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Write one line C function to find whether a no is power of two

1. A simple method for this is to simply take the log of the number on base 2 and if you get an integer then number is power of 2.

2. Another solution is to keep dividing the number by two, i.e, do n = n/2 iteratively. In any iteration, if n%2 becomes non-zero and n is not 1 then n is not a power of 2. If n becomes 1 then it is a power of 2.

```c
#include<stdio.h>
#define bool int

/* Function to check if x is power of 2*/
bool isPowerOfTwo(int n)
{
  if (n == 0)
    return 0;
  while (n != 1)
  {
    if (n%2 != 0)
      return 0;
    n = n/2;
  }
  return 1;
}

/*Driver program to test above function*/
int main()
{
  isPowerOfTwo(31)? printf("Yes\n"): printf("No\n");
  isPowerOfTwo(17)? printf("Yes\n"): printf("No\n");
  isPowerOfTwo(16)? printf("Yes\n"): printf("No\n");
```
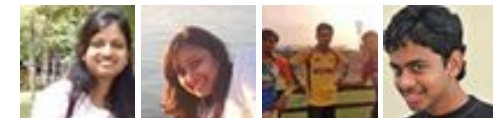
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```c
  isPowerOfTwo(2)? printf("Yes\n"): printf("No\n");
  isPowerOfTwo(18)? printf("Yes\n"): printf("No\n");
  isPowerOfTwo(1)? printf("Yes\n"): printf("No\n");
  return 0;
}
```

Output:

```
No
No
Yes
Yes
No
Yes
```

3. All power of two numbers have only one bit set. So count the no. of set bits and if you get 1 then number is a power of 2. Please see http://geeksforgeeks.org/?p=1176 for counting set bits.

4. If we subtract a power of 2 numbers by 1 then all unset bits after the only set bit become set; and the set bit become unset.

For example for 4 (100) and 16(10000), we get following after subtracting 1
3 –> 011
15 –> 01111

So, if a number n is a power of 2 then bitwise & of n and n-1 will be zero. We can say n is a power of 2 or not based on value of n&(n-1). The expression n&(n-1) will not work when n is 0. To handle this case also, our expression will become n& (!n&(n-1)) (thanks to Mohammad for adding this case).
Below is the implementation of this method.

```c
#include<stdio.h>
#define bool int

/* Function to check if x is power of 2*/
bool isPowerOfTwo (int x)
{
  /* First x in the below expression is for the case when x is 0 */
  return x && (!(x&(x-1)));
}
```

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```c
/*Driver program to test above function*/
int main()
{
  isPowerOfTwo(31)? printf("Yes\n"): printf("No\n");
  isPowerOfTwo(17)? printf("Yes\n"): printf("No\n");
  isPowerOfTwo(16)? printf("Yes\n"): printf("No\n");
  isPowerOfTwo(2)? printf("Yes\n"): printf("No\n");
  isPowerOfTwo(18)? printf("Yes\n"): printf("No\n");
  isPowerOfTwo(1)? printf("Yes\n"): printf("No\n");
  return 0;
}
```
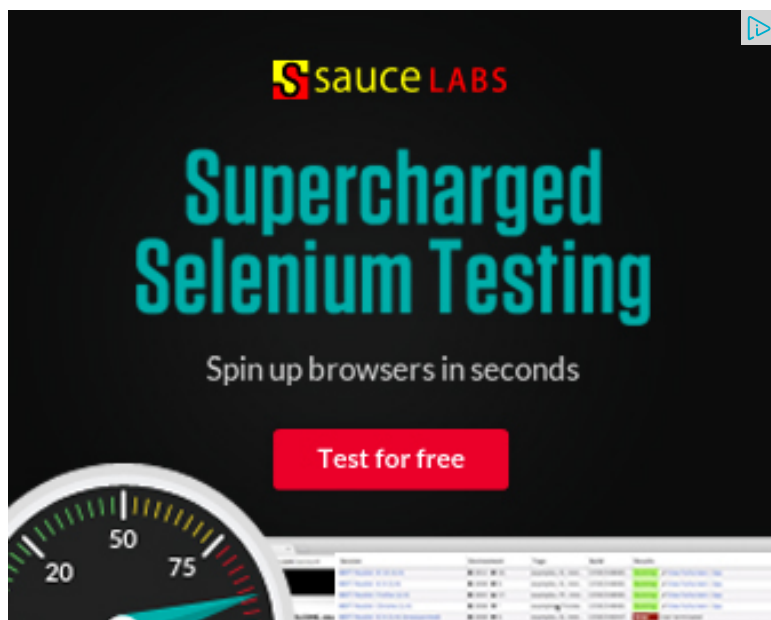
Output:

```
No
No
Yes
Yes
No
Yes
```

