Programming Fundamentals
Week 1 Talk a

Introduction

Produced by:
Siobhan Roche
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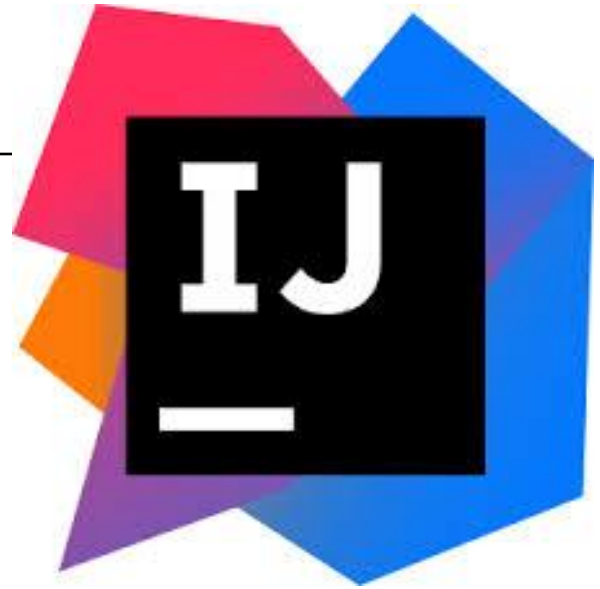
Peter Windle



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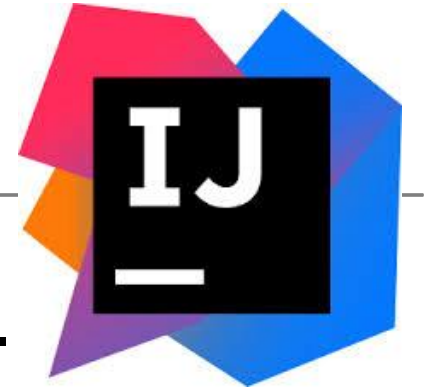
Learning to Program in Java



- Learn to think like a programmer (problem-solving, logic).
- Understand the building blocks: **classes, objects, methods, variables**.
- Use tools (IntelliJ, JVM) to write and run programs.
- Build from small programs → larger projects.

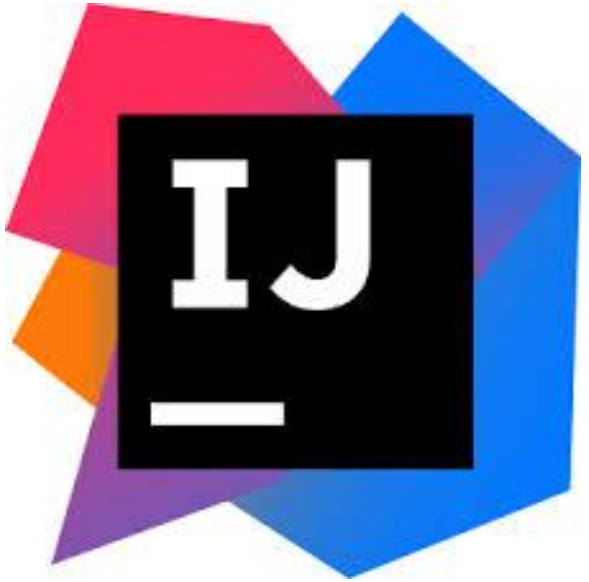
What You'll Be Able to Do…

- Write your own Java programs from scratch.
- Understand how code becomes a running program.
- Apply problem-solving skills to real-world examples.
- Gain skills valued by industry — Java is widely used in software development.

This Week..

- Getting started with Java
- Understanding JVM, main and IDE
- Write your first program

- Variables and data types
- Using Scanner class to enter information



Introduction to JVM

Java Virtual Machine and the main method

Produced by: Dr. Siobhán Drohan,
Ms. Mairead Meagher,
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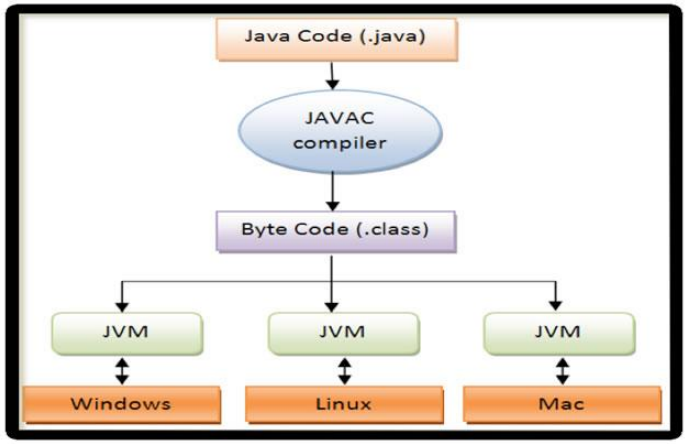
Topics list

