COMP90041: Programming and Software Development
Sem 1, 2021

Programming environment setup guide

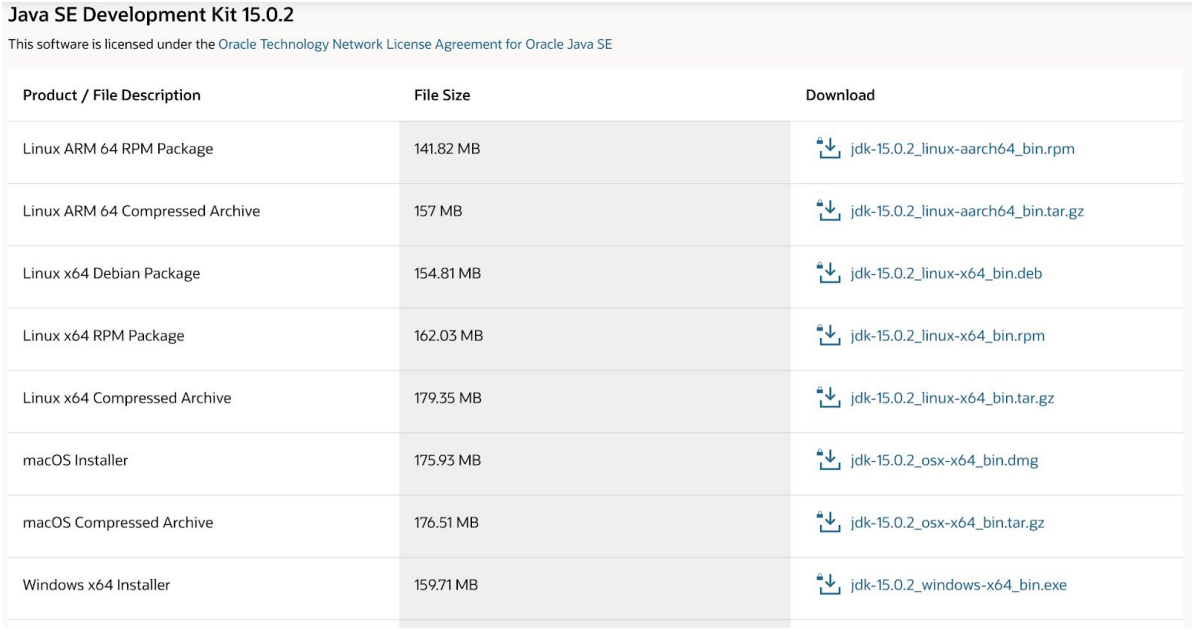
This document will help you set up everything you need to start writing your programs using Java. It contains instructions for 1) installing Java Development Kit (JDK), 2) creating your first Java program, and 3) installing an Integrated Development Environment (IDE) tool of our choice (e.g., Eclipse, IntelliJ IDEA). The instructions have been tested on two most popular Operating Systems (OSes) which are Windows and Mac OS. If you are using another system, the instructions would still work with some minor modifications.

Step-1. Install Java Development Kit

Java Development Kit (JDK) is a collection of tools and libraries necessary for developing and running Java applications. JDK helps you convert your source code into a format named Java byte-code that the Java Runtime Environment (JRE) can execute. Specifically, the JDK includes a Java Runtime Environment (JRE), an interpreter (java), a compiler (javac), an archiver (jar), a documentation generator (javadoc), and some other development tools. The Java Runtime Environment itself consists of the Java Virtual Machine (JVM), supporting files, and core classes. Typically, if you are only interested in running Java programs, you only need to install JRE. However, in the context of COMP90041, you are learning how to develop applications with Java so you will need a JDK.

The instructions to install Java JDK are similar for Windows and Mac OS.

