

SETUP JAVA DEVELOPMENT ENVIRONMENT LAB 1

1. Objectives:

- Understand Java development environment.
- Edit, build and run a demo program using text editor and Java tools.
- Generate code documentation using Java tools.
- Understand Java files (source code, bytecode, jar...)
- Learn to use an Integrated Development Environment: Eclipse.

Setup Java Development Environment

1.1. Install Oracle's Java Development Kit

- Download/Install latest version of Oracle's Java Standard Edition Development Kit (JDK) at <http://www.oracle.com/technetwork/java/javase/downloads/index.html>

Note Java SE stands for Standard edition

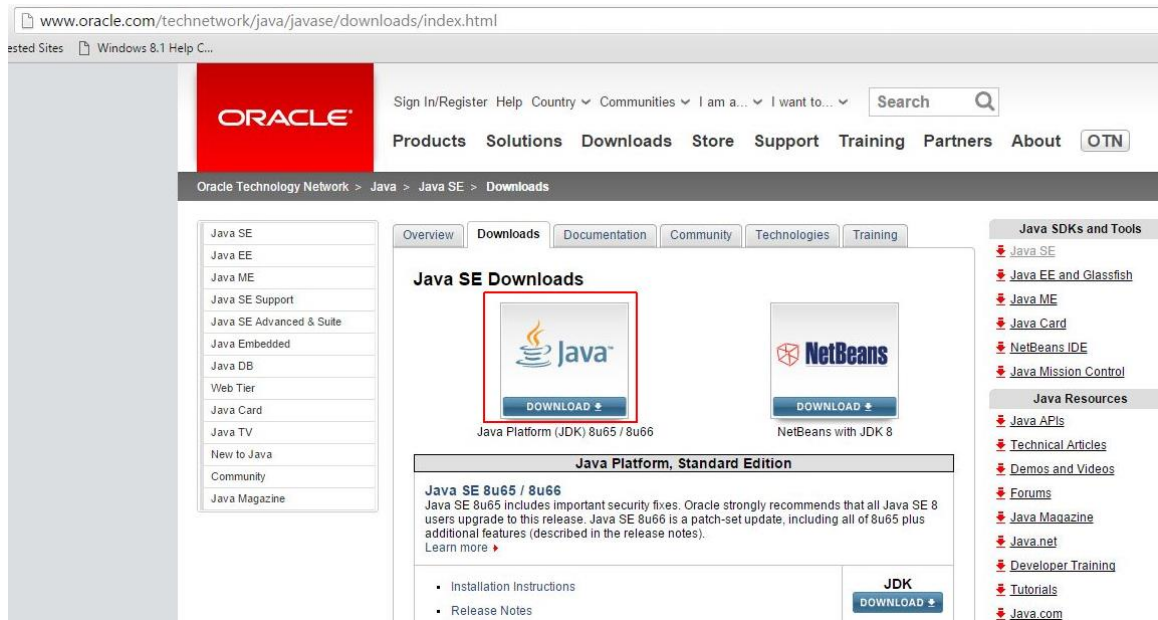


Figure 1 JDK Download

Click on the read square

Java SE Development Kit 8u201

You must accept the [Oracle Binary Code License Agreement for Java SE](#) to download this software.

Thank you for accepting the Oracle Binary Code License Agreement for Java SE; you may now download this software.

Product / File Description	File Size	Download
Linux ARM 32 Hard Float ABI	72.98 MB	jdk-8u201-linux-arm32-vfp-hflt.tar.gz
Linux ARM 64 Hard Float ABI	69.92 MB	jdk-8u201-linux-arm64-vfp-hflt.tar.gz
Linux x86	170.98 MB	jdk-8u201-linux-i586.rpm
Linux x86	185.77 MB	jdk-8u201-linux-i586.tar.gz
Linux x64	168.05 MB	jdk-8u201-linux-x64.rpm
Linux x64	182.93 MB	jdk-8u201-linux-x64.tar.gz
Mac OS X x64	245.92 MB	jdk-8u201-macosx-x64.dmg
Solaris SPARC 64-bit (SVR4 package)	125.33 MB	jdk-8u201-solaris-sparcv9.tar.Z
Solaris SPARC 64-bit	88.31 MB	jdk-8u201-solaris-sparcv9.tar.gz
Solaris x64 (SVR4 package)	133.99 MB	jdk-8u201-solaris-x64.tar.Z
Solaris x64	92.16 MB	jdk-8u201-solaris-x64.tar.gz
Windows x86	197.66 MB	jdk-8u201-windows-i586.exe
Windows x64	207.46 MB	jdk-8u201-windows-x64.exe

Java SE Development Kit 8u201 Demos and Samples Downloads

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Product / File Description	File Size	Download
Linux ARM 32 Hard Float ABI	9.05 MB	jdk-8u201-linux-arm32-vfp-hflt-demos.tar.gz
Linux ARM 64 Hard Float ABI	9.06 MB	jdk-8u201-linux-arm64-vfp-hflt-demos.tar.gz
Linux x86	56.13 MB	jdk-8u201-linux-i586-demos.rpm
Linux x86	55.98 MB	jdk-8u201-linux-i586-demos.tar.gz
Linux x64	56.23 MB	jdk-8u201-linux-x64-demos.rpm
Linux x64	56.08 MB	jdk-8u201-linux-x64-demos.tar.gz
Mac OS X	56.25 MB	jdk-8u201-macosx-x86_64-demos.zip
Solaris SPARC 64-bit	12.2 MB	jdk-8u201-solaris-sparcv9-demos.tar.Z

Figure 2 JDK Download

- Accept the license agreement and download the installer file corresponding to your environment:
 - Windows 7/8/10 users, download “Windows x64”
 - Windows XP users, download “Windows x86”

Download `jdk-8u45-windows-x64.exe` (217 Mbytes)

- Run the installer
- Click on “next” until installation is complete



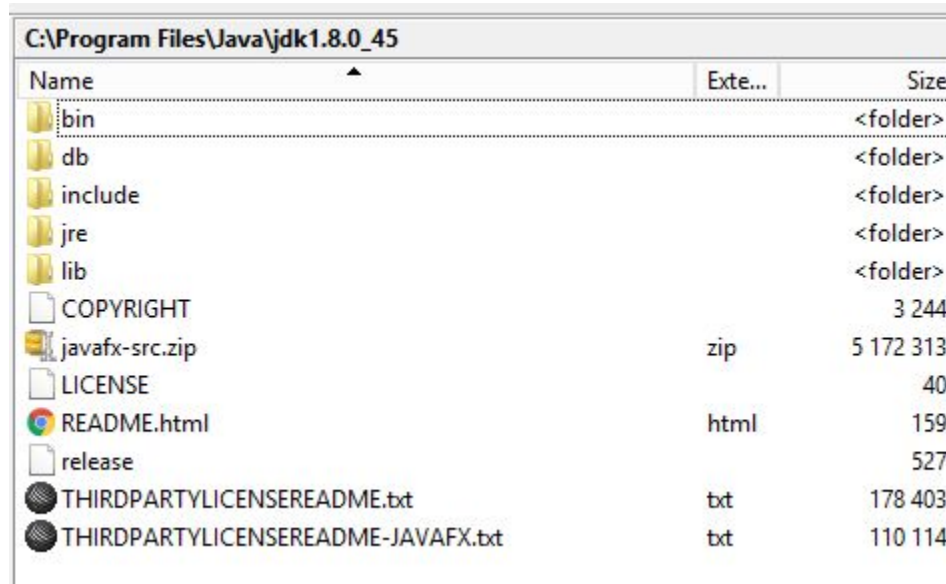
Figure 3 JDK Install Process



Figure 4 JDK installation Result

- Then click on “close”

