

At promised, here are the slides for the Java Masterclass course re-master (that really is a mouthful).

What is being remastered?

Well first, some history.

I originally conceived the idea of this Java Masterclass in 2015 after students in my Android Java course kept asking me to extend the size of the Java tutorial section in that course.

Realising that Java really needed to be a complete course in it's own right, I create the Java Masterclass course and it got released to rave reviews late in 2015 and has been improved and updated ever since. Over 337,000 students have been through the course, and left 77,000+ reviews. It's grown into a huge course of over 77 hours of video training.

Like any educational material, over time bugs are found, things need updating, and combining this with what I have learnt about producing courses and using the feedback I have received from students like you lead me to making a decision in July 2019 to re-record the entire course. It's got past the point when I can just release an update video here and there.

What is getting re-recorded?

I am literally re-recording each and every video in the course. While the content will be substantially the same, there will be improvements. Firstly to the video recording quality itself. One of the issues students found was the font size. I'm using much larger fonts.

Secondly these slides (now part of many videos) help you understand key concepts.

Third, in the case of certain videos that did not adequately explain the concepts covered to the level I would have liked, they are being enhanced with additional clarification and explanation.

The end result will be a much improved course that is really going to help you become a Java Programmer, better than ever.

I sincerely believe this is the best content I have ever produced, and I'm looking forward to getting the content released. The fact that you are reading this is a sign that I have already released some of this new content on Udemy.

When will the remaster be completed?

Keep in mind that it will take me some time to get the new content completed. As explained in the early videos in the course, I'm releasing the new content one section at a time. This is the best way to reduce confusion between old and new content.

As new content is released this document will be updated. I'll be sending out a regular email to everyone who requested access to the slides.

How do you get notifications about new content and new slides?

I'll be sending out regular updates to the email list you used to get access to these slides. Just watch for regular emails letting you know what content is available (both new videos and updated slides).

Are you a pirate? (no judgement).

If you happened to download these slides and/or my course from the Internet, keep in mind that what you have is likely very out of date (both slides and videos). I won't judge your actions other than to say that I have spent hundreds of hours producing and supporting this course, and if you find the content valuable I would appreciate you buying your own copy of it.

Please consider clicking this [link](#) to get your very own copy of this course at the cheapest price I can make it available.

Unfortunately I have to do my part to make it harder for people to illegally download my content. This is my full time "job" and if you've seen a picture of me you know I like to eat. Staying on this email list is the best way to be notified about new content.

Current version

The current version of this slides document is v1.000 created on 22nd July, 2019.

Programming Tips and Career advice

I have a Youtube channel that I post regular videos to. In the past three months there have been 100 programming tips and career advice related videos released. Having been a programmer for 35 years I know a thing or two about programming and the industry so check out my playlist of [Programming Tips and Career Advice Videos](#).

Summary

Well that's it for me. If you want to drop me a line you can contact me at my blog. Visit [My Personal Blog here.](#)

I hope you enjoy the course and these slides.

Regards

Tim Buchalka



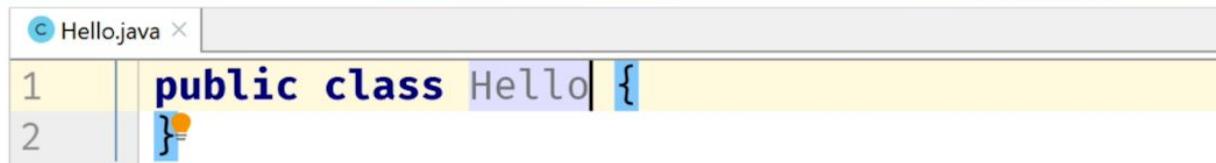
Java Masterclass Remaster Slides

Main Course Slides.

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Java Masterclass Remaster Slides



Keywords in Java



A screenshot of a Java code editor showing a file named 'Hello.java'. The code contains two lines: 'public class Hello {' on line 1 and '}' on line 2. The 'public' keyword and the class name 'Hello' are highlighted in blue, indicating they are Java keywords.

