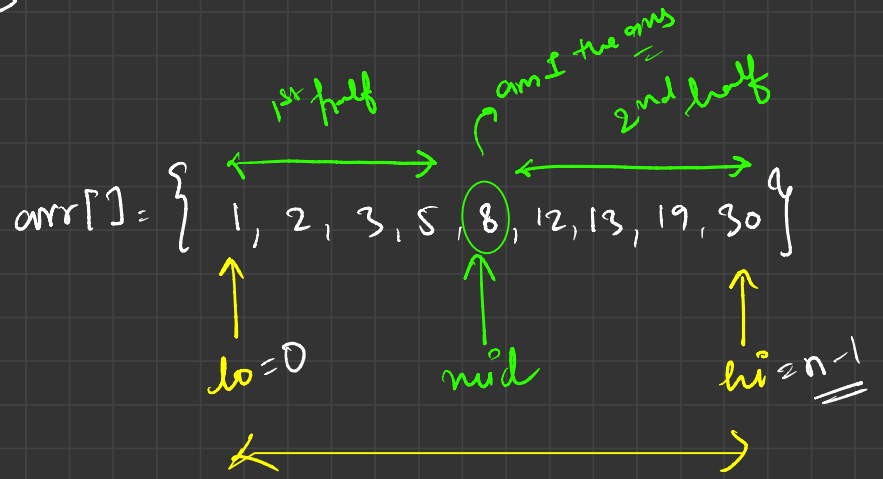
Binary Search



ele

Search Space size

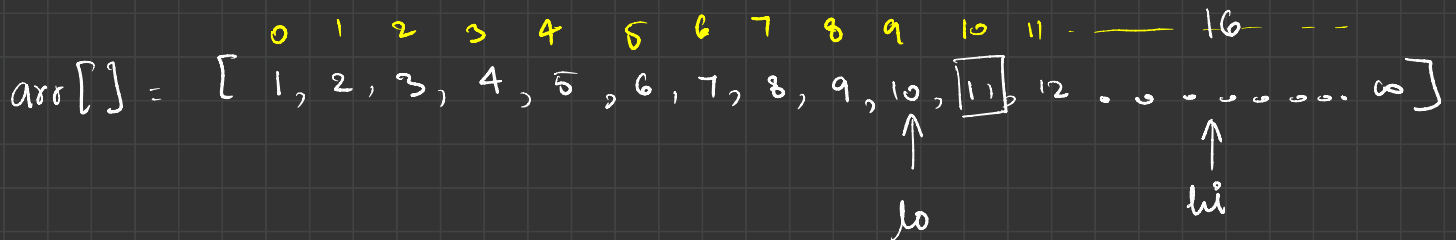
$N, \frac{N}{2}, \frac{N}{4}, \frac{N}{8}, \frac{N}{16}$ - - - - -

TC: $O(\log N)$ SC: $O(1)$

you got an infinite sorted array.

ele = 1014

Brute force linear search



range1 0 – 1 ⇝ 2

range2 2 – 2 ⇝ 1

range3 3 – 4 ⇝ 2

range4 5 – 8 ⇝ 4 = 2^2

range5 9 – 16 ⇝ 8 = 2^3

(arr[lo] <= target <= arr[hi])

