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

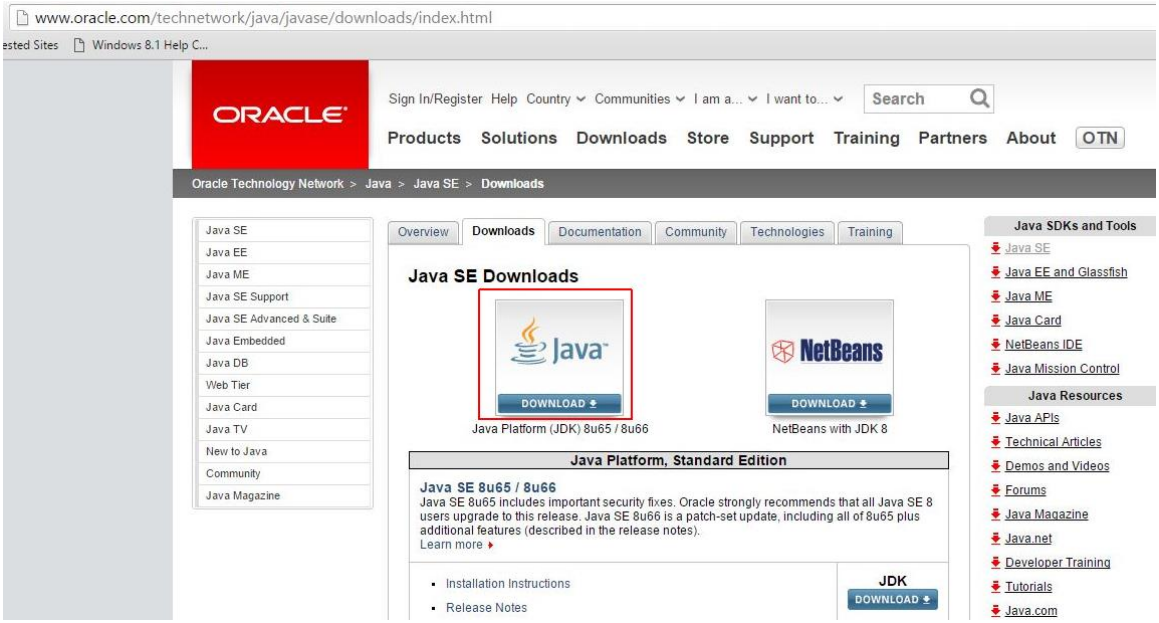
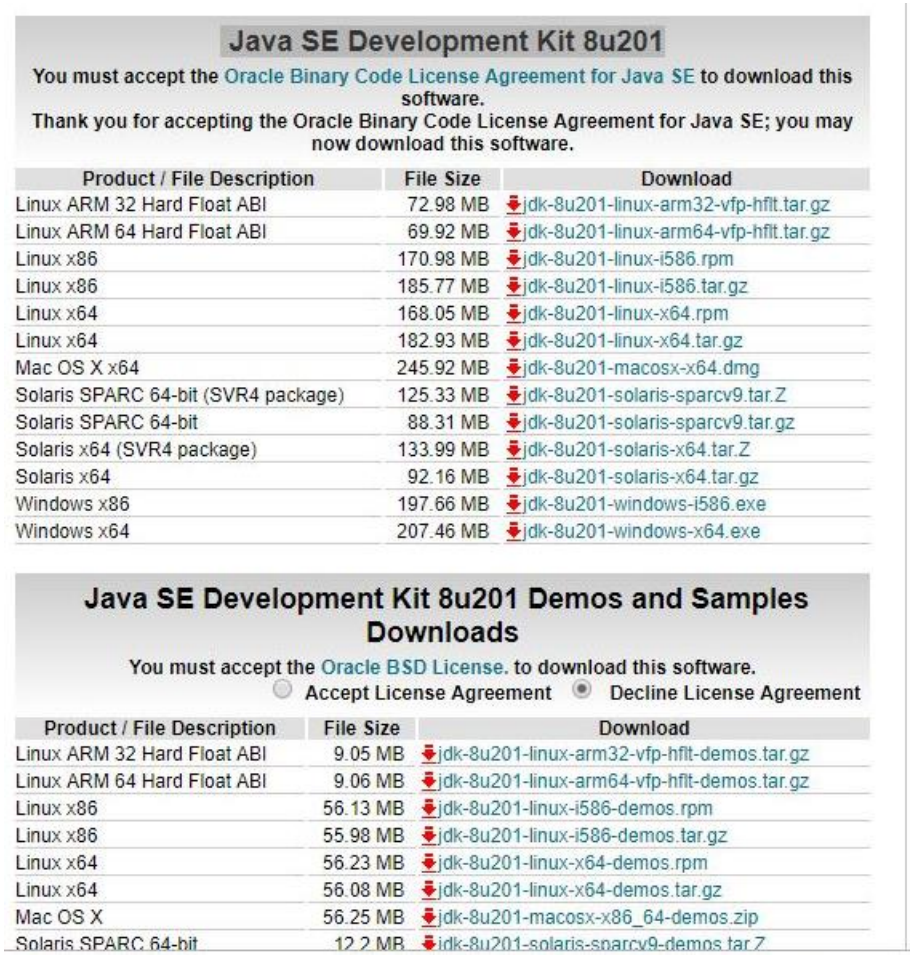


Figure 1 JDK Download

Click on the read square



Java SE Development Kit 8u201

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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