- Java Development Kit has been successfully installed on your machine. By default, JDK files should be located at C:\Program Files\Java\jdk1.8.0_45 (8.0_45 is the latest JDK version at the time this document is written).
- Open your file explorer and go to the JDK folder. Observe the JDK directory structure:



Name	Ext...	Size
bin		<folder>
db		<folder>
include		<folder>
jre		<folder>
lib		<folder>
COPYRIGHT		3 244
javafx-src.zip	zip	5 172 313
LICENSE		40
README.html	html	159
release		527
THIRDPARTYLICENSEREADME.txt	txt	178 403
THIRDPARTYLICENSEREADME-JAVAFX.txt	txt	110 114

Figure 5 JDK Folder

- **bin**
 - Executable files for the development tools contained in the Java Development Kit.
 - This path location should be added to your PATH environment variable. (Check Figure depicted below)

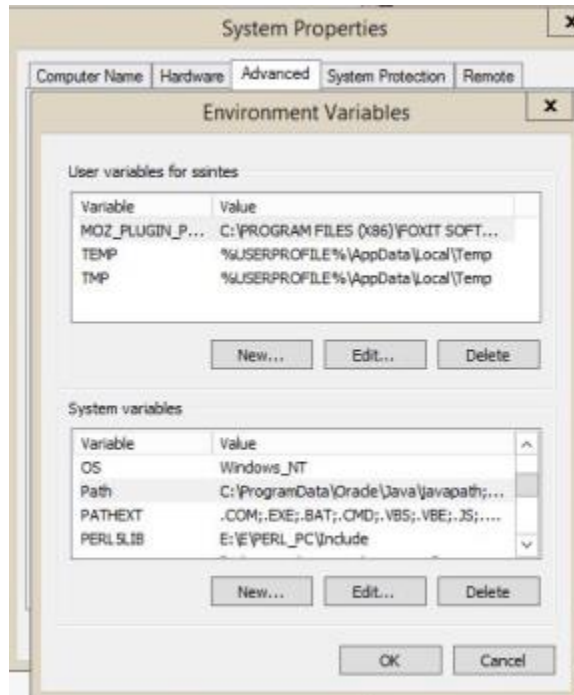


Figure 6: Windows Env Variable

My Path variable contains: **C:\ProgramFiles\Java\jdk1.8.0_45\bin;**

- **\lib**
 - Libraries used by the development tools (tools.jar, dt.jar, ant-javafx.jar).
- **\jre**
 - Root directory of the Java runtime environment used by the JDK development tools.
 - Implementation of the Java Platform (Virtual Machine, ...)
- **\jre\bin**
 - Executable files and DLLs for tools and libraries used by the Java platform.
- **\jre\bin\client**
 - DLLs used by the Java Client Virtual Machine
- **\jre\bin\server**
 - DLLs used by the Java Server Virtual Machine
- **\jre\lib**
 - Code libraries, property settings, and resource files used by the Java runtime environment
- For more details, go to :
<http://docs.oracle.com/javase/7/docs/technotes/tools/windows/jdkfiles.html>

- Let's have a look at the tools provided by the JDK. Go to `\bin` folder:

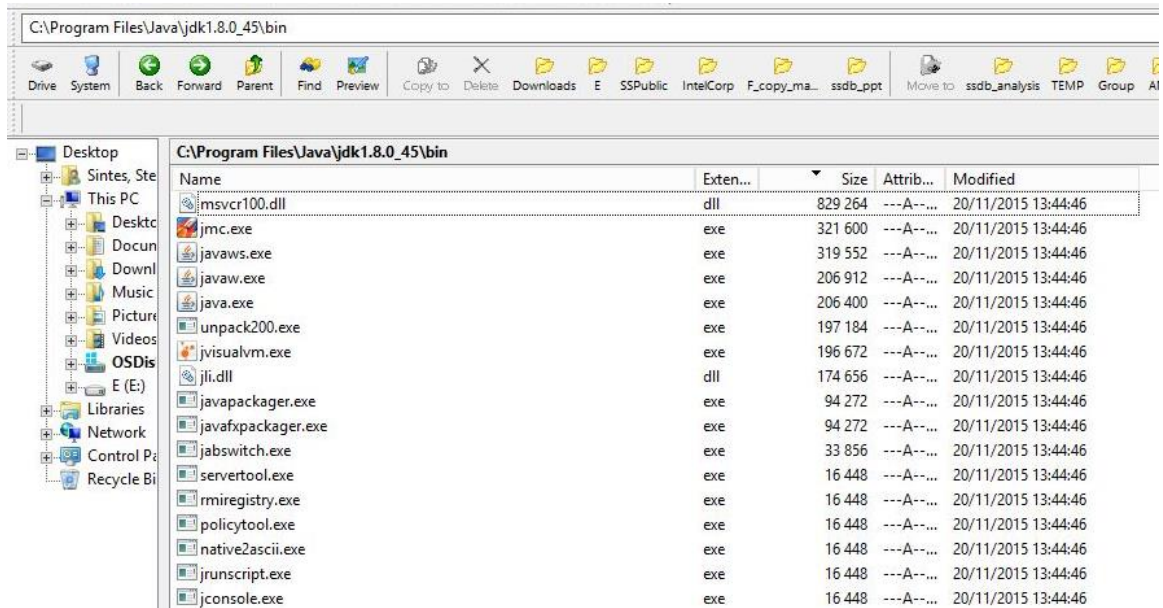


Figure 7: JDK bin folders

- “**javac.exe**” : **Java programming language compiler**
 - This tool compiles Java source code files (.java) into Java bytecode files (.class)
- “**java.exe**” : **Java application launcher**
 - This tool launches a Java application.
 - Start Java runtime environment, load specified class and invoke its main method.
- “**javap.exe**” : **Java bytecode disassembler**
 - This tool disassembles a class file.
- “**javadoc.exe**” : **Java API documentation generator**
 - This tool generates HTML pages containing API documentation from Java source files.
- “**jar.exe**” : **Java archive tool**
 - Combine multiple files into a single JAR archive file.