1. Files in Java.
2. Java Virtual Machine (JVM).
3. main() method.
4. Why Java?

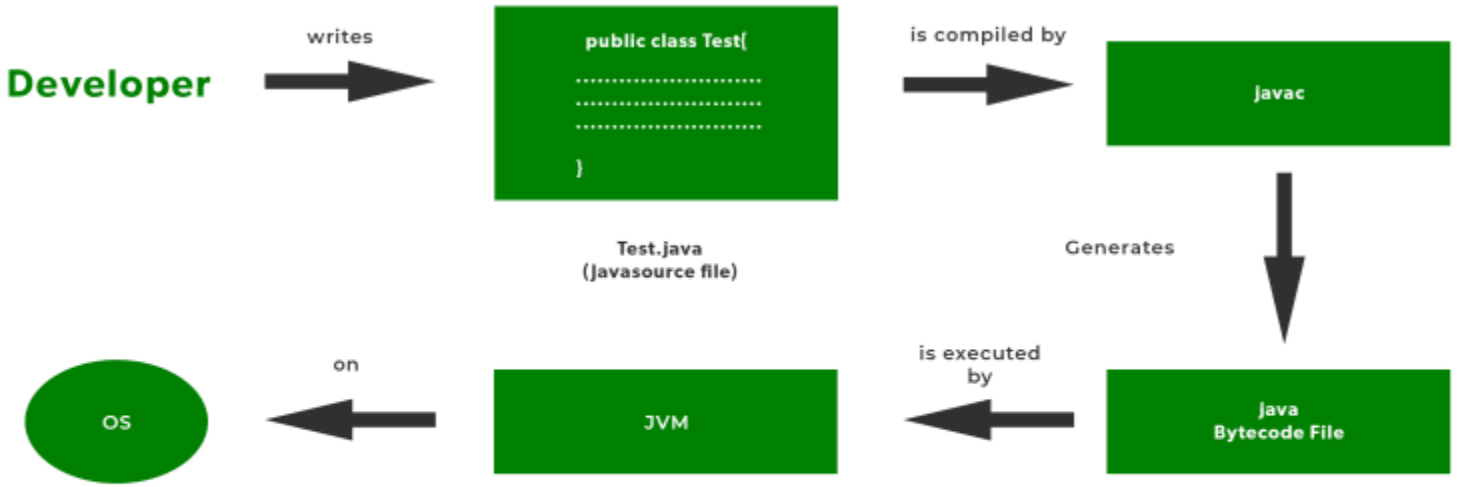
Files in Java

- **Java code** is written in **.java** file.
  - code contains one or more Java language constructs e.g. Classes, Methods, Variable, Objects etc.
- **Compiling** this code generates a **.class** file
    - A **.class** file
      - "**byte code**"
      - the input to Java Virtual Machine (JVM)
      - The **JVM** *(for a specific platform)*
        - **reads** this byte code
        - **interprets** it as machine code instructions *(for that platform)*
        - and **executes** the program *(on that platform)*



http://viralpatel.net/blogs/java-virtual-machine-an-inside-story/

Development Process



Step from java.code to machine code

- java source code is compiled.
- Transformed to bytecode by java compiler.
- Interpreted and executed by the java virtual machine on the underlying operating system.

https://dev.to/leetcode/what-happens-when-we-run-a-java-code-1p8i

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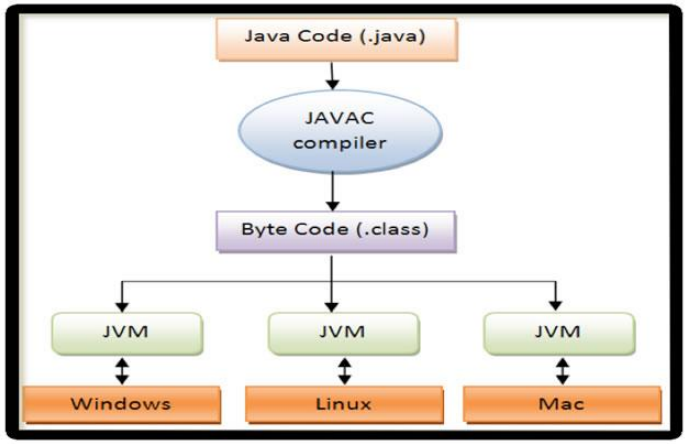
Java Virtual Machine (JVM)

- Java Virtual Machine (**JVM**)
  - is a "**virtual**" computer that resides in the "real" computer as a software process.
    - E.g. JVM for windows, for OSX, Linux etc.
- The JVM gives Java the flexibility of **platform independence**.
- The **.class** files can be run on any OS, once a JVM has been installed
  - (NB: JVM is installed when you install the JDK).



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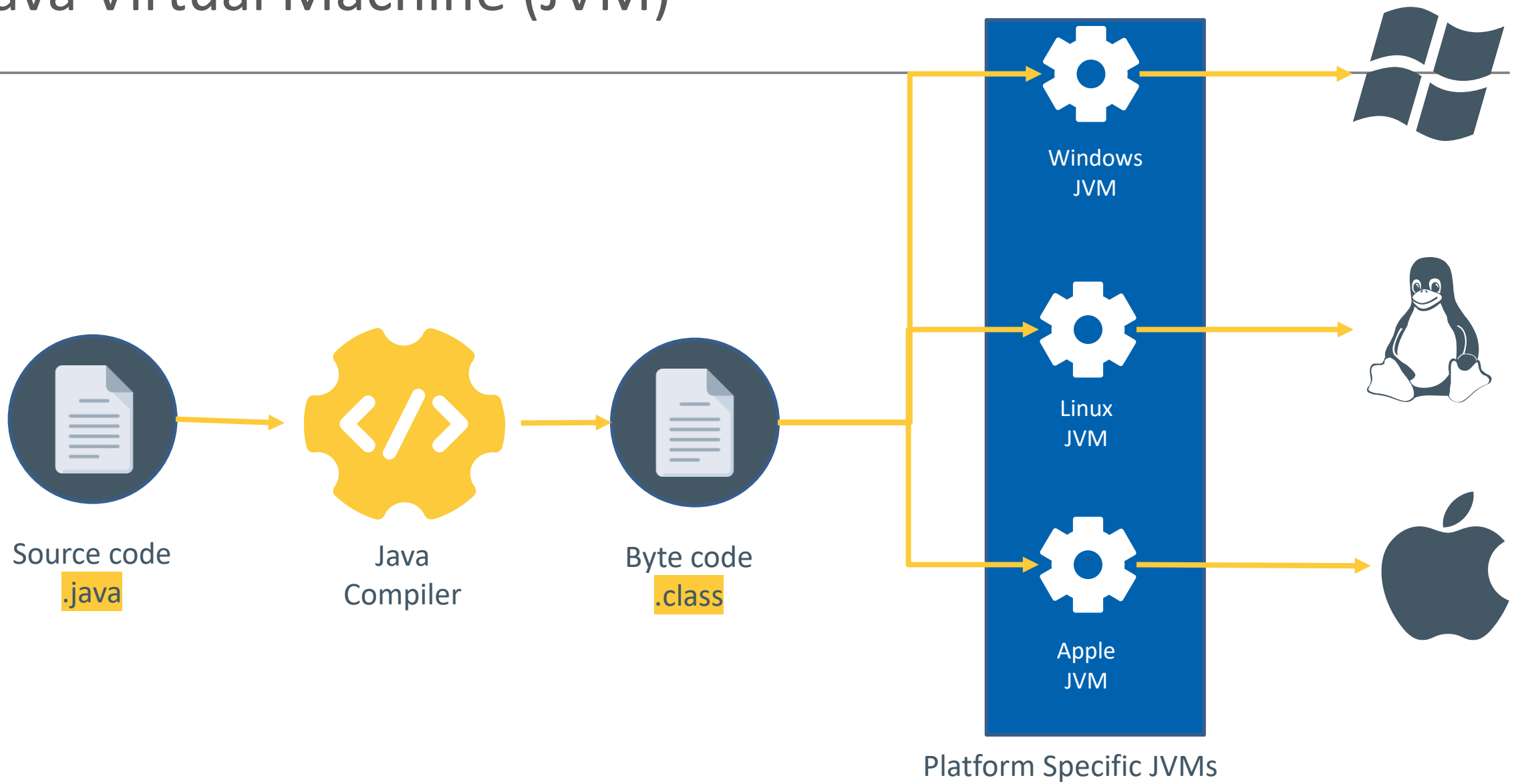
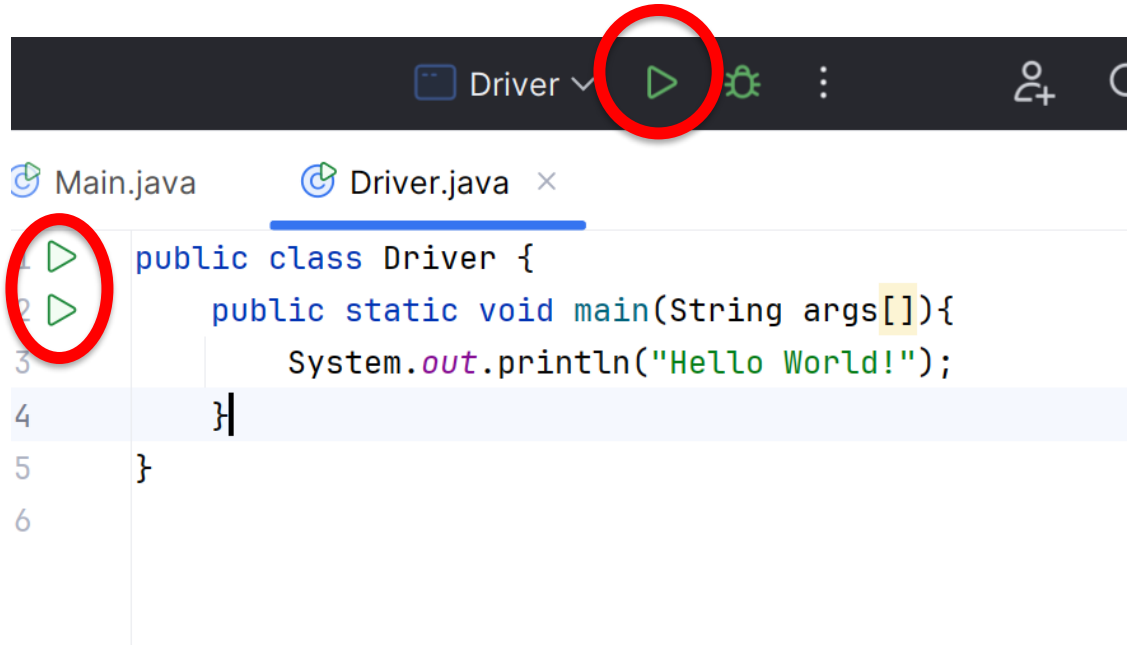
Java Virtual Machine (JVM)