- Visit the website for the official Oracle JDK installers (https://www.oracle.com/au/java/technologies/javase-downloads.html) and click on the Oracle JDK Download link for the latest release (Java SE 15.0.2 is the latest release at the time of making this document)



Java SE Development Kit 15.0.2

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Product / File Description	File Size	Download
Linux ARM 64 RPM Package	141.82 MB	jdk-15.0.2_linux-aarch64_bin.rpm
Linux ARM 64 Compressed Archive	157 MB	jdk-15.0.2_linux-aarch64_bin.tar.gz
Linux x64 Debian Package	154.81 MB	jdk-15.0.2_linux-x64_bin.deb
Linux x64 RPM Package	162.03 MB	jdk-15.0.2_linux-x64_bin.rpm
Linux x64 Compressed Archive	179.35 MB	jdk-15.0.2_linux-x64_bin.tar.gz
macOS Installer	175.93 MB	jdk-15.0.2_osx-x64_bin.dmg
macOS Compressed Archive	176.51 MB	jdk-15.0.2_osx-x64_bin.tar.gz
Windows x64 Installer	159.71 MB	jdk-15.0.2_windows-x64_bin.exe

- Pick the Java SE Development kit based on your Operating System (OS) and accept the license agreement. This will enable the download button, allowing you to download the installer to your computer.

- Once the download of the installer is complete, run it and walk through the setup options; the default options should work. This will set up the relevant Java binary source files on your computer enabling you to use Java. On Windows, by default the installer will set up the JDK in C:\Program Files\Java* path. Please do not change it as it is part of the PATH variable usually, meaning you will not need to perform any additional steps to add the path to the Java bin directory later on.
- Test that Java is available via your Command Prompt (CMD)
    - On Windows, click on the start button of your Windows 10 “taskbar” and type “cmd” or “Command Prompt” and click on the application that appears on your taskbar search.
    - Now type “java --version” and “javac --version” and press enter. If you are able to view a Java version number being returned (as shown below), then your Java setup is complete.

```
C:\Users>java --version
java 15.0.2 2021-01-19
Java(TM) SE Runtime Environment (build 15.0.2+7-27)
Java HotSpot(TM) 64-Bit Server VM (build 15.0.2+7-27, mixed mode, sharing)

C:\Users>javac --version
javac 15.0.2
```

    - Otherwise, we might need to set up the JAVA path environment variable on your computer. Please check this tutorial (https://javatutorial.net/set-java-home-windows-10) for step-by-step instructions to set up JAVA environment variables.

- On Mac OS, you can check your Java version by opening a “terminal” and running similar commands. To open a terminal, you can search for “Terminal” on your Launchpad or on the spotlight (opened by command + space).

Step-2. Create your first Java program

Creating a “Hello World” program, which just prints out a simple greeting message, is a common first step when we study a new program language. Following is a simple Java program which contains just one Java class and in its turn the class includes only one method.

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

Once Java JDK has been installed successfully, you can use any text editor of your choice, say Notepad/Notepad++ (https://notepad-plus-plus.org/), to write this small piece of code and save it into a file named Hello.java. Note that the file name must be the same as the class name.

To compile the program, open your terminal software (Command Prompt on Windows and Terminal on Mac OS), then move to the folder keeping the file Hello.java (using the “cd” command) and type the following command before pressing enter. The compilation process should be successful with no errors and a new file should be created named Hello.class -- this contains the Java byte-code that is understandable to the Java Virtual Machine.

```
javac Hello.java
```

To run the newly generated program, just run the following command and you should see a greeting message “Hello, World!” displayed on your screen.

```
java Hello
```

Step-3. Install An Integrated Development Environment (IDE)

