

Useful algorithm tricks

tutorial

c

c-plus-plus

strings

smsubham #1 August 6, 2019, 8:45am

Hi

Found some useful tricks which will be useful during programming contest.

Quickly divide or multiply by 2

Numbers are stored in memory as bits. So bitwise operations are quite fast.

So if you shift all bits to the left, you are multiplying a number by 2:

```
cout<<(3 << 1); //6 //shift bits to the left one time
cout<<(3 << 2); //12
```

Similarly if you shift bits to the right, you will be dividing them by 2:

```
cout<<(12 >> 1); //6
```

Swap two no without temporary.

Method 1 :

```
a = a + b;
b = a - b;
a = a - b;
```

Method 2 :

```
a ^= b;
b ^= a;
a ^= b;
```

Loop in C-string:

```
char s[100];
for (int i = 0; s[i]; ++i) { ... }
```

Quite useful (also avoids the strlen usage, that you could forget is $O(n)$ and put



Testing if not negative 1:

```
if (~x) { ... }
```

In competitive programming we look to code fast and try to write as little as possible, so a simple

```
x ! = -1
```

can be shortened to 2 characters.

Last one:

Finding size of array without sizeof in c and c++

```
int main ()
{
    int arr[100];
    printf ("%d", (&arr)1 - arr);
    return 0;
}
```

Source- [link text](#) and [link text](#)

Help me in adding more of these ...

9 Likes

[smsubham](#) #2 October 3, 2016, 7:43pm

For c++ user

To avoid many `#include` just write

```
#include <bits/stdc++.h>
```

This will include all standard c++ library including vectors , algorithm etc.

Faster I/O

```
ios_base::sync_with_stdio(false);
cin.tie(NULL);
```

For faster I/O , which actually disables sync with scanf and printf , increasing speed of I/O. After writing this you cannot use scanf or printf , it will result in compilation error.

4 Likes

coderaashir #3 October 3, 2016, 8:15pm

Swaps can be performed in another way;

If you have 2 variables a and b, you can swap them by using the following:

```
a = a + b - (b = a);
```

7 Likes

zscoder #4 October 16, 2016, 11:04am

Btw, in C++, you can use `swap(a, b)` to swap to integers a, b.

4 Likes

codetheta #5 October 16, 2016, 1:13pm

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<http://www.codetheta.com/>

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kay_kay #6 October 18, 2016, 6:25pm

Some other programming tricks

1. Find the power of 2 without using inbuilt function

$(1 \ll n)$ is equal to `pow(2, n)`

For Ex:

$(1 \ll 3) \rightarrow (00000001) \ll 3 = 00000100 = 8$

2. Find if a number is even or odd

For odd numbers, $(n \& 1)$ is equal to 1

For even numbers, $(n \& 1)$ is equal to 0

```
if(n&1){  
    //...Odd  
}else{  
    //Even...  
}
```

3. Find mid point without overflow

`int mid = (s+e)/2` may sometimes cause overflow

It is better to use `mid = s + (e-s)/2`

3 Likes

[bansal1232](#) #7 October 18, 2016, 7:52pm

Always use built in function of C++, Usefull for binary manipulation like...

Number of leading zeroes: `builtin_clz(x)`

Number of trailing zeroes : `builtin_ctz(x)`

Number of 1-bits: `__builtin_popcount(x)`

Use template of C++, as much as you can, even in taking input or output...

FOR INPUT

```
template inline void fi(T &a) { register char c=0; while (c<33) c=getchar(); a=0; int tmp = 0; while (c>33) { if ( c == 45 ) tmp = 1; else a=a*10+c-'0'; c=getchar(); } if ( tmp == 1 ) a = 0-(a); }
```

FOR OUTPUT

```
template void outpos(T n){if(n<0){outchar('-');n*=-1;}char snum[65];int i=0;do {snum[i++]=n%10+'0';n/=10;} while(n);i=i-1;while(i>=0)outchar(snum[i--]);outchar('');}
```

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[sarvagya3943](#) #8 October 18, 2016, 8:46pm

[Click for C++ tricks](#)

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[hkright](#) #9 October 18, 2016, 10:08pm

Using : `((x != 0) && !(x & (x - 1)))` to check if x is a power of 2. (i.e x is of form 2^k)

Initializing array in compact form with additional flexibility:

```
int A[] = {[0 ... 5] = 9, [6 ... 9] = 0};
```

[Notice spaces between 0 and '...' (ellipsis) and '...' and 5)

Good list of bit manipulation tricks ->



What USEFUL bitwise operator code tricks should a developer know about?

language-agnostic, bit-manipulation, bit

asked by [non sequitor](#) on 05:44PM - 07 Oct 09 UTC

Finding minimum of 3 numbers using function with 2 args : $k = \min(a, \min(b, c))$

Exiting nested loops :

Either by using goto statement or by invalidating test condition for outer loop.



how to exit nested loops

bo1

c++, loops, while-loop, break

asked by [gr33kbo1](#) on 05:22AM - 07 Sep 13 UTC

Ability to equate two arrays (using structs) : <http://stackoverflow.com/a/744556>

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[gmiller](#) #10 April 7, 2017, 1:24pm

Here is few more [C programming puzzles and tricks](#) .Bitwise Xor of A and B($A \oplus B$) is equivalent to sum of A and B($A+B$).

Hence algorithm can be re-written in terms of Xor operator as:

$A = A \oplus B$

$B = A \oplus B;$

$A = A \oplus B;$

or $A \oplus B \oplus A \oplus B;$

swap two variables using xor operator

Bitwise operator trick: Here is another trick to efficiently [multiply a number with 7 using bitwise operator](#).

As we know that, left shifting any number by one bit multiply it by 2. Hence, multiplying any number with 8 is equivalent to right shifting it by 3 bits(For Example : $N \times 3 = N \ll 3$).

Replacing $8 \times N$ in above statement by $8 \ll 3$.

$N \times 7 = (N \ll 3) - N$

smsubham #11 March 28, 2019, 1:01am

yes ... i have just provided how it can be done ...

smsubham #12 March 28, 2019, 1:01am

Thanks for posting this. I have made a post to check for power of 2. Have a look at it.

<https://discuss.codechef.com/questions/85703/checking-if-a-no-is-power-of-2>

Happy Coding ...

1 Like

smsubham #13 March 28, 2019, 1:01am

Thanks for posting this. Have provided this link in source already ...

Happy Coding ...

smsubham #14 March 28, 2019, 1:01am

Thanks for posting this. I have made a post to check for power of 2. Have a look at it.

<https://discuss.codechef.com/questions/85703/checking-if-a-no-is-power-of-2>

Happy Coding ...