Example in IntelliJ

- When you click Run, IntelliJ compiles and sends bytecode to JVM
- JVM runs it on your system



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main() method

- When you want to run a java project, the Java Virtual Machine (JVM) invokes the **main()** method in the project.

- For the JVM to recognise it, the main() method must have a specific method **signature**.

```
public static void main(String[] args)
{
   ...
}
```

main() method - **signature**

- “main” must exist
- “main” must be **public**
- “main” must be **static** (class method)
- “main” must have a **String array parameter**
- Only “main” can be invoked automatically.

```
public static void main(String[] args) {

    System.out.println("Hello world!");

}
```

Why This Signature?

- public: JVM must access it
- static: Belongs to class, not an object
- void: Doesn’t return a value
- String[] args: Can hold command-line input

Typical Program Flow

- Program starts in main()
- Create objects
- Call methods

```
public static void main(String[] args)
{
    Driver driver= new Driver();
    driver.runMenu();
}
```

Creates an object

Calls the first method

Putting It All Together

- Java code → .java → .class (bytecode)
- JVM = platform independence
- main() = starting point
- IntelliJ automates compiling + running

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Why Java?

- Java is one of the most in-demand programming languages
- Java is a great language for beginners to break into engineering
  - Strong market for entry-level Java developers.
  - Strong computer science fundamentals
- The world's biggest and best companies use Java

Questions?