2. Using Java Development Kit

- Check that JDK has been successfully installed
 - Open a terminal
 - Execute “java -version” command. You should see following output:

C:\Users\laz01878>java -version

java version "1.8.0_121"

Java(TM) SE Runtime Environment (build 1.8.0_121-b13)

Java HotSpot(TM) Client VM (build 25.121-b13, mixed mode)

With version 10:

C:\>java -version

java version "10" 2018-03-20

Java(TM) SE Runtime Environment 18.3 (build 10+46)

Java HotSpot(TM) 64-Bit Server VM 18.3 (build 10+46, mixed mode)

Verify also your javac version C:\Users\laz01878>javac -version

C:\>javac -version

javac 1.8.0_201

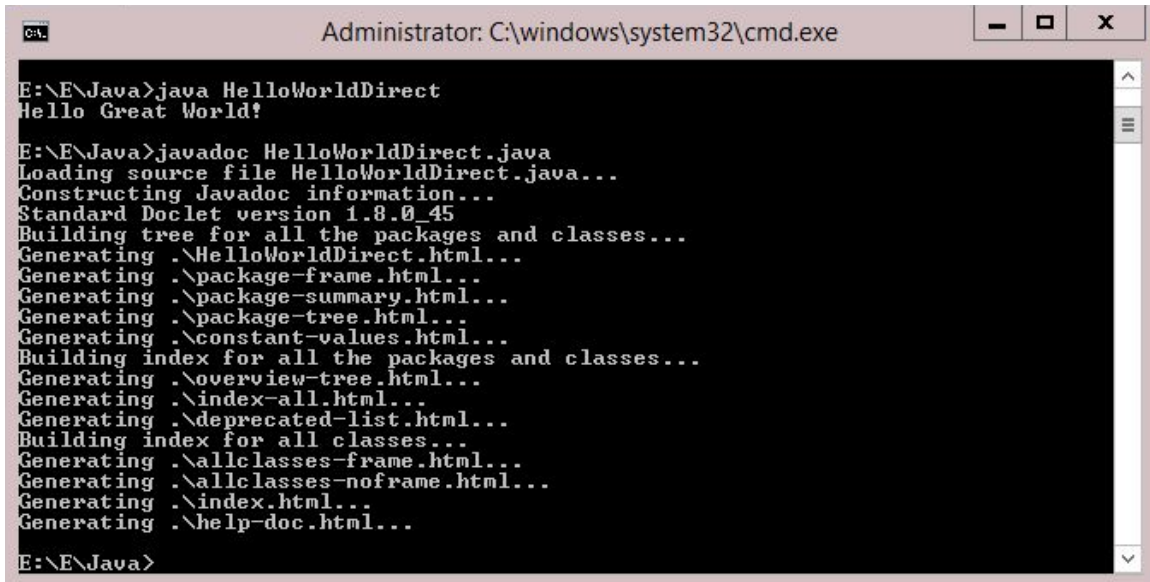
- Open your favorite text editor (For me Scite) and write your first Java program: HelloWorldDirect.java



```
1  - /*
2      Author: Stephane Sintes
3      Comments: Hello World for Direct Simple Compilation
4  */
5
6
7  // MAIN is the primary method to be called
8  // if you replace main by main2 : error msg : Error: Main method not found in class apples
9  - public class HelloWorldDirect {
10     - public static void main(String args[]){ // mandatory main =>static keyword is mandatory
11
12         //print a line PRINTLN
13         System.out.println("Hello Great World!");
14
15     } //end main
16
17
18 }
19
```

Figure 8 HelloWorldDirect.java

- Compile your first HelloWorldDirect.java program
 - Open a terminal
 - Execute “**javac HelloWorldDirect.java**” command
 - What's the result of this command?
- Launch your first HelloWorld application
 - Open a terminal
 - Execute “**java HelloWorldDirect**” command
 - What's the result of this command?
- Generate the *Javadoc* of your first program:
 - Open a terminal
 - Execute “**javadoc HelloWorldDirect.java**” command
 - What's the result of this command?
 - Open the *index.html* file with your favorite web browser.



```

Administrator: C:\windows\system32\cmd.exe

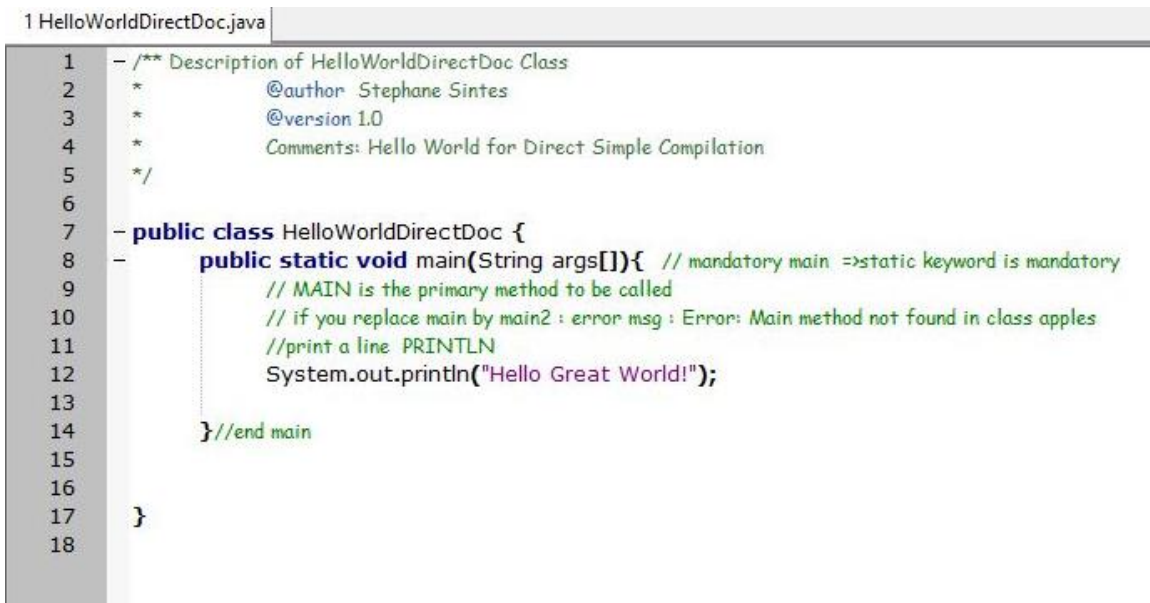
E:\E\Java>java HelloWorldDirect
Hello Great World!

E:\E\Java>javadoc HelloWorldDirect.java
Loading source file HelloWorldDirect.java...
Constructing Javadoc information...
Standard Doclet version 1.8.0_45
Building tree for all the packages and classes...
Generating .\HelloWorldDirect.html...
Generating .\package-frame.html...
Generating .\package-summary.html...
Generating .\package-tree.html...
Generating .\constant-values.html...
Building index for all the packages and classes...
Generating .\overview-tree.html...
Generating .\index-all.html...
Generating .\deprecated-list.html...
Building index for all classes...
Generating .\allclasses-frame.html...
Generating .\allclasses-noframe.html...
Generating .\index.html...
Generating .\help-doc.html...

E:\E\Java>
    
```

