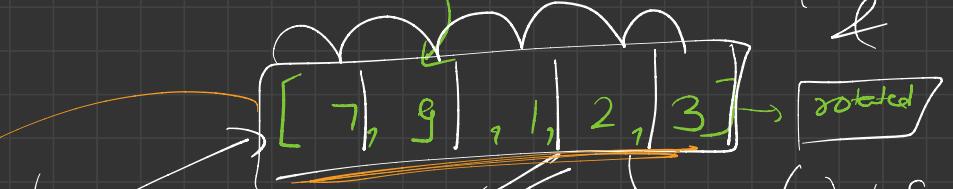



Binary Search Problems

→ find Pivot in an array

i/p → arr[] → { 1, 2, 3, 7, 9 } → sorted

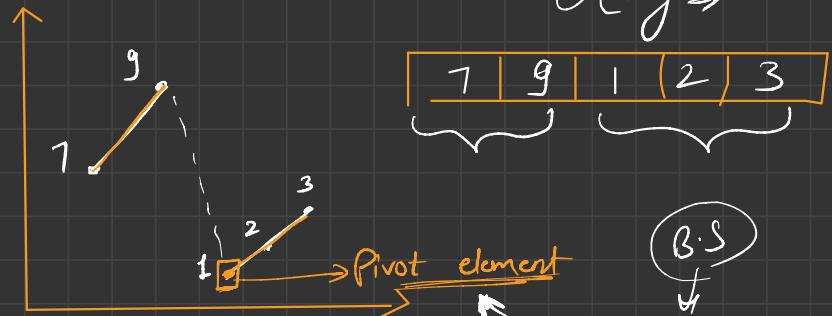


i/p → O(n) L.S X

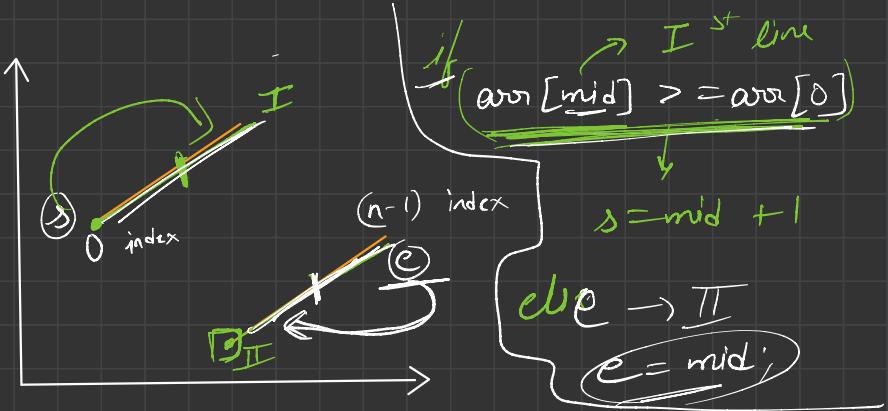
o/p → Pivot → ?

1 (minimum)

O(log n)

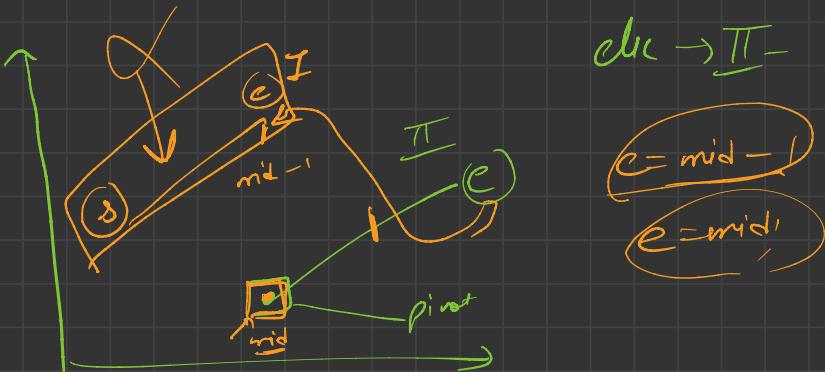


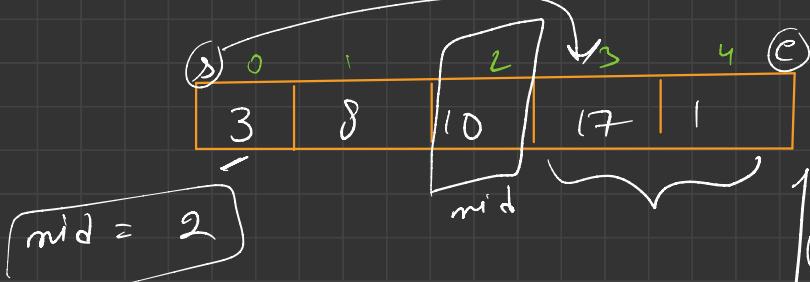
Kaise nikaloge?