IntelliJ

Lets get started in our new IDE

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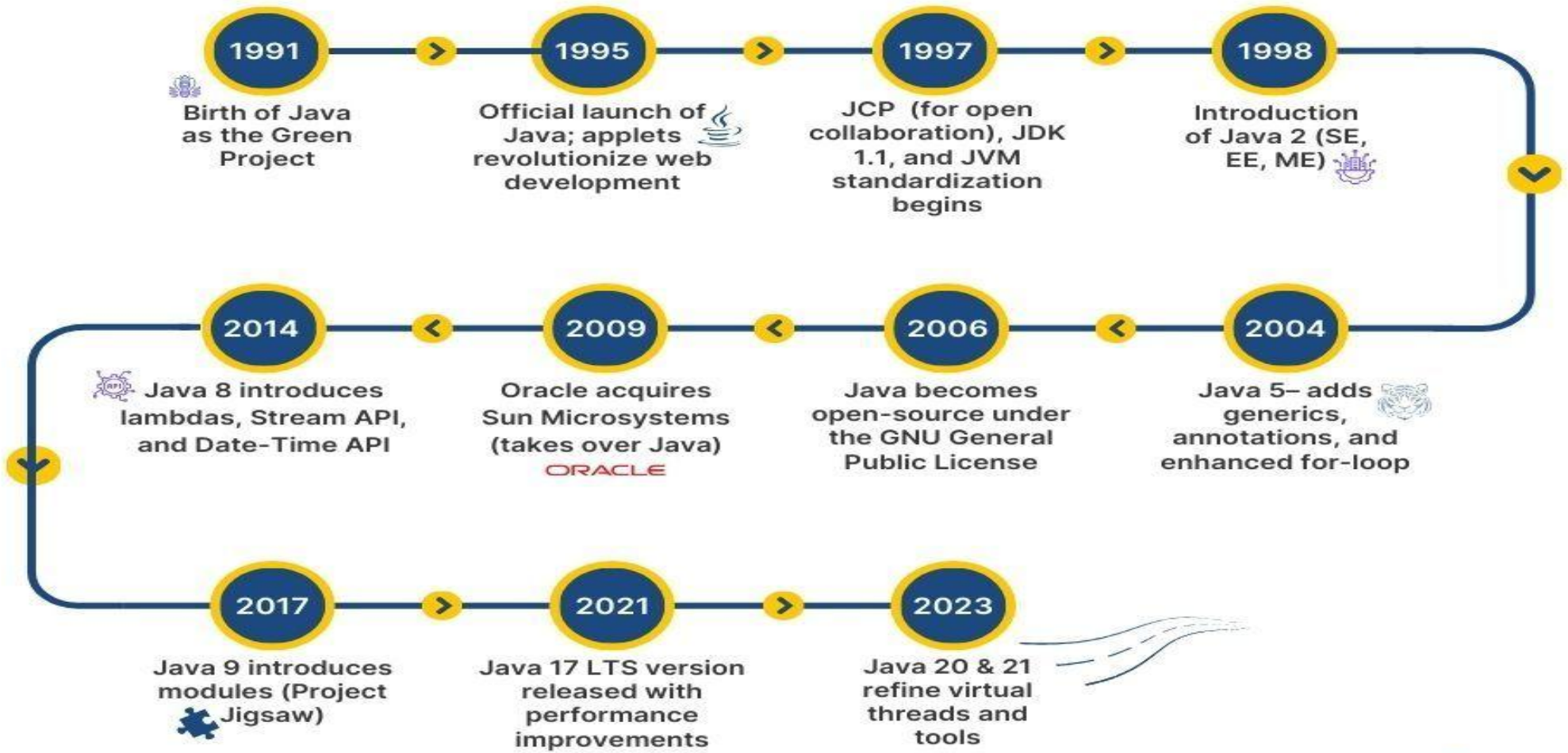
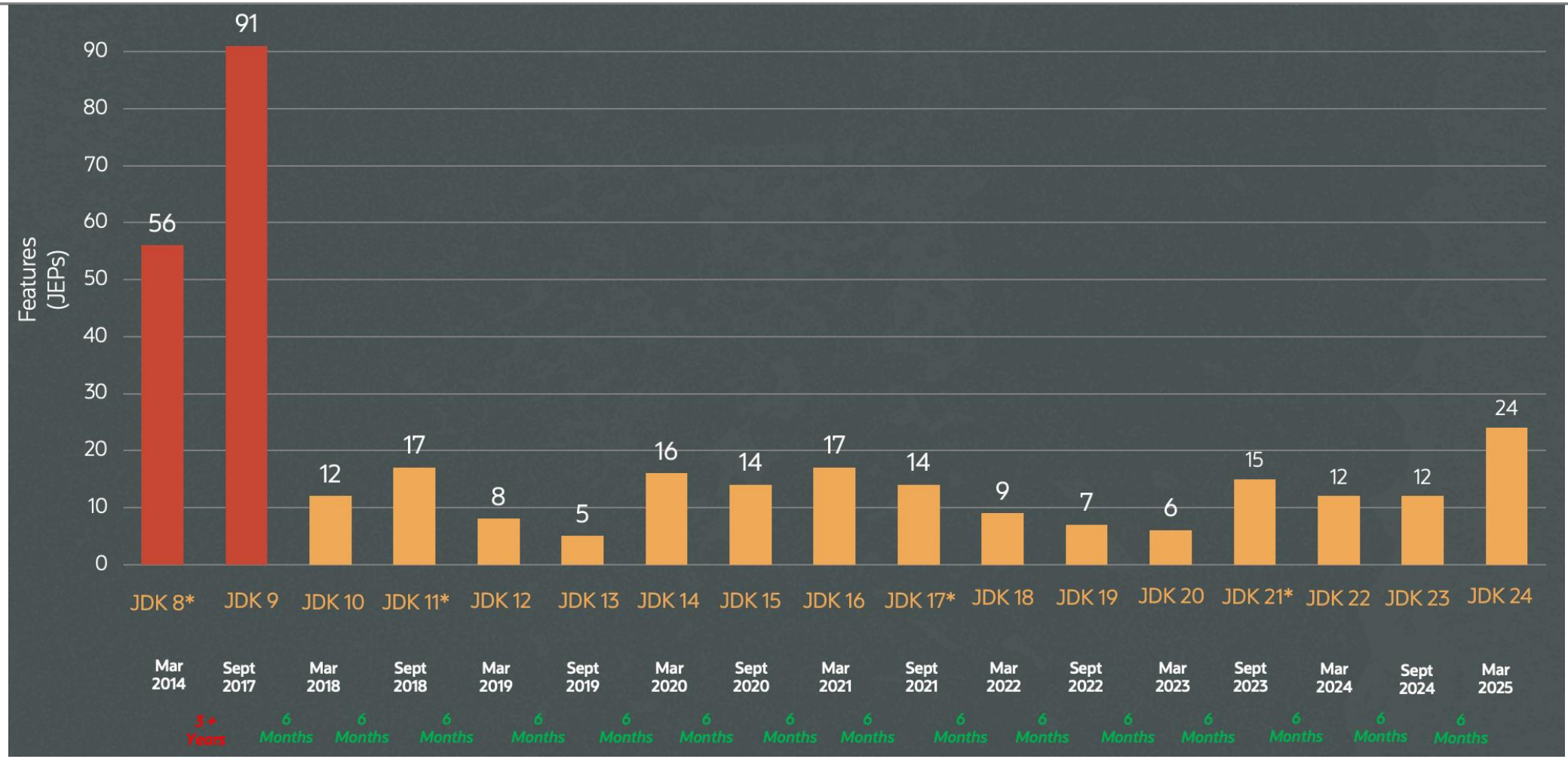
Timeline– History Of Java



unstop

JDK releases – 6 month cycle



What version of JDK should I install?

- The most up to date version that is available
  - Currently Java 25

What is an IDE?

- An IDE (Integrated Development Environment) is a software application that bundles all the necessary tools a programmer needs for software development into a single, easy-to-use graphical interface.
- An IDE (Integrated Development Environment) allows you to
  - quickly create applications by combining a source-code editor with the ability to compile and run your code,
  - integration with build, test and debug tools, version control systems, and so on.
  - search and navigate your codebase in ways your file system won't.

