Introduction to Java Programming

Session 1: Intro, Syntax, Variables, and Classes

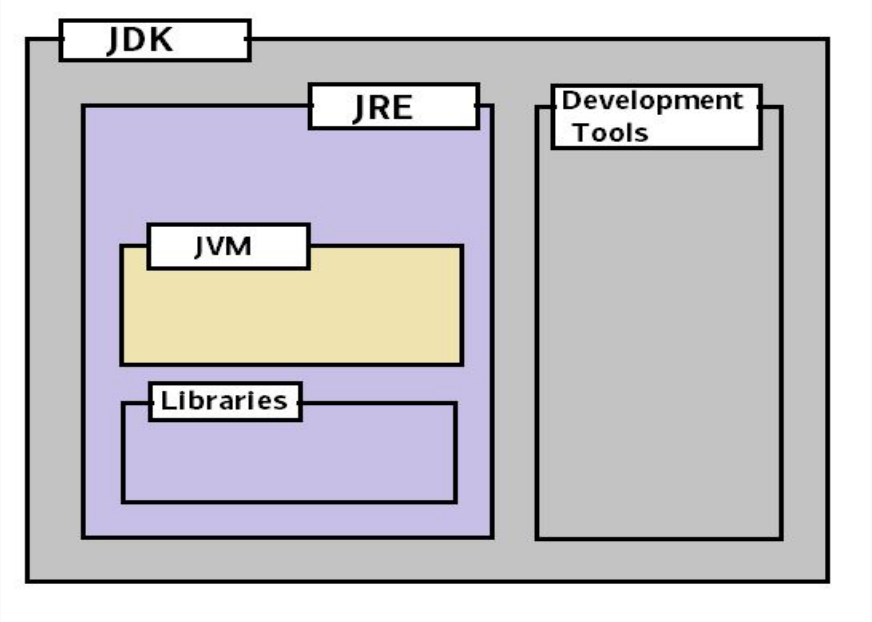
Java Is...

- A programming language that can be run on a massive number of different devices, from PCs to Android phones to robots.
- An Object-Oriented programming language that makes it intuitive to develop and organize complex programs
- A highly used, supported, and documented language with syntax that makes it easy to jump into other languages

What did we install?

THE JDK

- Java can run on most major operating systems, using a common Java Runtime Environment, or JRE, to run apps.
- The JDK allows us to compile human-readable code into instructions that the Java Virtual Machine (JVM) can execute, running our application!
- After we install it, we will never have to worry about it again! (unless there's an update)

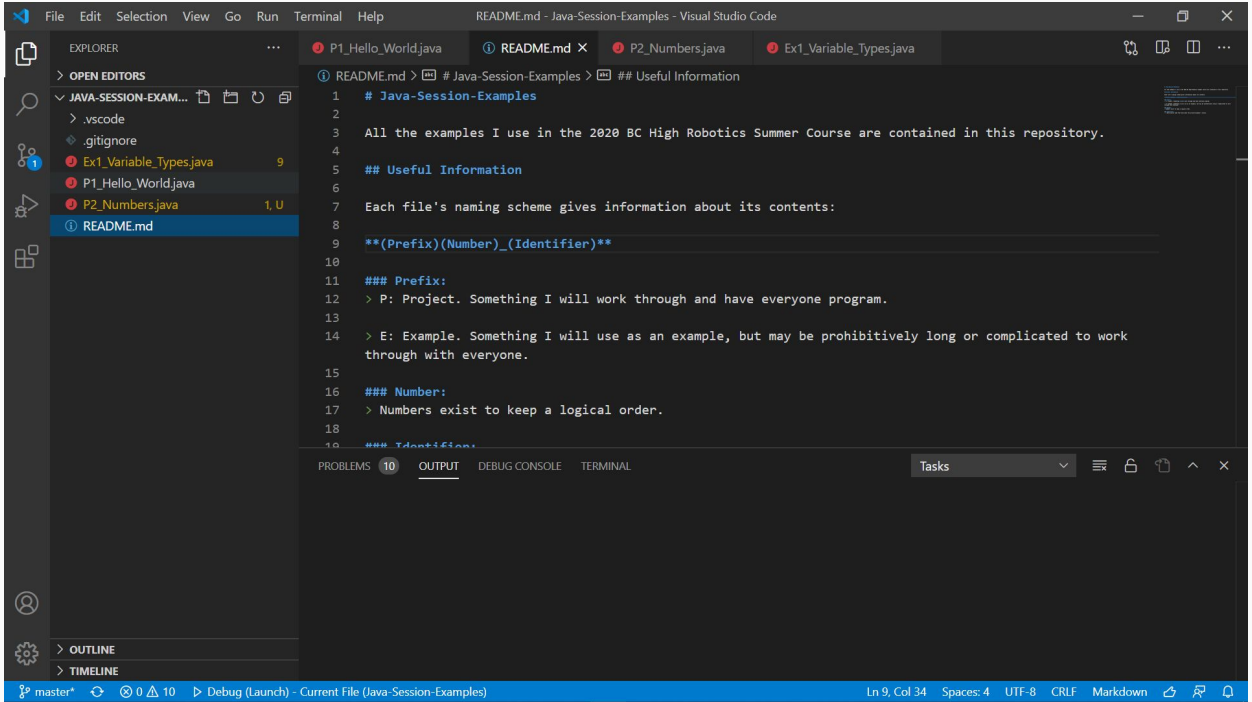


What did we install?