$$\text{mid} = \left(\frac{s+e}{2} \right) \text{ or } s + \frac{(e-s)}{2} \quad \text{mid} - 1$$

$\text{arr}[\text{mid}] \Rightarrow$

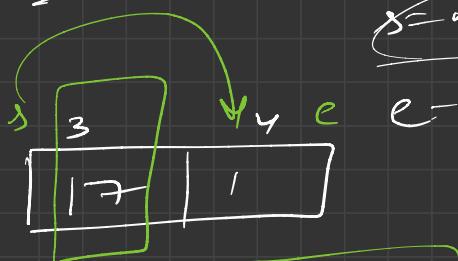




$$\text{arr}[\text{mid}] \geq \text{arr}[0]$$

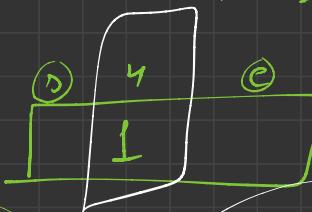
$(10 \geq 3) \rightarrow \text{True}$

$$s = \text{mid} + 1$$



$$\text{mid} = 3$$

$(17 \geq 3) \rightarrow \text{True}$



$$\text{mid} = 4$$

$(1 \geq 3) \rightarrow \text{False}$

$$e = \text{mid}$$

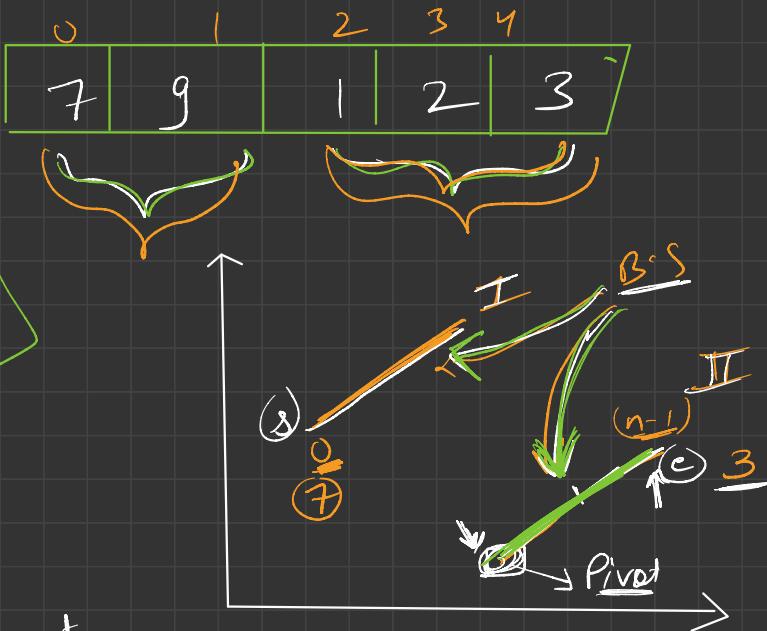
$$e = 4$$

$$s = 4$$

$$e = 4$$

return s; return e

YES



Target

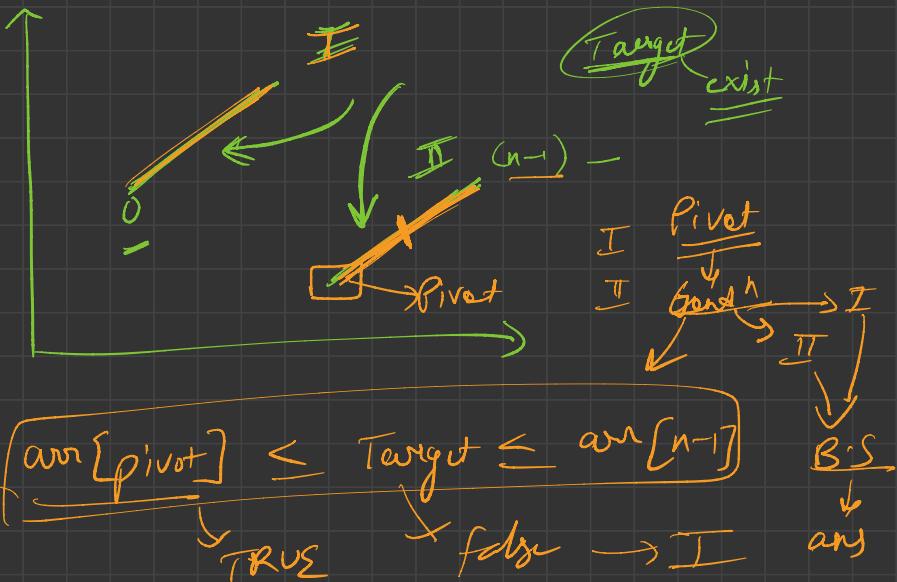
if

$$\text{arr}[\text{pivot}] \leq \underline{\text{Target}} \leq \text{arr}[n-1]$$

Binary search on (II)

