

Infix expressions

BODMAS

D, M > A, S

$$\begin{aligned}
 & 9 - 5 + 3 * 4 / 6 \\
 = & 9 - 5 + 12 / 6 \\
 = & 9 - 5 + 2 \\
 = & 4 + 2 \\
 = & 6
 \end{aligned}$$

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Infix expressions

str = "9-5+3*4/6"

Priority :

M, D

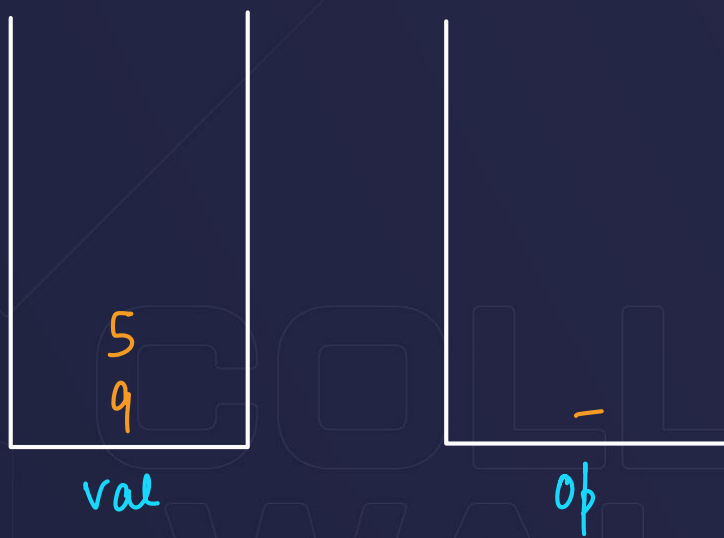
↓

A, S

1) ch → number
val.push(ch)

2) if (op.size() == 0)
op.push(ch)

3) ch → op
Soch samajke



Infix expressions

str = "9-5+3*4/6"
i

M, D

↓

A, S

if (op.size() > 0) {

if (op.peek() priority
 >= ch)

top → niptado

op.push(ch)

v2 = 4

v1 = 3



val



op

Infix expressions

while (val.size() > 1) {

Kaam

3



val



op

$$4 + 2 = 6$$

Infix expressions



val



op

$$v2 = 7$$

$$v1 = 9$$

```
while (st.size > 1) {
    int v2 = val.pop()
    int v1 = val.pop()
    if (op.peek() == '+')
        val.push(v1 + v2);
    else
        val.push(v1 - v2);
    op.pop();
}
```

Infix expressions



val

$v2 = 4$



op

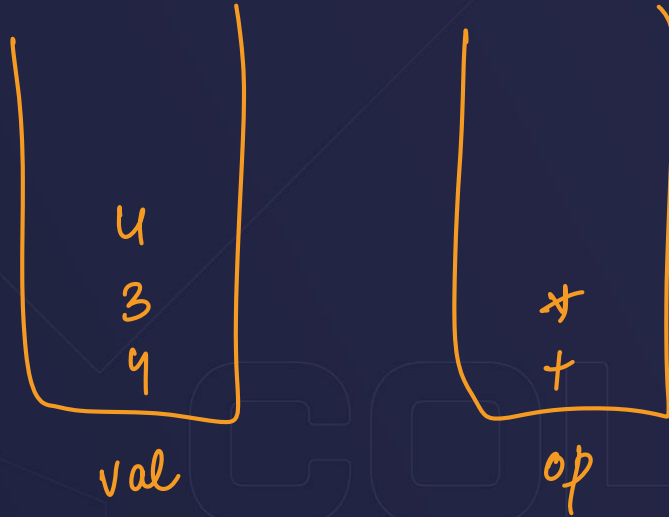
$v1 = 3$

```

if( op.peek() == '*' ||
    op.peek() == '/')
    int v2 = val.pop()
    int v1 = val.pop()
    if( op.peek() == '*' )
        val.push( v1 * v2 );
    else
        val.push( v1 / v2 );
    
```

Infix expressions

"9 - 5 + 3 * 4 / 6"



Evaluation of Infix expressions

str = "9 - (5 + 3) * 4 / 6"

(,)

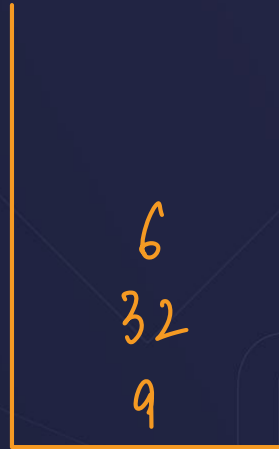
D, M

A, S

if (op.size() == 0 ||

ch == '(')

→ push



val



op

5 + 3 = 8

Prefix expressions

$a, b \in \{0, 1, 2 \dots 9\}$

Infix: $a + b$

In: "9-5 + 3*4 / 6"