Visual Studio Code

- At its core, VS Code is a text editor with a lot of extra features.
- Save for a few languages (LabView and Scratch), most programming languages are typed using a structure called syntax, unique to each language. This is why VS Code can handle so many languages.
- VS Code allows us to code, run, and debug our programs with ease.

Getting Started With VSCode - Window Overview



Getting Started With VSCode - Icons

File Explorer

Search Function

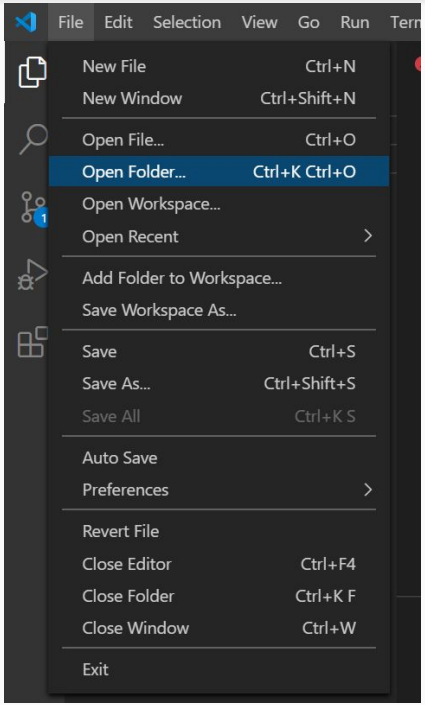
Version Control

Run/Debugging

Extensions

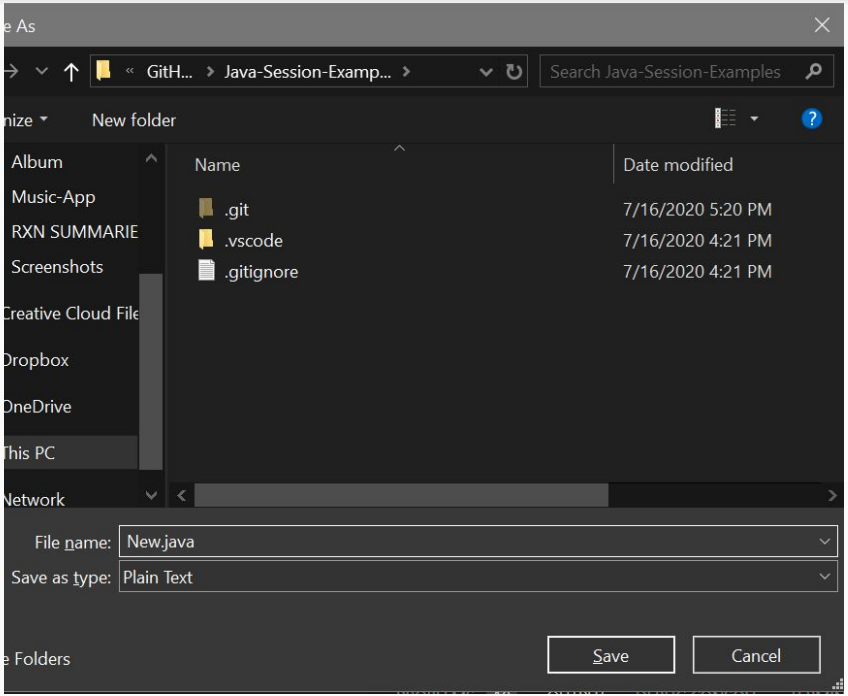
Creating The First Project

- To initialize a folder to hold all of your code, first create a folder anywhere you want on your computer (make sure you remember where!)
- Then, go to VS Code and click “File -> Open Folder” and select your chosen folder.
- You should see the name of your folder pop up to the left in the file explorer.



