Check for Integer Overflow

Write a “C” function, int addOvf(int* result, int a, int b) If there is no overflow, the function places the resultant = sum a+b in “result” and returns 0. Otherwise it returns -1. The solution of casting to long and adding to find detecting the overflow is not allowed.

Method 1

There can be overflow only if signs of two numbers are same, and sign of sum is opposite to the signs of numbers.

```
1)  Calculate sum
2)  If both numbers are positive and sum is negative then return -1
     Else
        If both numbers are negative and sum is positive then return -1
        Else return 0
```

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

/* Takes pointer to result and two numbers as
    arguments. If there is no overflow, the function
    places the resultant = sum a+b in “result” and
    returns 0, otherwise it returns -1 */
 int addOvf(int* result, int a, int b)
 {
     *result = a + b;
     if(a > 0 && b > 0 && *result < 0)
         return -1;
     if(a < 0 && b < 0 && *result > 0)
         return -1;
     return 0;
 }
```


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```
int main()
{
    int *res = (int *)malloc(sizeof(int));
    int x = 2147483640;
    int y = 10;

    printf("%d", addOvf(res, x, y));

    printf("\n %d", *res);
    getchar();
    return 0;
}
```

Time Complexity : O(1)
Space Complexity: O(1)

Method 2

Thanks to Himanshu Aggarwal for adding this method. This method doesn't modify *result if there us an overflow.

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

int addOvf(int* result, int a, int b)
{
   if( a > INT_MAX - b)
     return -1;
   else
   {
     *result = a + b;
      return 0;
   }
}

int main()
{
  int *res = (int *)malloc(sizeof(int));
  int x = 2147483640;
  int y = 10;

  printf("%d", addOvf(res, x, y));
  printf("\n %d", *res);
```

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```
    getchar();
    return 0;
}
```

Time Complexity : O(1)
Space Complexity: O(1)

Please write comments if you find any bug in above codes/algorithms, or find other ways to solve the same problem

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neelabhsingh • 6 months ago
How to check the overflow without using branch?

amit • 7 months ago
Even 1st method won't work if we take a>0 at boundary level and b<0 in that c
0

Anubhav Gupta • 9 months ago
I think both the methods are partially correct.
If one(or both) of the given numbers are already exceeding the integer ranges, it.
For eg.
if a = 32768, b = 3
then result = -32765
Is that wrong?

ajith • 9 months ago

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```
 int addOvf(int *result, int a,int b)
{
   int temp;
   *result=a+b;
   temp=(b-a)/2 + a;
   if(*result/2 == temp)
   return 0;

   return -1;
}
```


akshat gupta • 11 months ago

msb1=n1&(1<<31)
msb2=n2&(1<<31)
n1=n1-(msb1<<31);
n2=n2-(msb2<<31);

ovflow= (n1+n2)&(1<<31)
if((msb1&&msb2)||(msb1||msb2)&&ovflow)
return(-1);
return(0);

ultimate_coder • a year ago

hey...plzz tell me... is method 1 using roll over concept???

Hanish • a year ago

Method 2 does not work for the case when b is negative.
e.g.
if a= 50 and b= -10
result should be 40 with no overflow.
but method 2 gives the ans as -1
since, INT_MAX - b = -2147483639
thus, a>INT_MAX - b hence it returns -1 which is incorrect.

Kindly correct this

RDD ➚ Hanish • a year ago

Yes you are correct.

pajju • 3 years ago

```
 /* portable for any Compiler*/
int addOvf(int* result, int a, int b)
{
 if(a>0 && b>0)
    if ((a+b)<0)               //a+b<0 at Positive Overflow
    return -1;
 else if(a<0 && b<0)
         if ((a+b)>0)          //a+b>0 at Negative Overflow
    return -1;

 else
  {
  *result = a+b;
  return 0;
  }
}
```

dipendra • 3 years ago

this site describes the overflow detection to the best possible in generalized a

Himanshu Aggarwal • 4 years ago

Hi,

I think that first solution is non-compliant.

K&R, second edition, Appendix A- Section A.7, quotes :

"The handling of overflow, divide check, and other exceptions in expression ev
language."

Hence the solution is non-portable as per my understanding.

Regards,
Himanshu Aggarwal

pi Himanshu Aggarwal • 6 months ago

if((a>INT_MAX-b)||(a<int_min-b)) i="" think="" this="" statement="" shou
if(="" a="">INT_MAX - b) statement of second method

pajju Himanshu Aggarwal • 3 years ago

Your solution is not portable. You are expecting INT_MAX to be defined

Bandicoot • 4 years ago

I didn't understand the motivation behind method 2. The post says method 2 is *result. In that case why can't we use temp = a + b in method 1 instead of *res Also, in method 2, is there an assumption that both a >0 and b >0 ? If both are another case which checks a < INT_MIN - b ?

Himanshu Aggarwal Bandicoot • 4 years ago

Hi,

That would be an underflow if a<0 and b<0. The aforementioned proble detection.

Thanks,
Himanshu

GeeksforGeeks • 4 years ago

@Himanshu Aggarwal: Thanks for suggesting a new method. We have includ

@Hary: If we do not want to modify *result in case of overflow then we can use Aggarawal.

Himanshu Aggarwal • 4 years ago

Hi,

Let the two numbers be 'a' and 'b'

we can also write the overflow condition as :

```
 int addOvf(int* result, int a, int b)
{
      if( a > INT_MAX - b)
```

```
        else {
             *result = a + b;
              return 0;
        }
}
```

Hary • 4 years ago

Not very sure but to me the main solution also seems to be non-compliant. Re
itself says store the sum in "result" only if an overflow has not occured.

geeksforgeeks • 5 years ago

@Raj: Thanks, your solution looks concise, but when looked into this carefully
It always returns 0.

Gautam • 5 years ago

Raj's solution doesn't works for boundary conditions.

raj • 5 years ago

```
 int addOvf(int* result, int a, int b)
{
    *result = a + b;
    if((*result-a)==b)
    return 0;

     return -1 ;
}
```