Figure 9 Javadoc in Console

- Create HelloWorldDirectDoc.java a copy of HelloWorldDirect.java



```

1 HelloWorldDirectDoc.java
2
3 1 /** Description of HelloWorldDirectDoc Class
4 2 *      @author Stephane Sintes
5 3 *      @version 1.0
6 4 *      Comments: Hello World for Direct Simple Compilation
7 5 */
8
9 6
10 7 - public class HelloWorldDirectDoc {
11 8 -     public static void main(String args[]){ // mandatory main =>static keyword is mandatory
12 9         // MAIN is the primary method to be called
13 10         // if you replace main by main2 : error msg : Error: Main method not found in class apples
14 11         //print a line PRINTLN
15 12         System.out.println("Hello Great World!");
16 13
17 14     } //end main
18 15
19 16
20 17 }
21 18
    
```

Figure 10 HelloWorldDirectDoc.java

- Generate the *Javadoc* of your first program:
 - Open a terminal

- Execute “**javadoc HelloWorldDirectDoc.java**” command
- What's the result of this command?
- Open the *index.html* file with your favorite web browser.
- Review the Javadoc tool help : > **Javadoc -help**
 - **Try several options and compare the result**
 - >**Javadoc -author -version HelloWorldDirectDoc.java**

file:///E:/E/Java/Java_cours_sintes/Code/Lab1/index.html

- Just for your curiosity, disassemble the bytecode:
 - Open a terminal
 - Execute “**javap -v HelloWorldDirectDoc.class**” command
 - What's the result of this command?

Using Eclipse Integrated Development Environment

- Download Eclipse zip file: <http://www.eclipse.org/downloads/packages/eclipse-classic-421/junosr1>

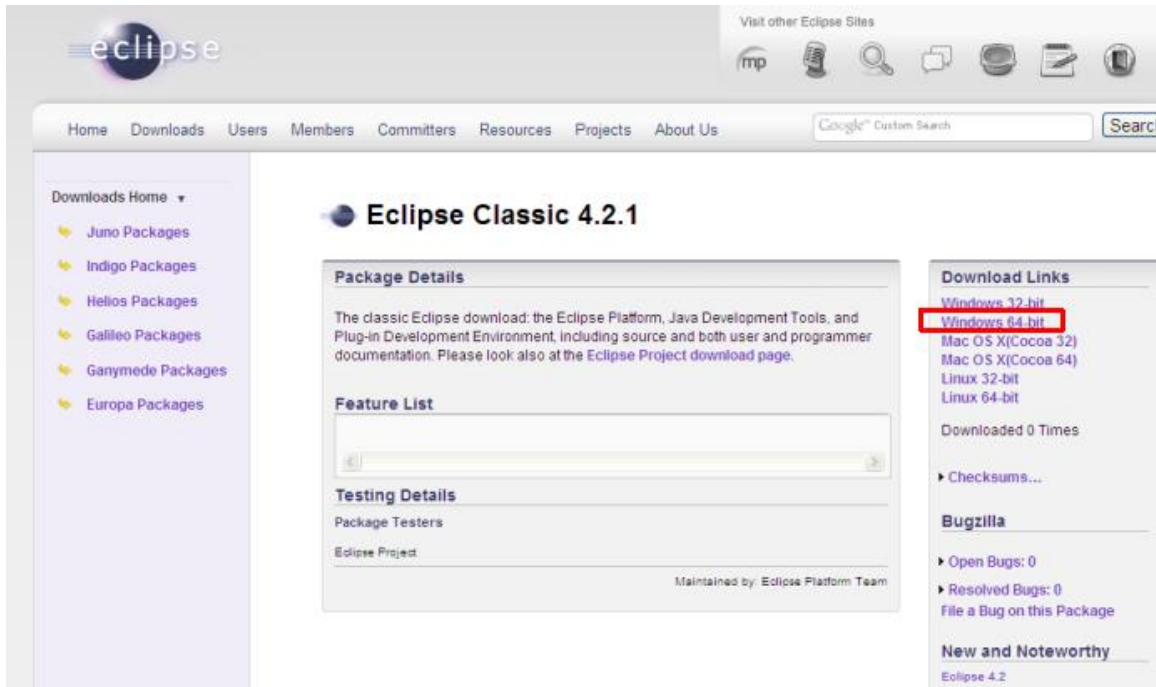
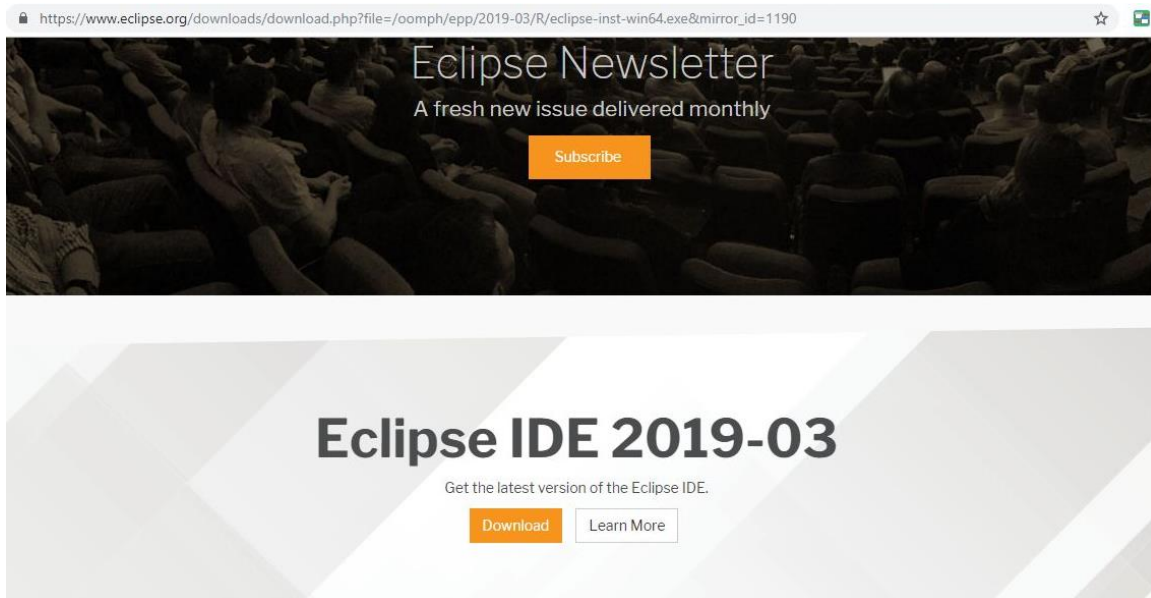


Figure 11 Get Eclipse Installer

- Extract the zip file and move “eclipse-SDK-4.2.1-win32\eclipse” folder to “c:\Program Files\”. Eclipse is now installed under “c:\Program Files\eclipse”

Download Eclipse Installer:

<https://www.eclipse.org/downloads/download.php?file=/oomph/epp/2019-03/R/eclipse-inst-win64.exe>



