```java
void main() {
    IO.println("Hello, world!");
}
```

Introduction to Java

Java Fundamentals

Agenda

- Java Background
  - What Is Java?
  - Compilation
  - History
  - Design Principles
- Java Design
  - Language Type
  - Why Static Types?
- Java Project Structure

Java Background

What Is Java?

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- System independent, and code can be analyzed and changed at runtime

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Variables have fixed data types which must be known at compile-time

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Create many types of applications

- Object-oriented programming (OOP) (mainly)
- Imperative programming
- Some functional-programming features

Java Terminology

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- *Java bytecode* is what compiled Java code is called

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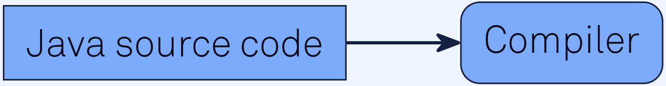
- *Java bytecode* is what compiled Java code is called
- The virtual machine used to execute Java applications is known as the *Java virtual machine (JVM)*

Java Compilation

Java Compilation

Java source code

Java Compilation



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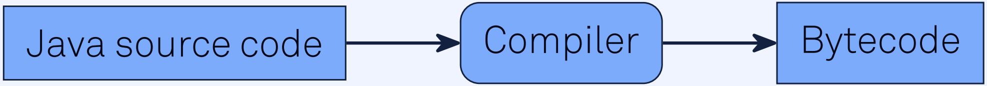
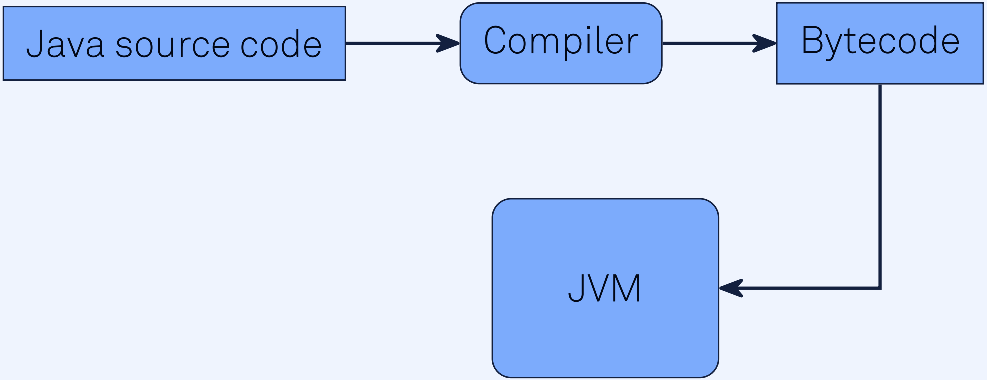


Java source code

Compiler

Bytecode

Java Compilation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JVM

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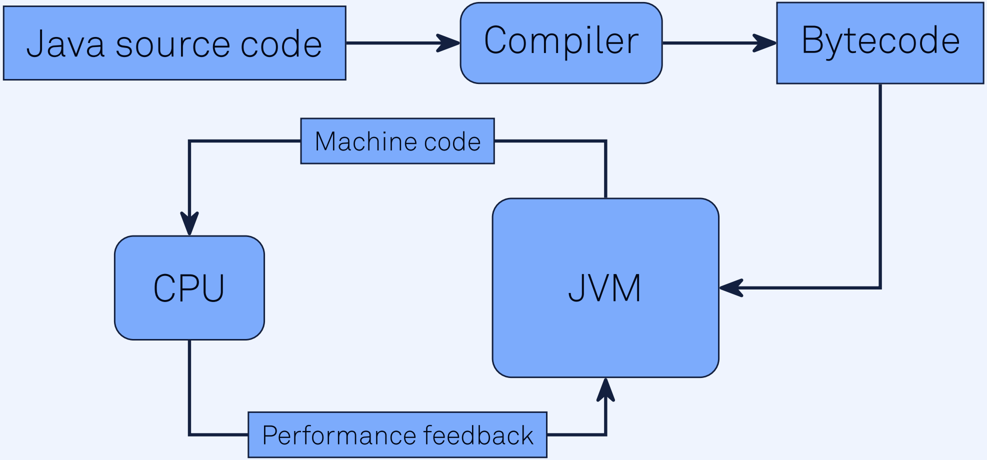

