## Operators in Java: Form of Operators, Precedence Rank List Expression

#### Lesson 6

## **Forms of Operators**

Operators can be classified into three considering number of operands in an expression. These are unary operators, binary operators and ternary operator.

## **Unary Operators**

1. Define unary operators and write the common unary operators.

The operator that operates on **one operand** is called unary operator.

- ++ increment operator. E.g.: ++a
- - decrement operator. E.g.: --a
- + unary plus (to determine the sign positive). E.g.: +a
- unary minus (to determine the sign negative). E.g.: -a
- ! Logical NOT. E.g.: !true !a !(5>3)

## **Binary Operators**

2. Define binary operators with different binary operators.

Binary operators are the operators that operate on two operands.

Assignment operator. E.g: a = b

Arithmetic operators. E.g: a+b

Relational operators. E.g: a > b

Logical && and || E.g: (a > b) && (a>c) (a > b) || (a>c)

## **Ternary Operator**

3. Define ternary operator with an example.

Ternary operators are the operators that operate on **three operands**. The conditional operators **?** : are ternary operators.

E.g.: **a?"Yes":"No"** (It means: if the value of a == true then "Yes" else "No").

Note: The following statement consist of four operators, but there are only three operands.

System.out.println((5>4) ? a : b);

The () of **a>b** is not necessary. It is given above to feel as it is a single expression. It executes first. Its result is either **true** or **false**. So it can be read as either **true?a:b** or **false?a:b**. So there are three operands.

## Rank List of Precedence And Associativity of Operators

<u>Rank</u>	<u>Operators</u>	Associativity		
1	<mark>()</mark> .[]			
2	++	Left to right		
2	- + (Unary minus, plus)	Left to right		
2	! (Logical not)			
2	(type)			
2	new			
3	*/%	Left to right		
4	+ - (addition, subtraction)	Left to right		
4	+ (concatenate)			
5	< <= > >= == !=	Left to right		
5	instanceof			
6	&&			
7	I			
8	?:			
9	+= -= *=/= %=	Right to left		
9	=	Right to left		

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# Expressions

- 3
- 1. Define **expression** with an example.

An expression is a valid combination of operators and operands. E.g: a = 5. Here a and 5 are operands, and = is an operator. The second operand can be a constant or a variable. E.g.: a = 5.

## Various Expressions

Assignment expression: Expression with assignment operator. E.g.: a=b

Arithmetic expression: Expression with arithmetic operator. E.g.: a+b

Arithmetic assignment expression: Expression with arithmetic assignment operator. E.g.: a+=b

Increment / decrement expression: Expression with increment/decrement operator. E.g.: a++, a--

Relational expression: Expression with relational operator. E.g.: a==b

Logical expression: Expression with logical operator. E.g.: a>b && a>c

Conditional expression: (a>b)?a:b

Compound expression: Combination of multiple expressions. E.g.: c=a+b

## Pure Expression

- 2. Define pure expression.
  When all operands are of same data type in an expression then it is a pure expression. *E.g.*1: 5+2 *E.g.*2: 5.0+3.0
- Define pure integer expression.
   When all operands are integers in an expression then it is a pure integer expression then it is pure integer expression. E.g.: 5+2
- Define pure real expression.
   When all operands are real data type in an expression then it is a pure real expression.
   E.g.: 5.0/2.0

## Impure Expression or Mixed Type Expression

5. Define impure or mixed expression.

When the operands are of **different data types** then it is a mixed expression or impure expression. E.g.: 5/2.0

6. What will be the data type of the output of a mixed type pure expression?

The output of a mixed type pure expression will be:

- If an expression with various integers then the result will be largest integer data type.
   E.g.: byte a=3; short b=4; int c=5; long d=6; long s=a+b+c+d; The s should be long.
- 2) If an expression with various real types then the result will be largest real type.
   E.g.: float a=2F; double b=3.0; double s=a+b; The s should be double.
- 7. What will be the data type of the output of a mixed type impure expression?

The output of a mixed type impure expression will be:

- If an expression with integer and real then the result will be real
   E.g.: int a=5; double b=2.0; double c=a/b; The c should be double.
- If an expression with character and integer then the result will be integer
   E.g.: char a='A'; int b=1; int c=a+b; The c should be int.
- If an expression with String and any other types then the result will be String
   E.g.: String a= "A"; int b=1; String c=a+b; The c should be String.

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<ol> <li>What will be the data type of the output of two char values? The output of two char type will be int E.g.: char a='A'; char b='B'; int c=a+b; The c should be int. Its output will be 131 (The sum of ASCII values: 65+66)</li> <li>Write data type of output value with an example of the followings:         <ol> <li>Expression with two int values. Answer: int E.g.: 5/2 is 2 as int</li> <li>Expression with an int and a long values. Answer: long E.g.: 5/2L is 2 as long (largest in integers)</li> <li>Expression with an int value and a double value. Answer: double E.g.: 5/2.0 is 2.5 as double (integer with real is real)</li> <li>Expression with an int and a float values. Answer: double E.g.: 5/2.0 is 2.5 as float (integer with real is real)</li> <li>Expression with a int and a float values. Answer: float E.g.: 5/2 fi s 2.5 as float (integer with real is real)</li> <li>Expression with a long and a float values. Answer: float E.g.: 5/2 fi s 2.5 as float (integer with real is real)</li> <li>Expression with a long and a float values. Answer: float E.g.: 5/2.0 is 2.5 as double (largest in real values)</li> <li>Expression with a float and a double values. Answer: int E.g.: A'+1 is 66 as int. (65+1. ASCII value is added. Character with integer is integer)</li> <li>Expression with two char values. Answer: int E.g.: 'A'+1 is 66 as int. (65+66. ASCII values are added)</li> <li>Relational expression Answer: boolean (true or false) E.g.: System.out.println(5&gt;3); Output is true.</li> <li>Logical expression Answer: boolean (true or false) E.g.: System.out.printl(5&gt;4&amp;&amp;5&gt;3); Output: false.</li> </ol> </li> <li>Expression with a String value Answer: String E.g.: System.out.printl("Value is "+6+7); Output: Va</li></ol>	ICS	EIX		4	Operators: Conditional			
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