Java Web

Welcome

Introductions

Getting to Know Each Other

Me

Kyle Schulz

- My hometown
  - Omaha
- My previous programming experience
  - Many years, many challenges and enjoyed every bit of it.
- My familiarity with Java
  - Sun Certified Java 2 Developer - 2002
- My hobbies or special skills/talents
  - Love coaching and playing basketball, especially with my kids.
  - Play Clash Royale every day for the past 3 years. Not proud.

- What excites you about software development?
  - The ability to create something beautiful from just sitting in a chair.
- What are your expectations from this course?
  - That each one of you grow your love for software development and gain confidence in your abilities.

You

- Your hometown
- Your previous programming experience
- Your familiarity with Java
- Your hobbies or special skills/talents

- What excites you about software development?
- What are your expectations from this course?

Course Objectives

Objectives for this course

Wow

Unit 1
Overview and Setup

- Introductions
- Review Objectives
- Initial Setup
- OOP
- Taste of Java

Unit 2
Java Intro

- Primitives
- Variables
- Assignment Operators
- Conditional Statements
- Loops
- Flow Charts
- JUnit
- Debugging

Unit 3
Advanced Java

- Classes
- Constructors
- Encapsulation
- Methods
- Inheritance
- Polymorphism
- Interfaces
- Collections & Generics

Unit 4
Databases

- NoSQL
- MySQL
- SQL

Unit 5
HTML / CSS / JavaScript

- HTML / CSS Review
- JavaScript
- Closures & Scope
- AJAX
- Algorithms in JavaScript
- Wireframes

Unit 6
Java Web

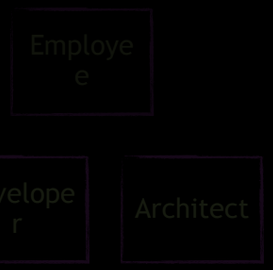
- Data Access Objects
- JSP/Servlets
- POJOs
- Deployment
- Spring Framework
- RESTful Web Services

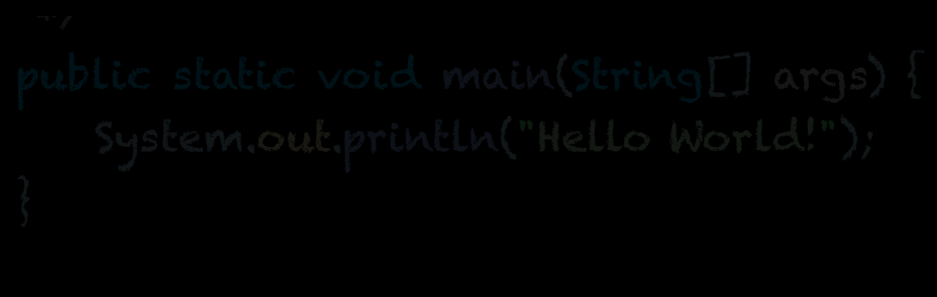
Unit 7
Cloud

- Server Management
- Heroku
- CI/CD Pipelines

Unit 8
Capstone Project

- Build Web-based application



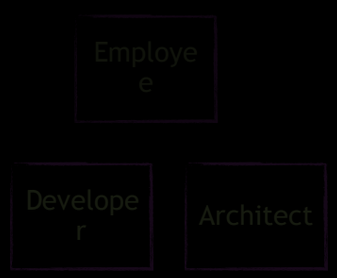


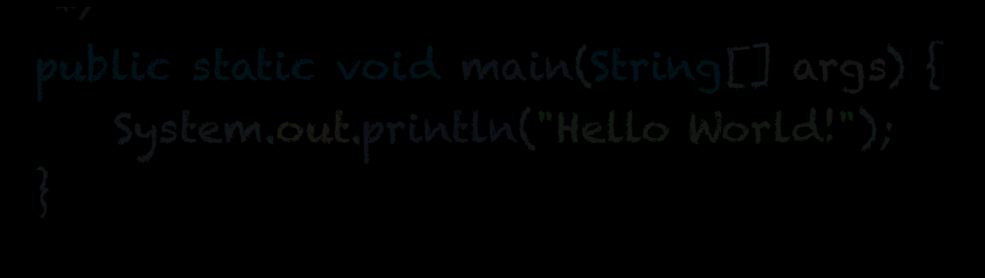
Unit Objectives

Unit 1 Objectives

Overview and Setup

- Introductions
- Review Objectives
- Download, Install and Setup of some cool tools
- Object Oriented Programming
- Taste of Java



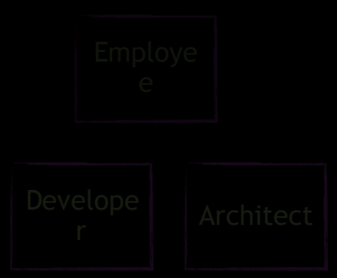


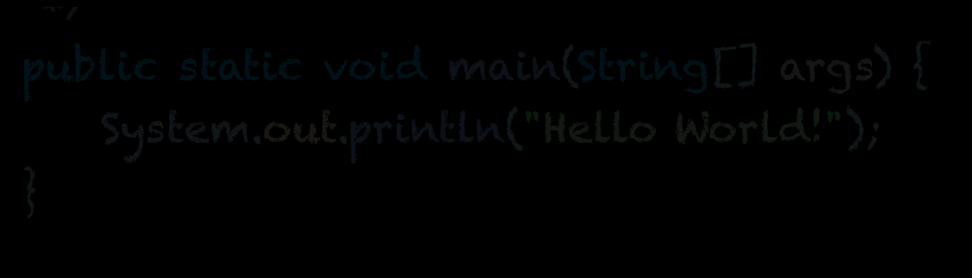
Class Objectives

Objectives for this class

What You Should Be Able To Do

- Explain the contents of the syllabus
- Explain what a high level programming language is
- Describe the steps to build and execute a Java program
- Install and configure Visual Studio Code
- Describe the structure of a Java program

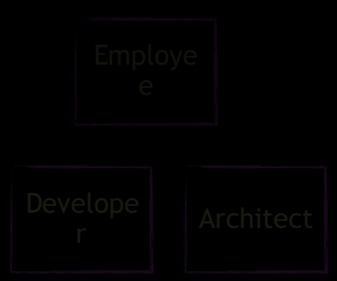


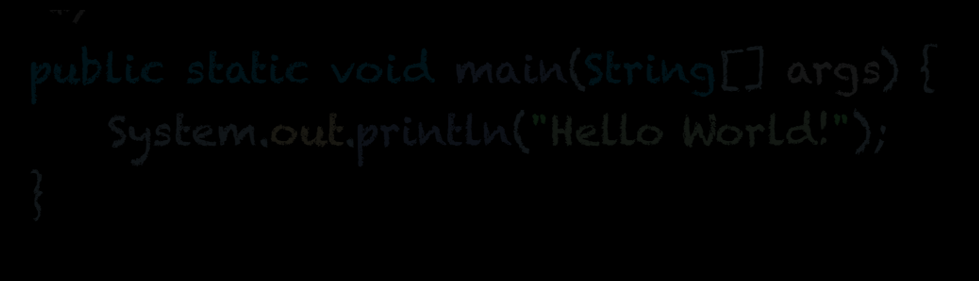


Objectives for this week

What You Will Learn In Class

- Software Installation and Configuration
- Signup for GitHub
- Introduction to OOP and Java
- How to write a HelloWorld Java Program
- Submit Code to Github