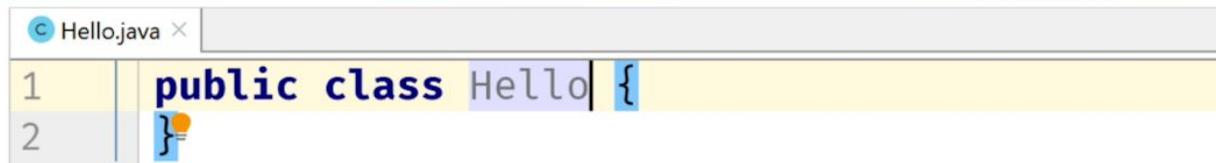
Java programs (and most other programming languages) have keywords. Each has a specific meaning and sometimes they need to be used in specific orders.

You write Java programs by following a specific set of rules, using a combination of these keywords and other things you will see which collectively form a Java program.

NOTE: keywords are case sensitive - public and Public and even PUBLIC are different things.

public and **class** are two java keywords - they have a specific meaning which we will find out more about moving forward.

Access Modifiers



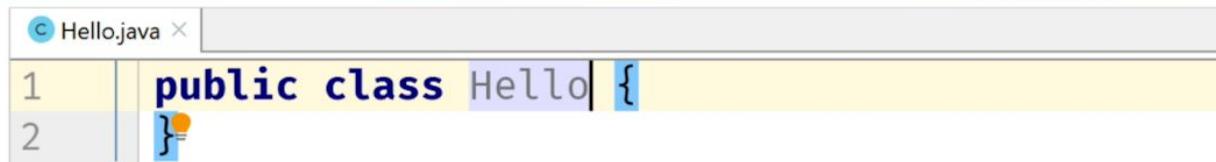
```
1 public class Hello {  
2 }
```

The **public** Java keyword is an access modifier. An access modifier allows us to define the scope or how other parts of your code or even some else's code can access this code. More on that later.

For now, we will use the public access modifier to give full access. We'll come back to access modifiers once we get further into the course.

Defining a class. The **class** keyword is used to define a class with the name following the keyword - Hello in this case and left and right curly braces to define the class block.

Defining a class



A screenshot of a Java code editor showing the definition of a class. The file is named 'Hello.java'. The code is as follows:

```
1 public class Hello {  
2 }
```

The code editor highlights the class definition with a yellow background. Line 1 shows the access modifier 'public' and the class name 'Hello'. Line 2 shows the closing curly brace '}'.

To define a class requires an optional access modifier, followed by class, followed by the left and right curly braces.

The left and right curly braces are defining the class body - anything in between them is "part" of this class. We can have data and code as you will see as we progress.

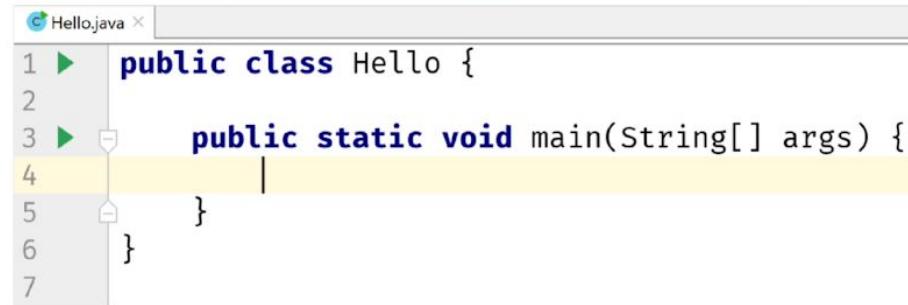
So that's our first class defined.

Methods in Java

What is a method? It's a collection of statements (one or more) that perform an operation. We'll be using a special method called the main method that Java looks for when running a program. It's the entry point of any Java code.

You can create your own methods as you will see later, but for now, let's create this main method.