↓ true

I'm in this range! → BS

fail ↓

I'm not in this range

↳ try to find a range

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lo = hi + 1;
hi = hi * 2;
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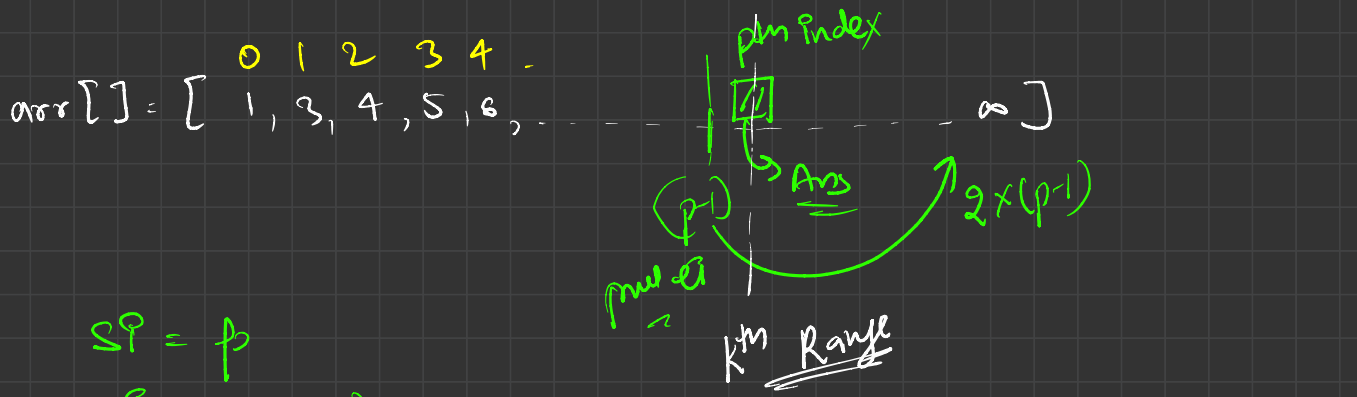


SP = p

el = 2(p-1)

No. of ele = 2(p-1) - p + 1 = (p-1) Elements

BS (O(log P))

No. of Elements

No. of Ele

no. of elements in first Range = 2

2nd n = 1 = 2^0

3rd n = 2 = 2^1

4th n = 4 ✓ = 2^2

2^3

k^{th} n = 2^{k-2}

Range

TC: O(K)

$$2^{k-2} = p-1$$

$$k-2 = \log_2(p-1)$$

$$\boxed{k = \log_2(p-1) + 2}$$

$$TC : O(k)$$

$$: O(\log_2(p-1)+2)$$

$$\boxed{TC \approx O(\log_2 p)} \longrightarrow \text{for finding}$$

① find Range TC: $\log P$ → Index of element

② BS : TC: $\log P$

TC: $\log P + \log P$

TC: $O(2 \log P) \approx O(\log P)$ → Index of the element

$\hat{i} = 0 \quad \hat{j} = 1$

question

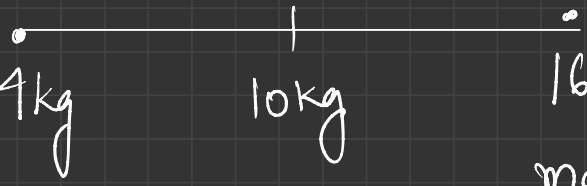
1	2	3	4
5	6	7	8
10	13	19	20
24	26	29	29

target = 13

Capacity of Ship packages within B days

	1	1	2	3	3	4
A[i] = [	3 ,	2,	2,	4,	1,	4]

days = 3



maxm cap

7kg

pAns = ~~10kg~~

arr[] : { 2, 4, 8, 2 } opt = 4

(3,1) (1,3) (2,2)

opt No.1

{ 2, 3, 1, 8, 2 }

(1,7) (7,1) (2,6) (6,2) (3,5) (5,3) (4,4)

opt No.2

{ 2, 3, 1, 3, 5, 2 }

(1,2) (2,1)

opt No.3

{ 2, 2, 1, 1, 3, 5, 2 }

(2,3) (3,2) (4,1) (1,4)

