INDIAN INSTITUTE OF TECHNOLOGY ROORKEE



CSN-103: Fundamentals of Object Oriented Programming

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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

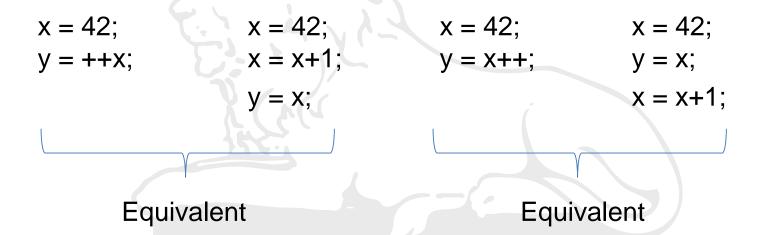
x = x + 1	equivalent to	X++	or	++X
x = x - 1	equivalent to	X	or	X

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



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
Λ	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	В	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)
System.out.print(data)
```

// Move to next line

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();
                                     nextChar() does not exist
long b = sc.nextLong();
double c = sc.nextDouble();
float f = sc.nextFloat();
boolean b = sc.nextBoolean();
String s = sc.nextLine();
```