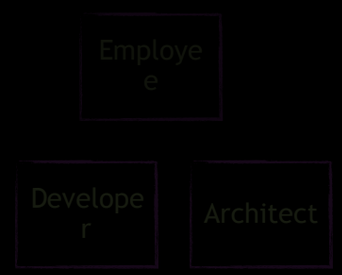


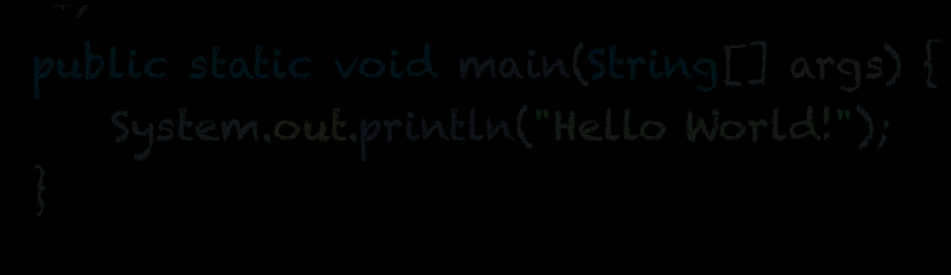


Objectives for Class

What You Will Do In Class

- Study Slides
- Review Course Syllabus
- Install and Configure Software
- Write some Java programs and submit them to GitHub





Learning Anything

Listen to your brain…

Slow Down

Slow down. The more you understand, the less you have to memorize.

Don’t just read. Stop and think.

The more deeply you force your brain to think, the better chance you have of learning and remembering.

Do the Assignments

Do the assignments. Keep your own notes. And don’t just look at the material.

Maybe use a pencil and write them on paper.

There’s plenty of evidence that physical activity while learning can increase the learning.

Long-term memory

Part of the learning (especially the transfer to long-term memory) happens after you put the book down.

Your brain needs time on its own, to do more processing.

If you put in something new during that processing-time, some of what you just learned will be lost.

Drink Water

Your brain works best in a nice bath of fluid.

Dehydration (which can happen before you even feel thirsty) decreases cognitive function.

Talk about it

Talk about it. Out loud.

Speaking activates a different part of the brain. If you're trying to understand something, or increase your chance of remembering it later, say it out loud.

Better still, try to explain it out loud to someone else.

Listen to your brain

Pay attention to whether your brain is getting overloaded. If you find yourself starting to skim the surface or forget what you just read, it’s time for a break.

Once you go past a certain point, you won’t learn faster by trying to shove more in, and you might even hurt the process.

Feel something!

Your brain needs to know that this matters.

Type and run the code

Type and run the code examples.

Then you can experiment with changing and improving the code (or breaking it, which is sometimes the best way to figure out what's really happening).

Getting Started

JDK, IDE, Java Project and Code Repository

WINDOWS, macOS, Other

Which are you?

Tools

Download, Install and Configure



Discord

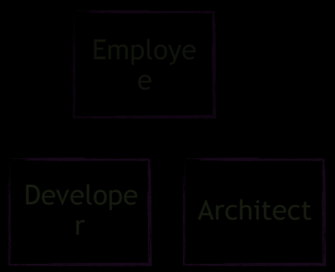
Download, Install & Join

We need an application to
Communicate, Share Documents & Videos

https://discord.com/download

Desktop and Mobile

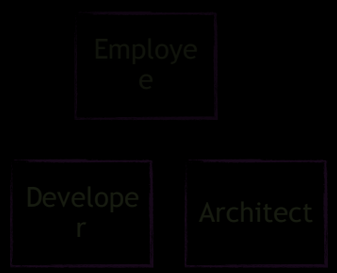
Join Discord
https://discord.gg/7PNkpwS

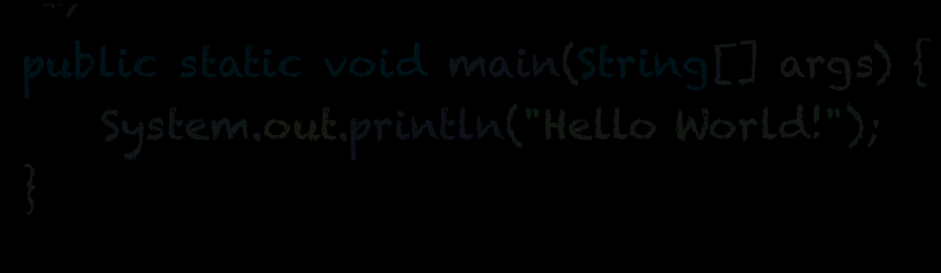


Discord Channels

Java Web

- announcements
- homework-help
- assignments
- presentations
- discussions





Java Development Kit (JDK)

Download and Install

Download and Install New Version of Java

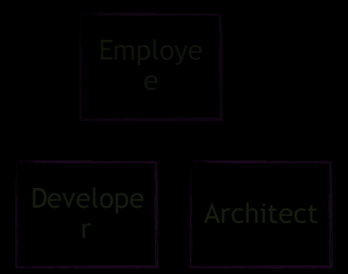
The JDK contains a package of tools that are required for developing Java programs.

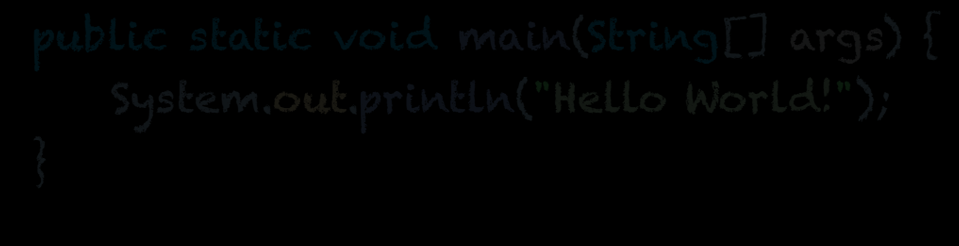
Download Java SE 11 (LTS)
https://www.oracle.com/java/technologies/javase-jdk11-downloads.html

Visual Studio Code (VS Code)

Download, Install and Configure

- IntelliSense - Syntax Highlights
  - Highlight parts of code and auto-completes
- Run and Debug
  - Call your code and walk through it
- Built-in Git
  - Push and Pull your code to team
- Extensions
  - Add features to VS Code other people have written

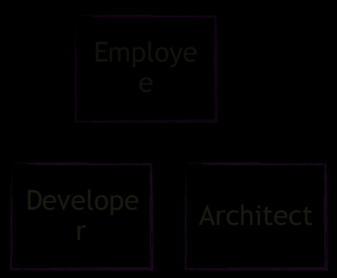


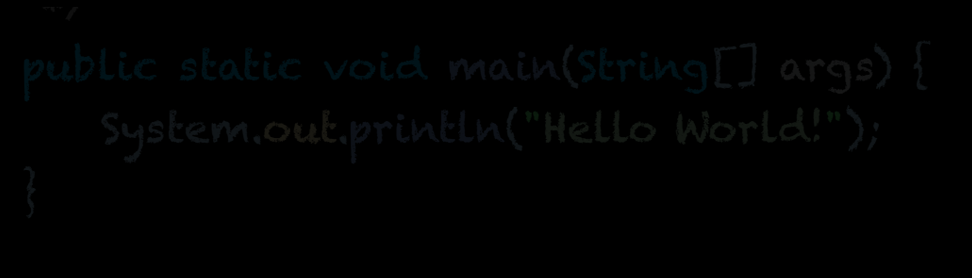


Visual Studio Code

Installation Instructions

- Download URL
  - https://code.visualstudio.com
- Install
  - Accept defaults except for…
    - Add VS Code to File Explorer