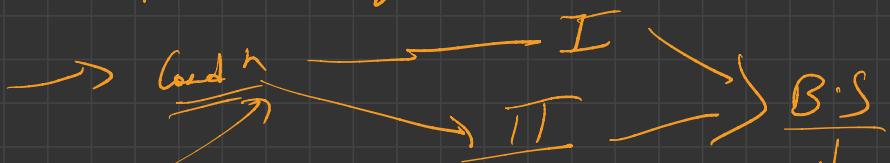
else

Binary Search \rightarrow (I)

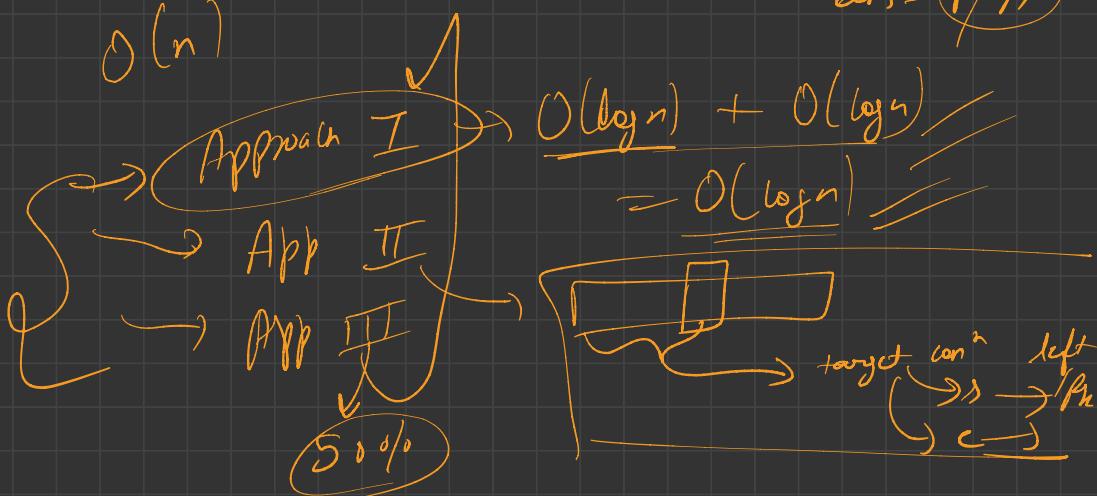


else

\rightarrow Pivot (algo)



$O(n)$



→ Square Root (B.S)

$$\cancel{1/p} - N \rightarrow 25$$

$$\cancel{0/p} \rightarrow \sqrt{25} \rightarrow \boxed{5} \leftarrow$$

$$N \rightarrow 27$$

$$\cancel{1/p} \rightarrow \sqrt{27} \rightarrow \boxed{5} \cdot \boxed{2}$$

\downarrow

$$\boxed{5} \quad \underline{\underline{\quad}}$$

$$\cancel{1/p} \rightarrow 8$$

$$\cancel{0/p} \rightarrow \sqrt{8} \rightarrow 2\sqrt{2} \rightarrow \boxed{2} \cdot \boxed{3}$$