Java source code

Compiler

Bytecode

Machine code

CPU

JVM

Performance feedback

A Brief History

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- C# (Microsoft) was heavily based on Java, but it is now significantly different

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- It must be interpreted, threaded, and dynamic

Java Design

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- It’s a *high-level* language compared to C and a *very high-level* language compared to Assembly language

Language-level Breakdown

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  - Low level (machine code, Assembly)

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        - Add many abstractions
        - Remove details about hardware control

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  - High level (Java, Python, C#)
    - Many abstractions
    - Automated memory management (garbage collector)

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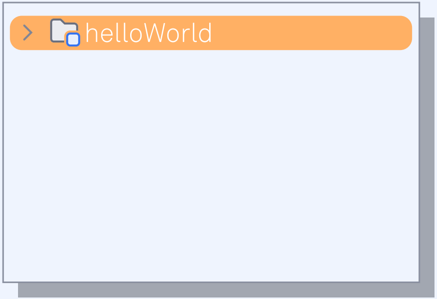
    - TypeScript/JSDoc comments

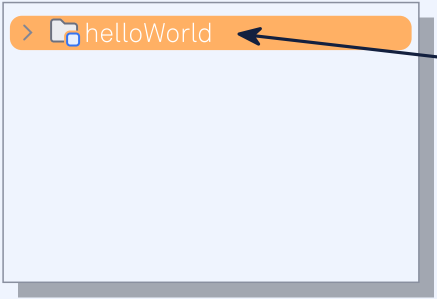
Java Project Structure

Project Structure



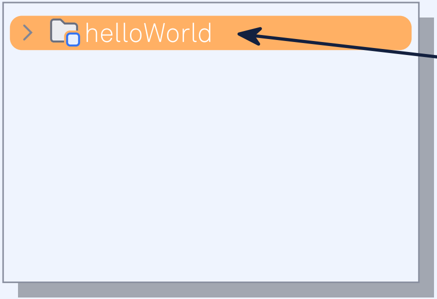
helloWorld

Project Structure



Java project directory

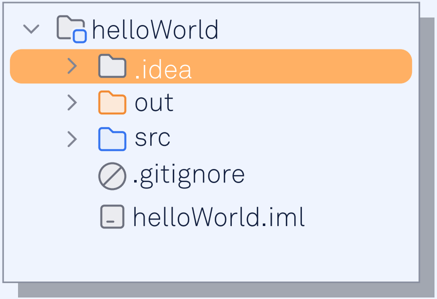
Project Structure



Java project directory

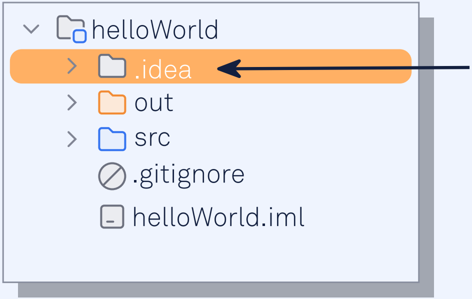
- This directory holds everything for a Java project

Project Structure



```
helloWorld
  .idea
  out
  src
  .gitignore
  helloWorld.iml
```

Project Structure



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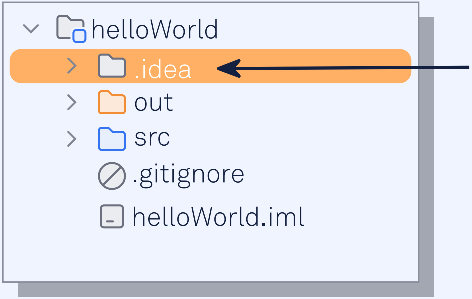
IntelliJ settings directory

Project Structure



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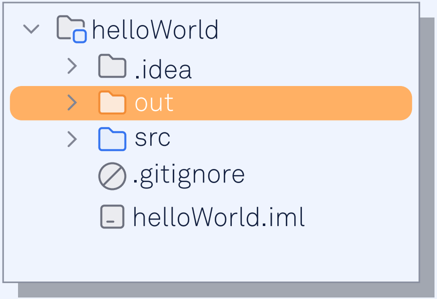
IntelliJ settings directory

- This file holds IDE settings.

