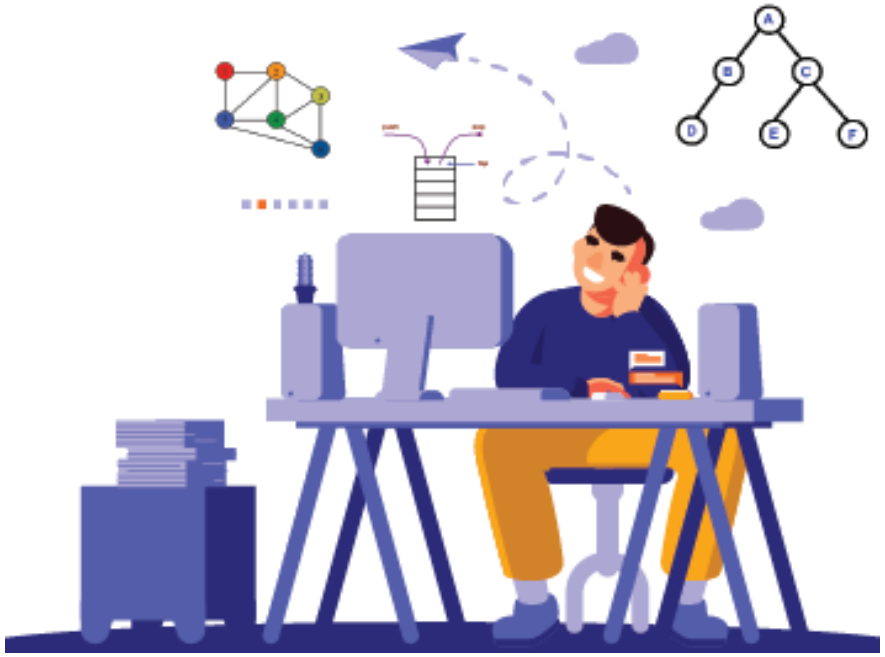
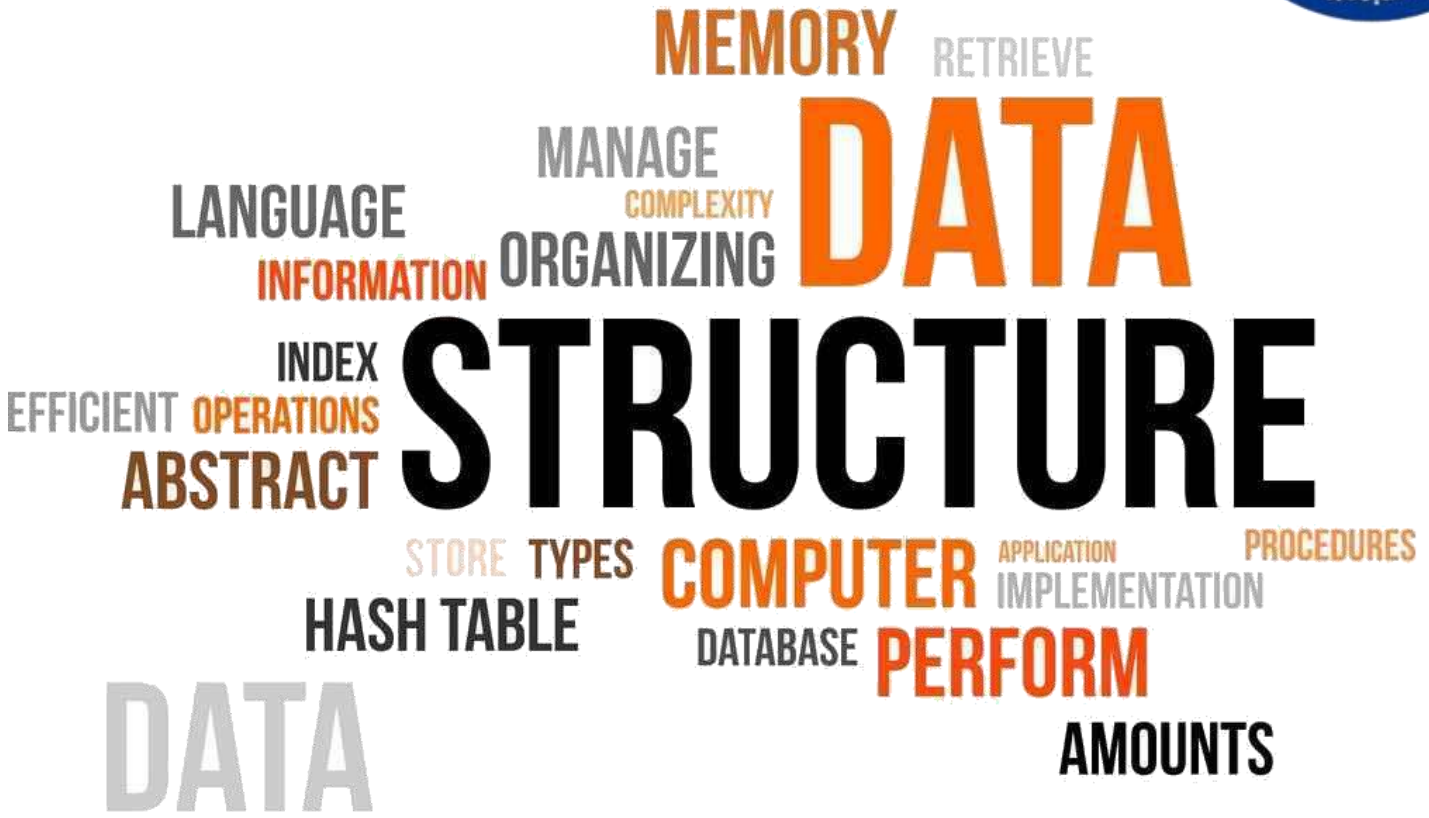