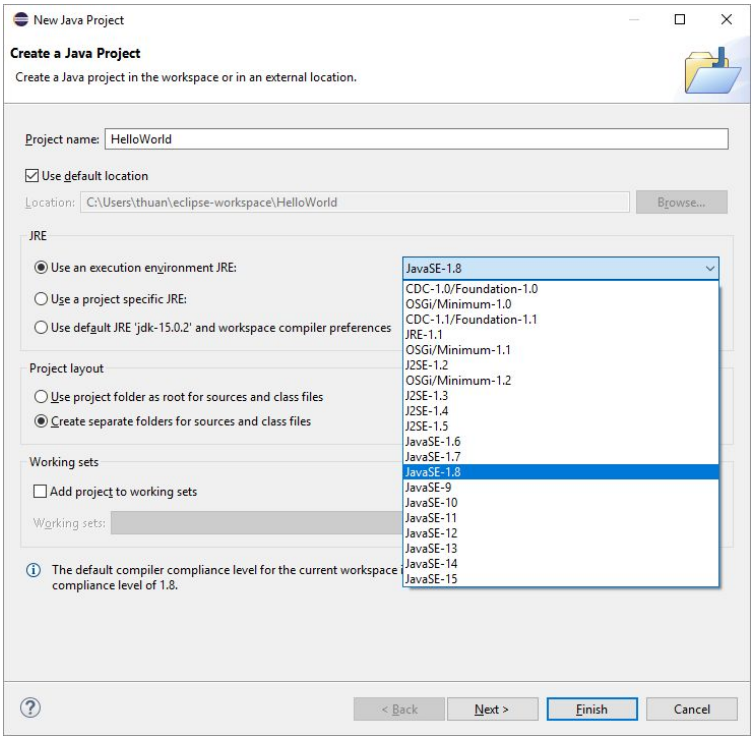
As shown in Step-2, you can write your code using any text editor of your choice (e.g., Notepad, Notepad++, Vim), compile it using the javac command and run the generated executable with the java command. However, having an IDE would help you increase your productivity. It enables programmers to consolidate the different aspects of writing a computer program. Specifically, it combines common activities of writing software into a single application: editing source code, building executables, running executables, and debugging.

In this document, we introduce to you two popular IDEs -- Eclipse and IntelliJ IDEA. Note that there is no strict requirement on the IDE being used in this subject.