Install Eclipse



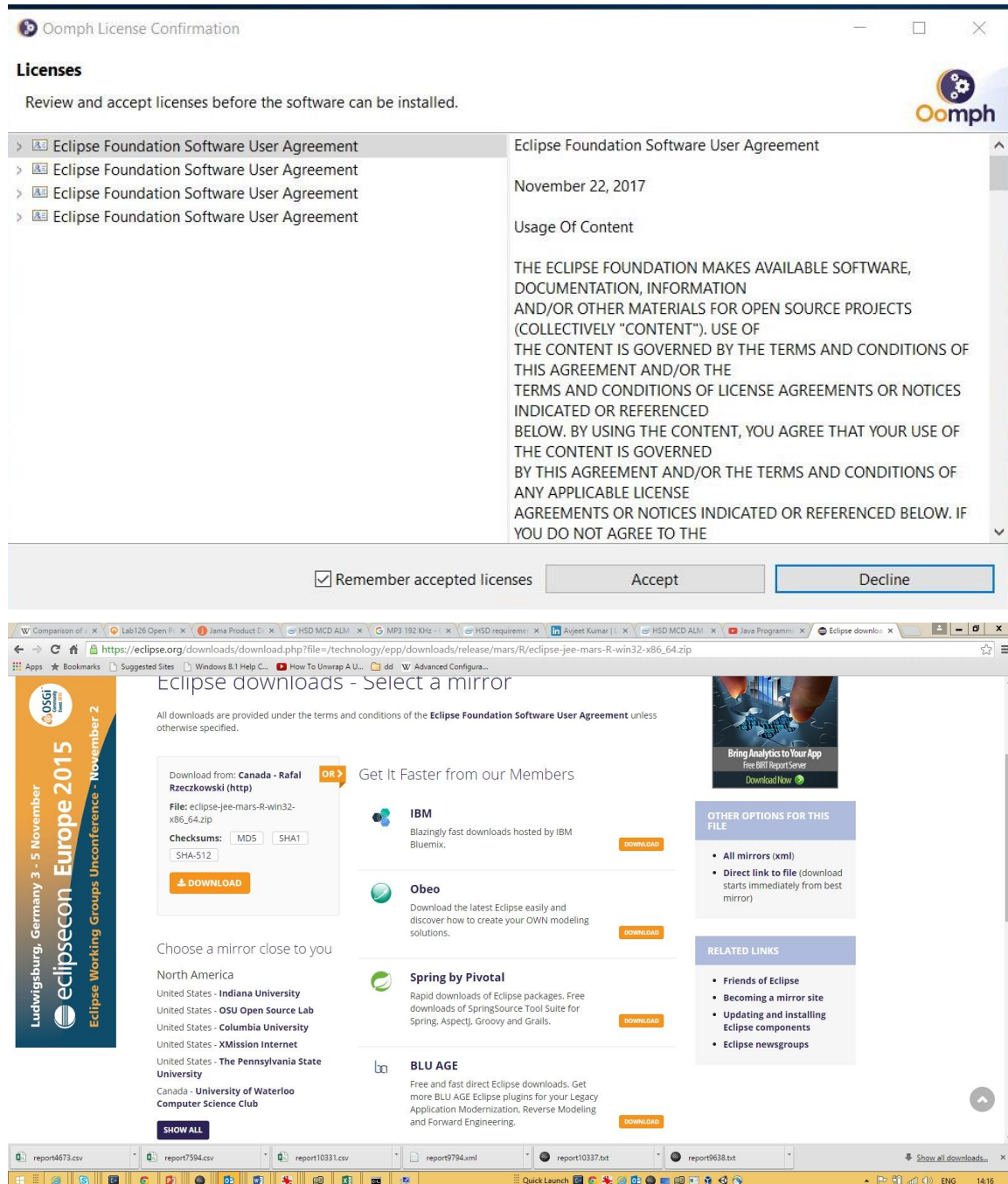


Figure 12 Eclipse Download

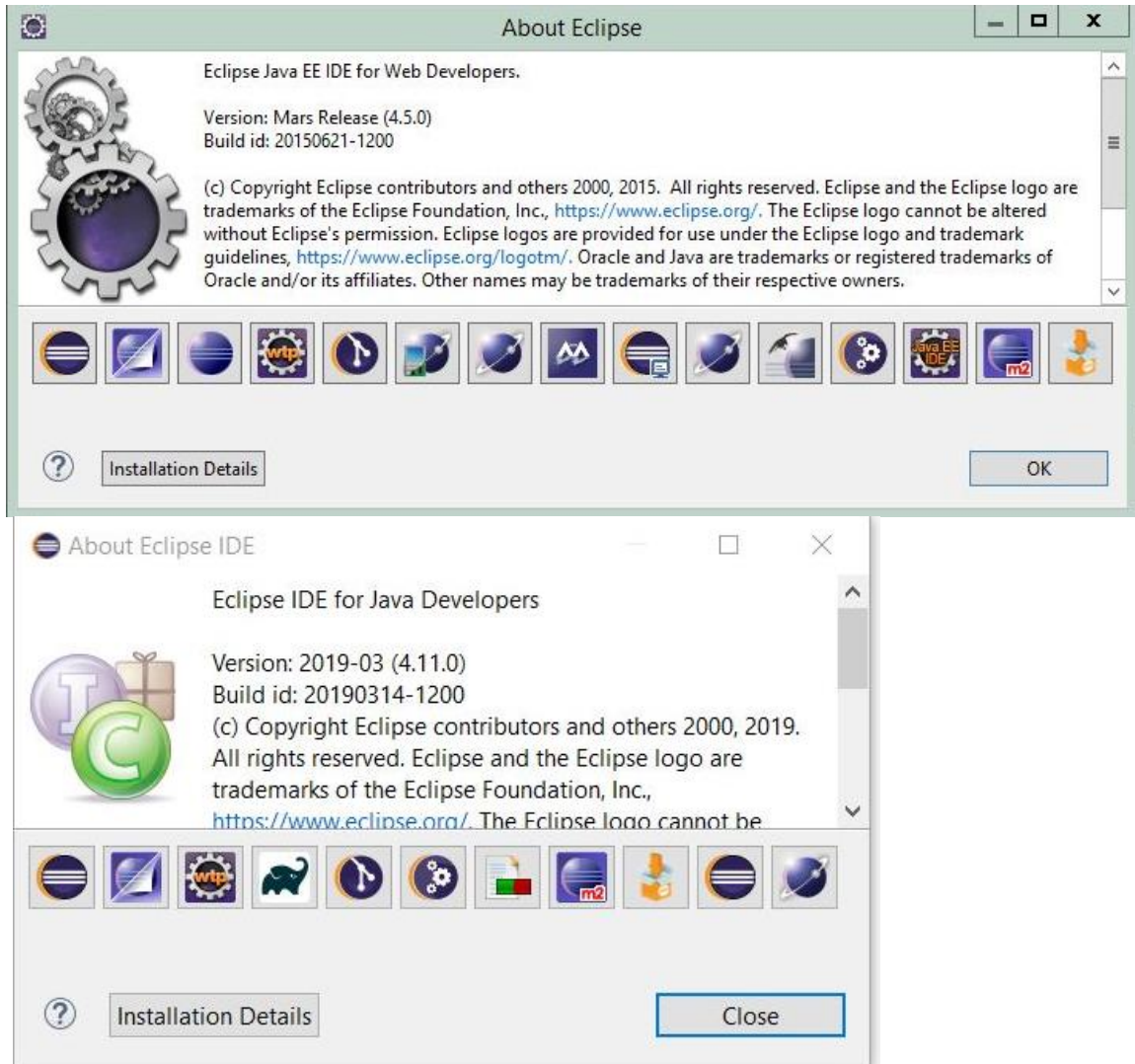
- Launch Eclipse: "c:\Program Files\eclipse\eclipse.exe"
 - Eclipse will ask for a workspace location to store your projects. You can use the location proposed by default or specify a dedicated folder:

Here below different workspace:

C:\Users\ssintes\workspace

C:\Users\laz01878\eclipse-workspace





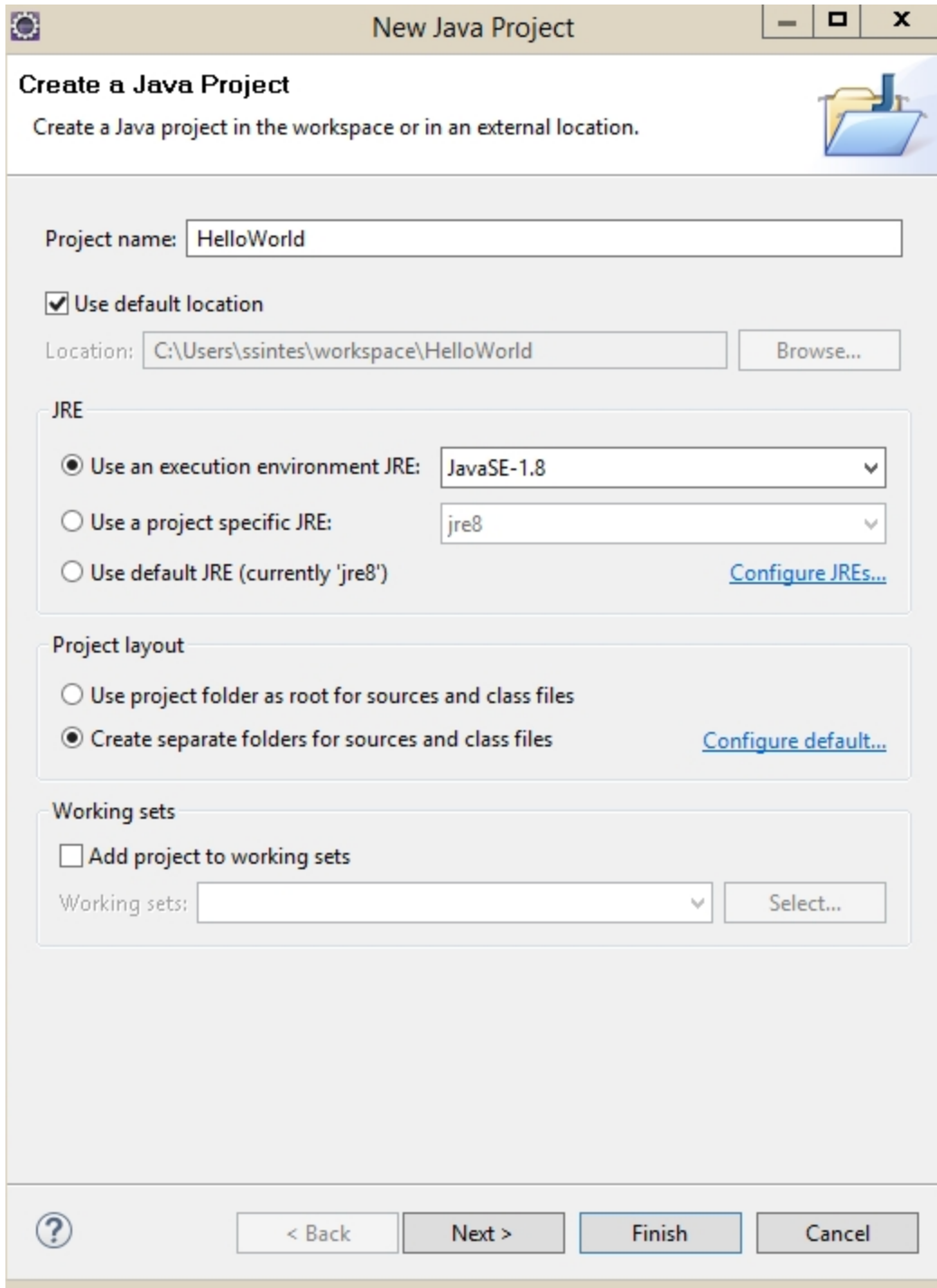
C:/D/SSPublic/Public_ImageNote/RN006562_capture_20190409_101957.jpg

Figure 13 About Eclipse

C:/D/SSPublic/Public_ImageNote/RN006562_capture_20190409_101957.jpg

First HelloWorld Project under Eclipse

- Create your first HelloWorld project
 - File > New > Java Project. Fill the project name field and click Finish.



The screenshot shows the 'New Java Project' dialog box in the Eclipse IDE. The title bar reads 'New Java Project'. The main heading is 'Create a Java Project', followed by the instruction 'Create a Java project in the workspace or in an external location.' and a folder icon. The 'Project name' field contains 'HelloWorld'. The 'Use default location' checkbox is checked, and the 'Location' field shows 'C:\Users\ssintes\workspace\HelloWorld' with a 'Browse...' button. Under the 'JRE' section, 'Use an execution environment JRE:' is selected, with 'JavaSE-1.8' chosen from the dropdown. Other options include 'Use a project specific JRE:' (with 'jre8' selected) and 'Use default JRE (currently 'jre8')' with a 'Configure JREs...' link. The 'Project layout' section has 'Create separate folders for sources and class files' selected, with a 'Configure default...' link. The 'Working sets' section has 'Add project to working sets' unchecked, and the 'Working sets:' dropdown is empty with a 'Select...' button. At the bottom are buttons for '?', '< Back', 'Next >', 'Finish', and 'Cancel'.

Create a Java Project
Create a Java project in the workspace or in an external location.

