



## Agenda

- Largest area histogram
- Celebrity Problem
- Infix evaluation and conversion.

# Imp Largest Area Histogram



which rectangle in this histogram will have maximum area?

$\text{int}[] \text{arr} = \{1, 2, 5, 4, 5, 1, 7\}$

Brute force

$\text{maxArea} = 0$

for (int i = 0 → n)

{  
  int minH = +∞;

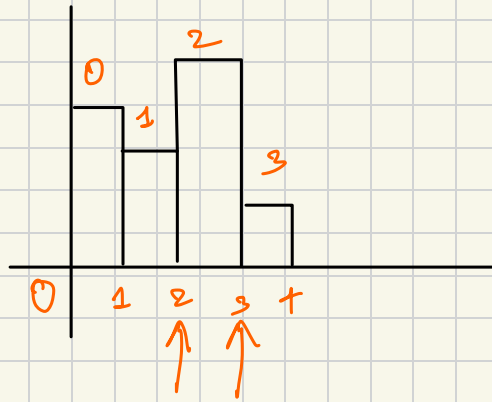
  for (int j = i → n)

{

$\text{minH} = \min(\text{minH}, \text{arr}[j]);$

$\text{maxArea} = \max(\text{maxArea}, \text{minH} * (j - i + 1));$

TC:  $O(N^2)$   
SC:  $O(1)$



$$\text{arr} = \{ 4, 3, 5, 1 \}$$

Orange arrows point to the indices 0, 1, 2, 3 above the array elements. Red arrows point to the values 3 and 5 in the array.

$$\text{maxA} = \cancel{1} \cancel{1} 9$$

$$\text{area} = (j - i + 1) \times \min H$$

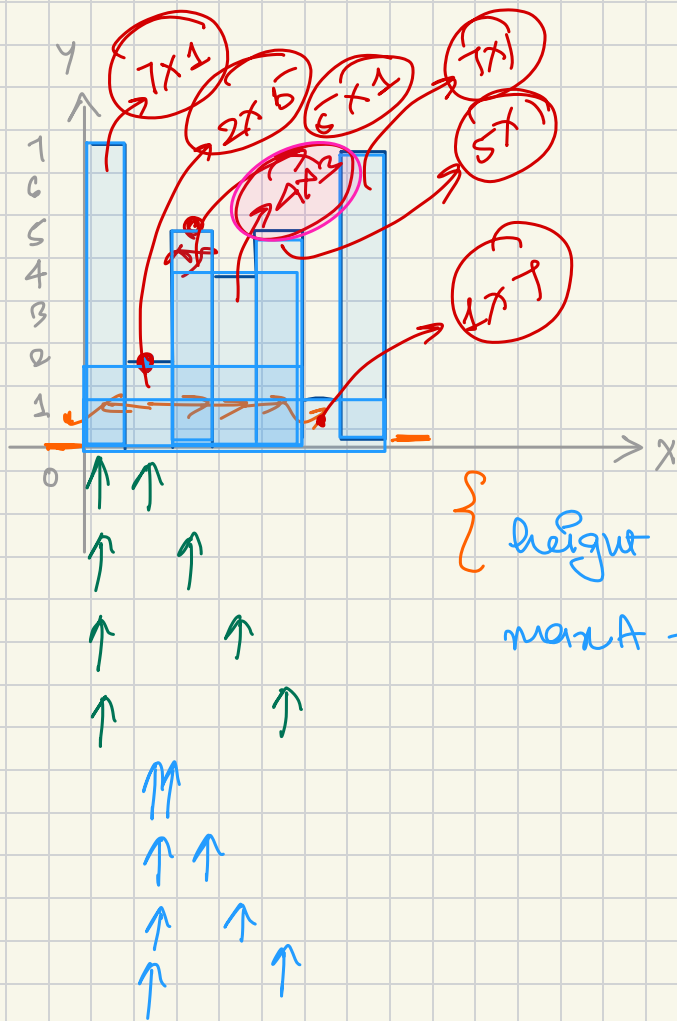
$$\text{area} = 1 \times 4 = 4$$

$$2 \times 3 = 6$$

$$3 \times 3 = 9$$

$$4 \times 1 = 4$$

$$1 \times 3 = 3$$



arr = { 0 1 2 3 4 5 6  
 { 1, 2, 5, 4, 5, 1, 7 }

{ height = 2

maxA = 2 x (max w)

When you are min<sup>m</sup> in your whole width

arr = {<sup>0 1 2 3 4 5 6</sup>  
 $\{7, 2, 5, 4, 5, 1, 7\}$ }

height = { $\{1, 5, 3, 5, 5, 7, 7\}$ }

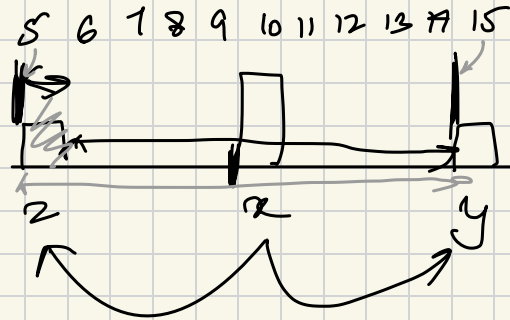
width = { $\{-1, -1, 1, 1, 3, -1, 5\}$ }

width = { $\{1, 5, 1, 3, 1, 7, 1\}$ }

7, 10, 5, 12, 5, 7, 7

max A = 12 ans

{ TC:  $O(N)$   
 SC:  $O(N)$  }



$$(15 - 5 - 1)$$

$$(5 - 1 - 1) = \text{width}$$

# Celebrity Problem

n - people are invited.

