

Ques-1

given an array A of N integers.

any element $A[i] = -1$ in one operation.

Make the maximum element of array equal to B

in min number of operations = ?

arr: $[2, 4, 3, 1, 5]$ $B = 3$

arr: $[2, -1, 3, 1, -1]$

ans = 2

arr: $[1, 4, 2]$ $B = 3$

ans = NOT POSSIBLE

ans = -1

CONCLUSION-

- 1) Check whether B exists or not, if not return -1

arr: $[2, 4, 3, 1, 5]$ $B = 3$

max. element = 5

operation
 $A[i] = -1$

(-1)

ans = 2

ans = No. of elements which are greater than B

$O(N) \rightarrow T.C.$

$O(1) \rightarrow S.C.$

PRE-1

BITWISE OR

```

10100101
01011101
-----
11111101

```

BITWISE AND

```

10100101
01011101
-----
00000101

```

PRE-2

int arr $[10^7]$; $\Rightarrow 4 \times 10^7$ bytes
 \Rightarrow 40mb

More than
40 mb,
MLE

int arr $[10^{15}]$; $\Rightarrow ?$ X

int arr $[10^3][10^3]$ $\Rightarrow ?$ ✓

int arr $[10^5][10^5]$ = ? $4 \times 10^5 \times 10^5$
 $= 4 \times 10^{10}$
 $= 40 \text{ gb}$

PRE-3

0 1 2 3 4 5 6 7 8

arr:

1	2	3	4	5	6	7	8	9
---	---	---	---	---	---	---	---	---

values fixed

$$\text{arr}[3] = 4$$

$$\text{arr}[6] = 7$$

$$\text{arr}[i] = i+1$$

2-D array

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

$N=3$ $M=5$

$i=2$ $j=2$

No. of rows = 3

" of cols = 5

$$\text{arr}[1][2] = 7$$

$$\text{arr}[1][3] = 9$$

$$\text{arr}[2][3] = 14$$

$$\text{arr}[i][j] = ?$$

⊙ value fixed \rightarrow row major order

$$N \leq 10^5$$

$$M \leq 10^5$$

$$\text{arr}[2][2]$$

$$= 2 \times 5 + 2 + 1$$

$$= 10 + 2 + 1 = 13$$

\Rightarrow row major order
 \Rightarrow 0 based indexing

$$\text{arr}[i][j] =$$

$$i \times m + j + 1$$

$$\text{arr}[10^5][10^6] = i \times m + j + 1$$

$$= 10^5 \times m + 10^6 + 1$$

No. of

= ✓

$$\text{arr}[2][3]$$

$$\Rightarrow 2 \times 5 + 3 + 1$$

$$\Rightarrow 10 + 3 + 1$$

$$= 14$$

.. 0 1 2 3 4 5 6 7 8

PRE-4

1	2	3	4	5	6	7	8	9
---	---	---	---	---	---	---	---	---

⇒ values fixed

⇒ ^{don't} change the original array.

arr:

0	1	2	3	4	5	6	7	8
1	2	3	4	5	6	7	8	9

arr: 1 2 5 6 3 4 7 8 9

2-1) array N=10⁵ M=10⁵

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

N=3 M=5

1 query is coming

(c₁, c₃)
swap c₁ with c₃

old ⇒

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

N=3 M=5

⇒

arr[1][1] = 9

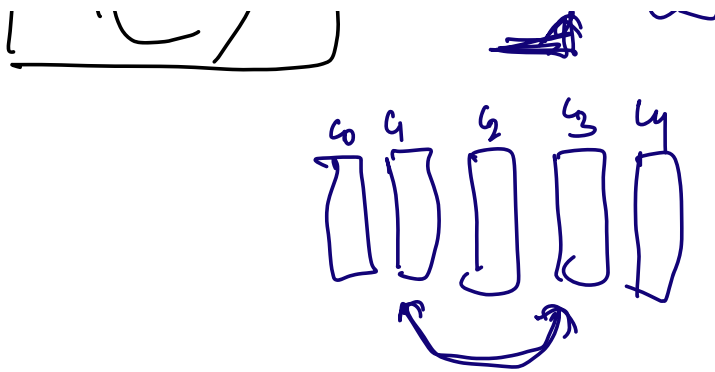
arr[1][1] = ?

arr[2][1] = ?

arr[0][3] = ?