Project name: HelloWorld

☒ Use default location
Location: C:\Users\ssintes\workspace\HelloWorld [Browse...](#)

JRE

☒ Use an execution environment JRE: JavaSE-1.8 [Configure JREs...](#)

☐ Use a project specific JRE: jre8

☐ Use default JRE (currently 'jre8')

Project layout

☐ Use project folder as root for sources and class files

☒ Create separate folders for sources and class files [Configure default...](#)

Working sets

☐ Add project to working sets

Working sets: [Select...](#)

? < Back Next > Finish Cancel

Figure 14 Java Project creation

C:\Users\ssintes\workspace\HelloWorld

- Add a new Java class to your project. In the package explorer view, right-click on the src\ folder New > Class

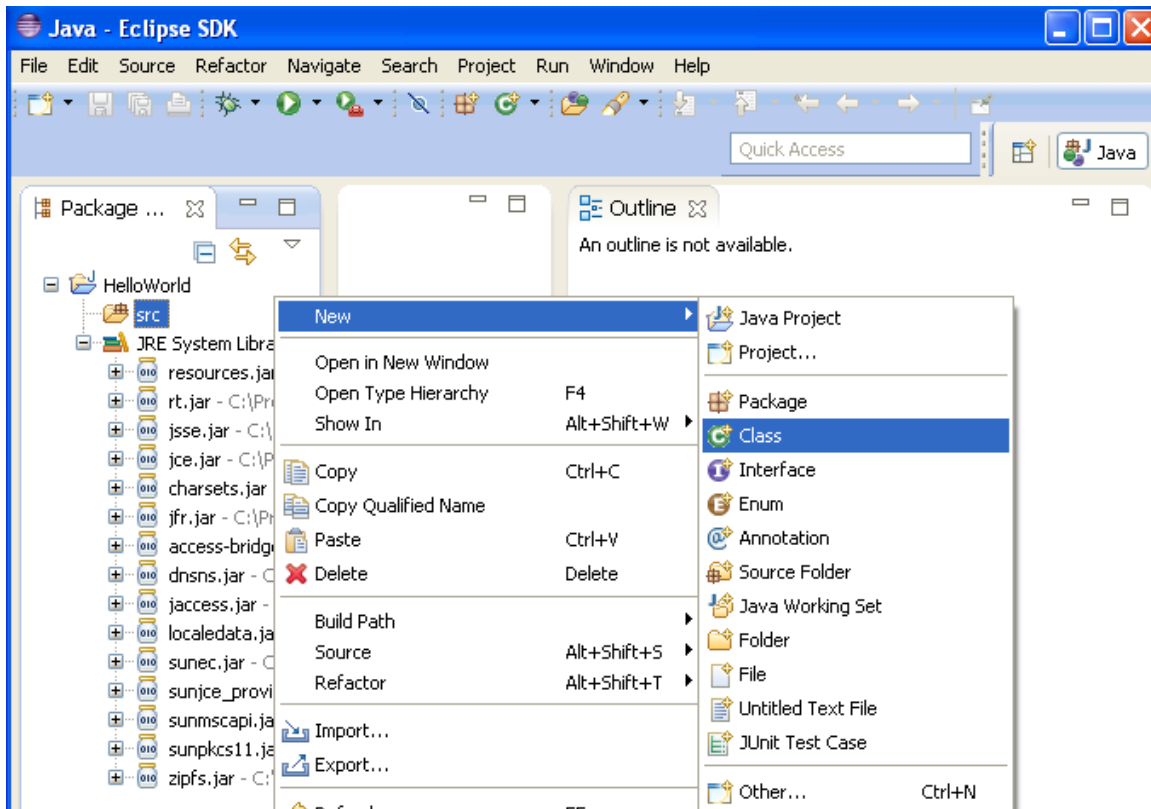


Figure 15 Eclipse New Class

- Fill the following fields and click on Finish
 - Package: “gse4.labs.java” (for example)
 - Name: “HelloWorld” (the name of your class)
 - Request the tool to automatically create the main method
 - Request the tool to automatically add comments

New Java Class

Java Class
Create a new Java class.

Source folder: HelloWorld/src Browse...

Package: gse4.labs.java Browse...

☐ Enclosing type: Browse...

Name: HelloWorld

Modifiers: ☒ public ☐ default ☐ private ☐ protected
☐ abstract ☐ final ☐ static

Superclass: java.lang.Object Browse...

Interfaces: Add... Remove

Which method stubs would you like to create?
☒ public static void main(String[] args)
☐ Constructors from superclass
☒ Inherited abstract methods

Do you want to add comments? (Configure templates and default value [here](#))
☒ Generate comments

