Sunday, 4 July 2021 12:00 PM

Q. You are given a numbers n, count no. of i such that

$0 \le i \le n$ && $n \wedge i = n + i$

Bitwise

$n = 6$,

output → 2

$6 \wedge 0 = 6 + 0$ ⇒ 0 ✓

$6 \wedge 1 = 6 + 1$ ⇒ 1 ✓

$6 \wedge 2 \ne 6 + 2$ ⇒ 2 ×

×× bitwise operator

$6 \wedge 6 = 6 + 6$ ××

x → 1 0 1 1 0 1 1 0

y → 1 1 0 1 0 1 1 0

0 1 1 0 1 1 0 0 0

$x + y = (x \wedge y) + 2*(x \& y)$

$n \wedge i = n + i$

$\cancel{n \wedge i} = \cancel{(n \wedge i)} + 2*(n \& i)$

$2(n \& i) = 0$

$\boxed{n \& i = 0}$

count the no of unset bits

$n \& i = 0$

n → 1 0 1 1 1 0 1 0 1 1 0 & 1

& 0 0/1 0 0 0 0/1 0 0/1 0 0 0/1

0

no. of unset set

$2^{(\text{no. of unset bit})}$

```
ans = 1
while (n) {
    if ((n & 1) == 0) ans *= 2;
    n >>= 1;   right shift
}
return ans;
```

$TC \to O(\log_2 n)$

Q. Given a range $[L, R]$, find a pair (i, j) such that $L \le i < j \le R$ & $(i \& j)$ is maximum

$i \ne j$

$(R \& R) == R$ ans

R → ans < R

$\boxed{R \& (R-1)}$ = minimise loss

$\boxed{R \& (R-1)}$ → unset the least significant bit

when R is a power of 2

$8 \& 7 \to 0$

R → power of 2

$(R-1) \& (R-2)$ = ans

Q. Given an array, find the max length of subsequence such that the XOR each consecutive element is equal to K

$A \to [3, 2, 4, 3, 5]$ $k = 1$

3 2 4 ××

subsequence → [3 ^ 2 ^ 3] = ans → 3

$\boxed{3 \wedge 2 \wedge 3} = k$

| a | b | c | d | e | ... |

$a \wedge b = b \wedge c = c \wedge d = d \wedge e = k$

$a \wedge b = k$

$b \wedge c = k$

$a \wedge \cancel{b} = \cancel{b} \wedge c$

$\boxed{a = c}$

$a \wedge \cancel{b} = k$

$\cancel{b} \wedge c = k$

$a = c$

k

$\boxed{a \quad a \wedge k,\ a,\ a \wedge k,\ a,\ a \wedge k \ldots}$

[3, 2, 4, 3, 5] $k = 1$

ele → positions

2 → 1

3 → 0 3

4 → 2

5 → 4

3 → $3 \wedge 1$

2

for distinct starting point, traverse how far can you go.

a, $a \wedge k$

2 3 2 ××

0 3

Q. Given an sorted array & two integers k and x, return the k closest integers to x in the array.

arr = [1, 2, 3, 4], k = 4, x = 3

[1, 2, 3, 4]

arr = [1, 2, 3, 4, 5] k = 4, x = -1

[1, 2, 3, 4]

x = 4, k = 5

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |

(smaller)

1 binary search & find ele closest to x

2 4 6

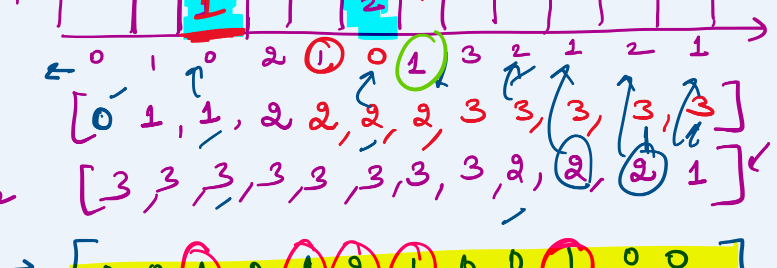
$O(\log(n)) + k$

Q. Given a histogram (elevation map), find out how much water can be trapped b/w the histogram.

min(2, 3) − 1 min(3, 2)

2 − 2 = 0

output → 6



0 1 0 2 1 0 1 3 2 1 2 1

l [0 1, 1, 2 2, 2, 2, 3 3, 3, 3, 3]

r [3, 3, 3, 3, 3, 3, 3, 3, 2, 2, 2, 1]

l = 1

h = 3

min(1, 3)

→ 1 − 0 = 1

ans → [0, 0, 1, 0, 1, 2, 1, 0, 0, 1, 0, 0]

6

min(l, h) − a[i]