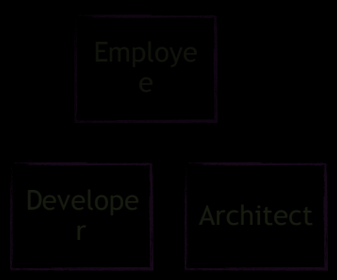


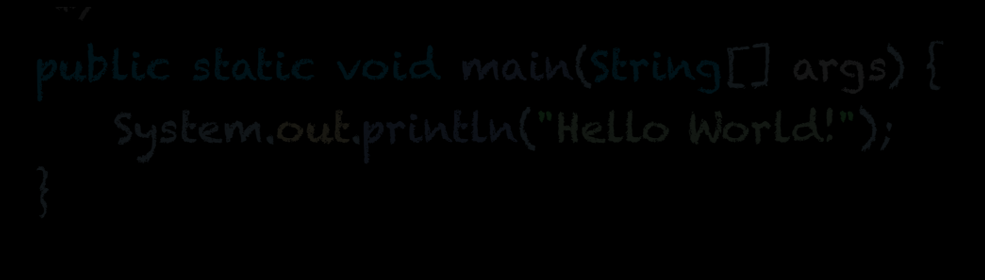


Visual Studio Code

Install Java Extensions Pack

- Click Extensions Icon
- Search “Java Extension Pack”
- Click Install
- Restart



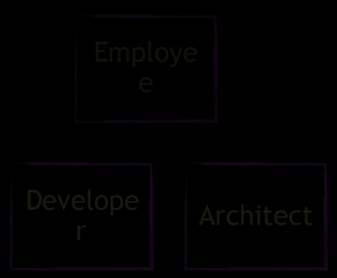


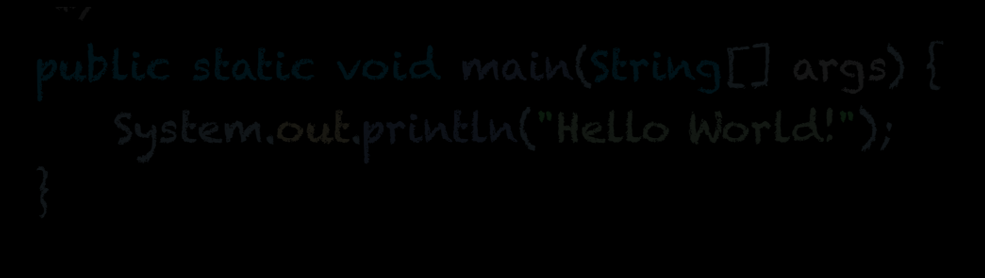
Visual Studio Code

Configure Java Runtime

- Verify/Configure Development Environment to use a JDK
- Ctrl+Shift+P (Win) | Cmd+Shift+P (macOS)
  - Java: Configure Java Runtime

- Also at
- https://code.visualstudio.com/docs/java/java-tutorial





Create New Java Project

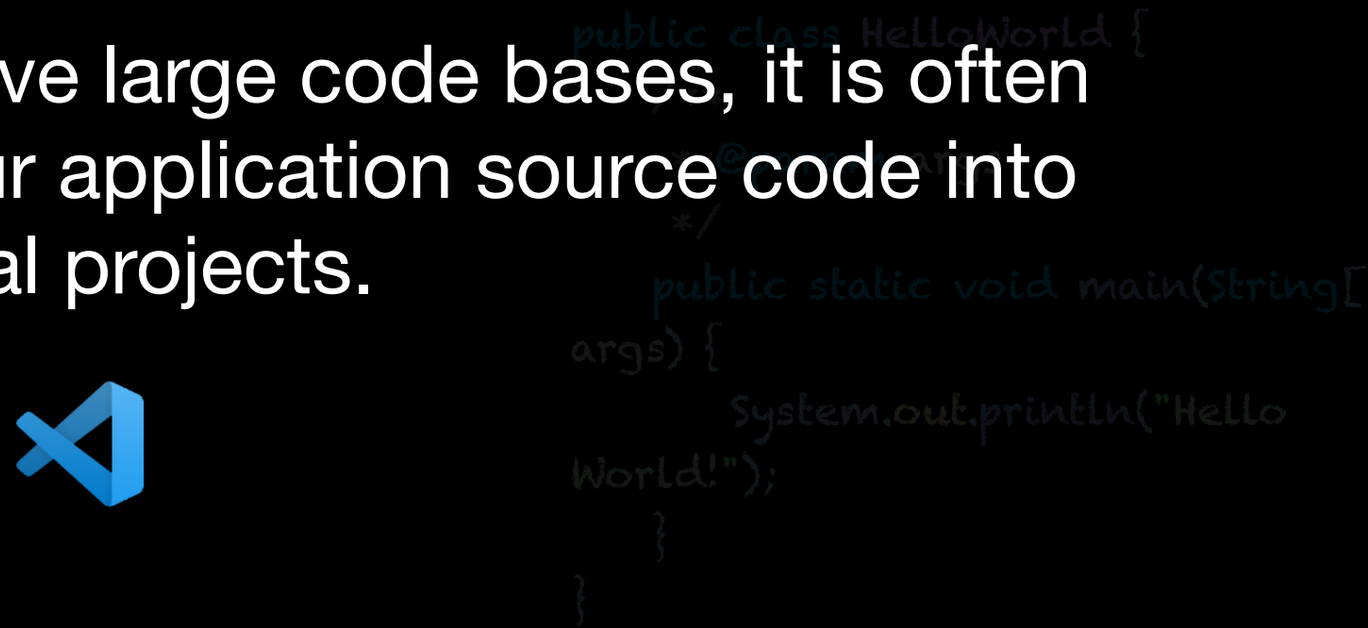
Java Project

What is a Java Project?

A java project is a group of source files and settings with which you build, run, and debug those source files.

In the IDE, all Java development has to take place within a project.

For applications that involve large code bases, it is often advantageous to split your application source code into several projects.



Creating a Java Project

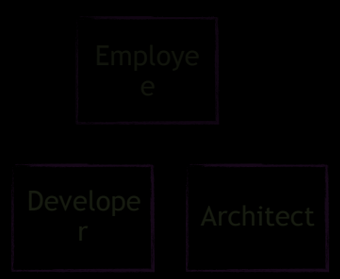
VS Code: Create Java Project

Show Command Palette
Ctrl+Shift+P, F1

Type:
> Java: Create Java Project

Select
No build tools

Select location: Create Folder “hello-world”