swap(c₁, c₃)

arr[1][3] original array,



$$\Rightarrow i * m + j + 1$$

$$\Rightarrow 1 * 5 + 3 + 1$$

$$= 5 + 4 = 9$$

$$arr[2][1] =$$

$$\Rightarrow arr[2][3]$$

$$\Rightarrow 2 * 5 + 3 + 1$$

$$= 14$$

$$\Rightarrow arr[0][3]$$

$$\Rightarrow arr[0][1]$$

$$= \frac{0 * 5 + 1 + 1}{2}$$

$$c_1 \leftrightarrow c_3$$

$$c_2 \leftrightarrow c_4$$

\Rightarrow 2 queries

$$(c_1, c_3)$$

$$(c_2, c_4)$$

$$arr[0][1] = 1$$

$$arr[0][3] = ?$$

$$arr[1][2] = 2$$

$$arr[2][4] = ?$$

$$arr[0][3]$$

$$arr[0][1]$$

$$arr[1][2]$$

$$arr[2][4]$$

original array

q queries

1 query (c_1, c_3)

col array:

(1,5)

0	1	2	3	4
0	1	2	3	4
m	m	m	m	m

$$\begin{bmatrix} c_1 & c_3 \\ c_2 & c_4 \\ i \end{bmatrix}$$

11

swap (c₁, c₃)

(4 ↔ 3)

61:

0	1	2	3	4
0	3	2	1	4

on the place of 1st col. 3 col. is there

swap (c₂, c₄)

column array

0	1	2	3	4
0	3	4	1	2

→ arr'[0][1]

→ ~~arr~~ [0][3]

→ arr'[1][2]

→ arr [1][4]

Q queries are there

→ PRE-3

swap (c₁, c₃)

swap (c₂, c₃)

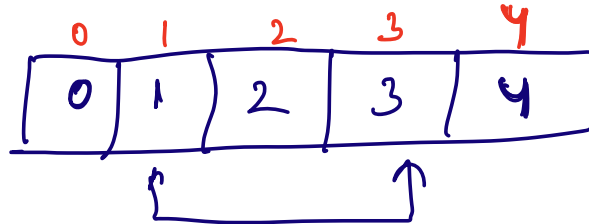
arr'[0][1] = ?

swap (1, 2)
 swap (1, 4)

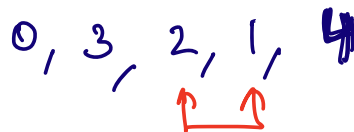
$$arr'[0][4] = 2$$

$$arr'[0][2] = ?$$

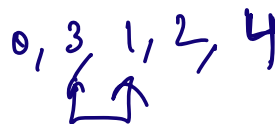
initial.
 column
 array :



swap (1, 3)



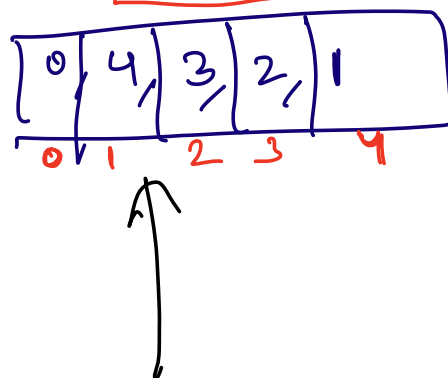
swap (2, 3)



swap (1, 2)



swap (1, 4)



$$\Rightarrow arr'[0][1]$$

$$\Rightarrow arr[0][4]_{original}$$

$$= 0 * 5 + 4 + 1$$

$$= 5$$

$$arr'[0][4] = ?$$

$$arr'[0][2] = ?$$

$$arr[0][1]$$

$$arr[0][3]$$

arr coming

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

$M=5$

swap (r_1, r_2)

swap (c_0, c_1)

$N=3$

swap the rows

row:

0	1	2
---	---	---

0 1 2

swap (r_1, r_2)

0	1	2
0	2	1

←

swap (c_0, c_1)

0	1	2
2	0	1

$$\text{arr}'[0][1] = ?$$

$$\text{arr}'[2][1] = ?$$

$$\Rightarrow \text{arr}'[0][1]$$

$$\Rightarrow \text{arr}[2][1] = \checkmark$$

$$= \text{arr}'[2][1]$$

$$= \text{arr}[1][1]$$

n^2 parallel,

(T.C) = ans arr

$= O(Q)$

(S.C) $\Rightarrow O(N)$

PRE-6

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

....

$M=5$

2 queries.

\rightarrow column swap (c_1, c_3)

\rightarrow row swap (r_0, r_2)

$$\text{arr}'[1][1] = ?$$

N = 3

row:

0	1	2
---	---	---

after swap.

2	1	0
---	---	---

col: 0 1 2 3 4

after swap.

0	3	2	1	4
---	---	---	---	---

$arr[0][3] = ?$

$arr[1][3]$

$arr[0][3]$
 $= arr[2][1]$

Ques

integer $N = \checkmark$
integer $M = \checkmark$

No. of rows $N \geq 1$
No. of columns $M \leq 10^5$

create a 2-D array of $N \times M$ in a row-major order.

