

# COMP 250

## INTRODUCTION TO COMPUTER SCIENCE

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Week 1-1 Java syntax Part 1

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# WHAT ARE WE GOING TO DO IN THIS VIDEO?



- Java programs **Assignment Project Exam Help**
- General Java syntax **<https://powcoder.com>**
- Variable declaration **Add WeChat powcoder**
- Operators

## JAVA RESOURCES

- Check out the free online Java book "How to think like a computer scientist:

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<http://greenteapress.com/wp/think-java>

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- If you are a Python programmer, you might want to try:

<http://interactivepython.org/runestone/static/java4python/index.html>

## EXAMPLES

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```
1. System.out.println("Hello World!");
```

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```
1. public class Hello {  
2.     System.out.println("Hello World!");  
3. }
```

## EXAMPLES

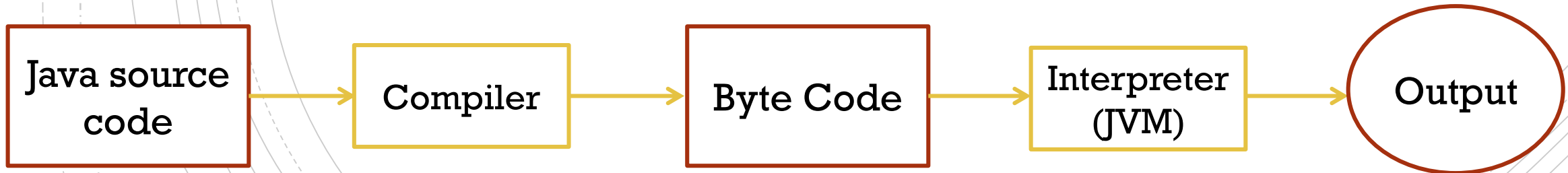
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```
1. public class Hello {  
2.     public static void f() {  
3.         System.out.println("Hello World!");  
4.     }  
5. }
```

# JAVA

- High-level programming language
- Both compiled and interpreted
  - The Java compiler translated the source code into **bytecode**.
    - As machine language, it is easy and fast to interpret.
    - As high-level languages, it is **portable**!
  - Then the Java Virtual Machine (JVM), an interpreter, runs the bytecode.



# STEPS TO PROGRAMMING IN JAVA

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1. Write a program and save it.

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2. Compile the program (**javac**) – it is enough to save your file in Eclipse

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3. Run the program (**java**) – the run button in Eclipse

# HELLO WORLD!

Let's look at the code of Hello World! written in Java:

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```
public class HelloWorld {  
    public static void main(String[] args) {  
        System.out.println("Hello, World!");  
    }  
}
```

As expected, the program simply displays Hello, World! on your screen.



## CURLY BRACES

```
public class HelloWorld {  
    public static void main (String[] args) {  
        System.out.println("Hello, World!");  
    }  
}
```

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- Java uses curly braces to group things together.
- They denote a *block* of code.
- They help us keep track of what parts of the code are related.
- If one of them is missing or there's an extra one → **syntax error**

# STATEMENTS

```
public class HelloWorld {  
    public static void main (String[] args) {  
        System.out.println("Hello, World!");  
    }  
}
```

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- A statement is a line of code that performs a basic operation.
- All statements in Java end in a semi-colon.
- The statement in this program is a print statement: it displays a message on your screen.

## PRINTING TO THE CONSOLE

```
public class HelloWorld {  
    public static void main (String[] args) {  
        System.out.println("Hello, World!");  
    }  
}
```

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- To print in Java you can use one of the following methods:
  - `System.out.println()` – which displays a new line character at the end
  - `System.out.print()` – which only display what it receives as input.
- **NOTE, Java is case-sensitive:** `System`  $\neq$  `system`  $\neq$  `SYSTEM`

# STRINGS

```
public class HelloWorld {  
    public static void main (String[] args) {  
        System.out.println("Hello, World!");  
    }  
}
```

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- Phrases that appear in quotation marks are called **Strings**.
- Strings literals must start and end with **double quotes**.

# METHODS AND CLASSES

```
public class HelloWorld {  
    public static void main (String[] args) {  
        System.out.println("Hello, World!");  
    }  
}
```

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- Almost every line of code you will write in Java will be inside a method.
- Every method you will ever write will be part of a class.
- In this program: **HelloWorld** is a class, **main** is a method.

## METHODS

```
public class HelloWorld {  
    public static void main (String[] args) {  
        System.out.println("Hello, World!");  
    }  
}
```

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- A method is named sequence of statements
- These open and close curly brackets tell the computer where the **main** method (named block of code) starts and ends.

## METHODS

```
public class HelloWorld {  
    public static void main (String[] args) {  
        System.out.println("Hello, World!");  
    }  
}
```

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- This program defines a method called **main**, which is **public**, **static**, and **void** (but don't worry about this for now)
- The `main` method is a special one:
  - The execution of a program always starts from the first statement in the main method and ends when it finishes the last statement.

# CLASSES

```
public class HelloWorld {  
    public static void main (String[] args) {  
        System.out.println("Hello, World!");  
    }  
}
```

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- This program **must** be saved as a file named *HelloWorld.java*
- Convention: names of classes starts with capital letter.