Creating The First Project

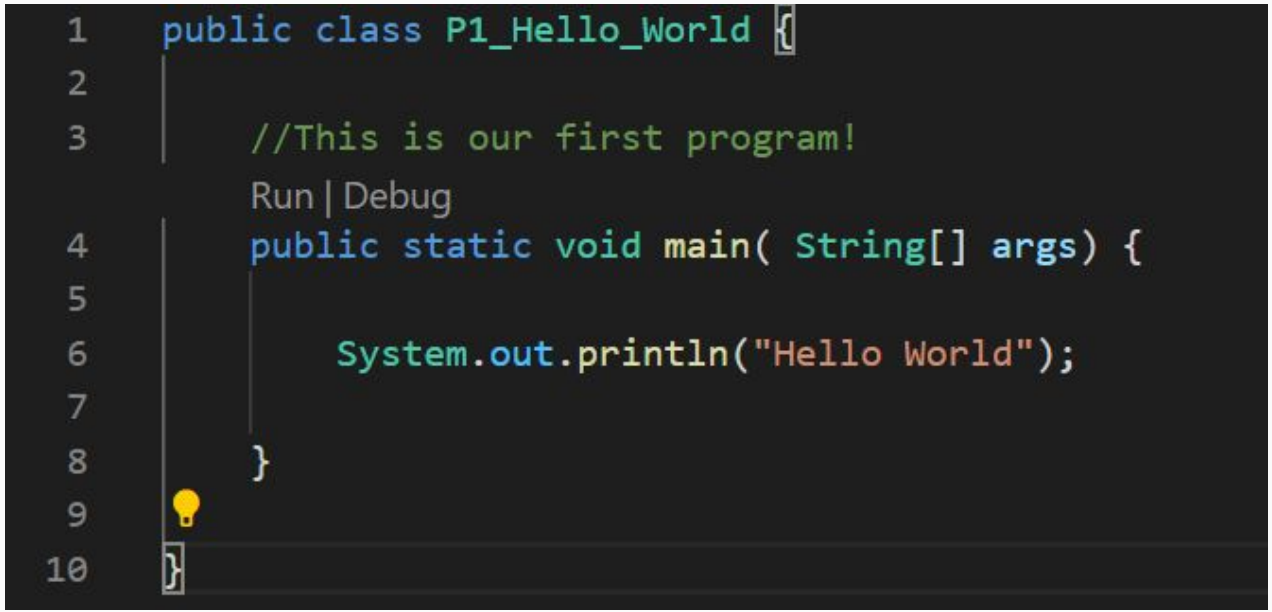
- Then, go to “File -> New File” or press Ctrl-N.
- Now you have a file open! Before typing anything, save with Ctrl-S.
- You will be prompted to enter a name. Name the file, but remember to end it with the extension “.java”
- This tells your computer that the file is an uncompiled Java source code file.
- Make sure your name has a capital letter - this is the convention for Java classes



Creating The First Project

- When you are done saving, you will notice some text has appeared in your file!
- By saving your file as a .java file, you have indicated that the file is a Java *class*. This is the basic unit of a program in Java.
- The text you see is initializing a class with the same name as your file.

Writing The “Hello, World!” Program



Notes:

- The class will be called whatever you named your file
- The “Run|Debug” button is not part of the code, but something VS Code adds for convenience

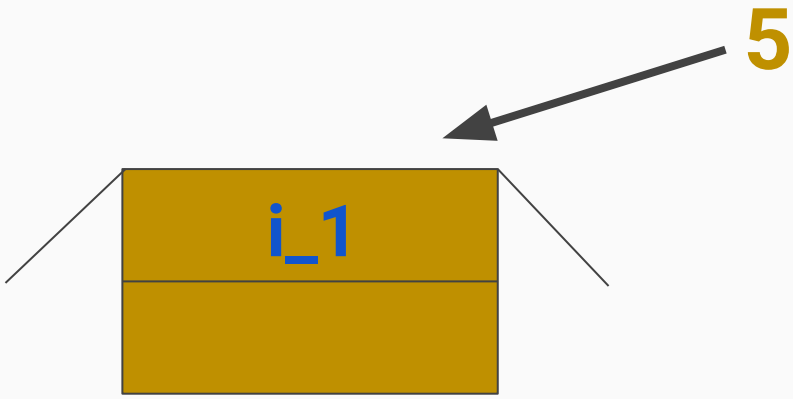
Basic Java Syntax Rules

- The **class** is the basic unit of Java programming. All code that runs has to be inside of one. We will learn just exactly what a class is later.
- A **method** is a group of code in a class that is grouped together and runs together, such as the *main()* method we just wrote.
- Both **classes** and **methods** include **blocks** of code, which are contained inside of “{...}” curly braces.
- **Statements** do things. **Statements** such as the *System.out.println(“Hello,World!);* require a semicolon to signify the end of the line
- Unlike some languages such as Python, whitespace (spaces, tabs, and line breaks) does not affect the execution of a program

Breaking Down *Hello, World!* Line-By-Line

What is a Variable?