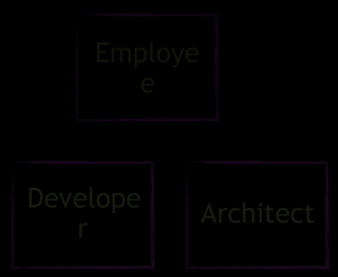
Java Project: hello-world

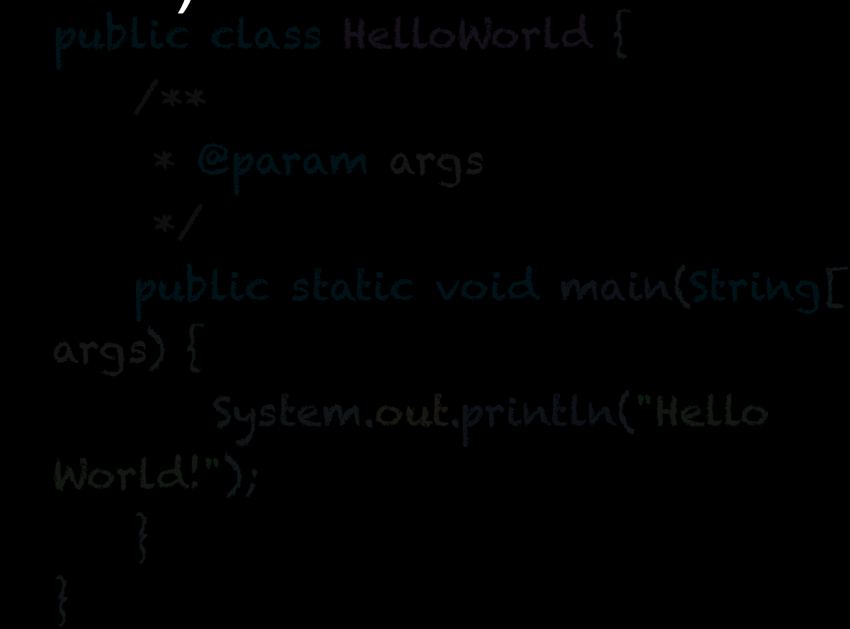
Run App using VS Code

Click
src/App.java

Click “Run” link
(right above public static void main)

See Output





High Level Languages

No matter what anyone else tells you, programming is an art. It is an extremely creative process that requires both passion and dedication.

“The computer programmer is a creator of universes for which he alone is the lawgiver. No playwright, no stage director, no emperor, however powerful, has ever exercised such absolute authority to arrange a stage or field of battle and to command such unswervingly dutiful actors or troops.”

–Joseph Weizenbaum

A computer is just a dumb machine. On its own, a computer is not capable of doing anything. We have to tell a computer what to do by giving it a set of instructions called a program.

Computers do not understand human languages, so we have special computer languages that we have to learn to write our programs.

These languages are called programming languages.

Machine Language

The most primitive form of programming language is machine language. Every computer has a built in set of primitive instructions, which are entered in binary.

Entering binary instructions into the computer is a tedious process.

Programs could be entered by flipping switches. When the switch was up it represented a zero. When it was own it represented a one.

Assembly Language

Assembly languages were developed to make programming easier. A program called the assembler is used to convert assembly language programs into machine code. This conversion is very fast, since there is usually a one-to-one relationship between assembly language code and machine code. Here is an example of an assembly language program that adds the contents of two memory addresses and leaves the sum in the accumulator

```
00200 CLA           / Clear the accumulator
00201 TAD A         / Add contents of memory location A to the accumulator
00202 TAD B         / Add the contents of memory location B to the accumulator
00203 HLT           / Stop the CPU
00204 JMP I, 7600   / return control to the operating system
00205 A, 0003       / define memory location A and store the value of 3 there
00206 B, 004        / define memory location B and store the value of 4 there
```

High Level Languages

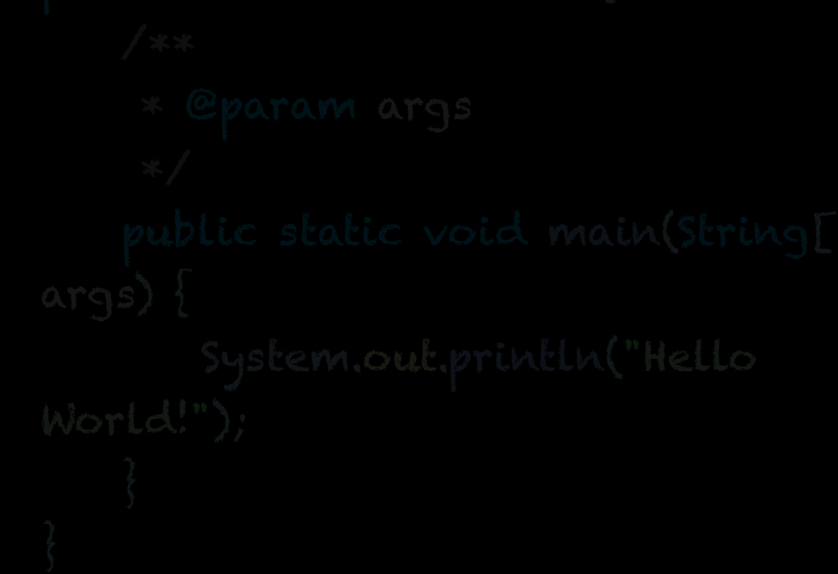
High-level programming languages are English-like and are much easier to learn and to use than assembly language. For example, the following is a high-level language statement that adds the values of a and b, and stores the sum in c.

```
c = a + b
```

Object-Oriented Programming

In an object-oriented programming language data and the procedures that operate on that data are put into a software package called an object.

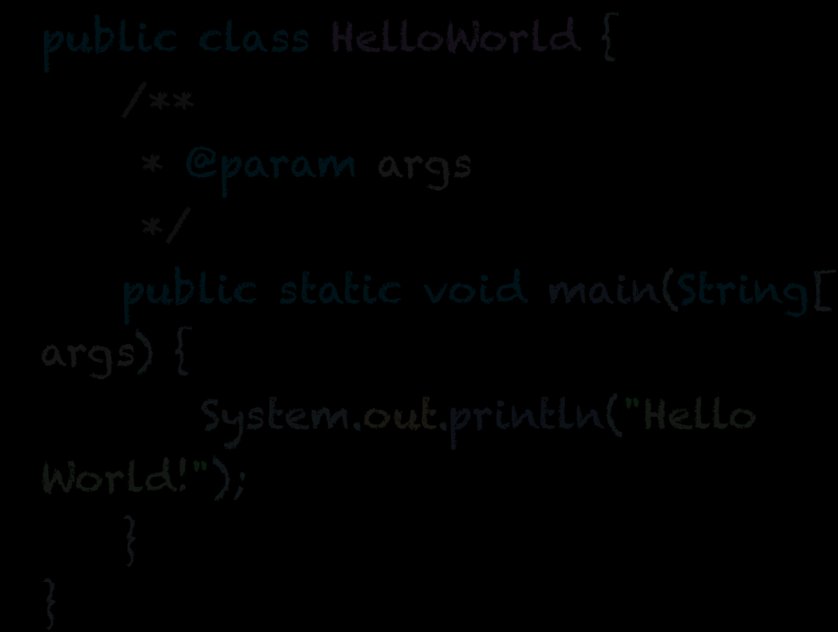
In Java, we refer to the procedures that are associated with an object as methods.



Object-Oriented Programming

The data inside of the object is typically declared as private, so that entities outside of the object cannot directly access the data.

This is called data hiding.



Java

Programming Languages that primarily deal with objects are called object-oriented programming languages.

One of the most popular object-oriented programming languages is Java.

In this course we will use Java to illustrate the important principles of object-oriented programming.

Java is a very rich language. We will only discuss the parts of Java necessary to explain the programming concepts presented in this course.

Java

Java was developed by James Gosling at Sun Microsystems. It was introduced in 1995 as part of Sun's Java platform.

Java derives much of its syntax from C and C++, but unlike C and C++, Java is compiled into bytecodes that allow it to run on any computer that supports the Java Virtual Machine.

With Java you only need to write a program once and then you can run it on any machine that has a Java Virtual Machine.

Visual Studio Code

In this class, you will use a software package called Visual Studio Code (VS Code) to create, compile, and execute your programs.

VS Code is what is known as an integrated development Environment, or IDE.