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

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Aveek Biswas · a month ago

Is writing an one line Java function for this possible?

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Guest · 4 months ago

int isPowerOfTwo(int n)

{

```
while(!(n&1))

n>>=1;

if(n==1)return 1;

else return 0;

}
```

∧ | ∨ · Reply · Share ›

Amit Kumar · 4 months ago

```
void main()

{
int value=8,i=1,count=0;
while (i){

if(value & i){ ++count;
}
i=i<<1;
}
printf(" value: %d", count);

if(count == 1) {
printf("Number is power of two");
}

}
```

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Raman Classes · 7 months ago

```
((n&(n-1))==0) ? printf("Power of 2") :printf("Not power of 2");
```

8 | · Reply · Share ›

gargsanjay · 10 months ago

in method 5

at one place u wrote n&(!(n)&n-1)

and at one place n&&(!(n)&(n-1)

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

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Hanish Bansal · a year ago

There is an error in Method 2.

For numbers of the form $2^x + 1$ (e.g. 17), it returns 1.

Correct function :

bool isPowerOfTwo(int n)

{

if(n == 0)

return 0;

while(n != 1)

{

if(n%2 != 0)

return 0;

n = n/2;

}

return 1;

}

∧ | ∨ · Reply · Share ›

amit ➔ Hanish Bansal · a year ago

yesss...method 2 is wrong

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

∧ | ∨ · Reply · Share ›

GeeksforGeeks → amit · a year ago

@Hanish Bansal: Thanks for pointing out the issue and solution up!

@amit: Thanks for bringing it to notice.

∧ | ∨ · Reply · Share ›

Rohit · 2 years ago

we can find this by checking 2's compliment of that number as 2's complimen the number itself.
therefore
if((~x+1)==x)
then power of 2
else
not
simple 1 line solution

1 ∧ | ∨ · Reply · Share ›

dgDinkar → Rohit · 7 months ago

2's compliment of any number gives it's negative number...
then how it can be equal??

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de-captcher · 2 years ago

I love your blog.. very nice colors & theme. Did you design this website yourself or did you hire someone to do it for you? Plz reply as I'm looking to design my own blog and would like to find

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krazykoder · 2 years ago

check if a log2 of the number is an integer or not!!

```c
 /* Paste your code here (You may delete these lines if not writing co
#include <stdio.h>
#include <math.h>


int main(){
    int n=9;
    float log=log2(n);
    int check=((int )(log*100))%100;// checking till precision of 2 de
    if(!check)
    printf("yeaa");
    else
    printf("noo");


}
```

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krazykoder · 2 years ago

check if a log2 of the number is an integer or not!!

```c
 /* Paste your code here (You may delete these lines if not writing co
#include <stdio.h>
#include <math.h>

int main(){
    int n=9;
    float log=log2(n);
```

```c
int check ((int )(log 100))%100;// checking till precision of 2 d

    if(!check)

    printf("yeaa");

    else

    printf("nooooo");


}
```

krazykoder · 2 years ago

```c
/* Paste your code here (You may delete these lines if not writing coc
#include <stdio.h>
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int main(){
    int n=9;
    float log=log2(n);
    int check=((int )(log*100))%100;// checking till precision of 2 de
    if(!check)
    printf("yeaa");
    else
    printf("nooooo");


}
```

ritesh_nitw · 2 years ago

One line and a single BITWISE AND is sufficient

```
x&(x-1)==0?print x is power of two : print Nops!!
```