Data Structures

Course code: IT623



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Lectures 25

Stack, Queue, and Recursion

Arithmetic Expressions : Polish Notation

→ Q be an arithmetic expression involving constants and operations

→ To find the value of Q, we will use Polish (Postfix) notation, using stack.

→ "Levels of precedence"

Highest: Exponentiation (↑)

Next highest: Multiplication (*) and division (/)

Lowest: Addition (+) and subtraction (-)

OPERATOR	TYPE	ASSOCIAVITY
( ) [ ] . ->		left-to-right
++ -- + - ! ~ (*type*) * & sizeof	Unary Operator	right-to-left
* / %	Arithmetic Operator	left-to-right
+ -	Arithmetic Operator	left-to-right
<< >>	Shift Operator	left-to-right
< <= > >=	Relational Operator	left-to-right
== !=	Relational Operator	left-to-right
&	Bitwise AND Operator	left-to-right
^	Bitwise EX-OR Operator	left-to-right
|	Bitwise OR Operator	left-to-right
&&	Logical AND Operator	left-to-right
||	Logical OR Operator	left-to-right
? :	Ternary Conditional Operator	right-to-left
= += -= *= /= %= &= ^= |= <<= >>=	Assignment Operator	right-to-left
,	Comma	left-to-right

Example:

1> 2↑3+5*2↑2−12/6

2> 12/(7−3)+2*(1+5)

} Evaluate the following: <5 minutes>

POLISH Notation :-

> For most common arithmetic operations, the operating system is placed between its two operands.

Ex- A+B C-D E*F G/H } This is called infix notation.

> With this notation, we must distinguish between (A+B)*C and A+(B*C)

> The order of the operators and operands in an arithmetic expression does not uniquely determine the order in which the operations are to be performed.

* Prefix notation:

> +AB −CD *EF /GH

> (A+B)*C = [+AB]*C = *+ABC

> A+(B*C) = A+[*BC] = +A*BC

* Reverse Polish notation refers to the analogous notation in which the operator symbol is placed after its two operands:

AB+ CD− EF* GH/

Postfix notation

(A+B)*C = (AB+)*C = AB+C*

A+(B*C) = A+(BC*) = ABC*+

Infix expression	Prefix expression	Postfix expression
1) 5+3	+53	53+
2) (4-2)*6	*-426	42-6*
3) 10/(7+2)	/10+72	1072+/
4) 8-2+6	+-826	82-6+
5) 2*(3-1)+4	+*2-314	231-*4+
6) 7/(4-1)+2	+/7-412	741-/2+
7) 5*(6+3)-2	-*5+632	563+*2-
8) (8+2)/(4-1)	/+82-41	82+41-/
9) 2+3*4-5	-+2*345	234*+5-
10) (9-1)/(4+2)	/-91+42	91-42+/

Infix expression	Prefix expression	Postfix expression
1.) (5+3)*(7-2)/4		
2.) (2+4*3)/(6-2)+8		
3.) 2*((9+3)-(5-1))/7		
4.) ((6-2)*(8+5))/(3+1)		
5.) (4+2*7)-((3+1)*5)		
6.) (10/(6-3))*(9-2)+8		
7.) ((7+2)*(4-1))/(8+2)		
8.) 5-((2+1)*(6-3))		

Infix expression	Prefix expression	Postfix expression
1.) (5+3)*(7-2)/4	/*+53-724	53+72-*4/-
2.) (2+4*3)/(6-2)+8	+/+2*43-628	243*+62-/8+
3.) 2*((9+3)-(5-1))/7	*2-+93-517	293+51--7*/
4.) ((6-2)*(8+5))/(3+1)	/*-62+85+31	62-85+*31-/
5.) (4+2*7)-((3+1)*5)	-+4*27*-315	427*+31-5*-
6.) (10/(6-3))*(9-2)+8	+/* 10-63-928	1063-/92-*8+
7.) ((7+2)*(4-1))/(8+2)	/*+72-41+82	72+41-*82+/
8.) 5-((2+1)*(6-3))	-5*+21-63	521+*68--