IntelliJ - An industry standard IDE

jetbrains.com/idea/download/?section=windows

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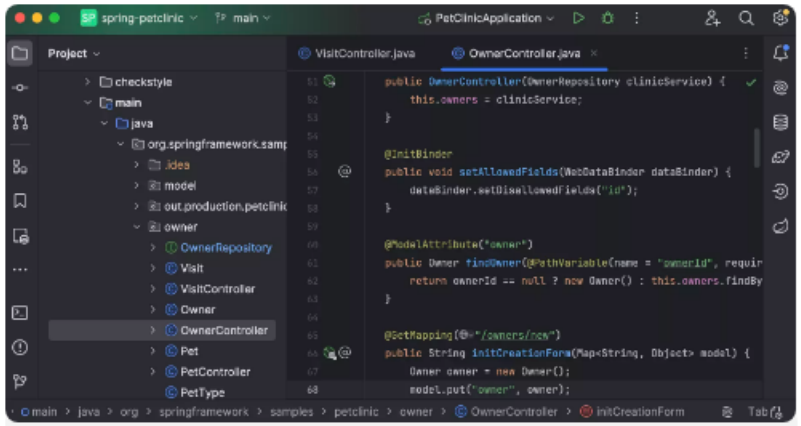
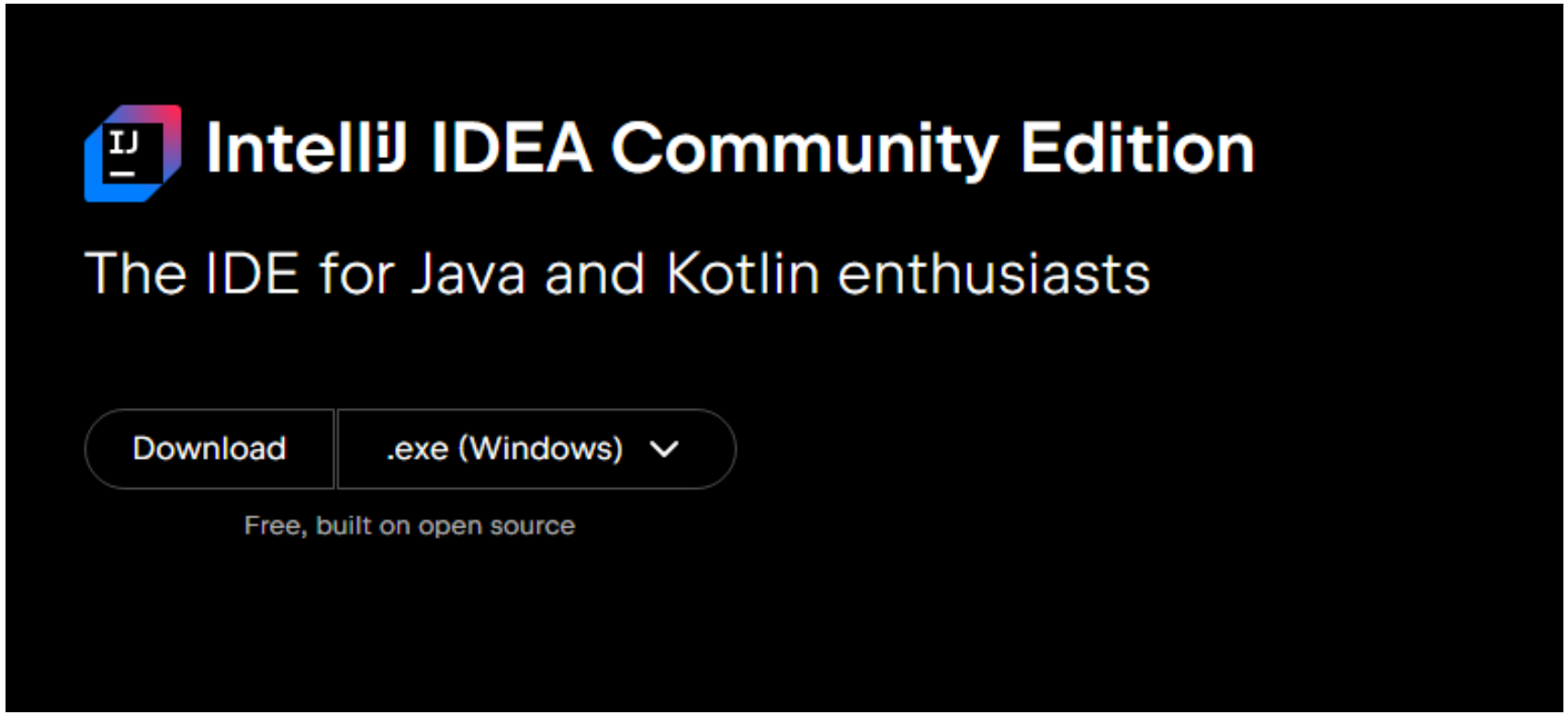


Version: 2025.2.2
Build: 252.26199.169
19 September 2025

System requirements Other versions
Installation instructions Third-party software

Community Edition

- You can scroll past the Ultimate version, and choose the free Community Version