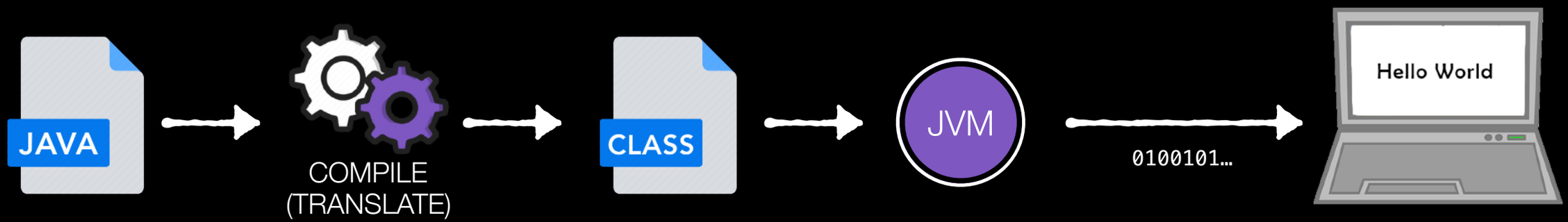
VS Code contains a complete set of tools to create, compile, test, debug, and execute Java programs.

Create. Compile. Run.

Using the code editor in VS Code, we create the source code. The source code is written in Java.

The compiler converts Java source code into an intermediate language called bytecodes.

The Java Virtual Machines (JVM) is a software program that runs on your computer. It interprets the byte code by converting them into machine language code that is executed as it is converted.

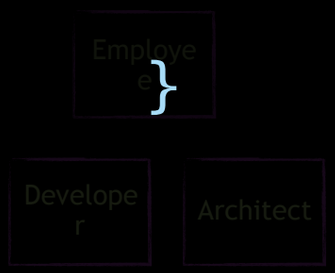

JAVA
COMPILE
(TRANSLATE)
CLASS
JVM
0100101...
Hello World

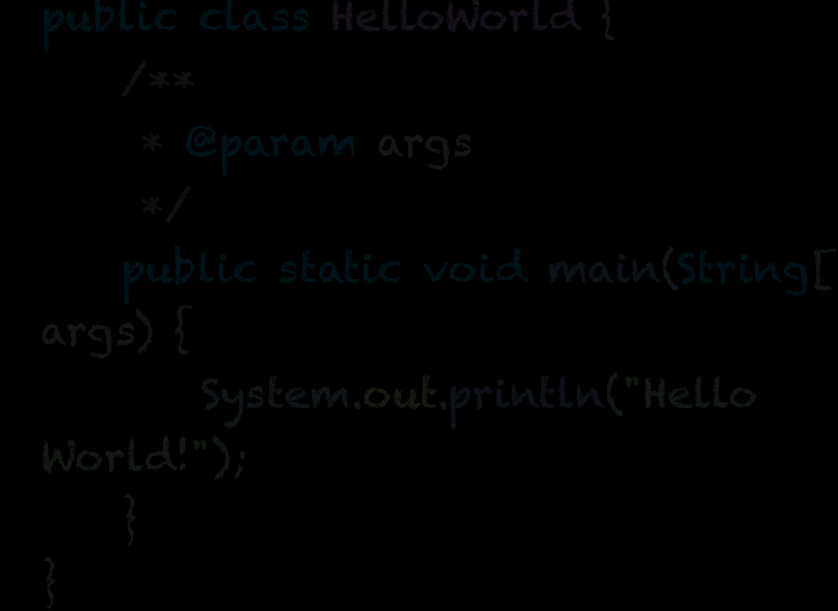
Java File

HelloWorld.java

```java
// This program displays the message
// Hello World!
public class HelloWorld {

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





Class File

HelloWorld.class

HelloWorld.class

src > HelloWorld.class

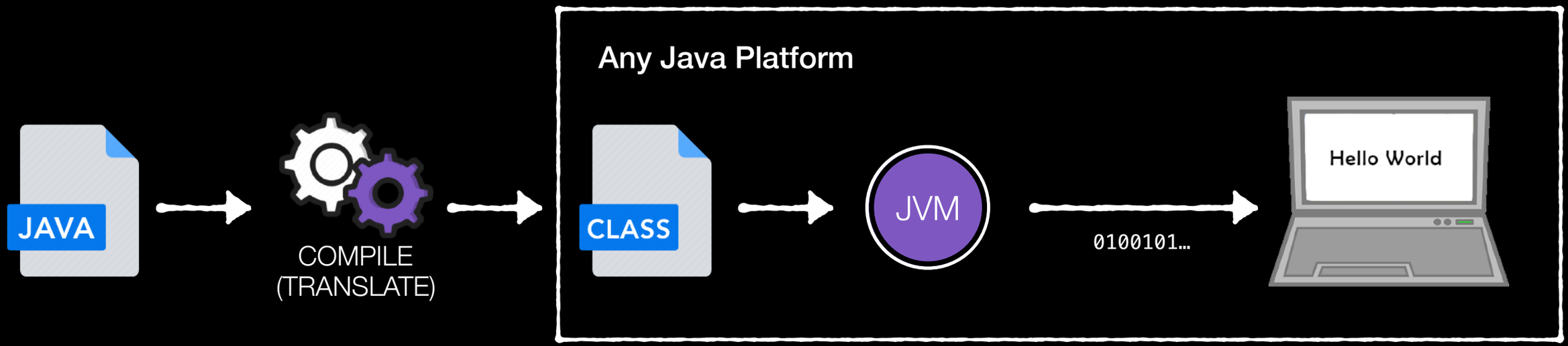
```
1   ????????7?
2   ??    ???
3   ?? ? ? ?<init>?()V?Code?LineNumberTable?main?([Ljava/lang/String;)
    V?
4   SourceFile?HelloWorld.java?????? ?Hello World!???? ?
5   HelloWorld?java/lang/Object?java/lang/System?out?Ljava/io/PrintStream;
    ?java/io/PrintStream?println?(Ljava/lang/String;)V?!?????????
    ????????*??????
6   ???????? ???? ??? ?%?????? ??  ?? ????
7   ???
8   ?????? ? ?
9   ???
```

Emplo
e

Develope
r

Architect

```
*/
public static void main(String[
args) {
    System.out.println("Hello
World!");
    }
}
```




```
$ javac HelloWorld.java
```

COMPILE

```
$ java HelloWorld
```

RUN

```
$ HelloWorld!
```

DISPLAY

Programming Style

Programming style deals with what a program looks like. It is possible to write a program that works, but because of bad programming style it is hard to read, and therefore hard to maintain. Most software development organizations will require their programmers to follow a set of style guidelines when writing their source code.

Naming Conventions

Choose meaningful and descriptive names.
Class names: Capitalize the first letter of each word in the name, for example,

```
HelloWorld
```

This is called title case.

Method names: The first letter is not capitalized. For example,

```
computeArea()
```

This is called camel case.

Indentation and Spacing

Indentation:
everything inside of a block should be indented.
Normally your IDE takes care of indentation for you.

Spacing:
use a blank line to separate segments of the code.

Formatting:
Right Click > Format Document OR Shift + Alt + F

```java
// This program displays the message
// Hello World!
public class HelloWorld {