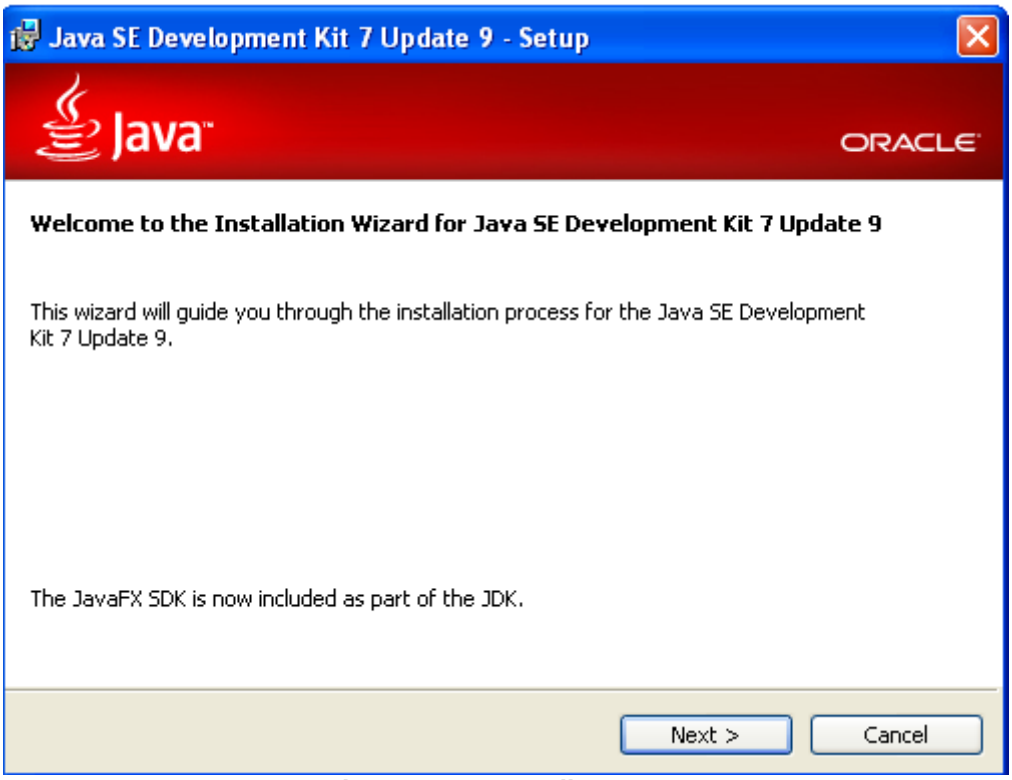


Figure 3 JDK Install Process

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:

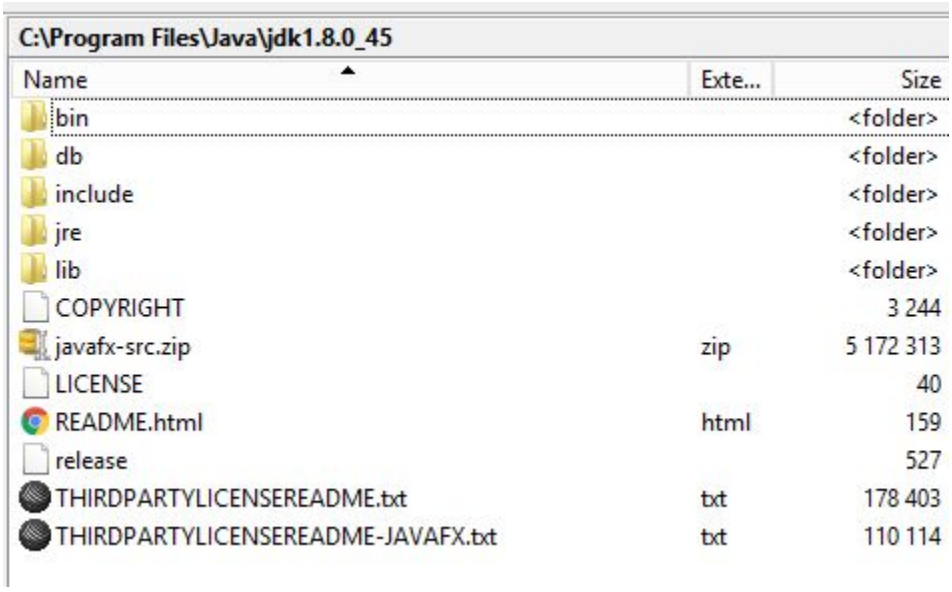


Figure 5 JDK Folder

  - **\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)

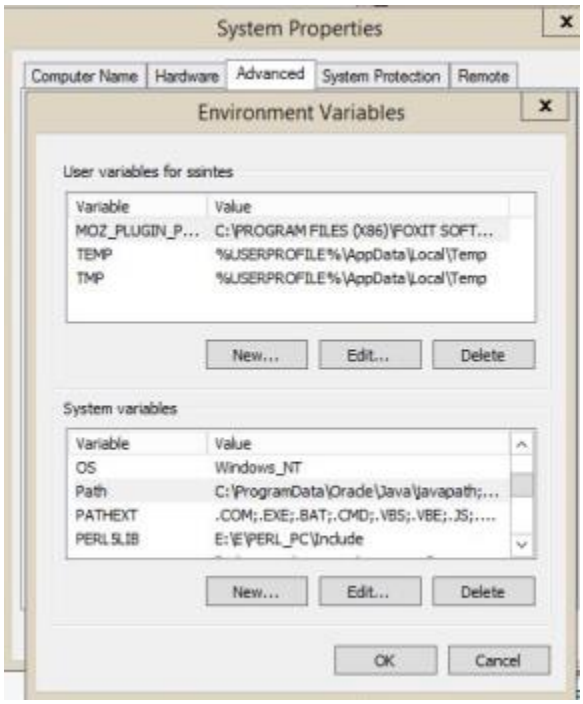


Figure 6:Windows Env Variable

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:

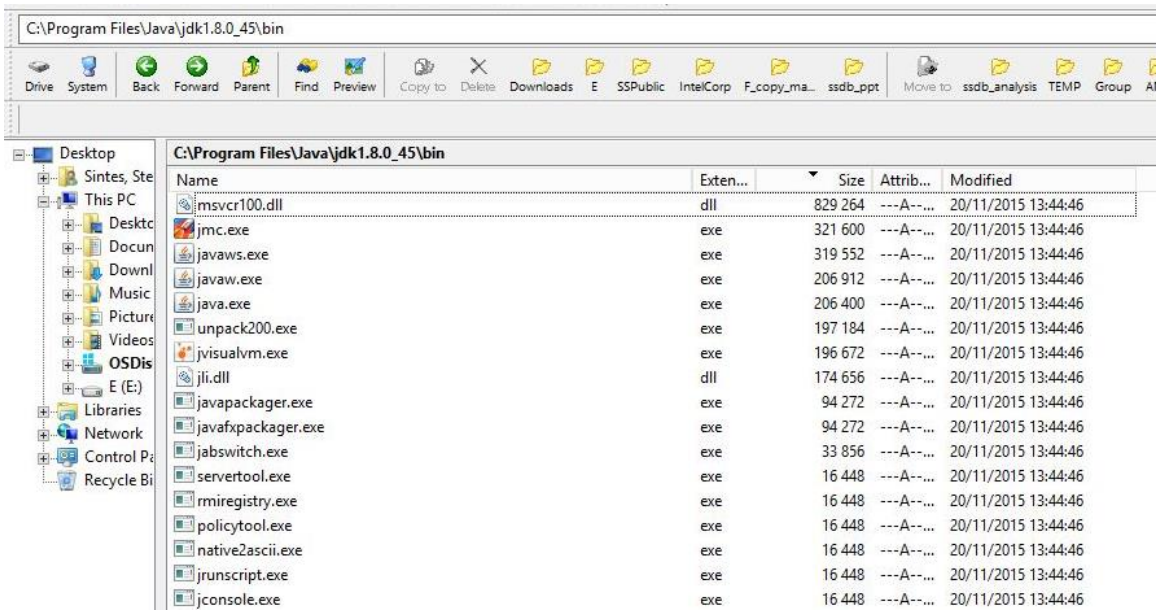


Figure 7: JDK bin folders

  - **"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\az01878>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\az01878>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

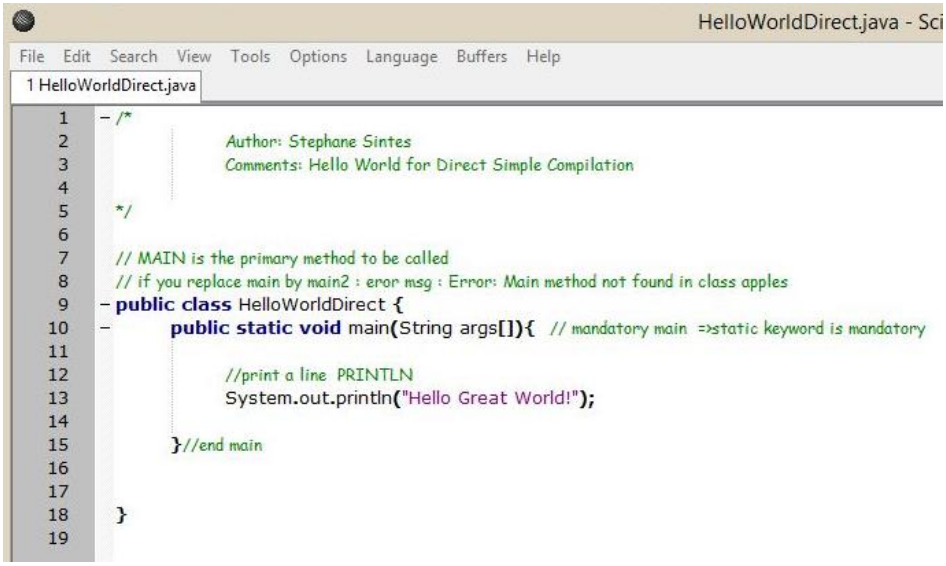


Figure 8 HelloWorldDirect.java

- 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.