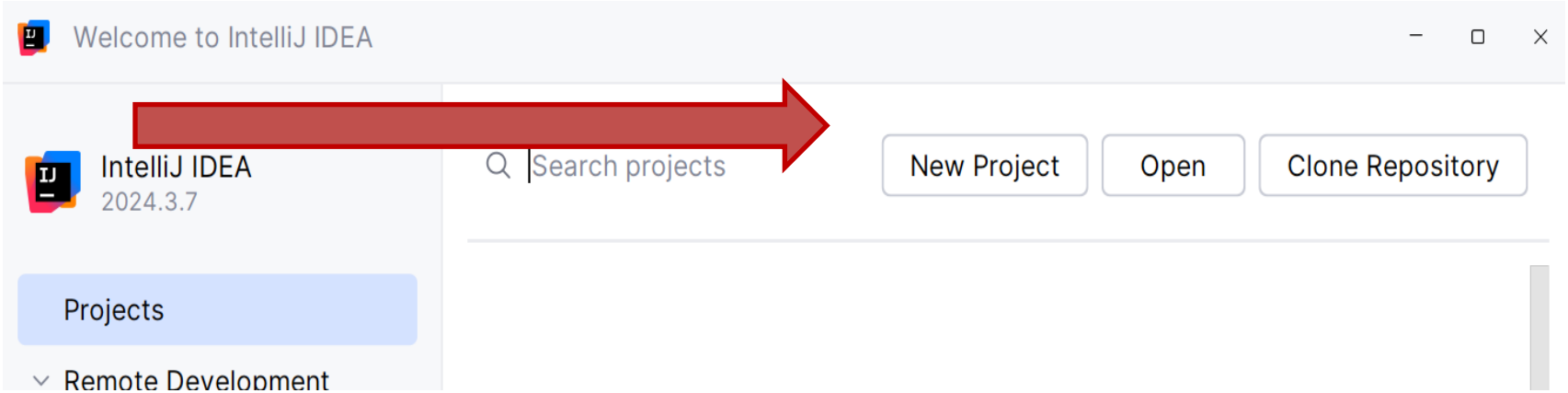


Hello World

IntelliJ

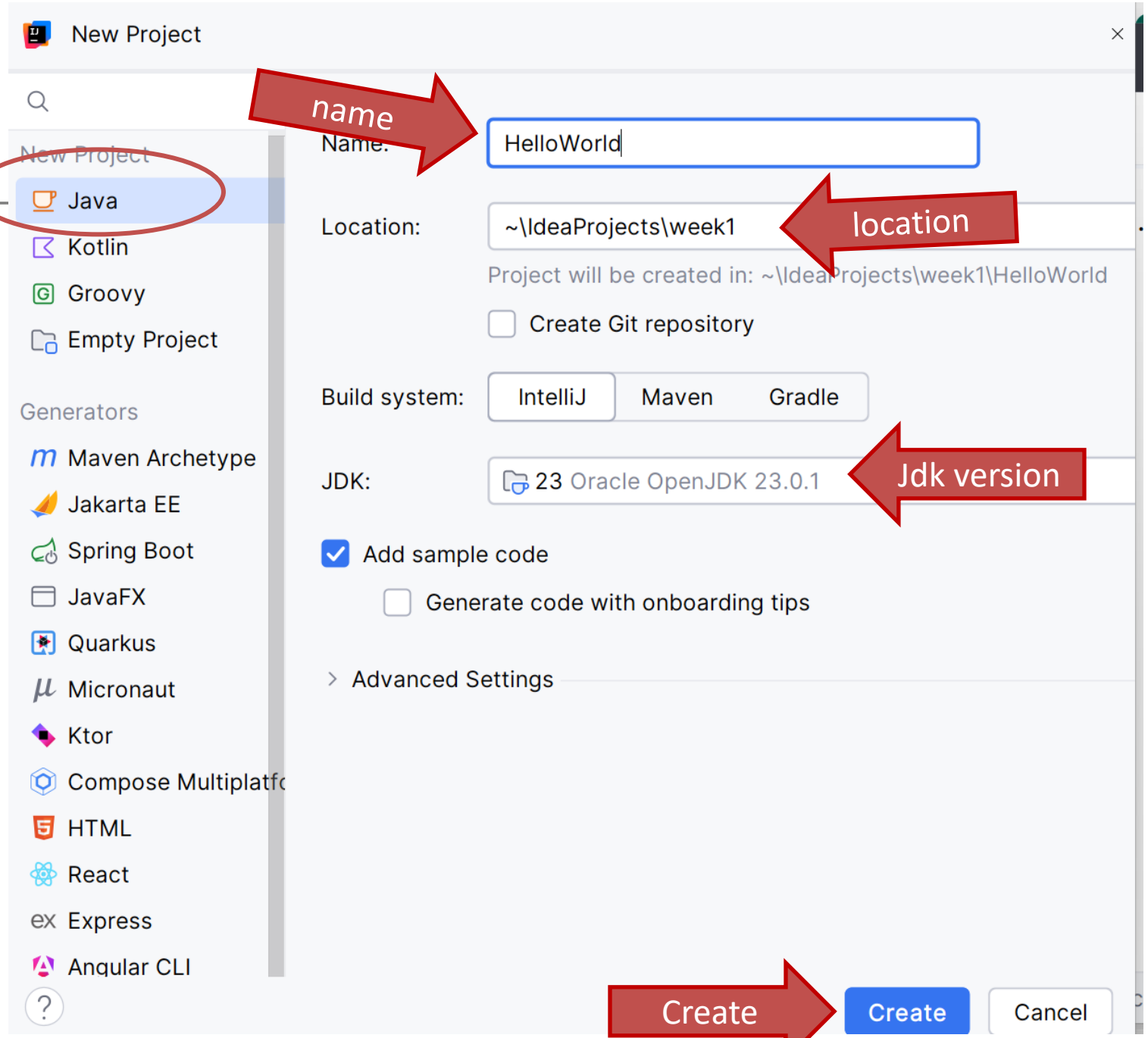
Launch IntelliJ

We can create a new project from the **Welcome** screen,

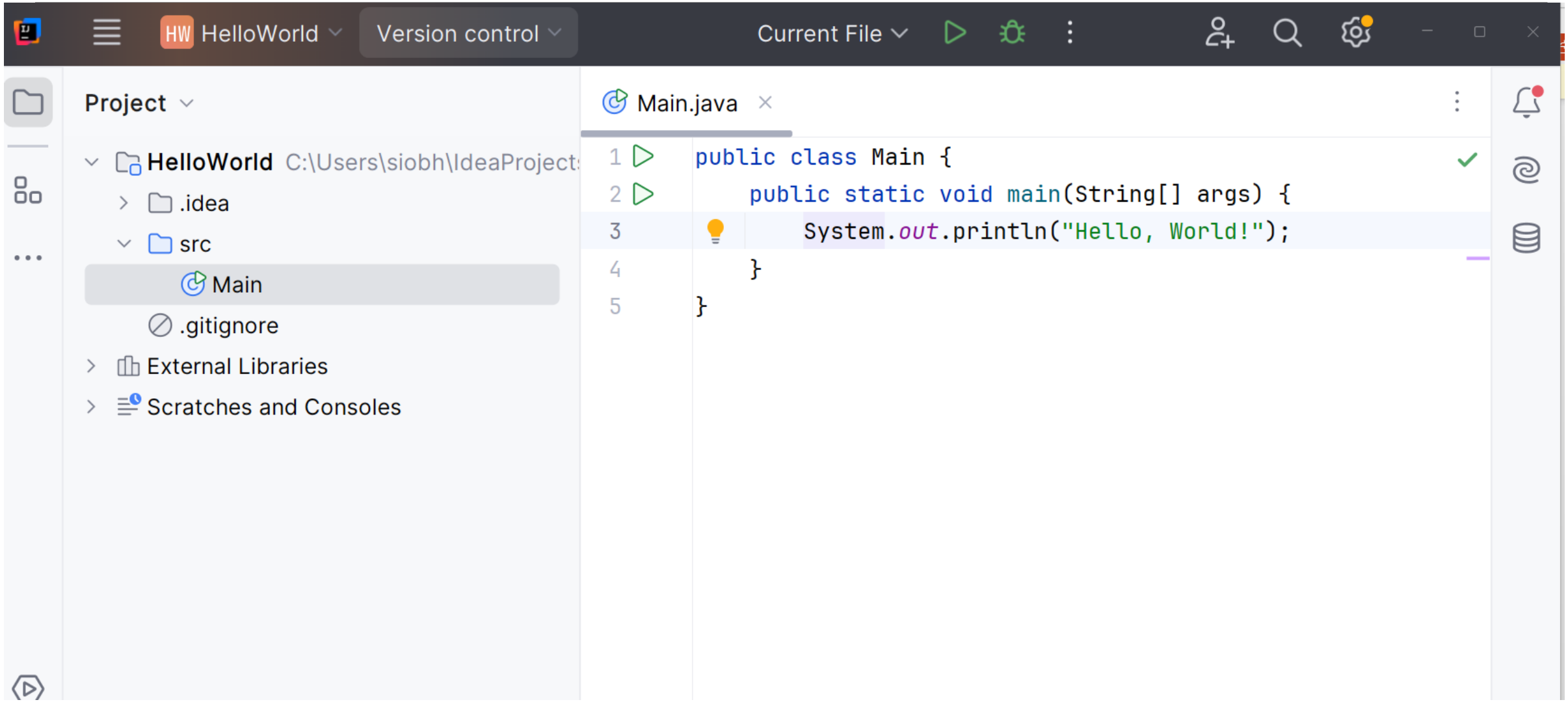


or we can go to **File | New | Project** in the main menu.