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

}
```

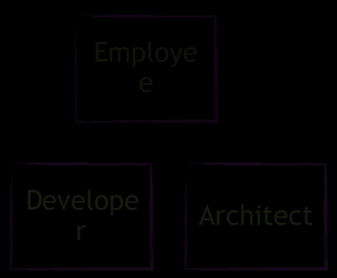
Hello World

Create, Run and Push It

Repository

What can a source code repository do?

- Here are just a few
- Archives your source files in an organized way
- Offers version control
  - Track and revert your changes
- Prepares your amazing code for release to production

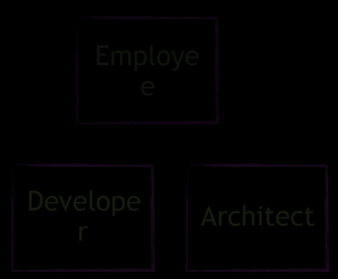


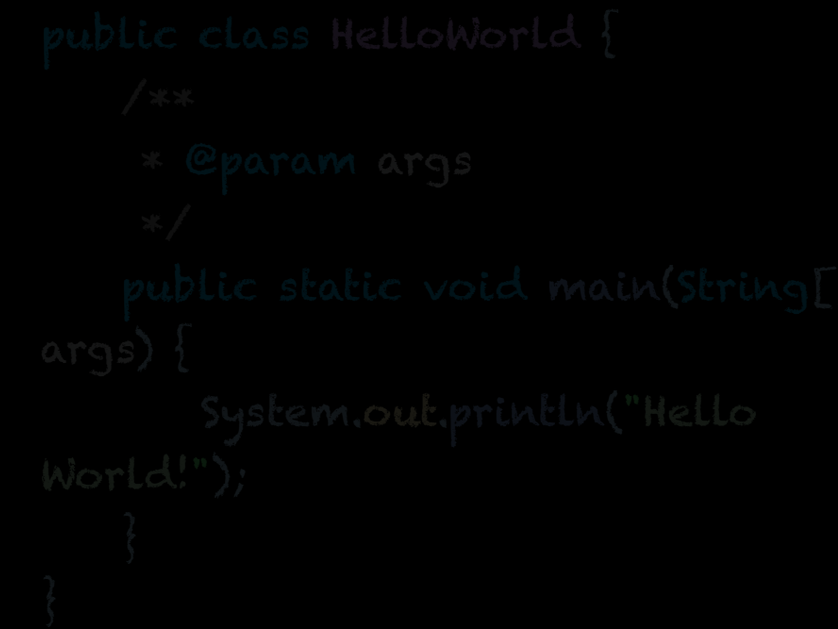
Create HelloWorld

HelloWorld

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

}
```





Run HelloWorld

HelloWorld

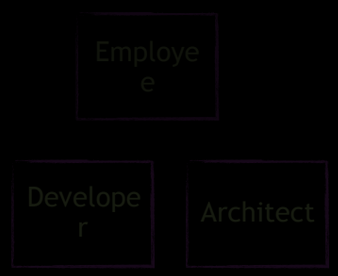
Push Java Project

hello-world

Now it’s time to push our Java Project to a repository.

But before we push it, we have to initialize the project as a git project

$ git init



Git

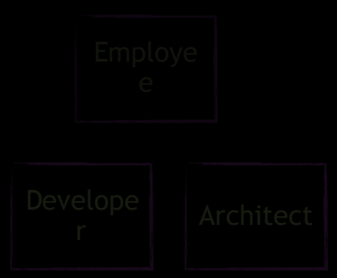
Download and Install

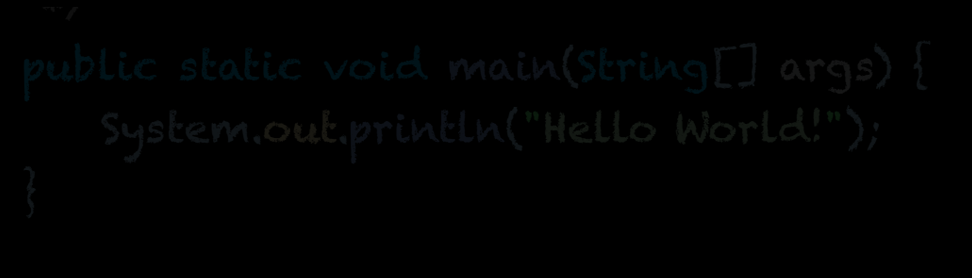
- Windows
  - https://git-scm.com/download/win
- macOS
  - $ git –version
  - https://git-scm.com/download/mac
- Accept defaults except…. (optional)
  - Choosing the default editor used by Git
    - Use Visual Studio Code as Git's default editor

Git

Initialize Git with your Project

- Initialize Git Project
  - $ git init





GitHub

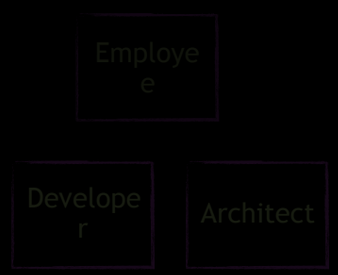
HelloWorld

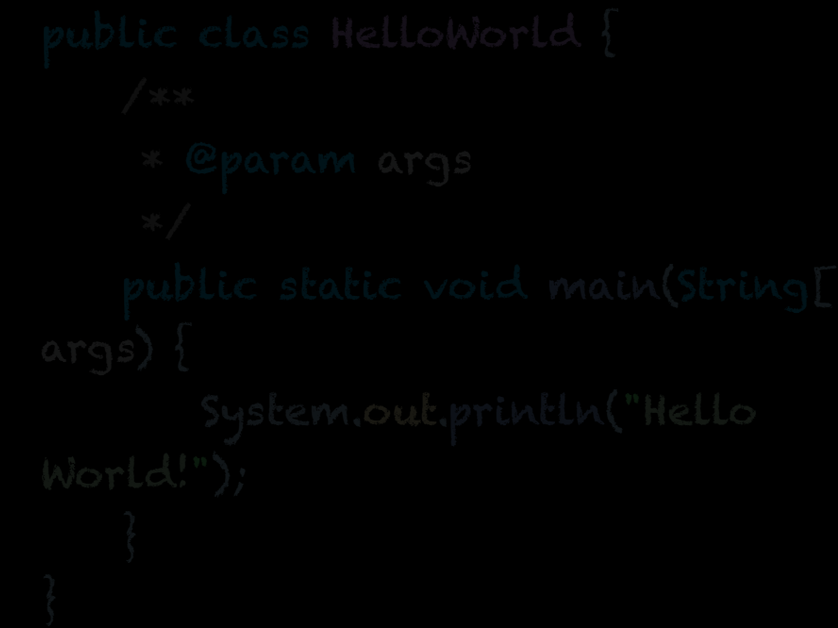
GitHub

Git Repository Hosting Service

Sign-in or Sign-up

github.com





GitHub

Create Repository in GitHub

- Create a new repository
- Repository name
  - Exact name as your project name
  - hello-world
- Public
- Do NOT check “Initialize this repository with a README”
- Create Repository button

GitHub

Push Existing Repository from the command line

- See the GitHub options and locate the following option

…or push an existing repository from the command line

git remote add origin …

git push -u origin master

- Click the copy button

GitHub

Push Existing Repository from the command line

- Go to your VS Code and click the source control button on the left side

GitHub

Push Existing Repository from the command line

- Go to your VS Code Terminal and make sure you are in the root folder of your project

Show Integrated Terminal
Ctrl + `, View > Terminal

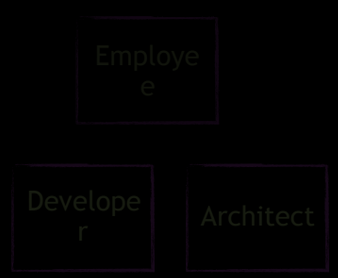
Verify Location of HelloWorld.java
pwd, ls, cd src

