit · 9 months ago

when v r dng xor v r getting the sum of two num "int sum=x^y"..then wr

^ | v · Reply · Share ›



fox_3 → sanjana · a month ago

see the logic of Half adder. You will understand.

^ | v · Reply · Share ›



Kashish Naznee · a year ago

java

^ | v · Reply · Share ›



aseemgoyal · a year ago

/* Paste your code here (You may **delete** these lines **if not** writing c)

^ | v · Reply · Share ›



chan · a year ago

ultimate solution..

^ | v · Reply · Share ›



Thangaraj · 2 years ago

```
#include"stdio.h"
```

```
#include"conio.h"
```

```
void main()
```

```
{
```

```
    int a,b,sum;
```

```
    char *p;
```

```
    clrscr();
```

```
    printf("Enter 2 values : ");
```

```
    scanf("%d%d",&a,&b);
```

```
    p = (char *)a;
```

```
    sum = (int)&p[b];
```



```
printf("\nSum : %d", sum);  
getch();  
}
```

^ | v • Reply • Share ›



Ranga → Thangaraj • 2 years ago

Can you tell me how this works? I'm not able to figure it out.

```
/* Paste your code here (You may delete these lines if not wri
```

^ | v • Reply • Share ›



sudhanshu → Ranga • 10 months ago

From what I checked, the above code simply adds them, using

Try using

```
sum =(int)(p+b);
```

And you will get what I mean. &p[b] does the same thing.

^ | v • Reply • Share ›



fox_3 → sudhanshu • a month ago

nice.!

^ | v • Reply • Share ›



decaptchers • 2 years ago

Fabulous, what a webpage it is! This web site presents valuable facts to us, keep it up.

^ | v • Reply • Share ›



mayautobot • 2 years ago



//for adding two integers without using any arithmetic operator

```
void add(int a, int b)
{
    int temp=((a&b)<<1)|((a^b);
    std::out<<temp;
}
```

//this program is also giving sum of two integers.

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Rajesh → mayautobot • 2 years ago

Hi,

How does this works for a = 6 and b = 10, where just one shifting of the

```
/* Paste your code here (You may delete these lines if not writing c
```

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Amor • 2 years ago

```
/* Paste your code here (You may delete these lines if not writing c
```

```
#include<iostream>
#include<iomanip>
using std::setw;
using namespace std;
void displaybit(unsigned int);
int add(int,int);
int main()
{
    unsigned int x=5;
    unsigned int y=3;
    cout<<"\n x= ";
```

```
displaybit(x),  
cout<<"\n y= ";  
displaybit(y);  
int l=add(x,y);
```

[see more](#)

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Amor → Amor • 2 years ago

This is the code for addition of two numbers without arithmetic operato

^ | v • Reply • Share ›



Spider • 2 years ago

```
#include<stdio.h>  
  
int main()  
{  
    int x=-5,y=12;  
  
    char *p=x;  
    printf("%d",&p[y]);  
}
```

^ | v • Reply • Share ›



Nihal → Spider • 2 years ago

how does it work??

```
/* Paste your code here (You may delete these lines if not wri
```

^ | v • Reply • Share ›



Spider → Nihal • 2 years ago

pointer p point the memory location denoted by x and p[y] = (p + y) * sizeof(int) = (p + y) * 4 = p + 4 * y = p + memory location x+y.

^ | v • Reply • Share ›



rkmlmp → Spider • 2 years ago

Hi Spider,

Will you please justify that

1. How can a int be assigned to char*?

2. p is the address of x, so p[y] yields

*(&x + y) i.e. some long value(address of x) + y that will
some of X and Y.

^ | v • Reply • Share ›



abc → rkmlmp • 2 years ago

Brilliant!!

```
/* Paste your code here (You may delete these li
```

^ | v • Reply • Share ›



Spider → rkmlmp • 2 years ago

@rkmlmp let see this example

```
#include<stdio.h>

int main()
{
    int x=10,y=2;

    char *p=x;
    printf("%d",&p[y]);
}
```

char *p=x => (genrally we assign *p =&x than p locate t
the variable x)but here p locate the memory location 10..
&p[y] = &(p+y) (not (&x+y))..so p[y]=content of the memr
&p[y] retur the address of that location

1 ^ | v • Reply • Share ›



ATul • 2 years ago

1. printf returns the length of the string it outputs.
i.e. printf("%d",printf("pqrt")) ==> will give 4 as output.

2. Also in printf("%*s) , %*s tells to read the precision field from the next argun
Here printf("%*s%*s",a,"",b,"") is equivalent to

```
printf("%9s,%3s","", ""); //As a=9 and b=3.
```

Thus two strings of length 9 and 3 are printed. And due to the nested printf, it r

```
printf("\n%d\n",printf("%9s%3s","", "")); //will also return 12.
```

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harsh • 2 years ago

here is the another solution

```
int main()  
{  
    int a=9;  
    int b=3;  
    printf("%d\n",printf("%*s%*s",a,"",b,""));  
  
    return 0;
```

```
}
```

^ | v • Reply • Share ›



hina → harsh • 2 years ago

can u xplain how it works

^ | v • Reply • Share ›



Anurag Gupta → harsh • 2 years ago

Doesn't works for negative numbers

```
/* Paste your code here (You may delete these lines if not wri
```

^ | v • Reply • Share ›



harsh • 2 years ago

hey wahat abt this code ??

without any operator

```
int main()
{
    int a=9;
    int b=3;
    printf("%d\n",printf("%*s*s",a,"",b,""));

    return 0;
}
```

^ | v • Reply • Share ›



deovrat → harsh • 2 years ago

the code is working properly but am unable to understand the working

^ | v • Reply • Share ›



adi → deovrat • 2 years ago

inner printf returns the no of chars and outer printf prints it.

^ | v • Reply • Share ›



harsh → harsh • 2 years ago

you can read about * operator in printf here

The width is specified as an additional integer value argument preceding formatted using * operator . So a and b specifies the width and printf refers to the outer printf and thus the result gets printed

^ | v • Reply • Share ›



harsh → harsh • 2 years ago

read here about * in printf

<http://www.cplusplus.com/reference/printf/>

^ | v • Reply • Share ›



harshitha → harsh • 2 years ago

Could u explain how it works?

^ | v • Reply • Share ›



udp → harsh • 2 years ago

@harsh, your solution works. Please explain your logic.

^ | v • Reply • Share ›



cleek → udp • 2 years ago

it doesn't really satisfy the terms of the question. it's just relying

^ | v • Reply • Share ›



This is a wonderful way to illustrate assembly programming.

```
/* Paste your code here (You may delete these lines if not writing c
```

^ | v • Reply • Share ›



ravida • 2 years ago

it's work....correctly but i not undestand what is comman set of bit?? and how binary ..?

^ | v • Reply • Share ›



rkmlmp → ravida • 2 years ago

Dear not only C but all Languages, internally work on Binary numbers(l operation are carried on after conversion into Binary.

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