

Java Expressions

Assignment Operators

Lecture Contents

- Operator Types
- Review of the Java Arithmetic Operators
- The basic Java Assignment Operator (=)
- Other Java Assignment Operators
- Operator Precedence

Operator Types

- Java uses the following types of operators
 - **arithmetic**
 - **assignment** (this lecture)
 - **increment/decrement**
 - **comparison**
 - **logical**
 - **bitwise**

Note: **bitwise** operators are not part of the AP Java Subset.

Review of the Java Arithmetic Operators

- Recall the Java *arithmetic operators*:
 - Add: $x + y$
 - Subtract: $x - y$
 - Multiply: $x * y$
 - Divide: x / y
 - Modulus: $x \% y$
 - Modulus is the remainder after integer division
- There is no exponential operator; exponentiation is implemented as a method in Java.

Review of the Java Arithmetic Operators

- The order of operations is the same as in mathematics:
 - multiplication, division and modulus are higher precedence than addition or subtraction.
 - Operation at the same level are performed left-to right.

Level	Operators	Associativity
16	()	Left-to-right
12	*, /, %	Left-to-right
11	+, -	Left-to-right

- *Note:* we will fill the missing **Levels** as we add more operators.

Lecture Contents

- Operator Types
- Review of the Java Arithmetic Operators
- **The basic Java Assignment Operator: =**
- Other Java Assignment Operators
- Operator Precedence

Java Assignment Operators

- An *assignment operator* is used to set the value of a variable.

Java Assignment Operators

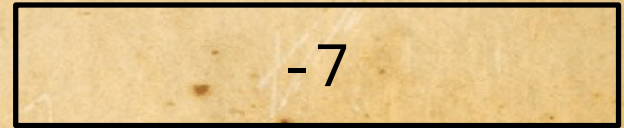
- An *assignment operator* is used to set the value of a variable.
- We used an *assignment operator*, `=`, when we *initialized* variables:

```
myInteger = -7;
```

int myInteger



int myInteger



Java Assignment Operators

- An *assignment operator* is used to set the value of a variable.
- We used an *assignment operator*, `=`, when we *initialized* variables:

```
public static void main(String[] args) {  
    int myNumber = 13;           ← declaration and initialization  
    System.out.println(myNumber);  
}
```

```
public static void main(String[] args) {  
    int myNumber;                ← declaration  
    myNumber = 13;               ← initialization  
    System.out.println(myNumber);  
}
```

Java Assignment Operators

- An ***assignment operator*** is used to set the value of a variable.
- We used the ***assignment operator*** when we *assigned* a new value to a variable after initializing it:

```
public static void main(String[] args) {  
    int myNumber = 13;  
    myNumber = 7;  
    System.out.println(myNumber);  
}
```

7

Java Assignment Operators

- An ***assignment operator*** is used to set the value of a variable.
- We used the ***assignment operator*** when we *assigned* a calculated value to a variable:

```
public static void main(String[] args) {  
    int myNumber = 13;  
    myNumber = myNumber + 7;  
    System.out.println(myNumber);  
}
```

Java Assignment Operators

- An ***assignment operator*** is used to set the value of a variable.
- We used the ***assignment operator*** when we *assigned* a calculated value to a variable:
 - Note the difference between how we would treat this expression in mathematics!

```
public static void main(String[] args) {  
    int myNumber = 13;  
    myNumber = myNumber + 7;  
    System.out.println(myNumber);  
}
```

20

Operator Precedence

- The assignment operator is the very lowest precedence
 - all calculations on the right side are performed
 - *then* the left side is assigned that value.
 - the left side is always a variable or constant, not an expression

Level	Operators	Associativity
16	()	Left-to-right
12	*, /, %	Left-to-right
11	+, -	Left-to-right
1	=	Right-to-Left

Note: there are more assignment operators that will be added to level 1.

Lecture Contents

- Operator Types
- Review of the Java Arithmetic Operators
- The basic Java Assignment Operator (=)
- **Other Java Assignment Operators**
- Operator Precedence

Other Java Assignment Operators

- Study the following code and its output.

```
public static void main(String[] args) {  
    int myNumber = 13;  
    myNumber *= 3;  
    System.out.println(myNumber);  
}
```

39

Other Java Assignment Operators

- There are assignment operators that combine **arithmetic** operations. For each row, the two expressions are equivalent:

	Arithmetic Operation and Assignment	Combined Operation
Addition	$x = x + 5$	$x += 5$
Subtraction	$x = x - 7$	$x -= 7$
Multiplication	$x = x * 3$	$x *= 3$
Division	$x = x / 6$	$x /= 6$
Modulus	$x = x \% 4$	$x \% = 4$

- Note: There are also **bitwise assignment** operators not shown in the table.

Operator Precedence

- The assignment operator is the very *lowest* precedence
 - all calculations on the right side are performed
 - *then* the left side is assigned that value.
 - the left side is always a variable or constant, not an expression

Level	Operators	Associativity
16	()	Left-to-right
12	*, /, %	Left-to-right
11	+, -	Left-to-right
1	=, +=, -= *=, /=, %=	Right-to-Left

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