Defining the Main Method



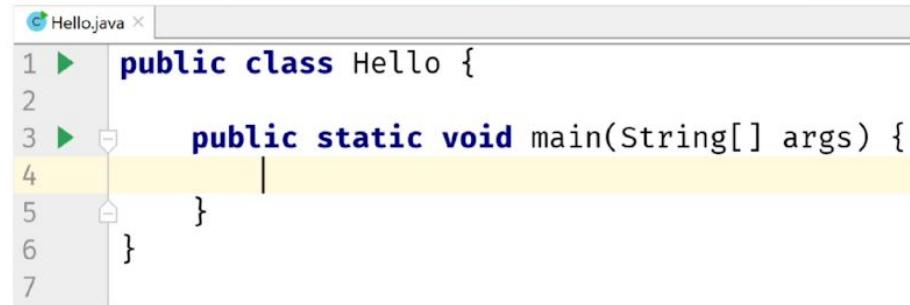
```
1 ► public class Hello {  
2  
3 ►   public static void main(String[] args) {  
4  
5   }  
6 }  
7
```

public is an access modifier we discussed when defining the class in the last video - same principle.

static is a Java keyword that needs an understanding of other concepts, for now, know that we need to have static for java to find our method to run the code we are going to add.

void is yet another java keyword used to indicate that the method will not return anything - more on that later.

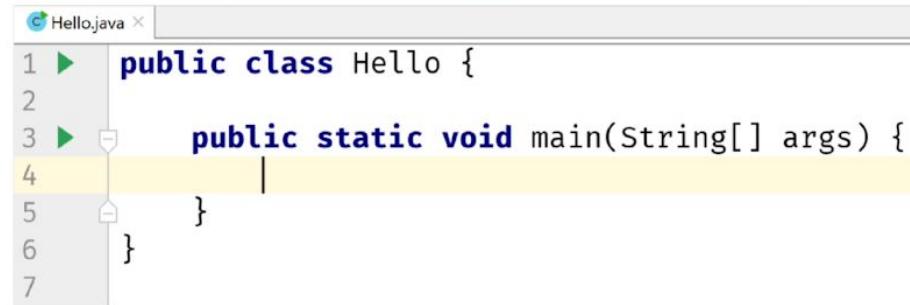
Defining the Main Method - 2



```
1 ► public class Hello {  
2  
3 ►   public static void main(String[] args) {  
4  
5   }  
6 }  
7
```

The left and right parenthesis in a method declaration are mandatory and can optionally include one or more parameters - which is a way to pass information to a method. More on that later.

Code Blocks



A screenshot of a Java code editor showing a file named 'Hello.java'. The code is as follows:

```
1  public class Hello {  
2  
3      public static void main(String[] args) {  
4          //  
5      }  
6  }
```

The line '4 //
' is highlighted with a yellow background, indicating it is part of a code block. The code editor interface includes a tab bar with 'Hello.java x' and a status bar with line numbers 1 through 7.

Code block - A code block is used to define a block of code. It's mandatory to have one in a method declaration and it's here where we will be adding statements to perform certain tasks.

Statements in Java

```
3 ►  public static void main(String[] args) {  
4   System.out.println("Hello World");  
5 }
```

Statement - This is a complete command to be executed and can include one or more expressions (we'll see these in action later).

Here we are using the build in Java functionality to print out our message.
System.out.println is calling a Java method to print our message.

What are Variables?

Variables are a way to store information in our computer. Variables that we define in a program can be accessed by a name we give them, and the computer does the hard work of figuring out where they get stored in the computers random access memory (RAM).

A variable, as the name suggests can be changed, in other words, it's contents are variable.

What we have to do is tell the computer what type of information we want to store in the variable, and then give it a name.

Data Types

There are lots of different types of data we can define for our variables. Collectively these are known as Data types. As you may have guessed, data types are keywords in Java.

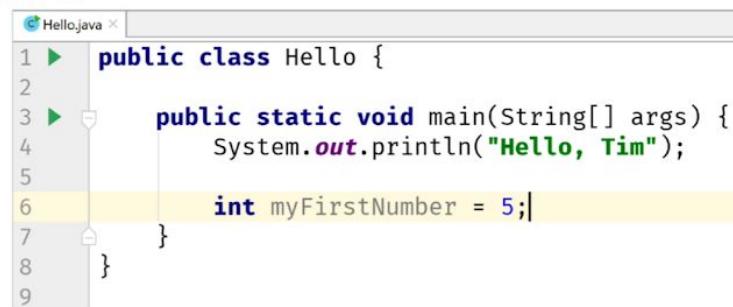
Let's start out by defining a variable of type **int** - **int** being an abbreviation for integer, a whole number (that is a number without any decimal points).

