Qs-

<https://leetcode.com/problems/counting-bits/submissions/>

**Input:** n = 2

**Output:** [0,1,1]

**Explanation:**

0 --> 0

1 --> 1

2 --> 10

**Input:** n = 5

**Output:** [0,1,1,2,1,2]

**Explanation:**

0 --> 0

1 --> 1

2 --> 10

3 --> 11

4 --> 100

5 --> 101

Video solution:-

<https://youtu.be/awxaRgUB4Kw>

Brute Force-O( Nlog N)

Iterate from 0 to N

From each i count set bits in log N.

Optimized- O(N)

Lets take equation X/2=Y

2 cases occur :-

When X is odd, When X is even

|  |  |
| --- | --- |
| When X is odd | When X is even |
| X=5,Y=5/2=2 | X=6 ,Y=6/2=3 |
| Number of Set bits in 5 is 2. | Number of Set bits in 6 is 2. |
| Number of Set bits in 2 is 1. | Number of Set bits in 3 is 2. |
| Why is there difference in number of setbits as 1?  As 5/2 is simply right shifting 5. | Why is there difference in number of setbits as 0?  As 6/2 is simply right shifting 6. |
| 5 is odd number having 1 at LSB. | 6 is even number having 0 at LSB. |
| Right shifting 5 means deleting the 1 at LSB,  Thus reducing number of set bits by 1. | Right shifting 6 means deleting the 0 at LSB,  Thus number of set bits is not reduced. |