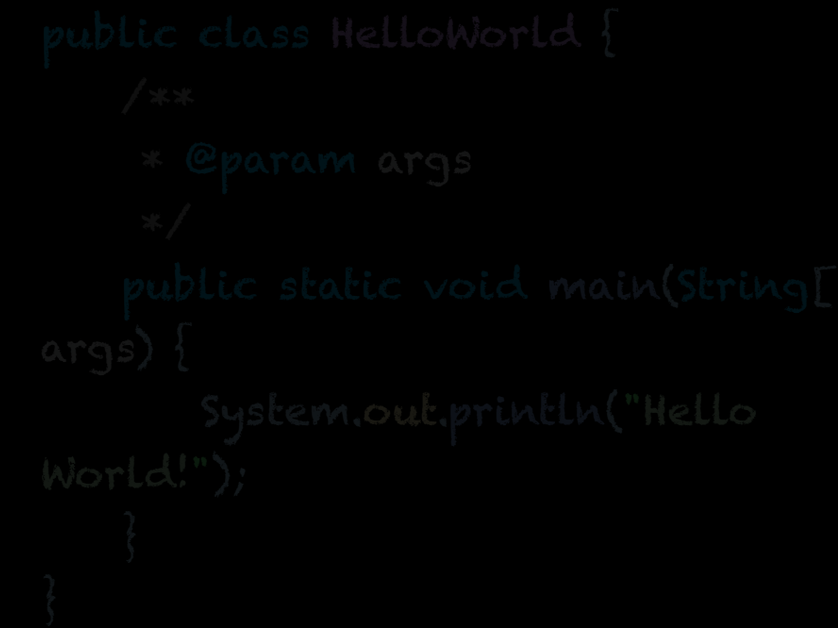
- Paste the git commands

GitHub

Verify Your Code Has Been Pushed

Go back out to GitHub and verify your code is in your GitHub repository





Clone Repository

From GitHub to your Machine

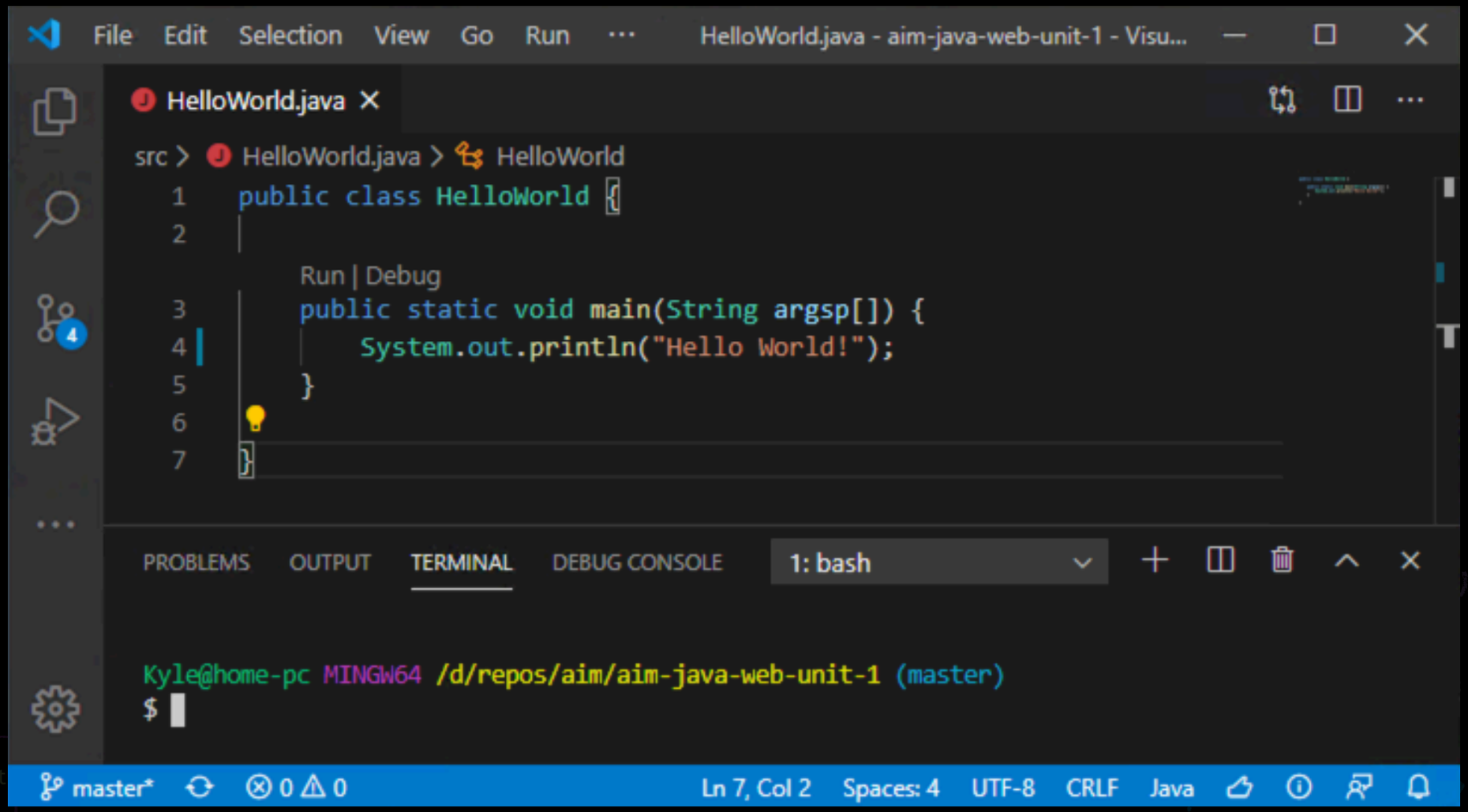
Verify your Java project is in your GitHub Repo
Copy the git clone repository command.

Once verified, delete your project from your machine
Using File Explorer or command line

Open up a new VS Code Window
Go to the terminal
Paste the git clone repo command

hello-world

Run App using Integrated Terminal



hello-world

Run App using Integrated Terminal

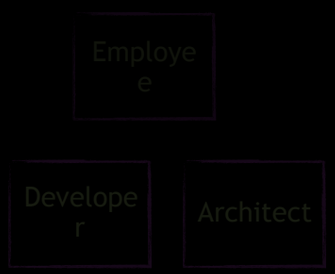
Show Integrated Terminal
Ctrl + `, View > Terminal

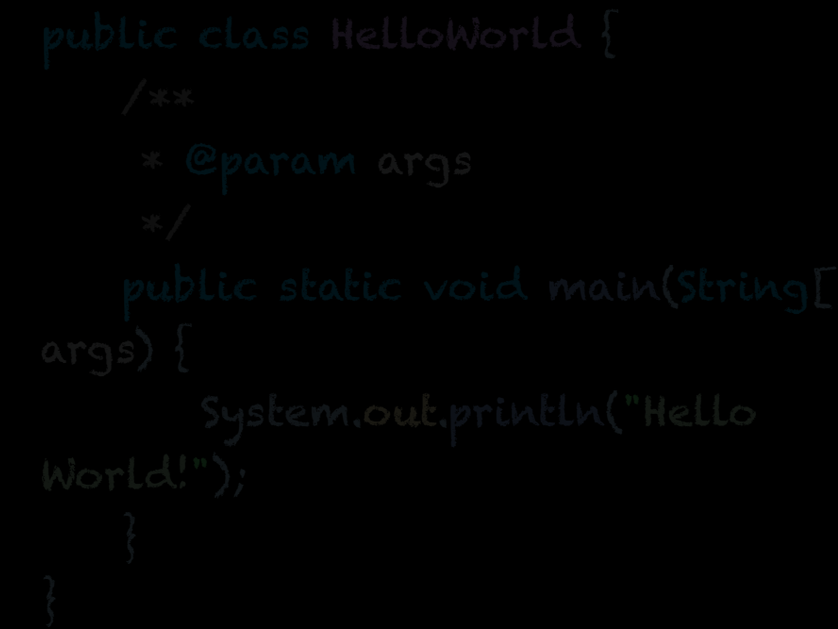
Verify Location of HelloWorld.java
pwd, ls, cd src

