



CSN-103: Fundamentals of Object Oriented Programming

Instructor: Dr. Rahul Thakur

Assistant Professor, Computer Science and Engineering, IIT Roorkee



Operators in Java

- Divided into four groups
 - Arithmetic
 - Bitwise
 - Relational
 - Logical

- Arithmetic

Operands must be of a numeric or char type

Operator	Result
+	Addition (also unary plus)
–	Subtraction (also unary minus)
*	Multiplication
/	Division
%	Modulus
++	Increment
+=	Addition assignment
– =	Subtraction assignment
*=	Multiplication assignment
/=	Division assignment
%=	Modulus assignment
--	Decrement

Operators in Java

- Arithmetic Compound Assignment Operators

$a = a + 4$	equivalent to	$a += 4$
$a = a - 4$	equivalent to	$a -= 4$
$a = a * 4$	equivalent to	$a *= 4$
$a = a / 4$	equivalent to	$a /= 4$
$a = a \% 4$	equivalent to	$a \% = 4$

- Increment and Decrement Operators

$x = x + 1$	equivalent to	$x++$	or	$++x$
$x = x - 1$	equivalent to	$x--$	or	$--x$

Postfix vs. Prefix Form

Postfix vs. Prefix Form

- ++ and -- in a larger expression
 - Prefix: Operand is incremented/decremented before the value is obtained for use in the expression
 - Postfix: Previous value is obtained for use in the expression, and then the operand is incremented/decremented

```
x = 42;
y = ++x;
```

```
x = 42;
x = x+1;
y = x;
```

```
x = 42;
y = x++;
```

```
x = 42;
y = x;
x = x+1;
```

Equivalent

Equivalent

Relational Operators

- *Relational* operators determine the relationship (equality and ordering) that one operand has to the other

Operator	Result
==	Equal to
!=	Not equal to
>	Greater than
<	Less than
>=	Greater than or equal to
<=	Less than or equal to

- The outcome of these operations is a **boolean** value
- Equality test is done using == NOT = which is Assignment operator
- Inequality test is done using !=

Boolean Logical Operators

- Operate only on **boolean** operands

Operator	Result
&	Logical AND
	Logical OR
^	Logical XOR (exclusive OR)
	Short-circuit OR
&&	Short-circuit AND
!	Logical unary NOT
&=	AND assignment
=	OR assignment
^=	XOR assignment
==	Equal to
!=	Not equal to
?:	Ternary if-then-else

Boolean Logical Operators

- Results of different each Boolean logical operation

A	B	A B	A & B	A ^ B	!A
False	False	False	False	False	True
True	False	True	False	True	False
False	True	True	False	True	True
True	True	True	True	False	False

- Short-Circuit Logical Operators
 - OR operator results in **true** when A is true, no matter what B is
 - AND operator results in **false** when A is false, no matter what B is
- Use || and && instead of | and &
 - Java will not evaluate the right-hand operand when the outcome of the expression can be determined by the left operand alone

The Assignment and Ternary Operator

- Assignment
 - Different than == (Equal to) operator
 - Create a chain of assignments

```
int x, y, z;
```

```
x = y = z = 100;
```

- The Ternary (?) Operator
 - The ? has this general form:

`expression1 ? expression2 : expression3`

- *expression1* can be any expression that evaluates to a boolean value.
- If *expression1* is true, then *expression2* is evaluated; otherwise, *expression3* is evaluated

System and Scanner Classes

Output to the Monitor

- System class
 - A class in the *java.lang* package
 - System class is a collection of methods and variables
 - Standard input
 - Standard **output**
 - Standard error
- Standard **output**

`System.out.println(data)` // Move to next line
`System.out.print(data)`

Input from the Keyboard

- Scanner class
 - Reads formatted input and converts it into its binary form
 - Can read from **Keyboard**, File, and String
- Steps

```
import java.util.Scanner;
```

//Necessary

```
Scanner sc = new Scanner(System.in);
```

```
byte b = sc.nextByte();
```

```
short s = sc.nextShort();
```

```
int a = sc.nextInt();
```

```
long b = sc.nextLong();
```

```
double c = sc.nextDouble();
```

```
float f = sc.nextFloat();
```

```
boolean b = sc.nextBoolean();
```

```
String s = sc.nextLine();
```

nextChar() does not exist