To define a variable we need to specify the data type, then give our variable a name, and optionally add an expression to initialize the variable with a value.

Let's swing back to the code to see how to define one.

Declaration Statement

Used to define a variable by indicating the data type, and the name, and optionally to set the variable to a certain value.



A screenshot of a Java code editor showing a declaration statement. The code is as follows:

```
1  public class Hello {  
2  
3      public static void main(String[] args) {  
4          System.out.println("Hello, Tim");  
5  
6      int myFirstNumber = 5;  
7  
8  }
```

The line `int myFirstNumber = 5;` is highlighted with a yellow background. The code editor interface shows lines 1 through 9 on the left.

Here the type (short for Data type) is an **int**, the name is **myFirstNumber** and the value we are assigning or initializing our variable with is **5**. We are declaring a variable of type **int** with the name **myFirstNumber** and assigning the value **5** to it.

Expression

This is a construct that evaluates to a single value - we'll discuss this in much more detail in the upcoming section on expressions.

String Literal

```
6      int myFirstNumber = 5;  
7      System.out.println("myFirstNumber");  
8  }
```

Any sequence of characters surrounded by double quotes is a String literal in Java. Its value cannot be changed, unlike a variable.

Java Operators

Java operators or just operators perform an operation (hence the word) on a variable or value. `+`, `-`, `/` and `*` are four common ones that I feel sure you are familiar with.

There are lots more you will learn as we go through the course.

Primitive Types

In Java primitive types are the most basic data types. The **int** is one of eight primitive types.

The eight primitive data types in Java are **boolean**, **byte**, **char**, **short**, **int**, **long**, **float** and **double**. Consider these types as the building blocks of data manipulation. Let's explore the eight primitive types in Java.

Java Packages

A package is a way to organize your Java projects. For now, consider them as folders with **learnprogramming** in our example being a subfolder of **academy**. Companies use their domain names reversed.

So **learnprogramming.academy** becomes **academy.learnprogramming** - we will go into a lot more detail about packages later in the course.

Wrapper classes

Java uses the concept of a Wrapper class for all eight primitive types - In the case of an **int**, we can use **Integer**, and by doing that it gives us ways to perform operations on an **int**.

```
int myMinIntValue = Integer.MIN_VALUE;
int myMaxIntValue = Integer.MAX_VALUE;
System.out.println("Integer Minimum Value = " + myMinIntValue);
System.out.println("Integer Maximum Value = " + myMaxIntValue);
```

In this case, we are using the **MIN_VALUE** and **MAX_VALUE** to get Java to tell us the minimum and maximum ranges of numbers that can be stored.

Overflow and Underflow in Java

If you try and put a value larger than the maximum value in Java, or a value smaller than the minimum value in Java, then you will get an Overflow in the case of the maximum value or an Underflow in the case of the minimum.

The computer just skips back to the minimum number or the maximum number, which is usually not what you want. It's an important concept to be aware of.

Size of Primitive Types and Width

A **Byte** occupies 8 bits. A bit is not directly represented in a primitive type - We have a **boolean** which is not really the same thing that we will discuss in a future video. So a **Byte** occupies **8 bits**. We say that a **byte** has a width of **8**.

A **short** can store a large range of numbers and occupies **16 bits**, and has a width of **16**.

An **int**, has a much larger range as we know, and occupies **32 bits**, and has a width of **32**.

The point here is that each primitive type occupies a different amount of memory - we can see that an **int** needs four times the amount of space, than a **byte** does for example.

It's not particularly relevant for you to know these numbers, but it could come up as an interview question and it is useful to know that certain data types take up more space than others.

Casting in Java

Casting means to treat or convert a number from one type to another. We put the type we want the number to be in parenthesis like this:

(byte) (myMinByteValue/2);

Other languages have casting, this is not just a Java thing.

Floating Point Numbers

Unlike whole numbers, floating point numbers have fractional parts that we express with a decimal point. **3.14159** is an example.

