

COMP 250

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INTRODUC TER SCIENCE

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Week 1-10 Java 8
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WHAT ARE WE GOING TO DO IN THIS VIDEO?



- Java programs **Assignment Project Exam Help**
- General Java syntax **<https://eduassistpro.github.io/>**
- Variable declaration **Add WeChat edu_assist_pro**
- Operators

JAVA RESOURCES

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

<https://greenteapress.com/books/jsj/book/index.html>

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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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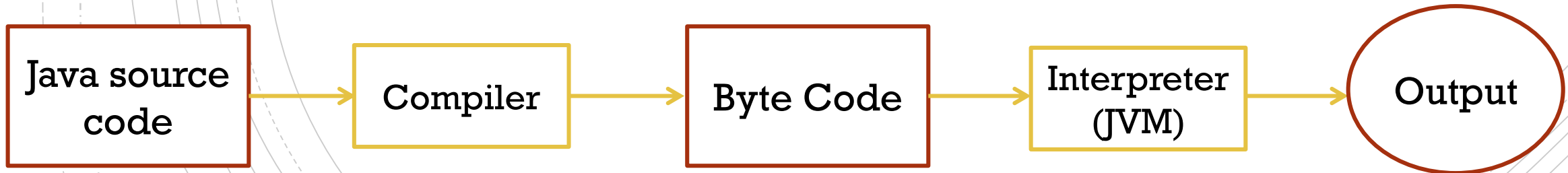
```
1. public cla
2.     public
3.         System.out.pri         lo World!");
4.     }
5. }
```

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JAVA

- High-level programming language
- Both compiled and interpreted
 - The Java compiler translates Java source code into **bytecode**.
 - As machine language, it is processed by the JVM to interpret.
 - As high-level languages, it is processed by the JVM to interpret.
 - 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 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  
    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  
        and th  
        and th  
        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

- Open up Eclipse
- Create a Java Project
- 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 <https://eduassistpro.github.io/>
These lines either end with an opening curly bracket, or the whole line is a single close curly bracket.
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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.
- (Almost) all of your methods will be inside a method.
- You can only run a .java file which contains the main method.

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GOOD PRACTICE

- In Java most spaces are optional.

- For instance, you cannot write

`publicstaticvargs) {`

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

```
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 code, but in general it is good practice to make sure to keep your program organized and easy to read!

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THE LIFE OF A VARIABLE

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- Declaration <https://eduassistpro.github.io/>
- Initialization Add WeChat edu_assist_pro
- Manipulation

DECLARATIONS

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```
int aNumber;
```

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- When you declare a variable, [Add WeChat edu_assist_pro](#) a name and a type

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.

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*.

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- When we make an assignment we update the variable's value.

- Assignment operator: = <https://eduassistpro.github.io/>

It assigns the value on the right to the left.

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- **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:

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

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VARIABLES

- Declaration:

```
int a;
```

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VARIABLES

- Declaration:

```
int a;
```

- Assignment:

```
a = 3;
```

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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, c`

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- We use UpperCamelCase for names of classes.

E.g.: `SomeMethods, ShapeClass.`

EXPRESSIONS

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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!

STANDARD INTEGER OPERATIONS

- Addition '+', Subtraction '-'

- Multiplication '*'

- Division '/'

- The output of the division between two integers is an integer! Java will always round toward zero. If the result is not an integer, 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

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```
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:
 - NOT ' ! '
 - AND ' & & '
 - OR ' | | '

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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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