Project Structure



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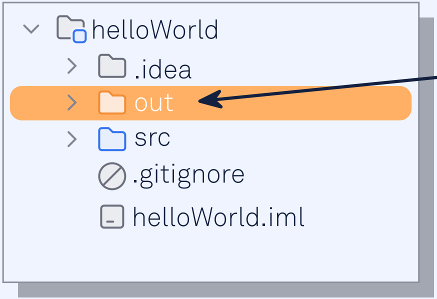

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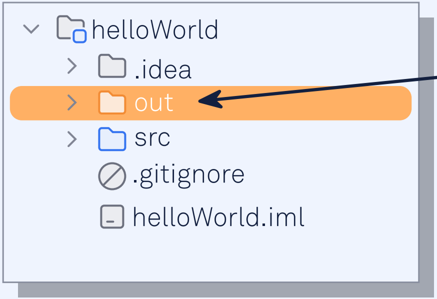
Output directory

Project Structure



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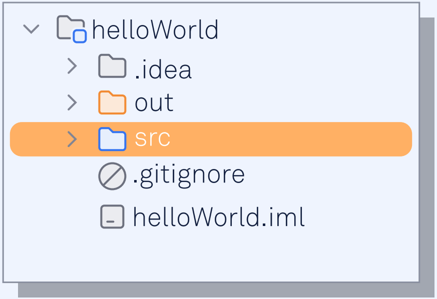
Output directory

- This is where the bytecode generated by the compiler goes

Project Structure



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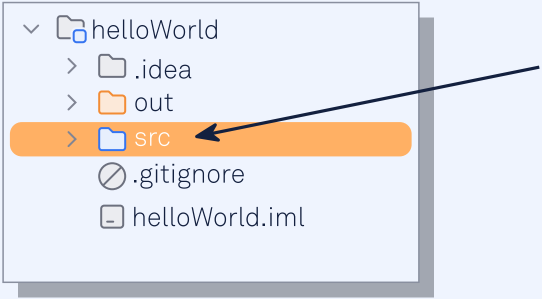

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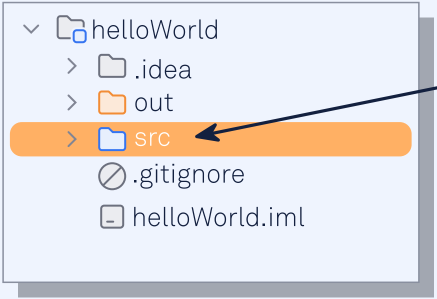
Source directory

Project Structure



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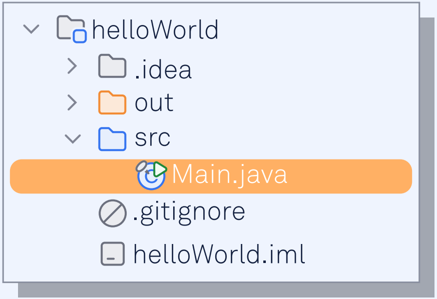
Source directory

- This is where the Java code goes

Project Structure



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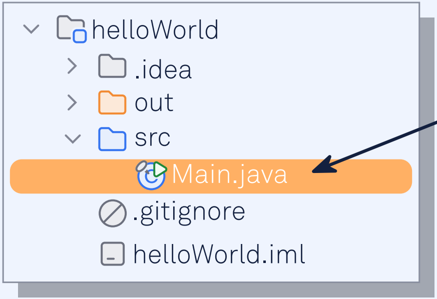