Prefix: $+ ab$

Pre: 9-5 + *34 / 6

Postfix: $ab +$

9-5 + / *346

-95 + / *346

+ -95 / *346

Prefix expressions

$$9 - (5 + 3) * 4 / 6$$

$$v2 = / * + 5 3 4 6$$

$$v1 = 9$$

$$o = -$$

$$o \vee v1 \vee v2$$



val

op

~~Evaluation of Prefix expressions~~

Infix to

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Postfix expressions

gn: v1 o v2

pre : o v1 v2

po : v1 v2 o

$$9 - (5 + 3) * 4 / 6$$

$$9 - \underline{5 + 3} * 4 / 6$$

$$9 - \underline{5 + 3 + 4} * / 6$$

$$9 - \underline{5 + 3 + 4 + 6} /$$

postfix 9 5 3 + 4 + 6 / -

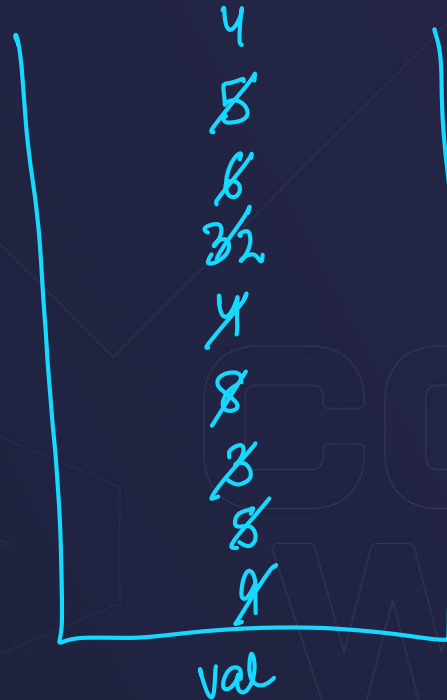
~~Evaluation~~ of Postfix expressions

Infix to

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Evaluation of Postfix expressions

str = " 9 5 3 + 4 * 6 / - "



Evaluation of Postfix expressions

Post: $9\ 5\ 3\ +\ 4\ *\ 6\ /\ -$

In: $9 - (5 + 3) * 4 / 6$

$$\rightarrow 9 - 8 * 4 / 6$$

$$\rightarrow 9 - 32 / 6$$

$$\rightarrow 9 - 5 = 4$$

Evaluation of Prefix expressions

Pre : "- 9/* + 534 6"



In : $9 - (5 + 3) * 4 / 6$



val

$$v1 = 9$$

$$v2 = 5$$

Q. Conversion of a Prefix expression to a Postfix expression

Pre: $"- 9 / * + 5 3 4 6"$

Stack <String>

9 5 3 + 4 * 6 / -

val

$v1 = 9$

$v2 = 53 + 4 * 6 /$

op = -

Practice

Homework

Conversion of a Postfix expression to a Prefix expression.

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Q, Post Fix to Infix

Post "9 5 3 + 4 * 6 / -"

<String>

$(9 - ((5 + 3) * 4) / 6)$

Val

$(v1 \text{ op } v2)$

String v2 =

String v1 =

char op =

Practice

Homework

Conversion of a **Prefix** expression to a **Infix** expression.

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Q1, Celebrity Problem

$N=3$

$M[i][j] =$

	0	1	2
0	0	1	0
1	0	0	0
2	0	1	0



$v1 =$

$v2 = 0$

if($M[v1][v2] == 1$) st.push($v2$);

else if($M[v2][v1] == 1$) st.push($v1$);

Q, Sliding Window Maximum → Hint → next Greater Element

	0	1	2	3	4	5	6	7	
nums :	1	3	-1	-3	5	3	6	7	K = 3
nge :	1	4	4	4	6	6	7	-1 or 8	
ans :		3	3	5	5	6	7		

$k=3$

		i			$i+k$			
nums :	1	2	3	4	5	6	7	8
nge :	2	3	4	5	6	7	8	-1
					j			

ans : 3

$O(n \cdot k)$

↓↓

$O(n)$

```
while (j < i+k)
    max = nums[j]
    j = nge[j]
```

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		i		$i+k$				
nums :	1	2	3	4	5	6	7	8
nge :	2	3	4	5	6	7	8	-1
					j			

 $k=3$

ans : 3 4

```
int j=0;
for(int i=0; i<n-k+1; i++)
```

```
    if(j>=i+k) j=i;
```

```
    max = nums[j];
```

```
    while(j<i+k)
```

```
    |   max = nums[j];
```

```
    |   j = nge[j];
```

```
3   3 ans[2++] = max;
```


	0	1	2	3	4	5	6	7
nums	1	3	-1	-3	5	3	6	7
nge	3	5	5	5	6	6	7	-1

```
for(int i = n-2; i >= 0; i--) {
```

(1, 0)
 (3, 1)
~~(-1, 2)~~
~~(-3, 3)~~
 (5, 4)
~~(3, 5)~~
 (6, 6)
 (7, 7)

$\text{nums} :$ 1 3 -1 -3 5 $\overset{i}{3}$ 6 7 $\overset{i+k}{}$
 $\text{nge} :$ 3 5 5 5 6 6 7 8
 $\text{ans} :$ 3 3 5 5 6 7

$k=3$
 j

Summary

- In this lecture we solved some problems based on stacks.

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Upcoming lecture

- Queues

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Thank You

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Maza aa gaya → Complete

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