Finish Cancel

Figure 16 Eclipse New Class Config

Java Labs – Stephane Sintes

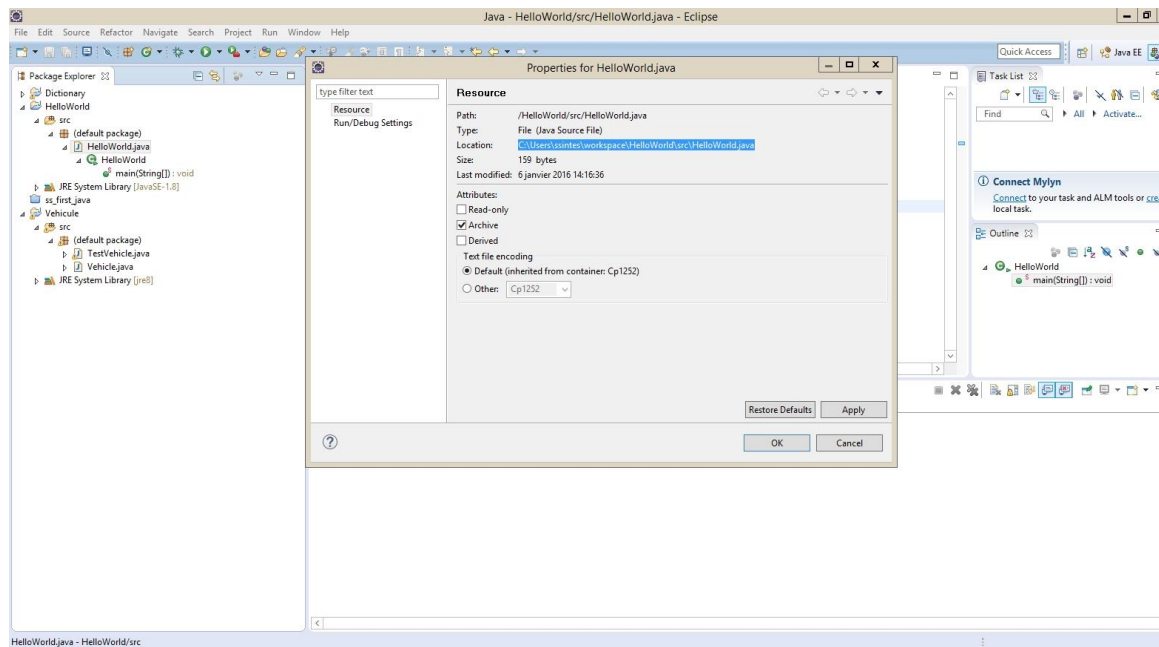


Figure 17 File Properties

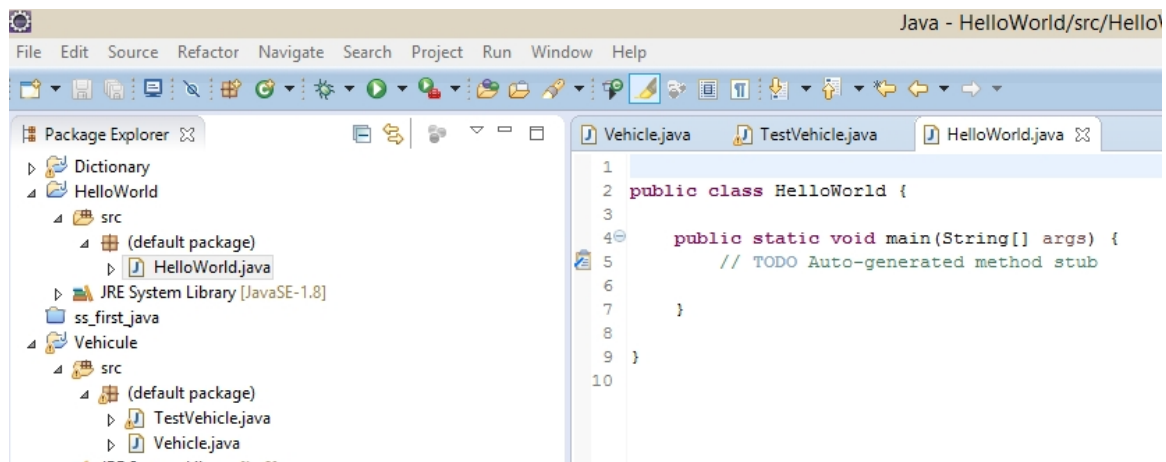


Figure 18 HelloWorld.java

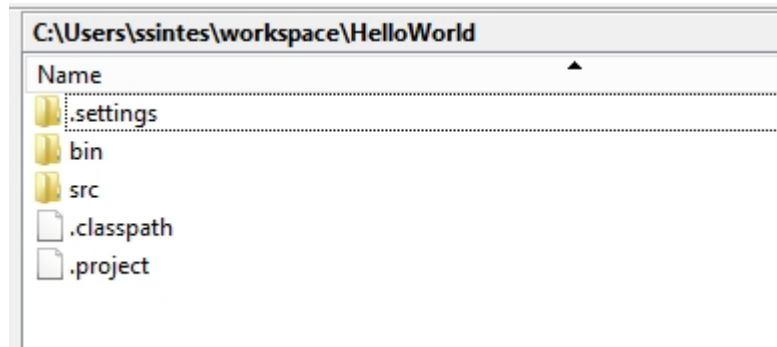


Figure 19 Hello Word Folder Tree

- Edit the HelloWorld.java file and complete the program.

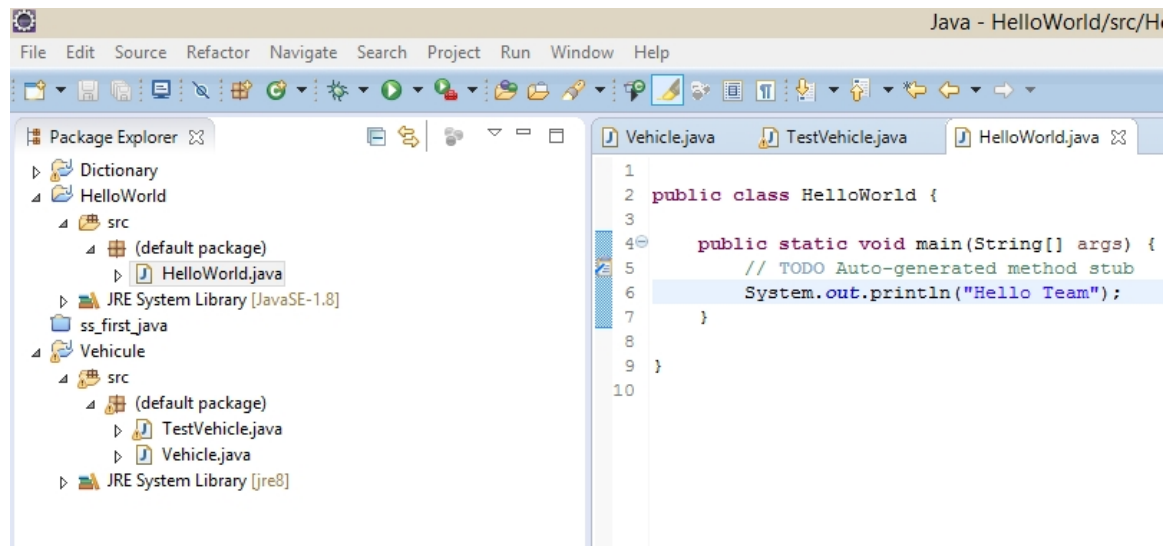


Figure 20 HelloWorld.java to complete

- Run the program Run > Run or using the Run icon
- Generate the documentation
 - Project > Generate Javadoc...
 - Indicate the location of the javadoc command (JDK bin folder)
 - Indicate destination folder for the documentation; the default location is fine.
 - Click on Finish

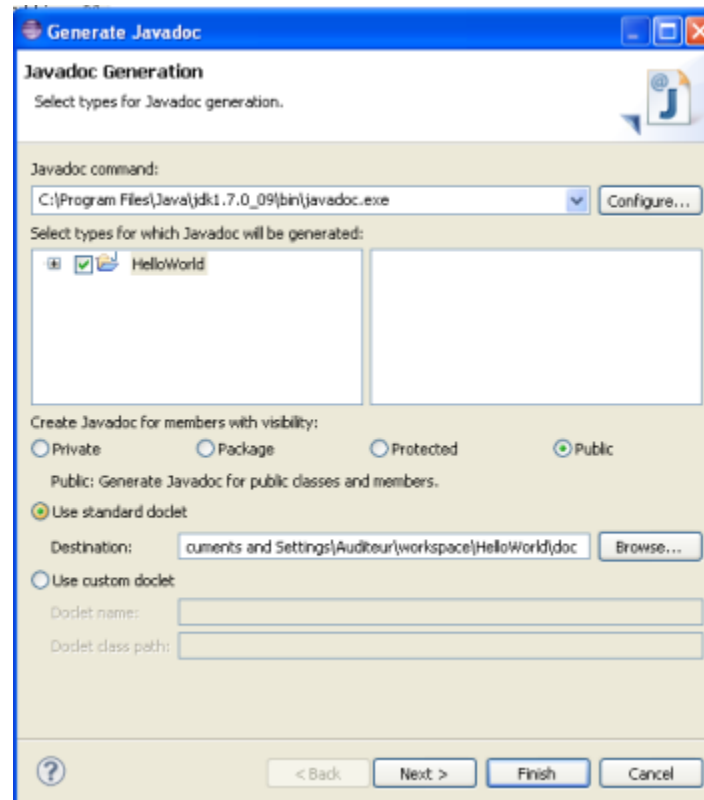


Figure 21: Javadoc

- Open “workspace\HelloWorld\doc\index.html” with your favorite browser.
- Compare with the Javadoc cmd line result