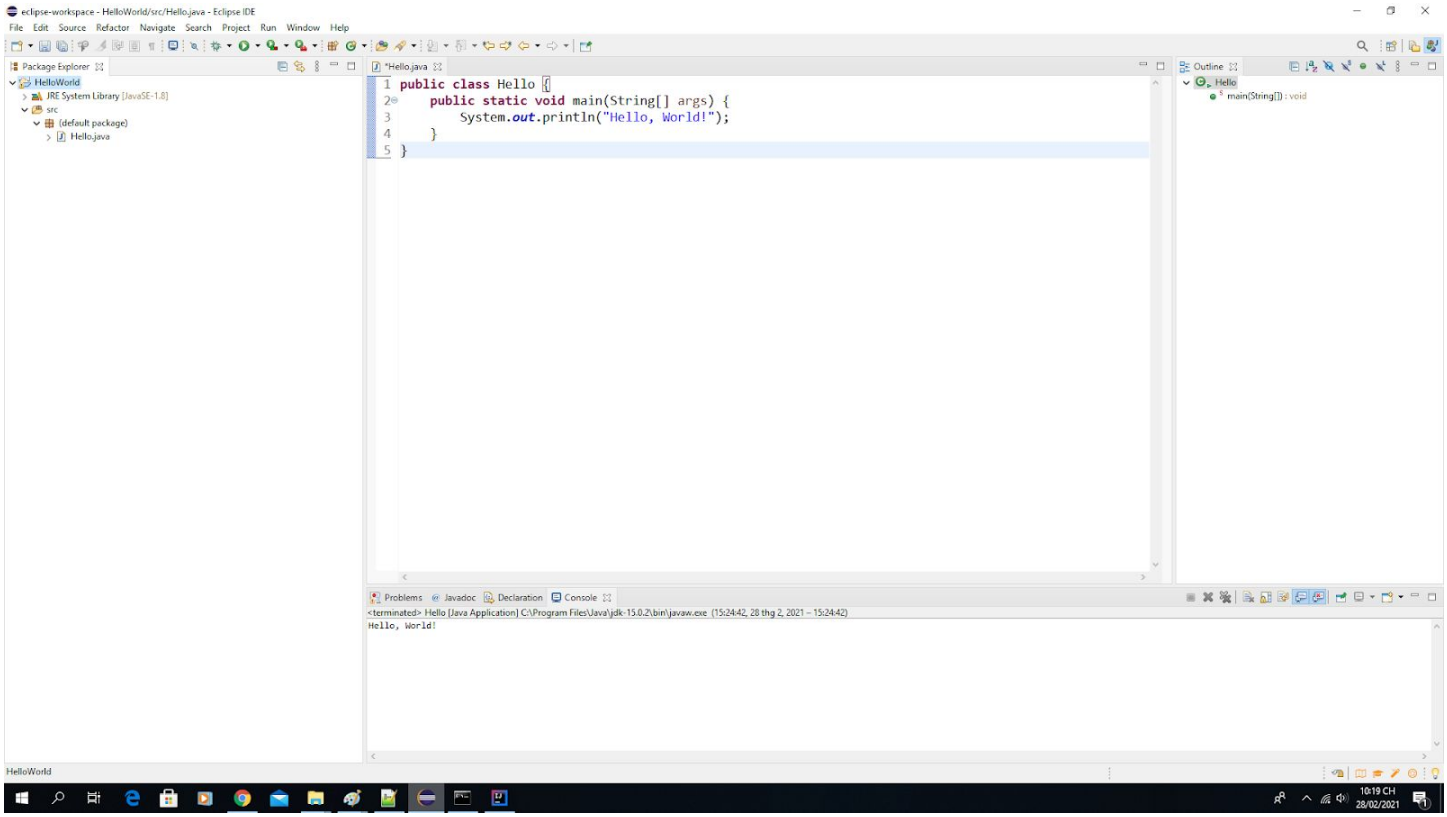
3.1. Install Eclipse

You can follow the detailed instructions at https://www.eclipse.org/downloads/packages/installer to install Eclipse on your computer. Basically, you first need to download the installer, run it, and select the package to install. For COMP90041, installing the “Eclipse IDE for Java Developers” package should be enough.

To check if Eclipse has been successfully installed, you can create a new project (by clicking on the File menu and choosing New →Java Project). Following is a “new project” dialog for a project named “HelloWorld”. Note that in Eclipse you can select a specific version of Java Runtime Environment (JRE). For COMP90041 assignments and the final project, please select JavaSE-1.8 so your programs are compatible with the automated grading system.



Once a project has been created, you can create a new class, say Hello.java as given in Step-2 (by choosing File → New → Class from the menu). Following is a screenshot of Eclipse -- it has several panels/sub-windows allowing us to view the projects (Package Explorer), write code, and see the program output etc. To compile and run your newly created project, please choose Run → Run from the menu or just click the green “Play” icon.



To learn more about Eclipse, please take a look at some tutorials that are available online. Here are some good ones:

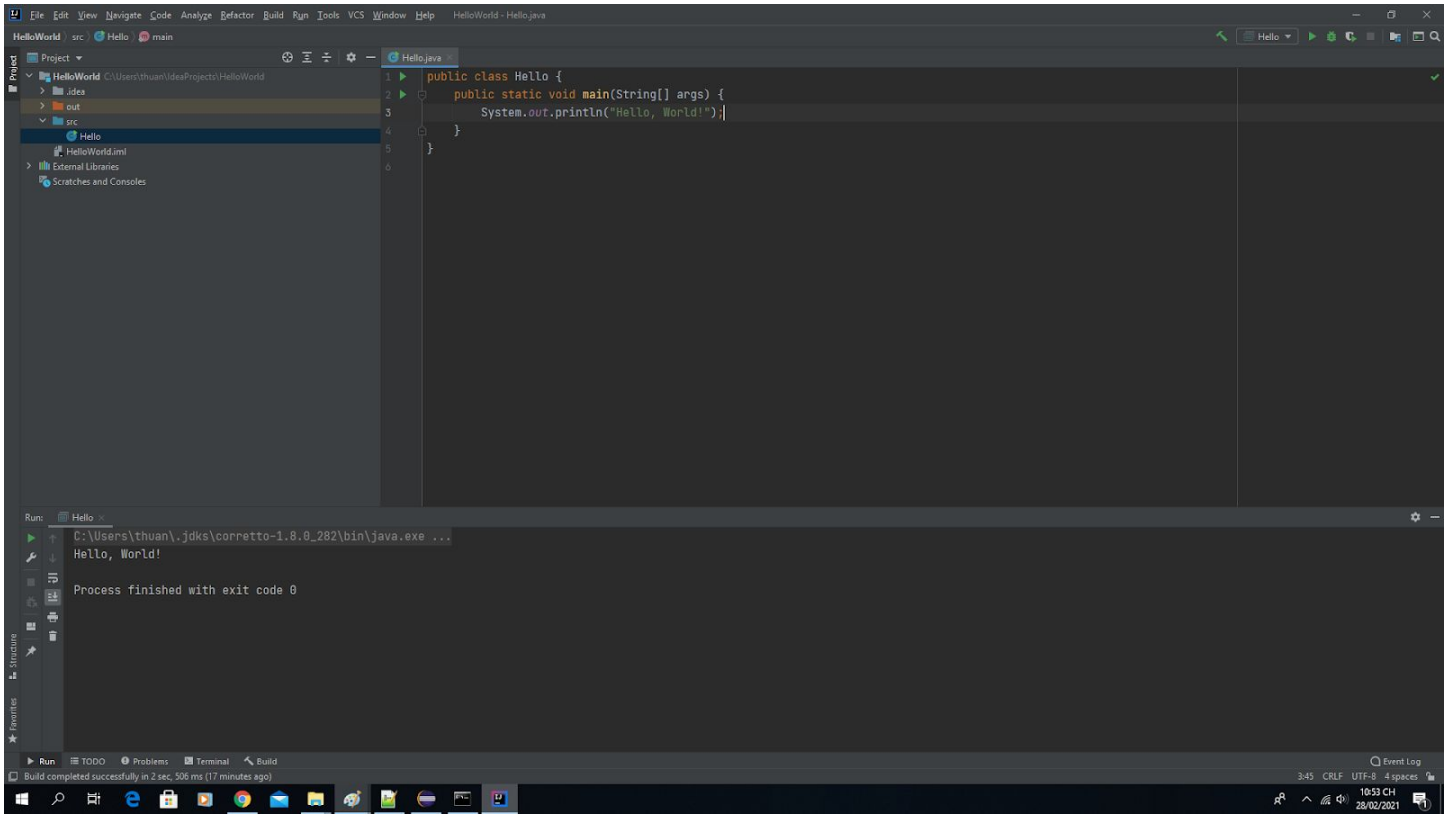
- https://www.vogella.com/tutorials/Eclipse/article.html
- https://www.youtube.com/watch?v=DYVhcvZ1WiY
- https://www.youtube.com/watch?v=mMu-JlBrYXo

3.2. Install IntelliJ IDEA

IntelliJ IDEA (https://www.jetbrains.com/idea/) is another popular IDE for Java. You can download a Community version of the IDE which is free and open-source. Once the installer is downloaded, please use the default options to install the IDE on your computer.

To check if IntelliJ IDEA has been successfully installed, you can create a new project (by clicking on the File menu and choosing New →Project) and follow all the steps.

Once a project has been created, you can create a new class, say Hello.java as given in Step-2 (by choosing File → New → Java Class from the menu). Following is a screenshot of IntelliJ IDEA -- it has several panels/sub-windows allowing us to view the projects (Project Explorer), write code, and see the program output etc. To compile and run your newly created project, please choose Run → Run from the menu or just click the green “Play” icon.



To learn more about IntelliJ IDEA, please take a look at some tutorials that are available online. Here are some good ones:

- https://www.jetbrains.com/help/idea/creating-and-running-your-first-java-application.html#write-code
- https://www.youtube.com/watch?v=S_GLO5la_nI