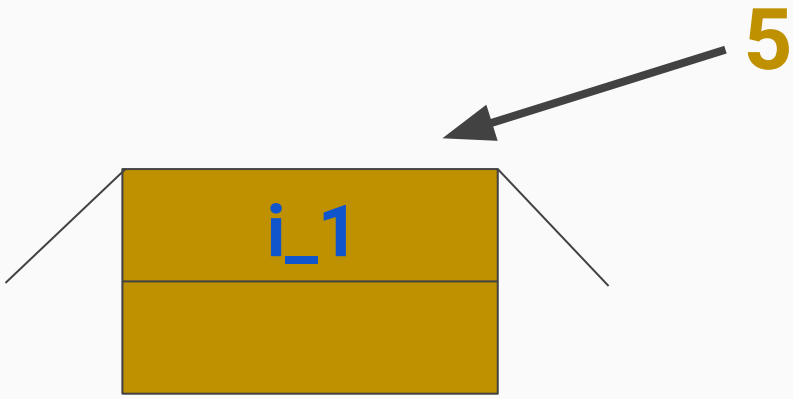
```
int i_1 = 5;
```



What is a Variable?

Declaration Assignment

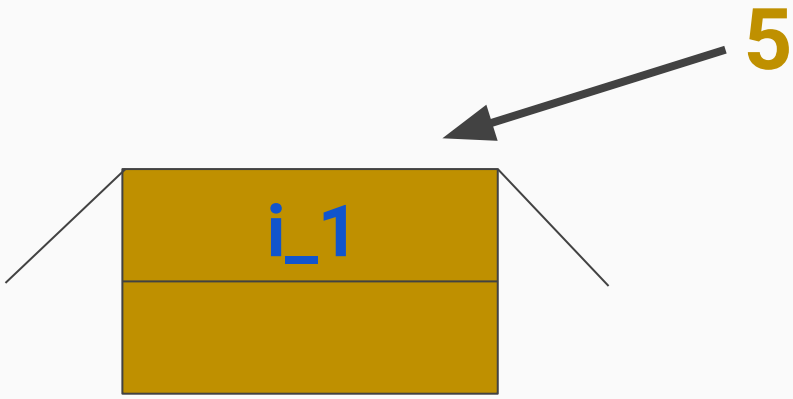
```
int i_1 = 5;
```



What is a Variable?

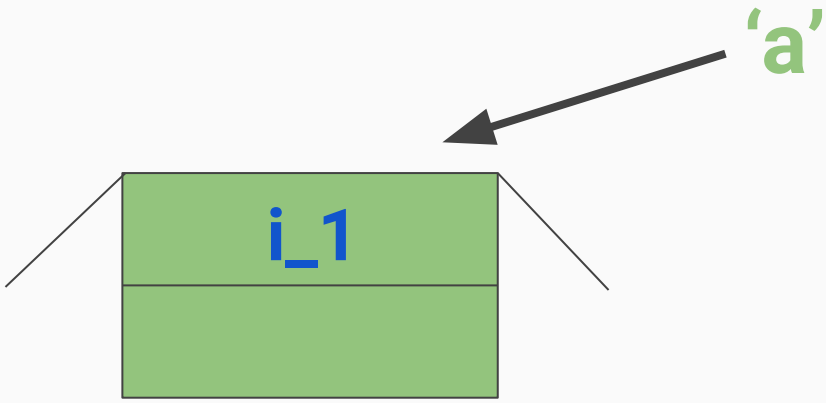
Type Identifier Value

```
int i_1 = 5;
```



What is a Variable?

```
char c_1 = 'a';
```



Variable Types

- Integer (int) - a whole number without decimals
- Double (double) - a precise number with decimals
- Float (float) - a less precise decimal number
- Boolean (boolean) - can have the value true or false
- Character (char) - a single character of text
- String (String) - a sequence, or string, of characters that often form a word or phrase, e.g. “Hello, World!”

Why is String in its own column?

It is a *reference data type*, not a *primitive data type*. This means it is based on a **class**.

Variable Operators

- An operation in Java is something that acts to change a variable.
- For example, all of the basic mathematical operations (+, -, *, and /) are available.
- There are many java operators, but some we will use often include comparison operators (==, >=, <=, etc.), modulus (%), increment (++, --, +=, -=, *=, /=), and logical (&&, ||).

Let’s use these now...

Project 2: Numeric Operations

P2_Numbers.java > P2_Numbers

```java
public class P2_Numbers {

    Run | Debug
    public static void main(String[] args) {

        //Here, we declare our integers and assign their values
        int a = 4;
        int b = 5;

        //We can also declare variables without assigning a value
        int c;

        //Try changing the '*' (times) to another operator (+, -, or /) and see what happens:
        System.out.println(a * b);

        //Here, we declare and assign the value of c based on the values of a and b
        c = a + b;
        System.out.println(c);

    }
}
```

What is Object Oriented Programming?