# CLASSES

```
public class HelloWorld {  
    public static void main (String[] args) {  
        System.out.println("Hello, World!");  
    }  
}
```

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- A class is a collection of methods.
- This program defines a class called **HelloWorld** which is:
  - **public** (we'll see more about this later)
  - defined by what is in between the curly brackets.

## COMMENTS

```
public class HelloWorld {  
    // This line is ignored  
    public static void main (String[] args) {  
        /* As well as this one  
           and this one  
           and this last one */  
        System.out.println("Hello, World!");  
    }  
}
```

- A single line comment in Java starts with // and ends when you press enter.
- A multi-line comment starts with /\* and ends with \*/.
- All comments are ignored by the computer.

## ECLIPSE DEMO

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- Open up Eclipse
- Create a Java Projects
- Write the HelloWorld program and run it.

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## WHICH LINES ARE STATEMENTS

Broadly speaking, there are 3 different kinds of 'lines' of code you can write:

1. Code that defines when a block starts and ends.  
These lines either end with an open curly bracket, or the whole line is a single close curly bracket.
2. A line of code that does something. These are statements and end with a semi-colon.
3. A comment.

## CODE STRUCTURE

- All of your methods will be *inside* a class.

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- (Almost) all of your statements will be *inside* of a method.

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- You can only run a .java file which contains the main method.

## GOOD PRACTICE

- In Java most spaces are optional.

- For instance, you cannot write

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```
publicstaticvoidmain (String[] args) {
```

- But it is **ok** to write our program as:

```
public class HelloWorld { public static void main  
(String[] args) { System.out.println("Hello,  
World!"); }}
```

## GOOD PRACTICE

- Tabs and newlines are optional, but without them the program becomes hard to read!  
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- Some editors automatically format the code, but in general it is good practice to make sure to keep you program organized and easy to read!

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# VARIABLES

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# THE LIFE OF A VARIABLE

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- Declaration <https://powcoder.com>
- Initialization Add WeChat powcoder
- Manipulation

# DECLARATIONS

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```
int aNumber;
```

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- When you declare a variable, you give it a name and a type

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# DECLARATIONS

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```
int aNumber;
```

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- The type of this variable is `int`
- `int` is a keyword (reserved word) in Java.  
It is short for integer.

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# DECLARATIONS

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```
int aNumber;
```

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- The name of this variable is `aNumber`
- This is **not** a keyword in Java.
- `aNumber` is the name of the place in memory with enough space to store an integer.

## ASSIGNMENT – RULES

We can store values inside a variable with an *assignment statement*.

- When we make an assignment we update the variable's value.
- Assignment operator: =  
It assigns the value on the right to the variable on the left.
- **The variable need to have the same type as the value we assign to it.**
- Variables must be **initialized** (assigned for the first time) before they can be used.

## ASSIGNMENT – EXAMPLES

### Examples:

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```
String today;           // the variable today is declared
today = "Monday";      // today gets initialized
/* the variable hour is declared and initialized on
the same line */
int hour = 10;
int date = "Wednesday"; // NOT LEGAL!
```

# VARIABLES

- Declaration:

```
int a;
```

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# VARIABLES

- Declaration:

```
int a;
```

- Assignment:

```
a = 3;
```

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3



# VARIABLES

- Declaration:

```
int a;
```

- Assignment:

```
a = 3;
```

- New assignment:

```
a = 5;
```

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# NAMING CONVENTIONS

- We use lowerCamelCase for names of variables and methods.  
E.g.: `isSnowing`, `catName`.  
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- We use UpperCamelCase for names of classes.  
E.g.: `SomeMethods`, `ShapeClass`.  
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# EXPRESSIONS and OPERATORS

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# EXPRESSIONS

---

Recall that an *expression* represents a single value that needs to be computed.

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That value has a specific type!

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# STANDARD INTEGER OPERATIONS

- Addition '+', Subtraction '-'
- Multiplication '\*'
- Division '/'
  - The output of the division between two integers is an integer! Java will always round toward zero. That is, it computes the quotient between two numbers.
- Modulo (remainder) "%"
  - It performs integer division and outputs the remainder.

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## THE '+' OPERATOR

- If used between numbers, it will add the numbers together
- If used between strings, it will concatenate those strings.
- What happens in the following example?

```
System.out.println( 2 + 3 + "5");  
System.out.println("5" + 2 + 3);
```

**Output:**

55

523

The two expressions are evaluated from left to right!

# RELATIONAL OPERATORS

- Relational: `<`, `>`, `<=`, `>=`
- Equality: `==`, `!=`
- They operate on compatible values (not on `String`)
- Expression containing them evaluates to a `boolean` value.

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# LOGICAL OPERATORS

- Logical operators take boolean expressions (i.e. expressions that evaluate to a boolean value) as inputs and produce a result of type `boolean`

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- Java has 3 logical operators

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- NOT     ‘!’
- AND    ‘&&’
- OR     ‘||’



# ORDER OF OPERATIONS

From left to right:

1. Parenthesis
2. !
3. Typcasting
4. Arithmetic
  - i. \*, /, %
  - ii. +, -
5. Comparison
  - i. Relational: <, >, <=, >=
  - ii. Equality: ==, !=
6. Boolean: &&, ||

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# Coming Soon

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In the next video we will be talking more about  
Java syntax and the scope of variables.

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