opt 4

{ 2, 2, 1, 1, 3, 2, 3, 2 }

3

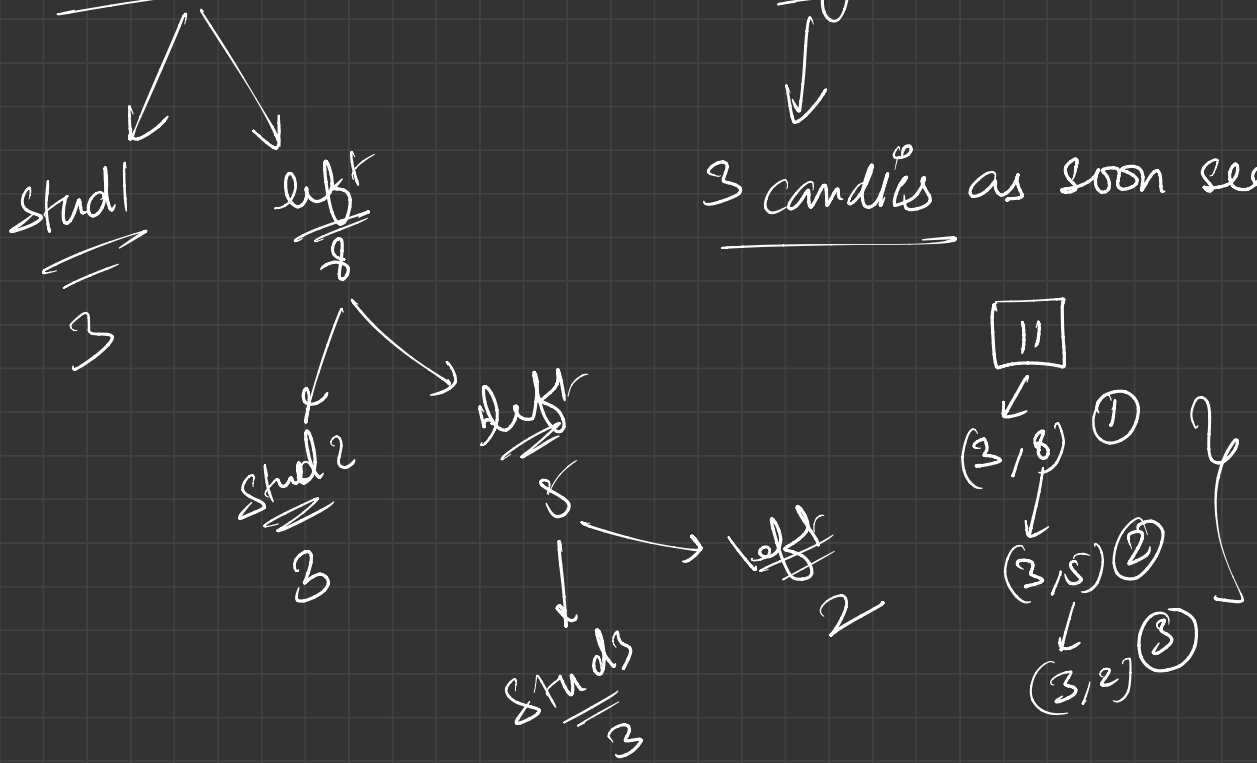
arr[] = {2, 4, 8, 2}

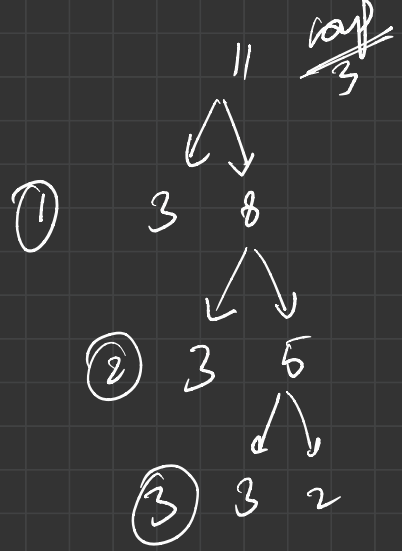
4 op*

pAns = 1/2

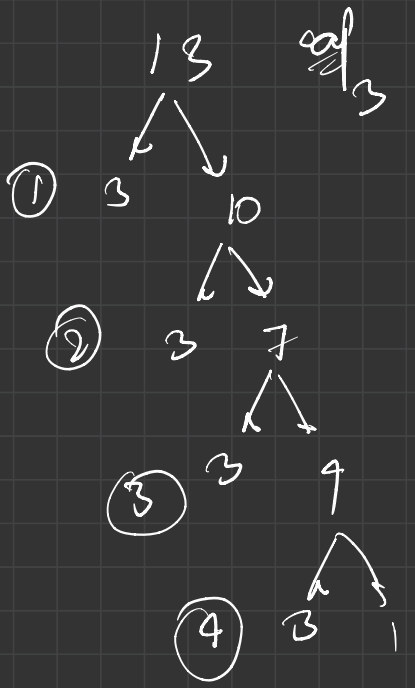
11 candies among Students