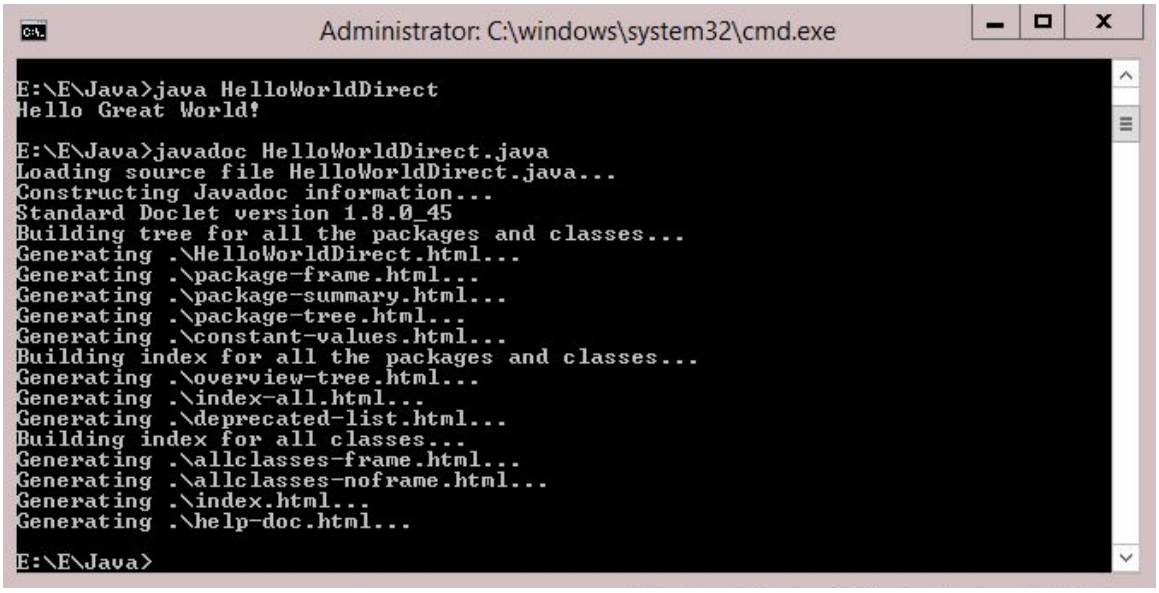


Figure 9 Javadoc in Console

- Create HelloWorldDirectDoc.java a copy of HelloWorldDirect.java

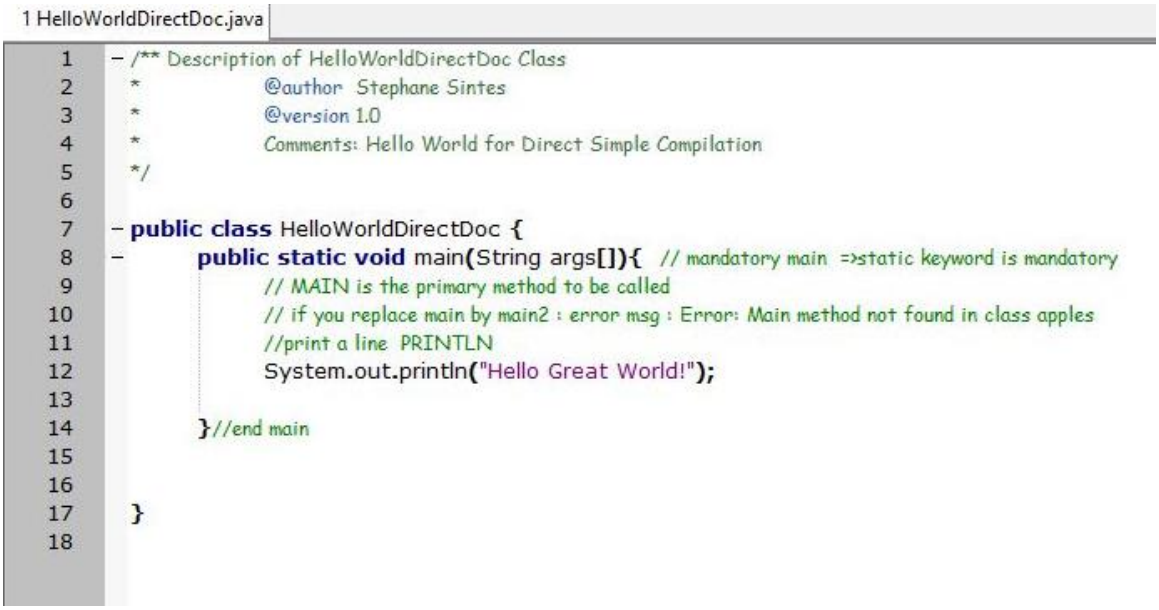


