Binary representation of a given number

Difficulty Level : Easy • Last Updated : 26 Jul, 2021

Write a program to print Binary representation of a given number.

Recommended: Please solve it on "***PRACTICE***" first, before moving on to the solution.

Source: Microsoft Interview Set-3

Method 1: Iterative
For any number, we can check whether its 'i'th bit is 0(OFF) or 1(ON) by bitwise ANDing it with "2^i" (2 raise to i).

```
1) Let us take number 'NUM' and we want to check whether it's 0th bit is
    bit = 2 ^ 0 (0th bit)
    if  NUM & bit >= 1 means 0th bit is ON else 0th bit is OFF

2) Similarly if we want to check whether 5th bit is ON or OFF
    bit = 2 ^ 5 (5th bit)
    if NUM & bit >= 1 means its 5th bit is ON else 5th bit is OFF.
```

Let us take unsigned integer (32 bit), which consist of 0-31 bits. To print binary representation of unsigned integer, start from 31th bit, check whether 31th bit is ON or OFF, if it is ON print "1" else print "0". Now check whether 30th bit is ON or OFF, if it is ON print "1" else print "0", do this for all bits from 31 to 0, finally we will get binary representation of number.

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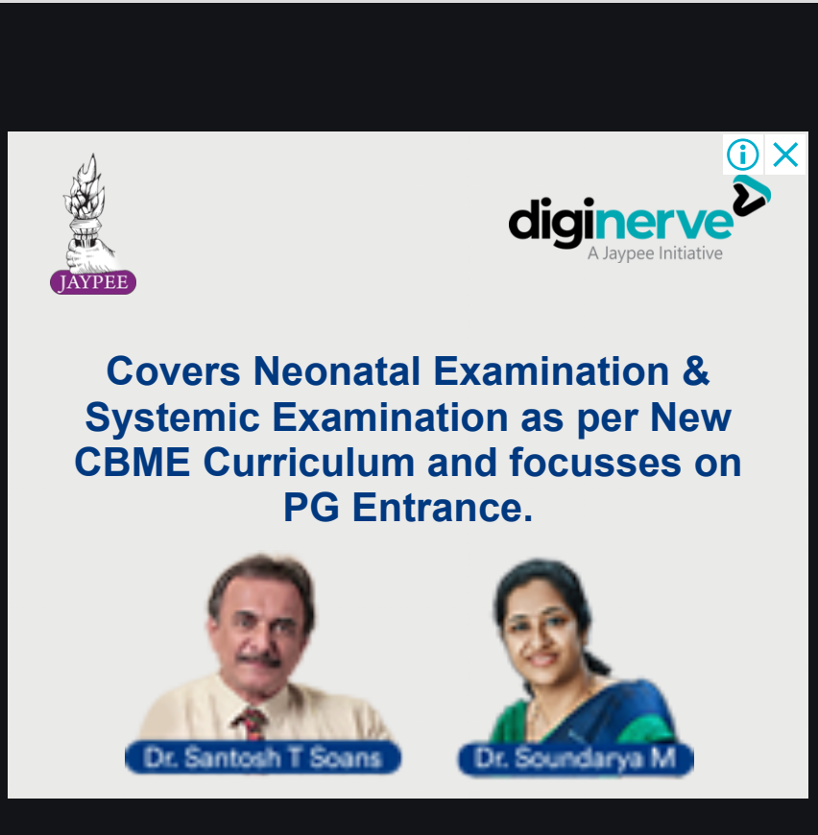
```c
#include<stdio.h>
void bin(unsigned n)
{
    unsigned i;
    for (i = 1 << 31; i > 0; i = i / 2)
        (n & i) ? printf("1") : printf("0");
}

int main(void)
{
    bin(7);
    printf("\n");
    bin(4);
}
```

Output



```
00000000000000000000000000000111
00000000000000000000000000000100
```

Method 2: Recursive
Following is recursive method to print binary representation of 'NUM'.

```
step 1) if NUM > 1
    a) push NUM on stack
    b) recursively call function with 'NUM / 2'
step 2)
    a) pop NUM from stack, divide it by 2 and print it's remainder.
```

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```c
// C Program for the binary
// representation of a given number
void bin(unsigned n)
{
    /* step 1 */
    if (n > 1)
        bin(n / 2);

    /* step 2 */
    printf("%d", n % 2);
}

// Driver Code
int main(void)
{
    bin(7);
    printf("\n");
    bin(4);
}
```

Output

```
111
100
```

Method 3: Recursive using bitwise operator
Steps to convert decimal number to its binary representation are given below:

```
step 1: Check n > 0
step 2: Right shift the number by 1 bit and recursive function call
step 3: Print the bits of number
```

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```cpp
// C++ implementation of the approach
#include <bits/stdc++.h>
using namespace std;

// Function to convert decimal
// to binary number
void bin(unsigned n)
{
    if (n > 1)
        bin(n >> 1);

    printf("%d", n & 1);
}

// Driver code
int main(void)
{
    bin(131);
    printf("\n");
    bin(3);
    return 0;
}
```

Output

```
10000011
11
```

Method 4: Using Bitset of C++

We can use the *bitset class of C++* to store the binary representation of any number (positive as well as a negative number). It offers us the flexibility to have the number of bits of our desire, like whether we want to have 32-bit binary representation of just an 8-bit representation of a number.