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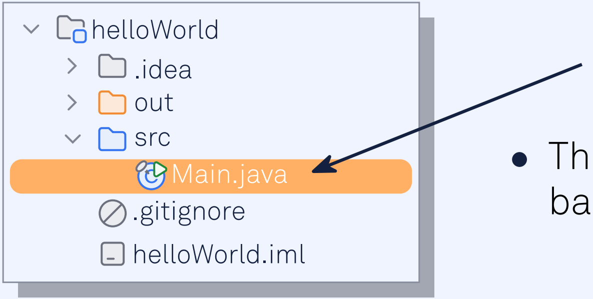
Java `Main` class

Project Structure



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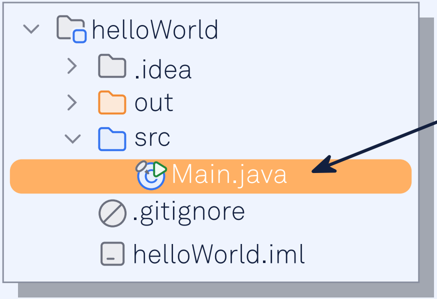
Java `Main` class

- This is the main class for a basic console application

Project Structure



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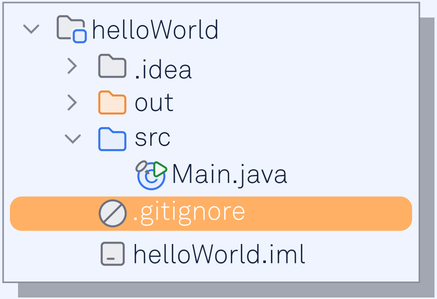
Java **`Main`** class

- This is the main class for a basic console application
- This is where the code from the title slide goes

Project Structure



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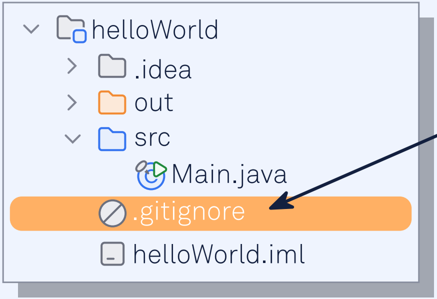

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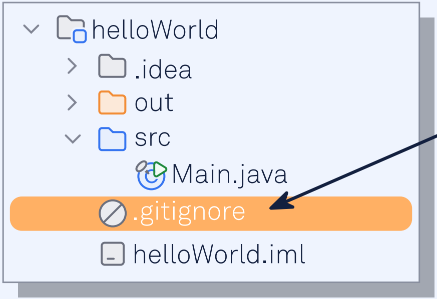
Git ignore file

Project Structure



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Git ignore file

- This file is used when uploading to a remote repository

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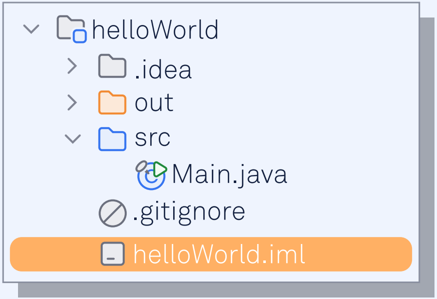

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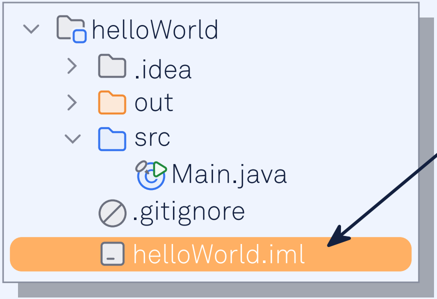

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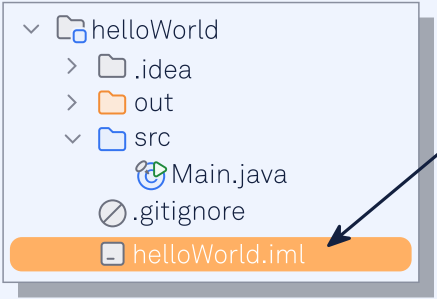
Idea module file

Project Structure



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Idea module file

- This file manages more IDE settings

Any Questions?