

# Bit-Manipulation



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## Sort Integers by

## The Number Of

## 1 bits

Company :- amazon

### 1356. Sort Integers by The Number of 1 Bits

Hint

Easy

1.9K

96



Companies

Sort C++/Java.

You are given an integer array `arr`. Sort the integers in the array in ascending order by the number of 1's in their binary representation and in case of two or more integers have the same number of 1's you have to sort them in ascending order.

Return the array after sorting it.

Example:-  $arr = \{5, 2, 3, 8\}$   $\leftarrow$

$\downarrow$	$\downarrow$	$\downarrow$	$\downarrow$
101	10	11	1000
(2)	(1)	(2)	(1)

Output =  $\{2, 8, 3, 5\}$

$\uparrow$	$\uparrow$	$\uparrow$	$\uparrow$
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Before we start, we  
should know how to  
write comparator/lambda

# for Sort

<sup>return type</sup>  
<sup>↑</sup>  
auto <sup>name</sup>  
<sup>↑</sup>  
lambda = <sup>capture clause</sup> [ ] <sup>Receive Parameters</sup>  
<sup>↑</sup>  
 (int&a, int&b) {

<sup>---bm.</sup>  
<sup>←</sup>  
 int CA = <sup>cl</sup> ~~---bm~~ <sup>cl</sup> (a);  
 int CB = <sup>h</sup> (b);  
 if (CA == CB)  
     return a < b ; //asc.  
 return CA < CB ; //asc. on basis  
                     True.                      ? 1 bit count.

$O(n \log(n) * \log_2(\text{num}))$

⇒ Sort (begin(arr), end(arr), lambda);

int find 1 bits Count (int num) {

`int count = 0;`

`while (num != 0) {` ←

`count += (num & 1);`

`num >= 1;`

$O(\log(\text{num}))$

`}  
return count;`

`}`

✓✓✓✓  
1001  
num →  $\log_2(\text{num})$

bits = 3

→ num = 1 1 0 1  
& 0 0 0 1 ←  
0 0 0 1 ← one

1

num = 0 1 1 0 ←  
& 0 0 0 1 ← one  
0

num = 0 0 1 1  
& 0 0 0 1

1

0 0 0 0 1  $\leftarrow$  one

num =  $\begin{array}{r} 00001 \\ \& 00001 \\ \hline 00001 \end{array}$   $\leftarrow$  one

1 ✓

num = 0000

App: 2  $O(n \log n)$  overall.

C++ = builtin\_popcount(num) ;  $O(1)$

JAVA = Integer.bitCount(num) ;  $O(1)$

the 1990s, the number of people in the UK who are employed in the public sector has increased by 1.5 million, from 2.5 million in 1980 to 4 million in 1995. The public sector has also become an important employer of women, with 5.5 million women employed in the public sector in 1995, compared with 4.5 million in 1980. The public sector has also become an important employer of people with disabilities, with 1.5 million people with disabilities employed in the public sector in 1995, compared with 1 million in 1980. The public sector has also become an important employer of people from ethnic minorities, with 1.5 million people from ethnic minorities employed in the public sector in 1995, compared with 1 million in 1980.

The public sector has also become an important employer of people who are over 50 years of age, with 1.5 million people over 50 years of age employed in the public sector in 1995, compared with 1 million in 1980. The public sector has also become an important employer of people who are under 25 years of age, with 1.5 million people under 25 years of age employed in the public sector in 1995, compared with 1 million in 1980.

The public sector has also become an important employer of people who are single, with 1.5 million single people employed in the public sector in 1995, compared with 1 million in 1980. The public sector has also become an important employer of people who are married, with 1.5 million married people employed in the public sector in 1995, compared with 1 million in 1980.

The public sector has also become an important employer of people who are divorced, with 1.5 million divorced people employed in the public sector in 1995, compared with 1 million in 1980. The public sector has also become an important employer of people who are widowed, with 1.5 million widowed people employed in the public sector in 1995, compared with 1 million in 1980.

The public sector has also become an important employer of people who are cohabiting, with 1.5 million cohabiting people employed in the public sector in 1995, compared with 1 million in 1980. The public sector has also become an important employer of people who are living alone, with 1.5 million people living alone employed in the public sector in 1995, compared with 1 million in 1980.

The public sector has also become an important employer of people who are living with a partner, with 1.5 million people living with a partner employed in the public sector in 1995, compared with 1 million in 1980. The public sector has also become an important employer of people who are living with a family, with 1.5 million people living with a family employed in the public sector in 1995, compared with 1 million in 1980.

The public sector has also become an important employer of people who are living with a child, with 1.5 million people living with a child employed in the public sector in 1995, compared with 1 million in 1980. The public sector has also become an important employer of people who are living with a grandchild, with 1.5 million people living with a grandchild employed in the public sector in 1995, compared with 1 million in 1980.

The public sector has also become an important employer of people who are living with a parent, with 1.5 million people living with a parent employed in the public sector in 1995, compared with 1 million in 1980. The public sector has also become an important employer of people who are living with a sibling, with 1.5 million people living with a sibling employed in the public sector in 1995, compared with 1 million in 1980.

The public sector has also become an important employer of people who are living with a friend, with 1.5 million people living with a friend employed in the public sector in 1995, compared with 1 million in 1980. The public sector has also become an important employer of people who are living with a neighbour, with 1.5 million people living with a neighbour employed in the public sector in 1995, compared with 1 million in 1980.

The public sector has also become an important employer of people who are living with a stranger, with 1.5 million people living with a stranger employed in the public sector in 1995, compared with 1 million in 1980. The public sector has also become an important employer of people who are living with a pet, with 1.5 million people living with a pet employed in the public sector in 1995, compared with 1 million in 1980.