Floating point numbers are also known as real numbers. We use a floating point number when we need more precision in calculations.

Single and Double Precision

Precision refers to the format and amount of space occupied by the type. Single precision occupies **32 bits** (so has a width of **32**) and a Double precision occupies **64 bits** (and thus has a width of **64**).

As a result the **float** has a range from **1.4E-45** to **3.4028235E+38** and the **double** is much more precise with a range from **4.9E-324** to **1.7976931348623157E+308**.

Floating Point Number Precision Tips

In general **float** and **decimal** are great for general floating point operations. But both are not great to use where precise calculations are required - this is due to a limitation with how floating point numbers are stored, and not a Java problem as such.

Java has a class called **BigDecimal** that overcomes this. We will talk more about that later in the course. For now just keep in the back of your mind that when precise calculations are necessary, such as when performing currency calculations, floating-point types should not be used.

But for general calculations **float** and **double** are fine. Again, we will discuss it later in the course.

Char Data Type

A **char** occupies two bytes of memory, or **16 bits** and thus has a width of **16**. The reason it's not just a **single byte** is that it allows you to store Unicode characters.

Unicode

Unicode is an international encoding standard for use with different languages and scripts, by which each letter, digit, or symbol is assigned a unique numeric value that applies across different platforms and programs.

In the English alphabet, we have the letters A through Z. Meaning only 26 characters are needed in total to represent the entire English alphabet. But other languages need more characters, and often a lot more.

Unicode allows us to represent these languages and the way it works is that by using a combination of the **two bytes** that a **char** takes up in memory it can represent one of **65535** different types of characters.

Boolean Primitive Type

A **boolean** value allows for two choices **True** or **False**, **Yes** or **No**, **1** or **0**. In Java terms we have a **boolean** primitive type and it can be set to two values only. **true** or **false**. They are actually pretty useful and you will use them a lot when programming.

Literal String Examples

```
9  System.out.println("Float minimum value = " + myMinFloatValue);
10 System.out.println("Float maximum value = " +myMaxFloatValue);
11
12 double myMinDoubleValue = Double.MIN_VALUE;
13 double myMaxDoubleValue = Double.MAX_VALUE;
14 System.out.println("Double minimum value = " + myMinDoubleValue);
15 System.out.println("Double maximum value = " +myMaxDoubleValue);
```

String Datatype

The **String** is a datatype in Java, which is not a primitive type. It's actually a **Class**, but it enjoys a bit of favoritism in Java to make it easier to use than a regular class.

What is a String?

```
5 ► ↴  public static void main(String[] args) {  
6  
7      char myChar = 'D';  
8      char myUnicodeChar = '\u0044';  
9      System.out.println(myChar);  
10     System.out.println(myUnicodeChar);  
11     char myCopyrightChar = '\u00A9';  
12     System.out.println(myCopyrightChar);  
13     boolean myTrueBooleanValue = true;  
14     boolean myFalseBooleanValue = false;  
15  
16     boolean isCustomerOverTwentyOne = true;  
17 }  
18 }
```

A **String** is a sequence of characters. In the case of the **char** which you can see above which we discussed in the previous video, it could contain a **single character** only (regular character or Unicode character).

A **String** can contain a sequence of characters. A large number of characters. Technically it's limited by memory or the **MAX_VALUE** of an **int** which was **2.14 Billion**. That's a lot of characters.

Immutable Strings

When I said you can delete characters out of a **String**, that's not strictly true. Because **Strings** in Java are immutable. That means you can't change a **String** after it's created. Instead, what happens is a new **String** is created.

Immutable Strings - 2

```
24     int myInt = 50;
25     lastString = lastString + myInt;
26     System.out.println("LastString is equal to " + lastString);
27     double doubleNumber = 120.47d;
28     lastString = lastString + doubleNumber;
29     System.out.println("LastString is equal to " + lastString);
30
```

So in the case of this code, **lastString** doesn't get appended the value "**120.47**" instead a new **String** is created which consists of the previous value of **lastString** plus a text representation of the double value **120.47**.