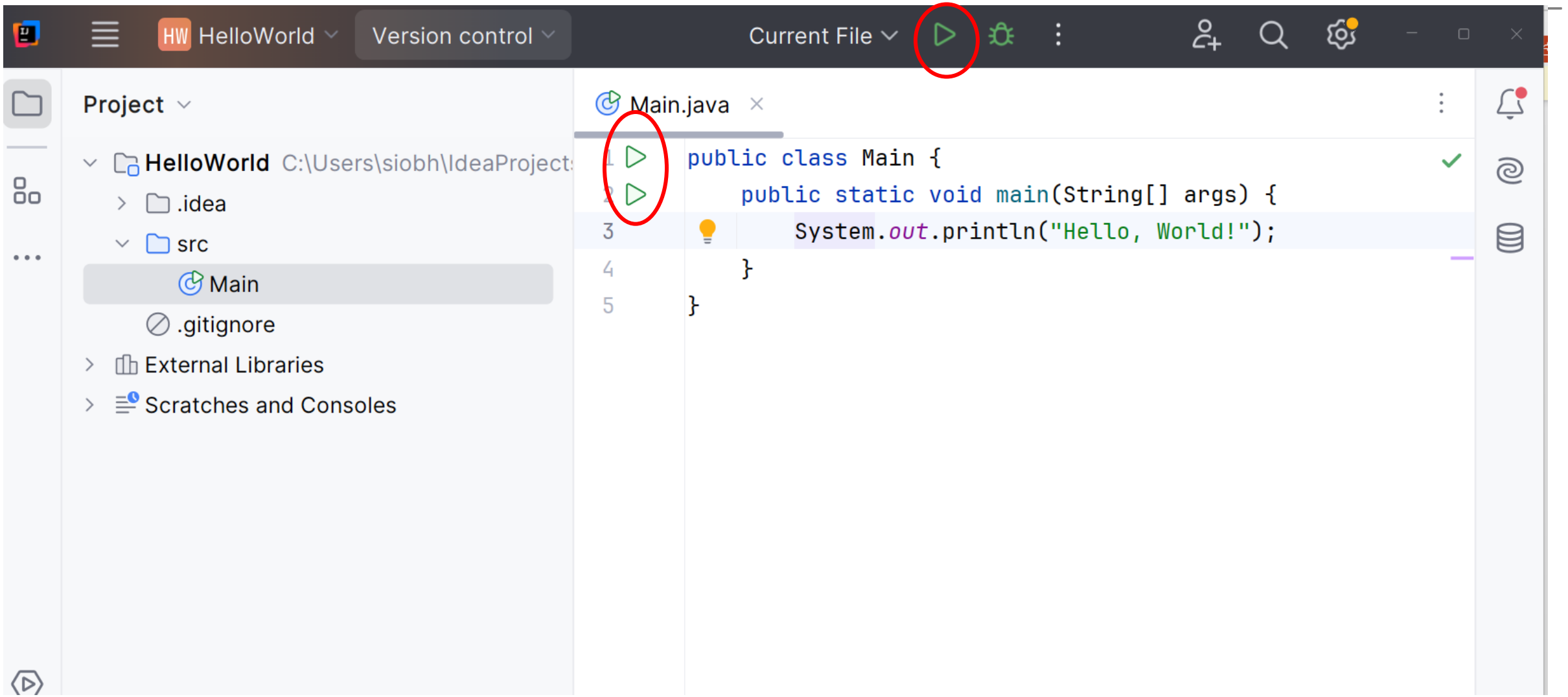
New Java Project



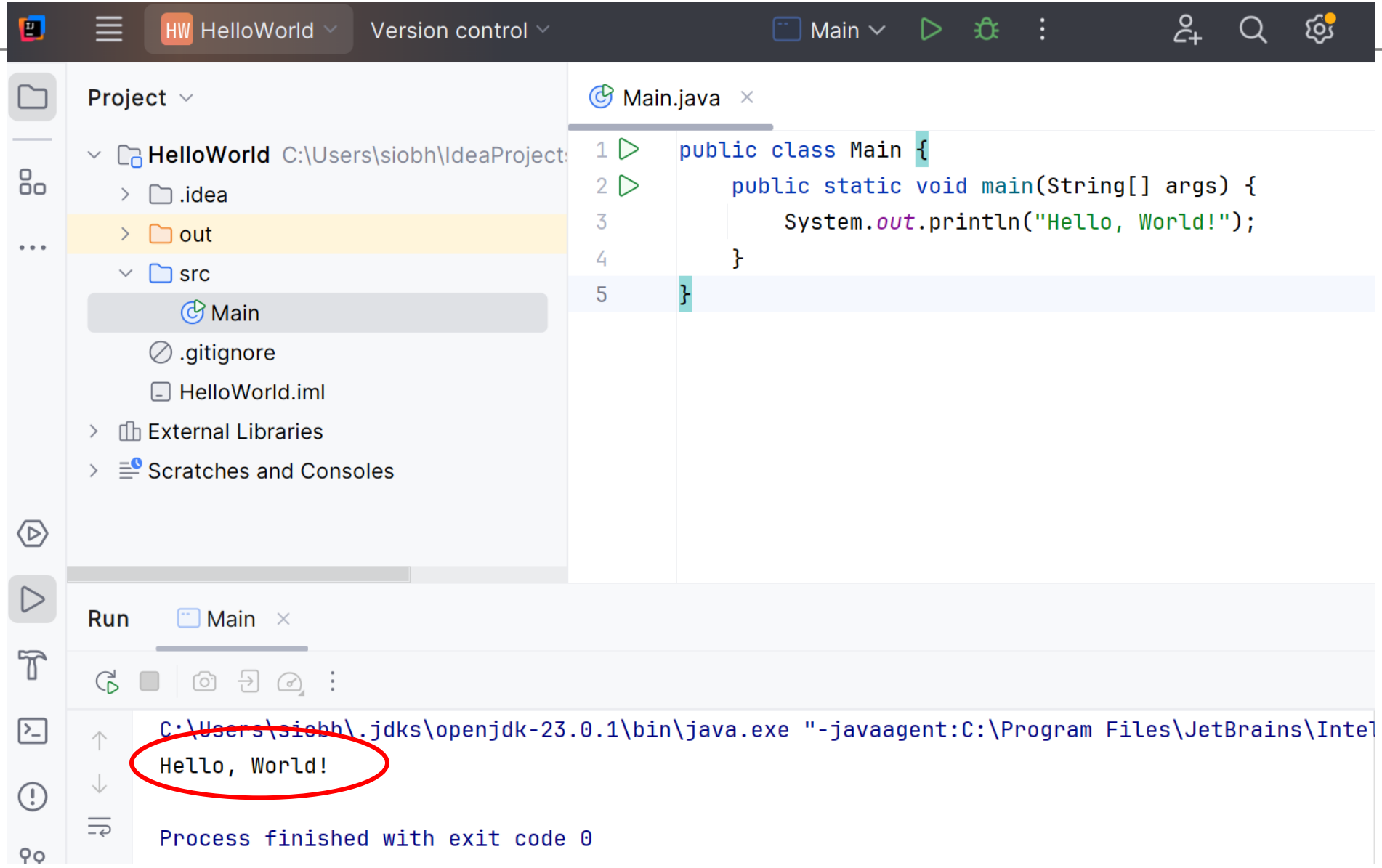
New Project – main method



Run app


HelloWorld
Version control
Current File
Project
HelloWorld C:\Users\siobh\IdeaProject
.idea
src
Main
.gitignore
External Libraries