javac HelloWorld.java
java HelloWorld

See Output

Delete HelloWorld.class



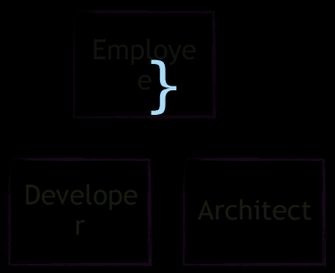


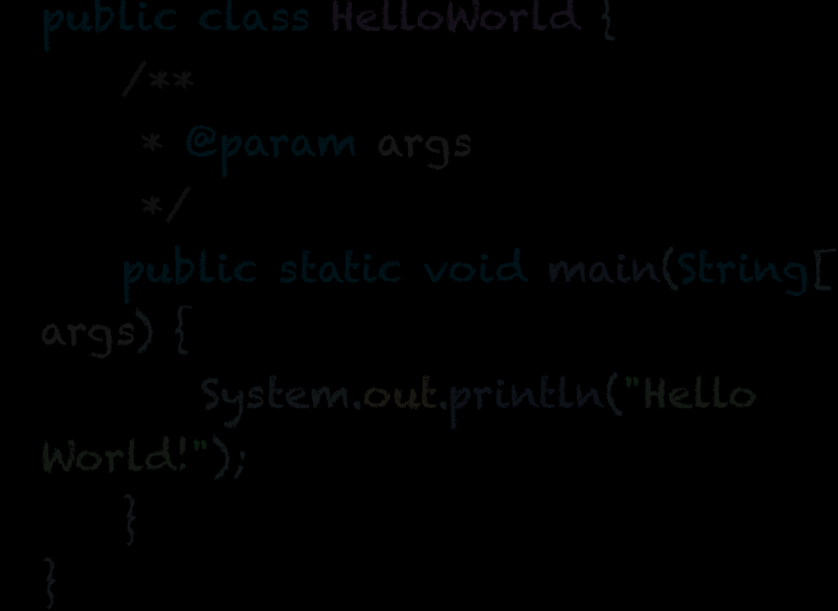
How does it work?

HelloWorld

```
// This program displays the message
// Hello World!
public class HelloWorld {

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



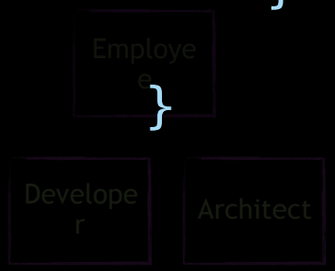


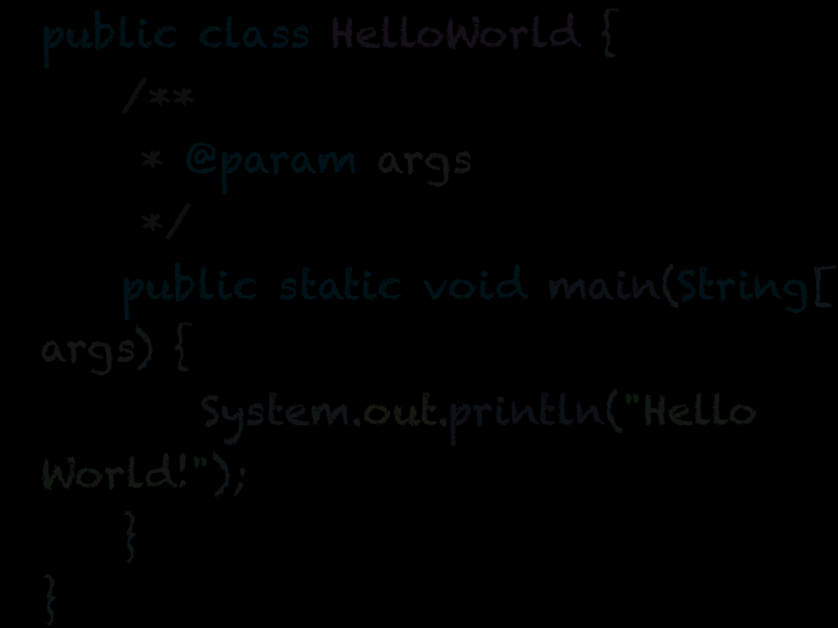
HelloWorld

Recap

```java
// Every valid Java “Application” must have a class definition
// The class definition must match the filename
public class HelloWorld {

    // The main method must be inside the class definition
    // The compiler executes the code starting from the main function
    public static void main(String[] args) {
        System.out.println("Hello World!");
    }
}
```



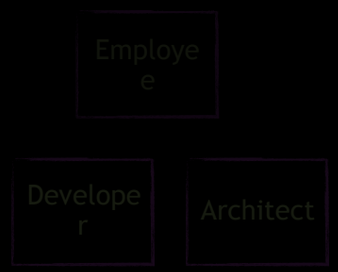


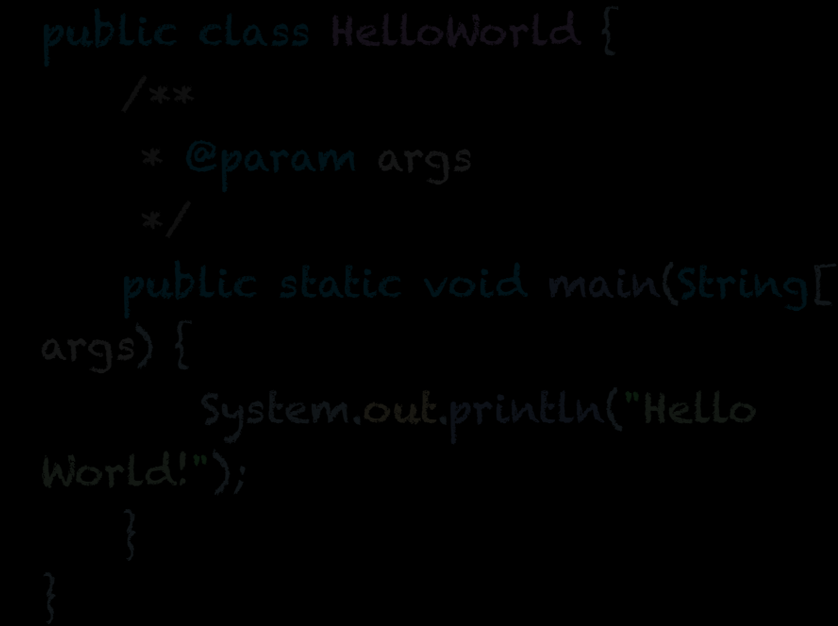
Assignments

Assignments

#assignments discord channel

Unit1Assignment.pdf





Class Review

Accomplishments

- Discord
- JDK
- Visual Studio Code
- Git
- GitHub
- HelloWorld

Learning to Program

Requires

- Time
- Patience
- Good language skills
- The ability to think abstractly
- Good math skills
- The ability to solve problems
- Practice - Program, program, program
- A sense of curiosity