The net result is the same, **lastString** has the right values, however, a new **String** got created and the old one got discarded.

Don't worry if this makes no sense, it will later in the course. For now, I just wanted to point out that **Strings are immutable**.

The Code We Used To Append Strings Was Inefficient

As a result of a **String** being created, appending values like this is inefficient and not recommended. I'll show you a better way of doing it in a future video where we discuss something called a **StringBuffer** which can be changed.

We need an understanding of classes before we tackle **StringBuffer**, and also, you will come across code written in the style I've used in this lecture so it's still useful for you to know how to do things this way.

What are Operators?

Operators in Java are special symbols that perform specific operations on one, two, or three operands, and then return a result. As an example, we used the + (addition) operator to sum the value of two variables in a previous video.

27
28

```
double doubleNumber = 120.47d;  
lastString = lastString + doubleNumber;
```

There are many others in Java.

What is an Operand?

An **operand** is a term used to describe any object that is manipulated by an **operator**. If we consider this statement

```
int myVar = 15 + 12;
```

Then **+** is the operator, and **15** and **12** are the **operands**. Variables used instead of literals are also **operands**.

```
double mySalary = hoursWorked * hourlyRate;
```

In the above line **hoursWorked** and **hourlyRate** are **operands**, and ***** (multiplication) is the **operator**.

More on Expressions

An **expression** is formed by combining variables, literals, method return values (which we haven't covered yet) and operators.

In the line below, **15 + 12** is the expression which has (or returns) **27** in this case.

```
int myValue = 15 + 12;
```

More on Expressions - 2

In the statement below, **hoursWorked * hourlyRate** is the expression. If **hoursWorked** was **10.00** and **hourlyRate** was **20.00** then the expression would return **200.00**;

double mySalary = hoursWorked * hourlyRate;

Lets explore Operators in more detail.

Comments in Java

Comments are ignored by the computer and are added to a program to help describe something. **Comments** are there for humans.

We use **//** in front of any code, or on a blank line. Anything after the **//** right through to the end of the line is ignored by the computer.

Aside from describing something about a program, comments can be used to temporarily disable code.

if-then Statements in Java

The **if-then** statement is the most basic of all the control flow statements. It tells your program to execute a certain section of code only if a particular test evaluates to **true**.

This is known as **conditional logic**.

Conditional Logic

Conditional logic uses specific statements in Java to allow us to check a condition and execute certain code based on whether that condition (the expression) is **true** or **false**.

Let's see how this works in practice.

if-then Recommendation - Use Code Blocks

```
47     boolean isAlien = false;
48     if (isAlien == true)
49         System.out.println("It is not an alien!");
50         System.out.println("And I am scared of aliens");
51     }
52 }
```

Instead of using the **if**-statement as we can see here, we should instead use a **code block**.

A **code block** allows more than one statement to be executed - a block of code.

The format is:

```
if (expression) {
    // put one or more statements here
}
```

Conditions in Java

A **condition** is an expression that returns a **boolean** value.

Conditional Statements

The **if-then** statement starting on **line 59** is one of a number of conditional statements in Java. As you have seen it's a way to execute code based on a condition.

We'll be seeing more conditional statements as we progress through the course, as well as the **if else** statement which is an enhanced form of the **if-then** statement we have used so far. More on that later.

Logical AND and Logical OR

The **AND** operator comes in two flavors in Java, as does the **OR** operator.

&& is the Logical **AND** which operates on **boolean** operands - Checking if a given condition is **true** or **false**.

Logical AND and Logical OR - 2

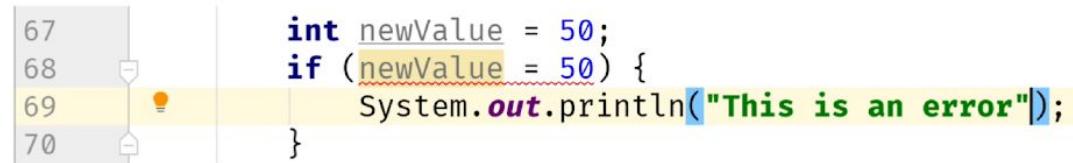
You will almost always want to be doing this. The **&** is a bitwise operator working at the bit level. This is an advanced concept that we won't get into here.

