

10

Index of first 1 in an infinite Binary sorted array

0	1	2	3	4	5	6	7	8	9	10	11	12	...	∞
0	0	0	0	0	0	0	0	0	0	0	1	1	...	

↑
l

↑
r

$a[r] = 0$

$l = r + 1$
 $r = r \times 2 = 2$

0	1	2	3	4	5	6	7	8	9	10	11	12	...	∞
0	0	0	0	0	0	0	0	0	0	0	1	1	...	

↑↑
l r

$a[r] = 0$

$r = 4$

0	1	2	3	4	5	6	7	8	9	10	11	12	...	∞
0	0	0	0	0	0	0	0	0	0	0	1	1	...	

↑
l

↑
r

$a[r] = 0$

$l = 4$
 $r = 8$

0	1	2	3	4	5	6	7	8	9	10	11	12	...	∞
0	0	0	0	0	0	0	0	0	0	0	1	1	...	

↑
l

↑
r

$a[r] = 0$

$l = 9$
 $r = 16$

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	...	∞
0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	...	

↑
l

↑
r

now find first occurrence of 1 in [9, 16]

9	10	11	12	13	14	15	16
0	0	1	1	1	1	1	1

↑
l

↑
mid

↑
r

$a[mid] = 1 \rightarrow$ This could be a possible answer

first = 12

But first occurrence might be on left

$\rightarrow r = mid - 1$

9	10	11	12	13	14	15	16
0	0	1	1	1	1	1	1

↑
l

↑
mid

↑
r

$a[mid] = 0 \rightarrow$ Go right $\Rightarrow l = mid + 1$

9	10	11	12	13	14	15	16
0	0	1	1	1	1	1	1

↑
l

↑
mid

↑
r

$a[mid] = 1 \rightarrow$ This could be a possible answer

But first occurrence might be on left

$\rightarrow r = mid - 1$

$(r < l) \rightarrow$ Exit

first = 11

↑

Ans