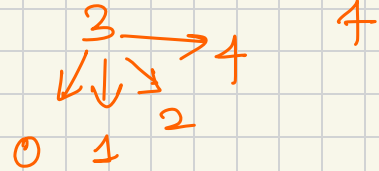
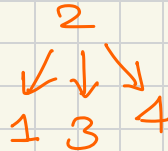
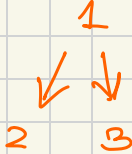
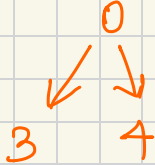
int[][] arr =

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

Who is a celeb?

- known by everyone ✓
- doesn't know anyone ✓

Brute Force  
T:  $O(n^2)$   
S:  $O(1)$



identify celeb?

$x^{\text{th}}$  row  $\rightarrow$  if zero { you don't know anyone }

$x^{\text{th}}$  col  $\rightarrow$  if one { known by everyone }

NOTE : ignore the diag. pos.

int[][] arr =

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

TC:  $O(3N) \sim O(N^2)$   
SC:  $O(N)$

✓ elimination method?

0, ~~1~~

0, ~~2~~

~~1~~, 3

~~1~~, 4

✓ (4)

potential celeb



## Infix evaluation and Conversion to prefix and postfix

infix, postfix, prefix }  $\rightarrow$  write an exp.

infix  $\rightarrow$  human readable

postfix  
prefix  $\rightarrow$  loved by compilers

~~$((a + (b * c)) - d)$~~   $\rightsquigarrow$  infix exp.

$- + a * b c d \rightsquigarrow \text{prefix exp.}$

$a b c * + d -$   $\rightsquigarrow$  postfix exp.

$v1 \ o \ v2$

infix

$a + b$

$o \ v1 \ v2$

prefix

$+ a b$

$v1 \ v2 \ o$

postfix

$a b +$

$a + b * c$

$+ a * b c$

$a b c * +$

$((a * b) / c) + d$   $+ / * a b c d$

$a b * c / d +$

BODMAS

$\rightarrow *, /$   
 $+ , -$

$$(6 + (3 \times 2)) = 12 \quad \text{infix}$$

$$+ 6 \times 3 2 \quad \rightsquigarrow \text{prefix}$$

$$\boxed{6 \ 3 \ 2 \ \times \ +} \quad \rightsquigarrow \text{postfix}$$

↑ ↑ ↑ ↑ ↑

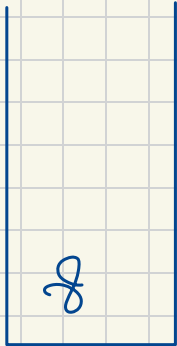
$$3 \times 2 = 6$$

$$6 + 6 = 12$$

$$\boxed{12}$$

$$(((6 * 2) / 3) + 4) = 8 \rightsquigarrow \text{Infix}$$

$$\begin{array}{ccccccccc} 6 & 2 & * & 3 & / & 4 & + \\ \uparrow & \uparrow & \uparrow & \uparrow & \uparrow & \uparrow & \uparrow \end{array} \rightsquigarrow \text{Postfix}$$



$$12 / 3$$

$$4 + 4 = 8$$

# infix exp .

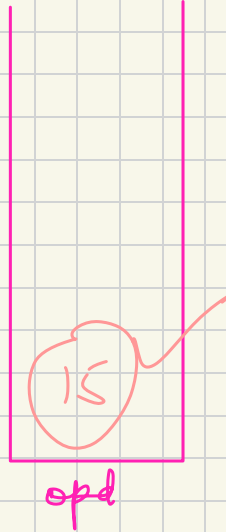
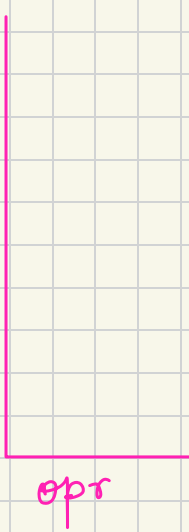
$$\text{exp} = ((2 + (6 * 4 - 8)) - 3)$$

*(Red diagonal marks are present under the expression, likely indicating tokenization or operator precedence.)*

<u>opr</u>	
(	)
/	*
+	-

↑ inc priority

$$18 - 3 = 15$$



$$6 * 4 = 24$$

$$24 - 8 = 16$$

$$2 + 16 = 18$$