Likewise **||** is the Logical **OR** what again operates on **boolean** operands - Checking if a given condition is **true** or **false**.

Again, you will almost always want to be doing this. The **|** is a bitwise operator working at the bit level.

Assignment and Equal to Operators - Differences

```
67
68
69
70
```



```
int newValue = 50;
if (newValue = 50) {
    System.out.println("This is an error");
}
```

As you can see in the code we typed to declare the **newValue int**, it's using the **assignment operator** (one equal sign) to assign the value **50** to **newValue**.

What we needed to do in the code is to not use the **assignment operator** in the **if-then** statement, but rather the **equal to** operator which has two equal signs.

Assignment and Equal to Operators - Differences - 2

```
67      int newValue = 50;
68      if (newValue = 50) {
69          System.out.println("This is an error");
70      }
```

This is what the code should look like:

```
67      int newValue = 50;
68      if (newValue == 50) {
69          System.out.println("This is an error");
70      }
```

We are not assigning a value here, we want to test if the values are equal to each other.

The NOT Operator

The `!` or NOT Operator is also known as the Logical Complement Operator.

For use with **booleans** it tests the alternate value - we saw **(isCar)** tests for **true**, by adding a `!` operator before the value we can check the opposite - **false** in this case.

boolean isCar = false;

We can use either of these statements:

if (isCar == false)

if (!isCar)

to check if the **boolean isCar** is **false**.

The NOT Operator - 2

We can use either of these statements:

if (isCar == false)

if (!isCar)

to check if the **boolean isCar** is **false**.

I'd generally recommend using the abbreviated form of both for two reasons. One to avoid the potential for error by accidentally using an assignment operator, and second, the code is more concise.

Ternary Operator

The **ternary** operator is a shortcut to assigning one of two values to a variable depending on a given condition.

It's a shortcut of the **if-then-else** statement (**else** we will be discussing later).

Ternary Operator - 2

```
int ageOfClient = 20;  
boolean isEighteenOrOver = ageOfClient == 20 ? true : false;
```

Operand one - **ageOfClient == 20** in this case is the condition we are checking. It needs to return **true** or **false**.

Operand two - **true** here is the value to assign to the variable **isEighteenOrOver** if the condition above is **true**

Operand three - **false** here is the value to assign to the variable **isEighteenOrOver** if the condition above was **false**.

Ternary Operator - 3

```
int ageOfClient = 20;  
boolean isEighteenOrOver = ageOfClient == 20 ? true : false;
```

In this case, **isEighteenOrOver** is assigned the value **true** because **ageOfClient** has the value **20**.

It can be a good idea to use **parentheses** like this to make the code more readable.

```
boolean isEighteenOrOver = (ageOfClient == 20) ? true : false;
```

Java Masterclass Remaster Slides

Challenge Slides.

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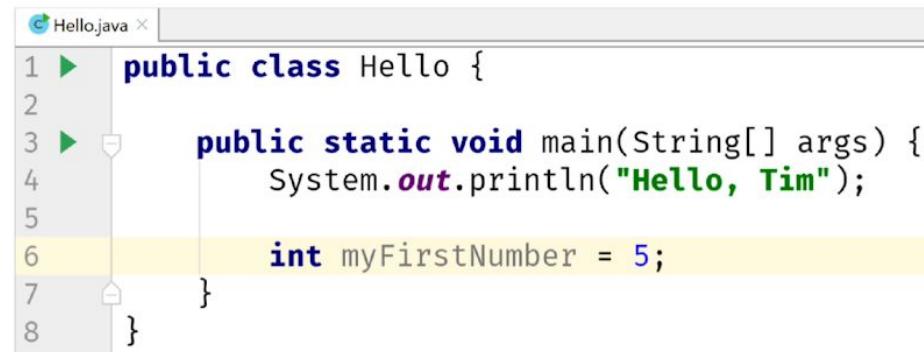
Challenge

```
1 ► public class Hello {  
2  
3 ►   □   public static void main(String[] args) {  
4       System.out.println("Hello World");  
5   □ }  
6 }  
7
```

How would you go about changing this to print my name, instead of World?