Figure 10 HelloWorldDirectDoc.java

- 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

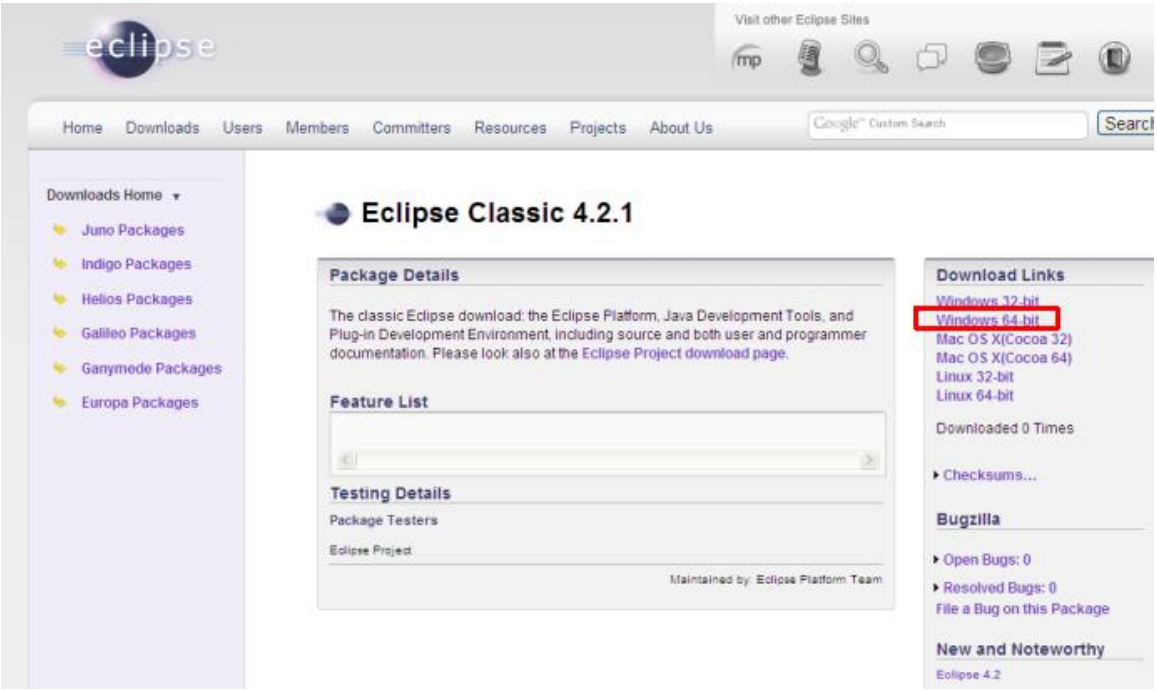
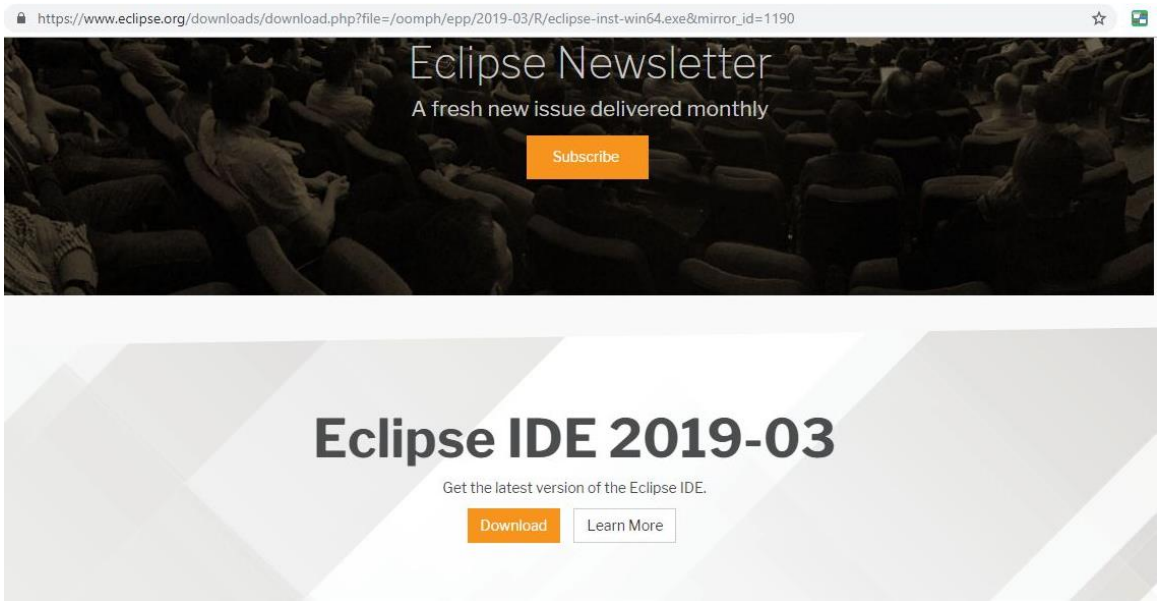