Scratches and Consoles
Main.java
public class Main {
public static void main(String[] args) {
System.out.println("Hello, World!");
}
}

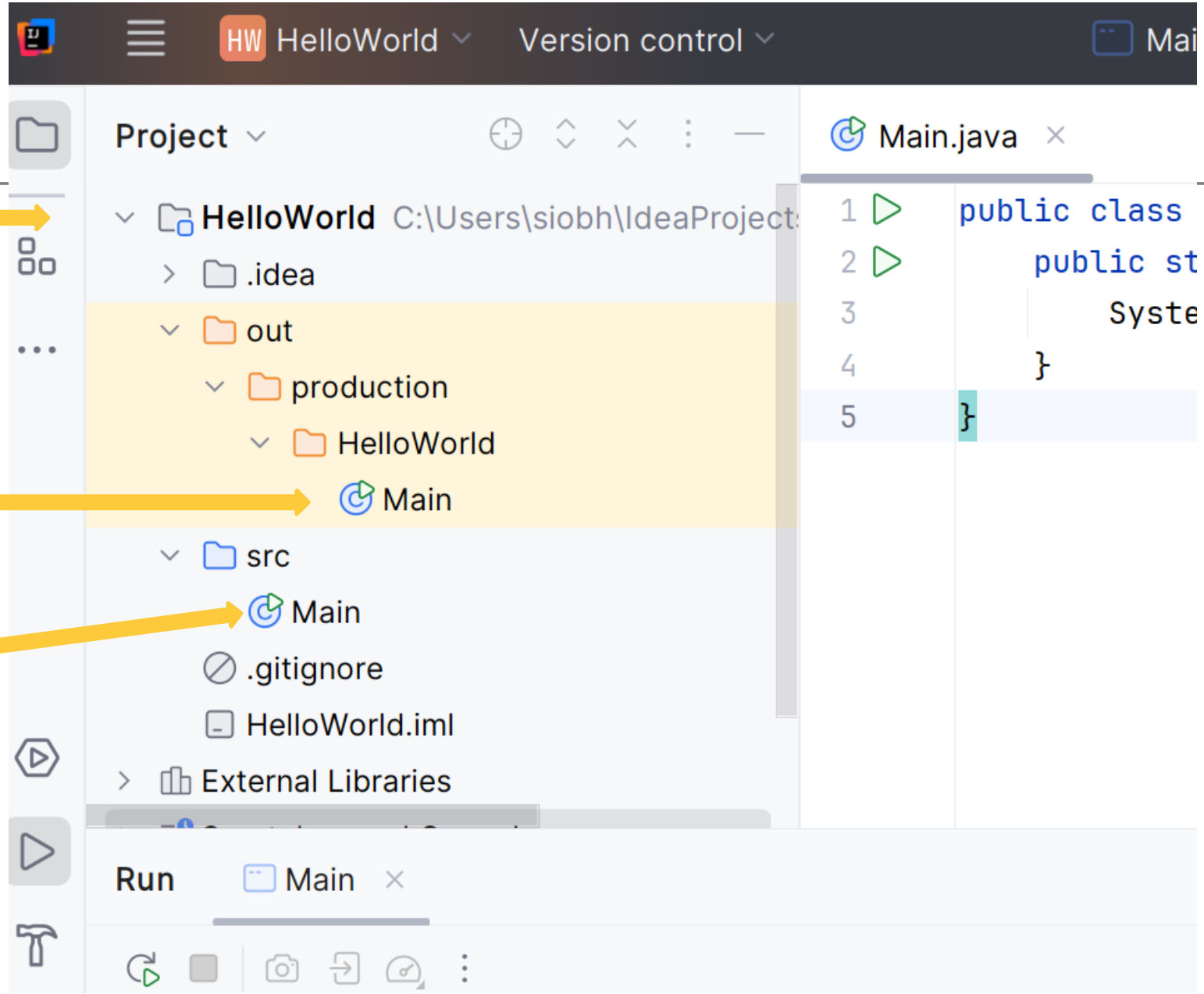
Console output



Project File

.class file
(compiled)

.java file
(source)



Lets get coding!

IntelliJ

Questions?