Looking at this code see if you can figure it out.

Challenge



```
1 ► public class Hello {  
2  
3 ►   public static void main(String[] args) {  
4       System.out.println("Hello, Tim");  
5  
6       int myFirstNumber = 5;  
7   }  
8 }
```

Looking at the first **System.out.println** statement, what do you think should be typed on the line below our declaration statement to print out the value of the variable **myFirstNumber**?

Challenge

Create additional variables.

Declare the following variables and add to our program.

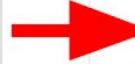
mySecondNumber which is an **int** and assign a value of **12** to it.

myThirdNumber, also an **int** with a value of **6**.

Challenge

Put the declaration statements above the **System.out.println** - you'll see why later.

```
2
3 ►  public static void main(String[] args) {
4      System.out.println("Hello, Tim");
5
6      int myFirstNumber = (10 + 5) + (2 * 10);
7      System.out.println(myFirstNumber);
8  }
9 }
```



Final Variable Challenge

Create a new variable call **myLastOne**.

We want the value to be **1000 less** the current value of **myTotal** - the data type is an **int**.

Print out the value of **myLastOne**.

Hint: Use another operator that we haven't actually used before, but should be easy to figure out if you think about it for a bit.

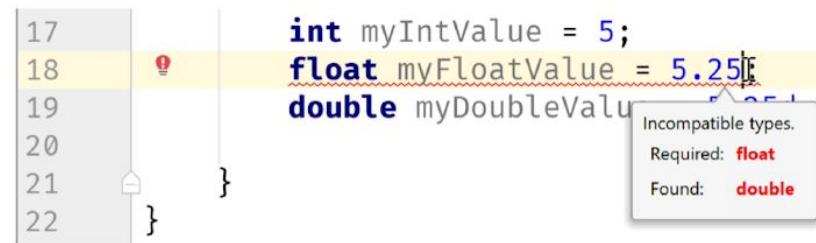
Primitive Types Challenge

Your challenge is to create a **byte** variable and set it to any valid **byte** number, it doesn't matter. Create a **short** variable and set it to any valid **short** number.

Create an **int** variable and set it to any valid **int** number. Lastly, create a variable of type **long** and make it **equal to 50000 plus 10 times the sum of the byte plus the short plus the integer values**.

Challenge

Thinking back to our discussion on casting which we used to convert both a **byte** and a **short** to the **int** equivalent, how do you think you would do the same for the **float** to remove the error?



A screenshot of a Java code editor showing a compilation error. The code is as follows:

```
17
18     int myIntValue = 5;
19     float myFloatValue = 5.25f;
20     double myDoubleValue
21
22 }
```

The line `float myFloatValue = 5.25f;` is highlighted in yellow, and a red exclamation mark icon is positioned above the line. A tooltip box is displayed, showing the error message: "Incompatible types. Required: float Found: double".

Challenge

Convert a given number of pounds to kilograms.

STEPS:

1. Create a variable with the appropriate type to store the number of pounds to be converted to kilograms.
2. Calculate the result i.e. the number of kilograms based on the contents of the variable above and store the result in a 2nd appropriate variable.
3. Print out the result.

HINT: **1** pound is equal to **0.45359237** of a kilogram. This should help you perform the calculation.

Operator Challenge

Let's test what you have learned about **Operators**.

1. Create a **double** variable with a value of **20.00**.
2. Create a second variable of type **double** with the value **80.00**.
3. Add both numbers together and multiply by **100.00**.
4. Use the **remainder** operator to figure out what the **remainder** from the result of the operation in **step 3** and **40.00**. We used the **modulus** or **remainder** operator on **int's** in the course, but we can also use it on a **double**.
5. Create a **boolean** variable that assigns the value **true** if the remainder in **#4** is **0**, or **false** if its **not zero**.
6. Output the **boolean** variable.
7. Write an **if-then** statement that displays a message "**Got some remainder**" if the **boolean** in **step 5** is **not true**. Don't be surprised if you see output for this step, where you might expect it not to show. I'll explain it in my solution.