Figure 11 Get Eclipse Installer

- 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

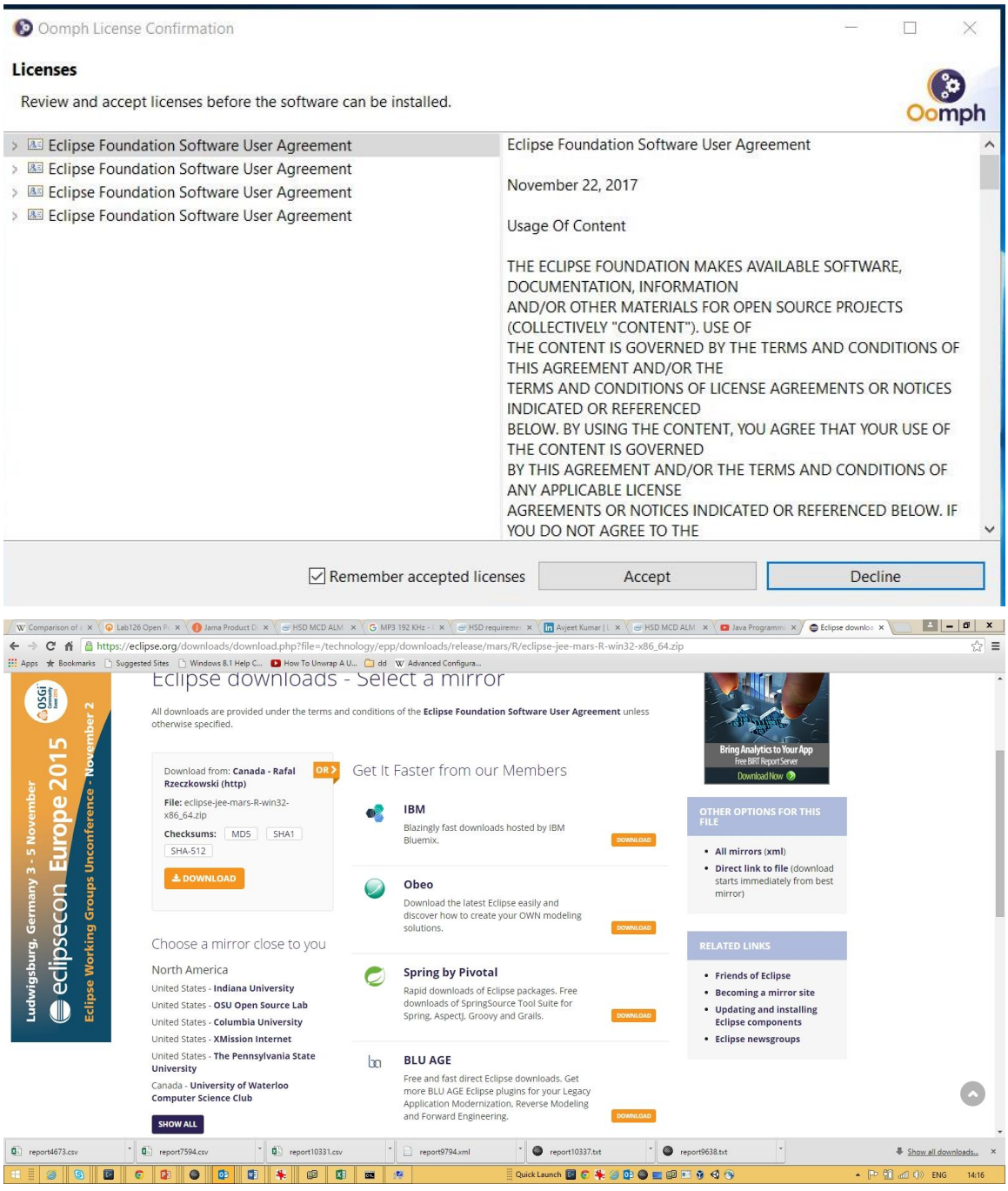


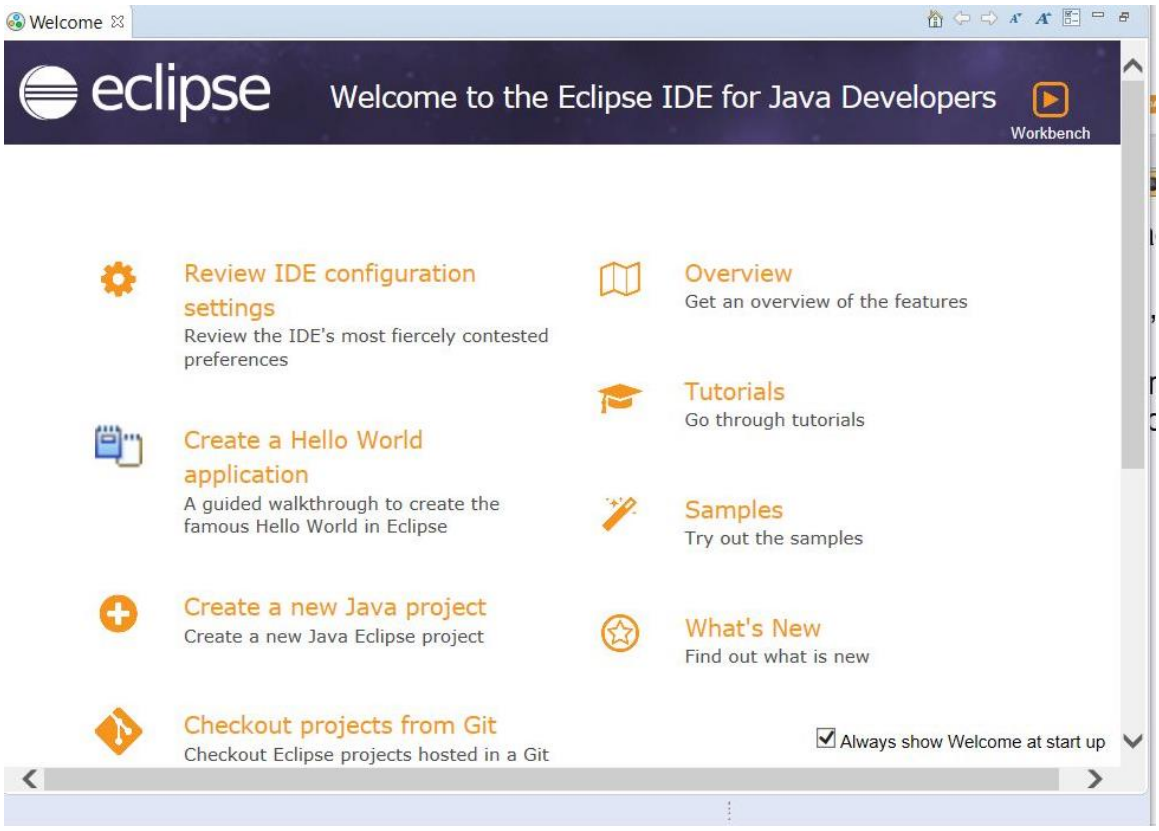
Figure 12 Eclipse Download

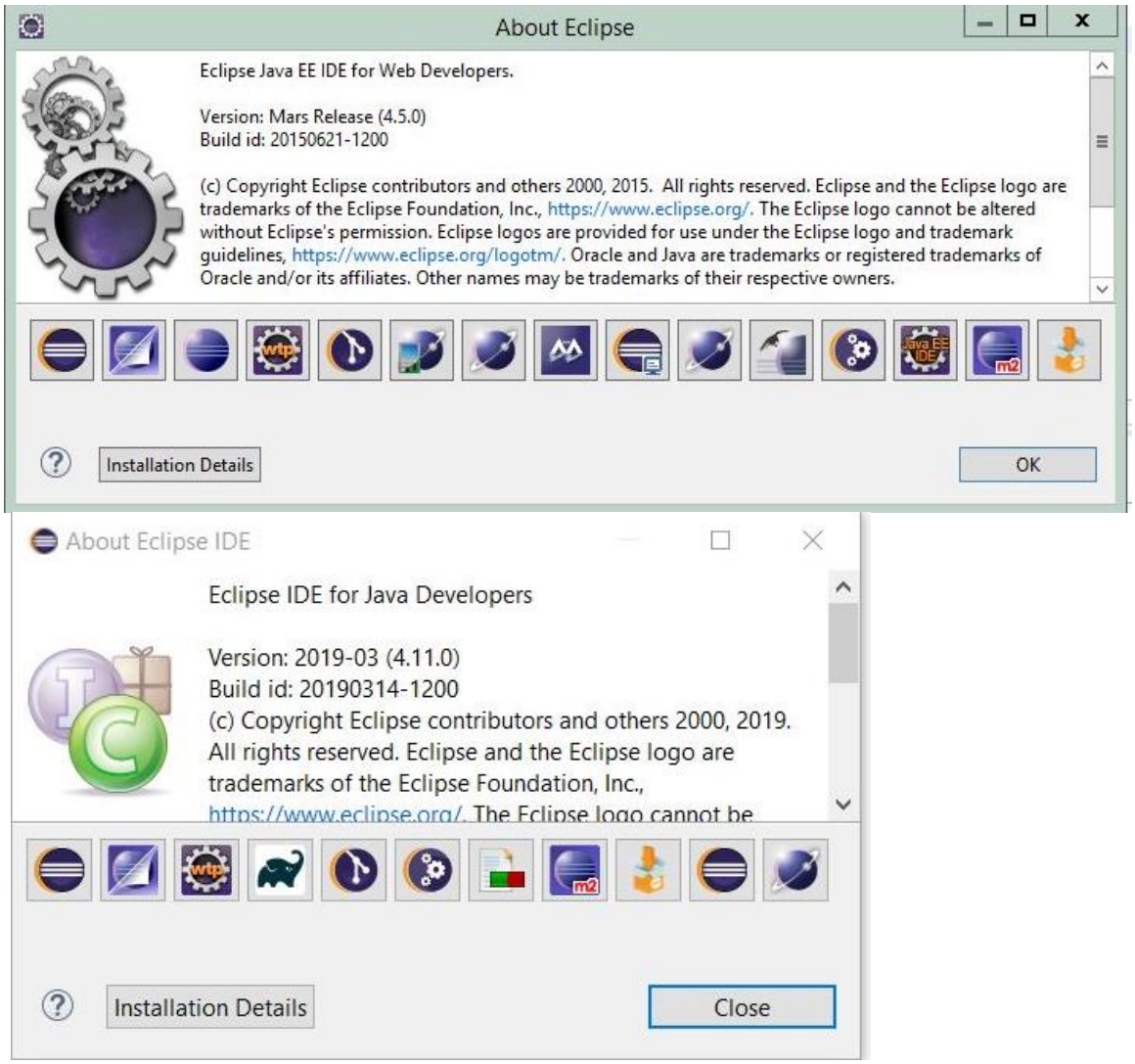
- Launch Eclipse: "c:\Program Files\eclipse\eclipse.exe"
  - Eclipse will ask for a workspace location to store your projects. You can use the location proposed by default or specify a dedicated folder:

Here below different workspace:

C:\Users\ssintes\workspace

C:\Users\az01878\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 HelloWord Project under Eclipse