2 ∧ | ∨ · Reply · Share ›

anji.swe · 2 years ago

sorry,....
conditions
n&(1-n)==n

n&(2+~n)==n

are giving false for one, and true for zero.

∧ | ∨ · Reply · Share ›

anji.swe · 2 years ago

if n is a power of two then ..

(n&(-n)) = n
(n&(1+~n)) = n
(n & (~(n & (n - 1)))) =n
(n & (n - 1))=0
~(n & (n - 1))=-1
!(n & (n - 1)) =1

so...
use any one of them in if condition and evaluate n...

:)

0,1 are treated as powers of 2, if dont want put a condition

anji.swe · 2 years ago

if n is a power of two then ..

(n&(1-n)) = n
(n&(1+~n)) = n
(n & (~(n & (n - 1)))) =n
(n&(2+~n)) =n
(n & (n - 1))=0
~(n & (n - 1))=-1
!(n & (n - 1)) =1

so...
use any one of them in if condition and evaluate n...

:)

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anji.swe · 2 years ago

if n is a power of two then ..

(n&(1-n)) = n
(n&(1+~n)) = n
(n & (~(n & (n - 1)))) =n
(n&(2+~n)) =n
(n & (n - 1))=0
~(n & (n - 1))=-1
!(n & (n - 1)) =1

so...
use any one of then in if condition and evaluate n...

:)

ap · 3 years ago

if (x & (~x + 1) == x) then it is a power of two

ap → ap · 3 years ago

correct me if i am missing any

pnh · 3 years ago

```
void twoPowerN(int n)
{
printf("%d is %s power of 2 \n ",n, (((n)&(n-1))==0?"a":"not a"));
}
```

mm10 · 3 years ago

Correction from my previous comment

```
if((n&1)==1) // not a power of 2
if((n&1)==0) // power of 2
```

Would this code not be feasible?

Thanks
MM

maruti kutre → mm10 · 7 months ago

number/2 ==0. 6 is divisible by 2 but its not power of 2. correct me if I a

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amit nanda ➜ mm10 · 10 months ago

1 is also a power of 2 but your code give wrong result.

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Sandeep ➜ mm10 · 3 years ago

@mm10:

This code would check for multiple of 2, not power of 2. For example, s
of 2".

1 ∧ | ∨ · Reply · Share ›

geeksforgeeks · 4 years ago

@manoj: We have added few more words in solution 2 to elaborate the point.

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manoj · 4 years ago

Solution (2) doesn't seem correct. 2's powers are 2,4,8,16,... and solution (2)
of 2.

∧ | ∨ · Reply · Share ›

pnh ➜ manoj · 3 years ago

6 = 110 and 5 = 101
(n)&(n-1) = (110 & 101) is not equal to zero....
so solution (2),
void twoPowerN(int n)
{
printf("%d is %s power of 2 \n ",n, (((n)&(n-1))==0?"a":"not a"));
}

Are you a developer? Try out the HTML to PDF API

works for all value of n !!!

geeksforgeeks · 5 years ago

@Mohammad: Thanks very much for suggesting this case. We have added it

Mohammad · 5 years ago

Nice solution but you should pay special attention to the case when x = 0. The

return x && (!(x&(x-1)));

I just added the term "x && "

Thanks

neha ↗ Mohammad · a month ago

pls explain mohammad, how u solve it by ussing "&&" ?

Aveek Biswas ↗ Mohammad · a month ago

Could you suggest an equivalent one line function in JAVA?

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