



SNS COLLEGE OF TECHNOLOGY

Coimbatore-35
An Autonomous Institution



Accredited by NBA – AICTE and Accredited by NAAC – UGC with 'A+' Grade
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

DEPARTMENT OF AIML

19ITT101-PROGRAMMING IN C AND DATA STRUCTURES

I YEAR - I SEM

UNIT 4 – STACK AND QUEUE

TOPIC 6 – Expression Parsing



Expression Parsing

- The way to write arithmetic expression is known as a notation. An arithmetic expression can be written in three different but equivalent notations, i.e., without changing the essence or output of an expression.
- These notations are –
- Infix Notation
 - Prefix Notation
 - Postfix Notation



Infix Notation



- infix notation, where operators are used in-between operands.
- It is easy for us humans to read, write, and speak in infix notation but the same does not go well with computing devices.
- An algorithm to process infix notation could be difficult and costly in terms of time and space consumption.

➤ $a - b + c$

➤ $a, b, c \rightarrow$ operands

➤ $- , + \rightarrow$ operator



Prefix Notation



- In this notation, operator is prefixed to operands, i.e. operator is written ahead of operands.
- For example, $+ab$.
- This is equivalent to its infix notation $a + b$. Prefix notation is also known as Polish Notation.



Postfix Notation



- This notation style is known as Reversed Polish Notation.
- In this notation style, the operator is postfixed to the operands i.e., the operator is written after the operands.
- For example, $ab+$. This is equivalent to its infix notation $a + b$.



Precedence



- When an operand is in between two different operators, which operator will take the operand first, is decided by the precedence of an operator over others.
- $a+b*c \rightarrow a+(b*c)$
- multiplication operation has precedence over addition, $b * c$ will be evaluated first. A table of operator precedence is provided later.



Associativity

- Associativity describes the rule where operators with the same precedence appear in an expression.
- For example, in expression $a + b - c$, both $+$ and $-$ have the same precedence, then which part of the expression will be evaluated first, is determined by associativity of those operators.
- Here, both $+$ and $-$ are left associative, so the expression will be evaluated as $(a + b) - c$.
 - $a + b - c \rightarrow (a + b) - c$
 - $a + b * c \rightarrow (a + b) * c$
- $a + b * c$, the expression part $b * c$ will be evaluated first, with multiplication as precedence over addition. We here use parenthesis for $a + b$ to be evaluated first, like $(a + b) * c$



Sr.No.	Operator	Precedence	Associativity
1	Exponentiation $^$	Highest	Right Associative
2	Multiplication ($*$) & Division ($/$)	Second Highest	Left Associative
3	Addition ($+$) & Subtraction ($-$)	Lowest	Left Associative



Infix to post fix and prefix



Sr.No.	Infix Notation	Prefix Notation	Postfix Notation
1	$a + b$	$+ a b$	$a b +$
2	$(a + b) * c$	$* + a b c$	$a b + c *$
3	$a * (b + c)$	$* a + b c$	$a b c + *$
4	$a / b + c / d$	$+ / a b / c d$	$a b / c d / +$
5	$(a + b) * (c + d)$	$* + a b + c d$	$a b + c d + *$
6	$((a + b) * c) - d$	$- * + a b c d$	$a b + c * d -$