3 candies as soon see a Student

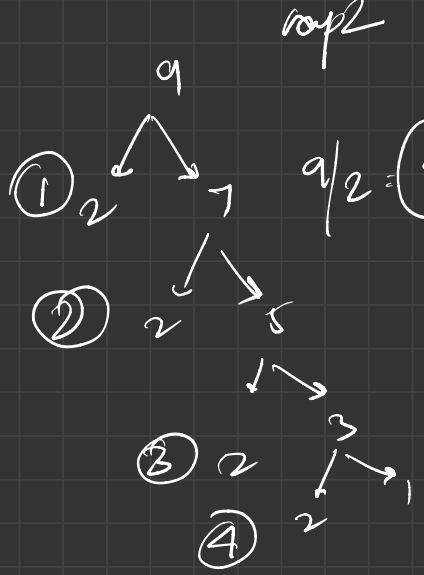




11/3 = 3

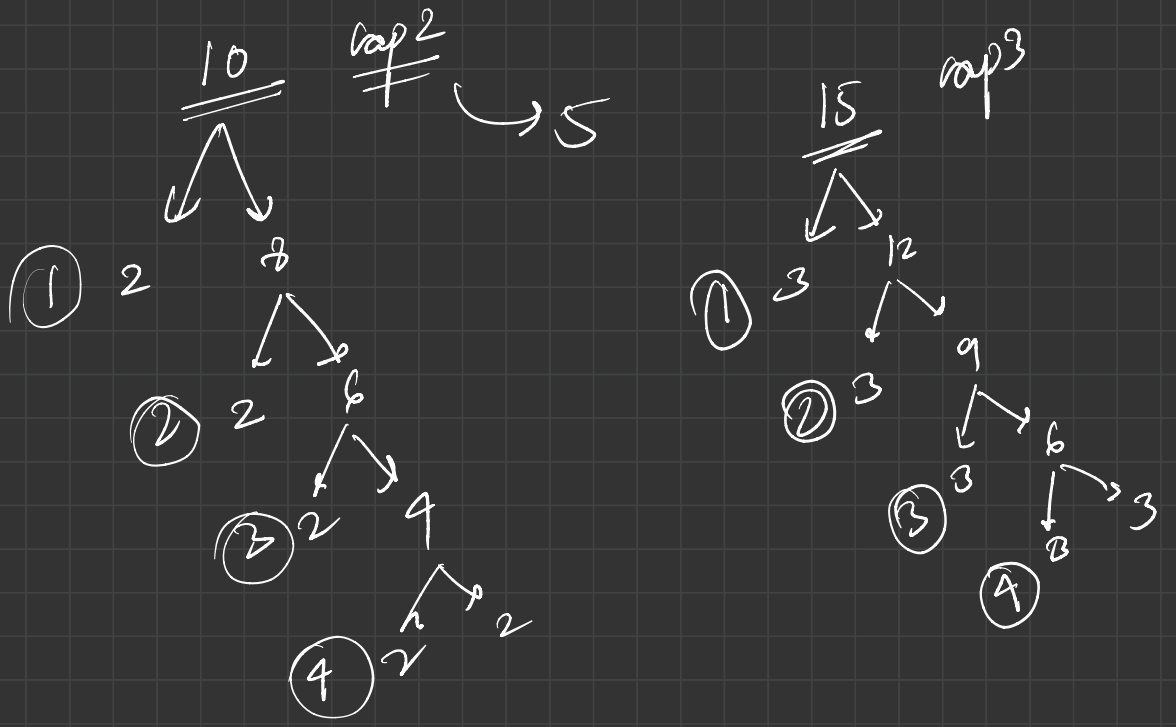


13/3 = 4



9/2 = 4

min opt = Number / cap


10
cap 2
5
8
2
2
6
2
2
4
2
2
2
15
cap 3
12
3
3
9
3
6
3
3
3