Q queries.

1 $C_1 C_2$: swap elements of column 1 with col 2.

2 $R_1 R_2$: swap element of R_1 row & R_2 row

→ 3 $x_1 y_1 x_2 y_2$:

$arr[x_1][y_1]$ | $arr[x_2][y_2]$
 $= ?$

4 $x_1 y_1 x_2 y_2$

$arr[x_1][y_1]$ & $arr[x_2][y_2]$

= ?

= ?

sample
input

N=2

M=3

Q=4

1-based
indexing

1	2	3			
3	1	2	2	2	
2	1	2			
4	1	2	2	3	

= ?

rows :

0	1
0	1

cols :

0	1	2
0	1	2

1 based swap (c₂, c₃)
0 based swap (c₁, c₂)

0	2	1
0	1	2

column

1 based

⇒ arr'[1][2] | arr'[2][2]

0 based

⇒ arr'[0][1] | arr'[1][1]

⇒ arr[0][2] | arr[1][2]

= 0*3 + 2 + 1 | 1*3 + 2 + 1

$$= 3$$

$$1$$

$$= 6$$

$$\underline{\underline{ans = 7}}$$

$$\begin{array}{r} 1 \ 1 \ 0 \\ 0 \ 1 \ 1 \\ \hline 7 \end{array}$$

row:

1	0
---	---

col:

0	2	1
---	---	---

1 based

$$arr'[1][2]$$

$$arr'[2][3]$$

0 based

$$arr'[0][1] \text{ } \> \text{ } arr'[1][2]$$

$$\Rightarrow arr[1][2] \text{ } \> \text{ } arr[0][1]$$

$$\frac{1*3 + 2*1}{= 6}$$

$$\frac{0*3 + 1*1}{= 2}$$

$$= 2$$

$$\begin{array}{r} 0110 \\ 0010 \\ \hline 0010 \end{array}$$

T.C \neq $O(\underline{N+M+Q})$

S.C \neq $O(N+M)$

row 7

0	1	2
---	---	---

for (int i = 0; i < arr[i]) = i

Ques-3

arr:

0	1	2	3	4	5
0	0	1	1	0	1

prefix sum = pre.

$$\Rightarrow pre[R] - pre[L-1]$$

Q queries.

$$sum[1, 3] = ?$$

$$sum[3, 5] = ?$$

2

2

Ques

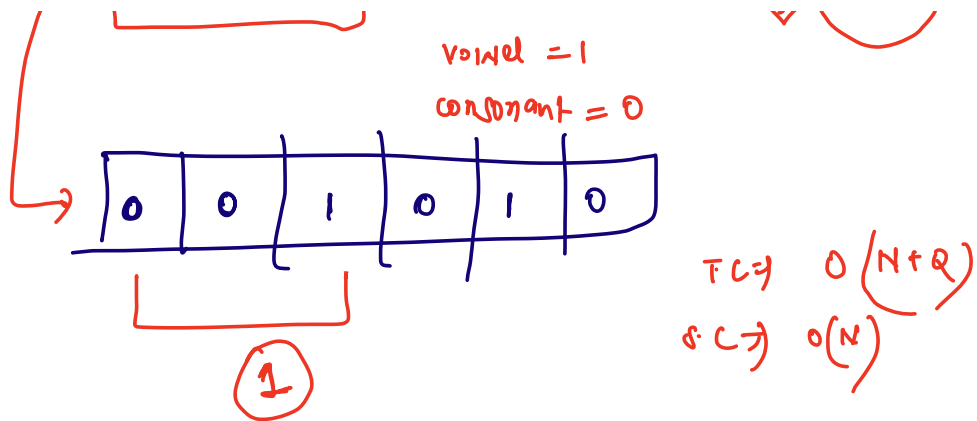
given an string

NO. OF vowel in a range.

(ex) "scaleo" [0, 2] = ?

0	1	2	3	4	5
s	c	a	b	e	o

(ans = 1)



Ques-4

0 0 1 0 1 0 0

6 5 4 3 2 1 0
0 0 1 0 1 0 0

A = ✓
B = ✓

$$\Rightarrow 2^2 + 2^4$$

$$= 4 + 16 = 20$$

constant binary no.

A is followed by B 0's.

decimal value = ?

A = 3 B = 2

(f.c) $\circ (A+B)$
 $\circ (A) \Rightarrow$
 $\circ (B)$

\Rightarrow 11100
 \Rightarrow ? 28

111 11

2⁴ 2³ 2² 2¹ 2⁰
1111 00011

11100
1111 - 00011