$$\boxed{2} \quad \underline{\underline{\quad}}$$

$i/p \rightarrow 27$

Brute force
 $1 \rightarrow 1^2$
 $\sqrt{2}$
 \vdots
 \sqrt{s}

\sqrt{N} , $\underline{\mathcal{O}(\log n)}$

\uparrow
 $\log n$

$i/p \rightarrow 27$

$\swarrow M.F \rightarrow \underline{BS}$

$\rightarrow [0, 1, 2, 3, \dots, 25, 26, 27]$

ans $\Rightarrow [0 \text{ --- } 27]$

\uparrow **Search Space**

$\searrow B.S$

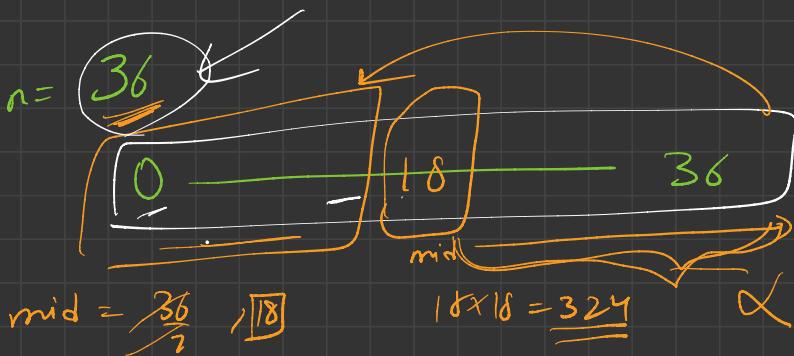
$n = 92$

$\sqrt{92} \rightarrow [0 \text{ --- } 92]$

$n = 37$

$\sqrt{37} \rightarrow [0 \text{ --- } 37]$

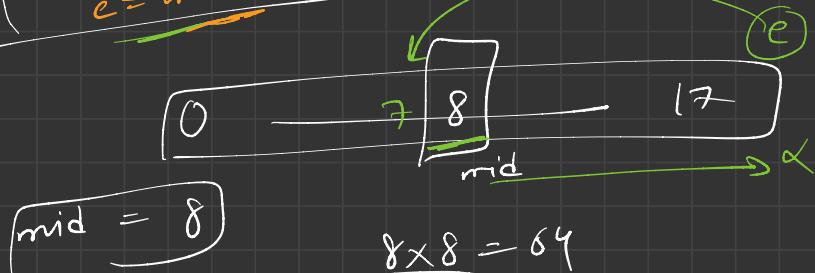
\downarrow
 $6 \cdot \times$



$18 \times 18 = 324$

$\left| \begin{array}{c} 19 \\ 20 \\ 21 \\ 22 \\ 23 \\ 24 \\ 25 \\ 26 \\ 27 \\ 28 \\ 29 \\ 30 \\ 31 \\ 32 \\ 33 \\ 34 \\ 35 \\ 36 \end{array} \right|$

if ($mid \times mid > num$)
 $e = mid - 1$



$$8 \times 8 = 64$$

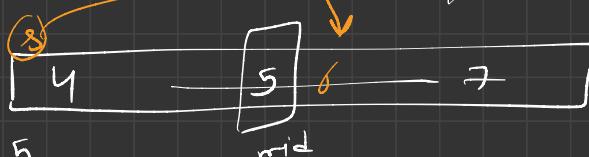


$$mid = 3$$

$$3 \times 3 = 9$$

$9 < 36$

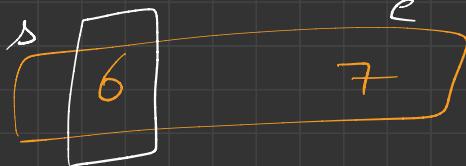
$(mid \times mid < num)$
 $\left\{ \begin{array}{l} ans = mid \\ s = mid + 1 \end{array} \right.$



$$5 \times 5 = 25$$

$25 < 36$

$$ans = 5$$



mid = 6

$$6 \times 6 = 36$$

$$\underline{36} = 36$$

↑
num

if $(\text{mid} \times \text{mid}) == \text{num}$
return mid;

$$\sqrt{37} \rightarrow \boxed{6.12}$$

$b =$

$$b \rightarrow \begin{array}{c} + \\ \circled{1} \end{array} \rightarrow \boxed{0.1}$$

$$b \cdot 1 \rightarrow (b \cdot 1)^2 < 37 \rightarrow \text{ans save}$$

$$\boxed{b \cdot 2} \rightarrow (b \cdot 2)^2 < 37 \rightarrow \text{save}$$

loop

$$\rightarrow b \cdot 3 \rightarrow (b \cdot 3)^2 < 37 \rightarrow \text{false}$$

butya

$$b \cdot 2 \quad \underline{0.01}$$

$$b \cdot 21 \rightarrow (b \cdot 21)^2 < 37 \rightarrow \text{save}$$

$$\boxed{b \cdot 22} \rightarrow (b \cdot 22)^2 < 37 \rightarrow \text{save}$$

$$\boxed{b \cdot 23} \rightarrow (b \cdot 23)^2 < 37 \rightarrow \text{false}$$

butya

$$b \cdot 22 \rightarrow \underline{0.01}$$

Process

more precision (37, 3, 6)

for (0 → 3)

factor = $0.1/10$

$j = 6.0_1$ $(6.0)_1^2 < 37 \downarrow$ $J = j + \text{fact}$
 ≈ 6.0 time $= 6.0 + 0.01$
 $\underline{\underline{6.01}}$

3 " ≈ 6.01

(n) → sqrt

6.082

→ Book Allocation Problem

path के
आगामी

Next Video