A complete guide to using bitset can be found on this gfg article **LINK**.

C++

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

int main()
{

    int n = 5, m = -5;
    bitset<8> b(n);
    bitset<8> b1(m);
    cout << "Binary of 5:" << b << endl;
    cout << "Binary of -5:" << b1 << endl;
    return 0;
}
```

```
Output:
Binary of 5:00000101
Binary of -5:11111011
```

Method 5: Inbuilt library of Python

Python3

```python
def binary(num):
    return int(bin(num).split('0b')[1])

if __name__ == "__main__" :
    x = 10
    binary_x = binary(x)
    print(binary_x)

# This code is contributed by Rishika Gupta.
```

Output

```
1010
```

https://youtu.be/p0Vyq2_Q_ul

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This article is compiled by **Narendra Kangralkar**.

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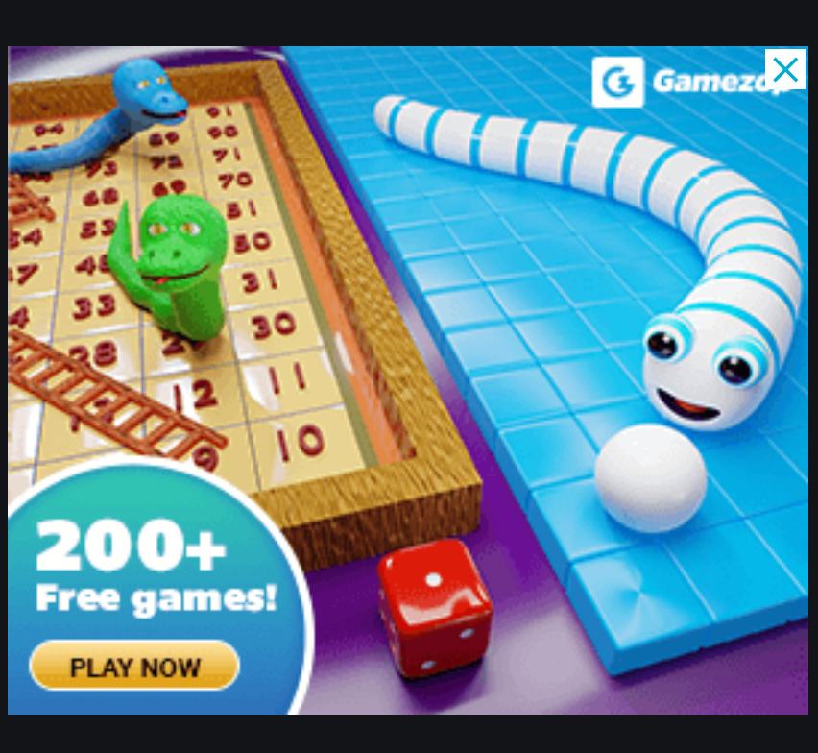

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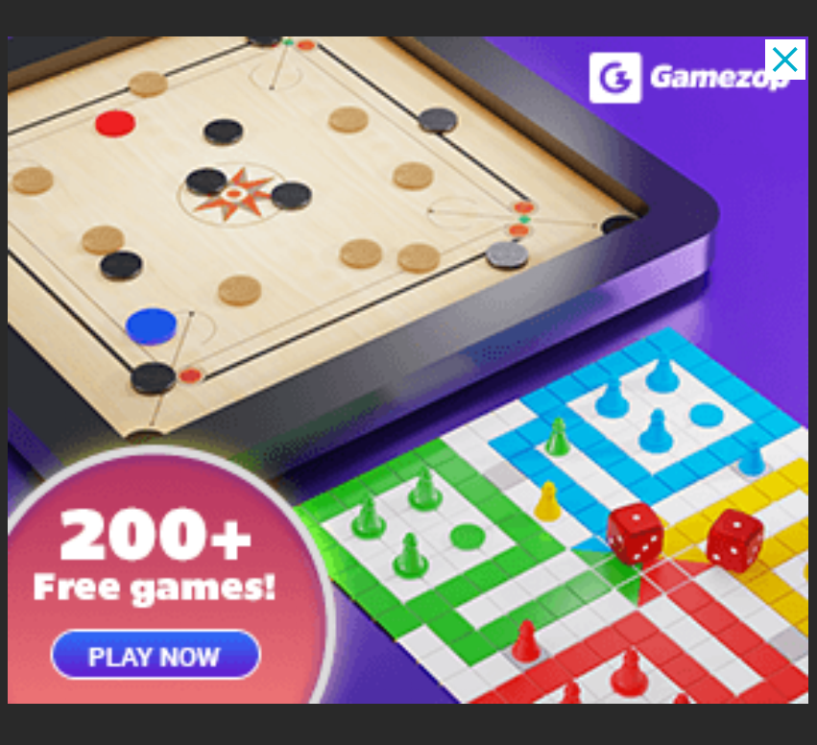

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