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

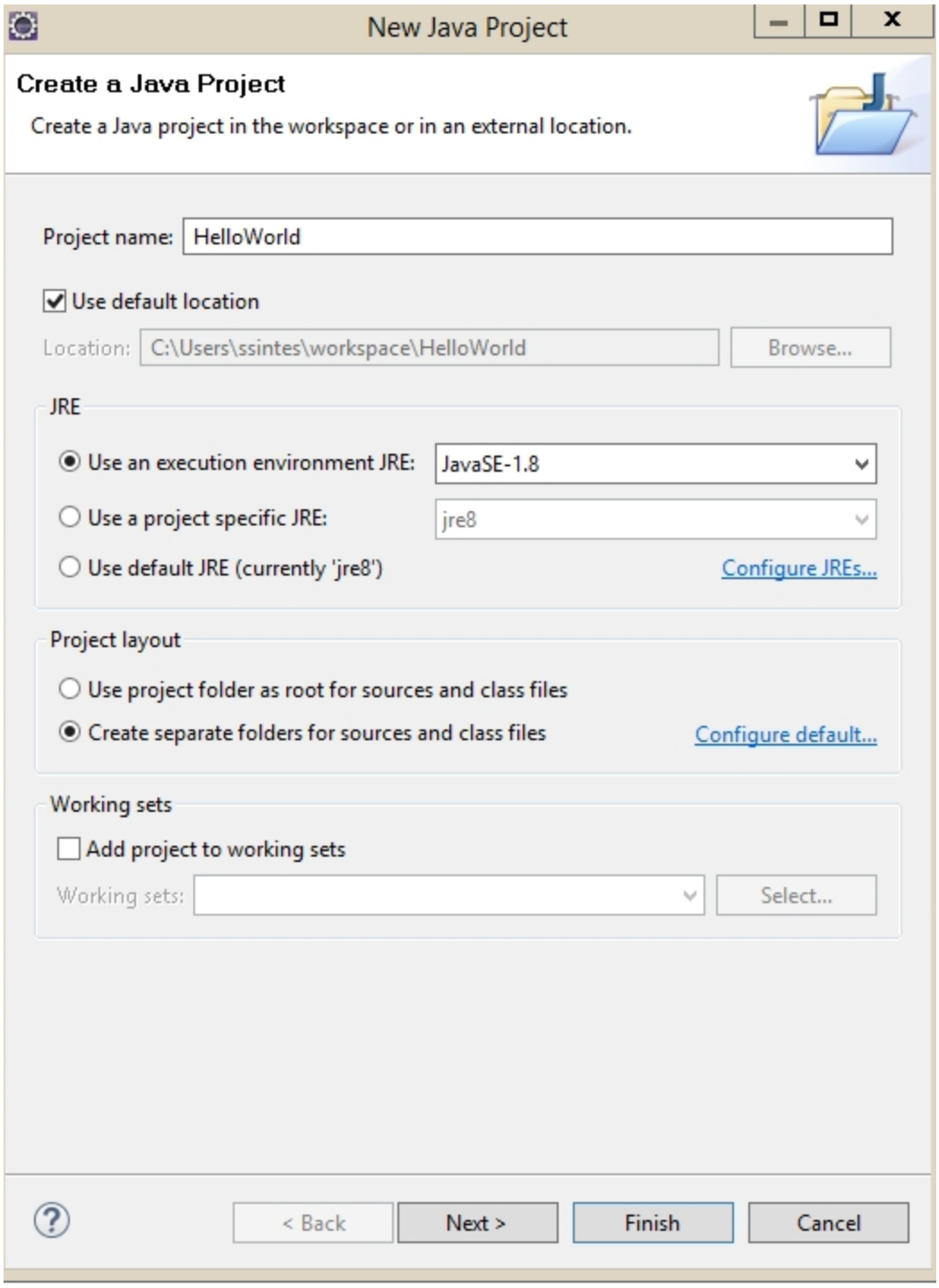


Figure 14 Java Project creation

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

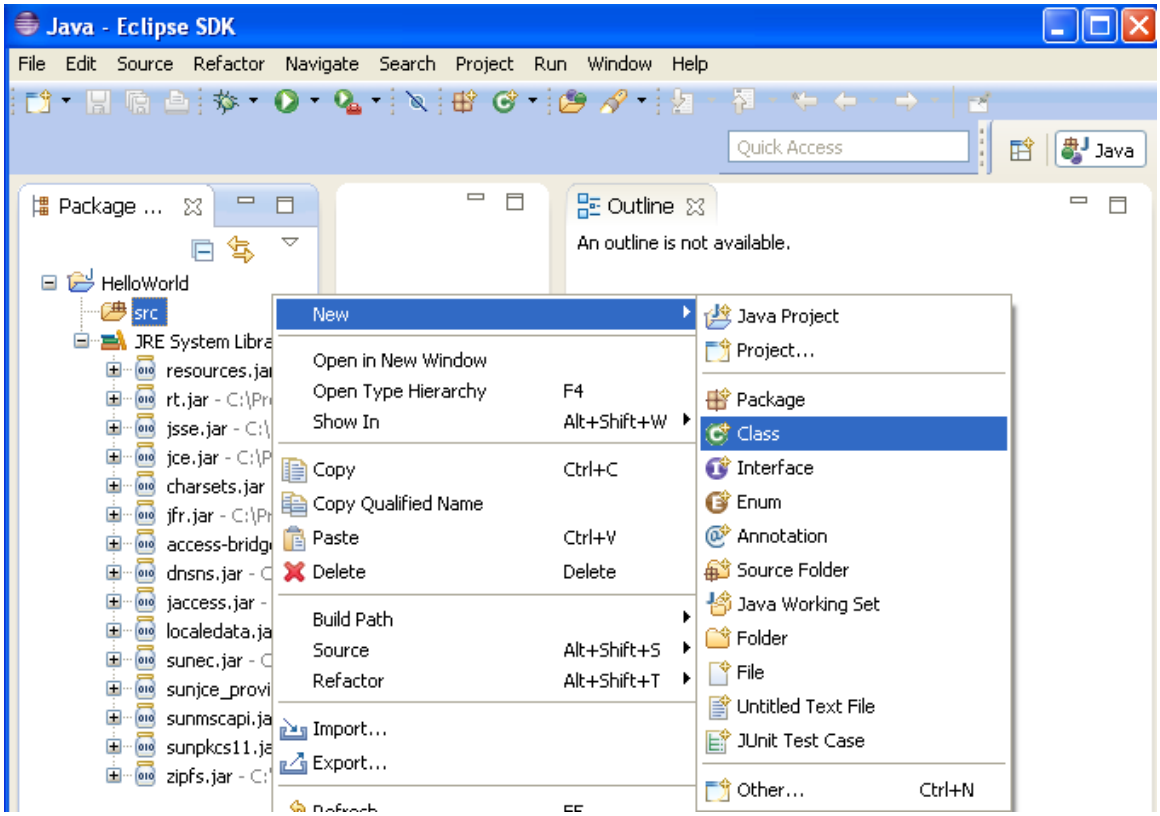


Figure 15 Eclipse New Class

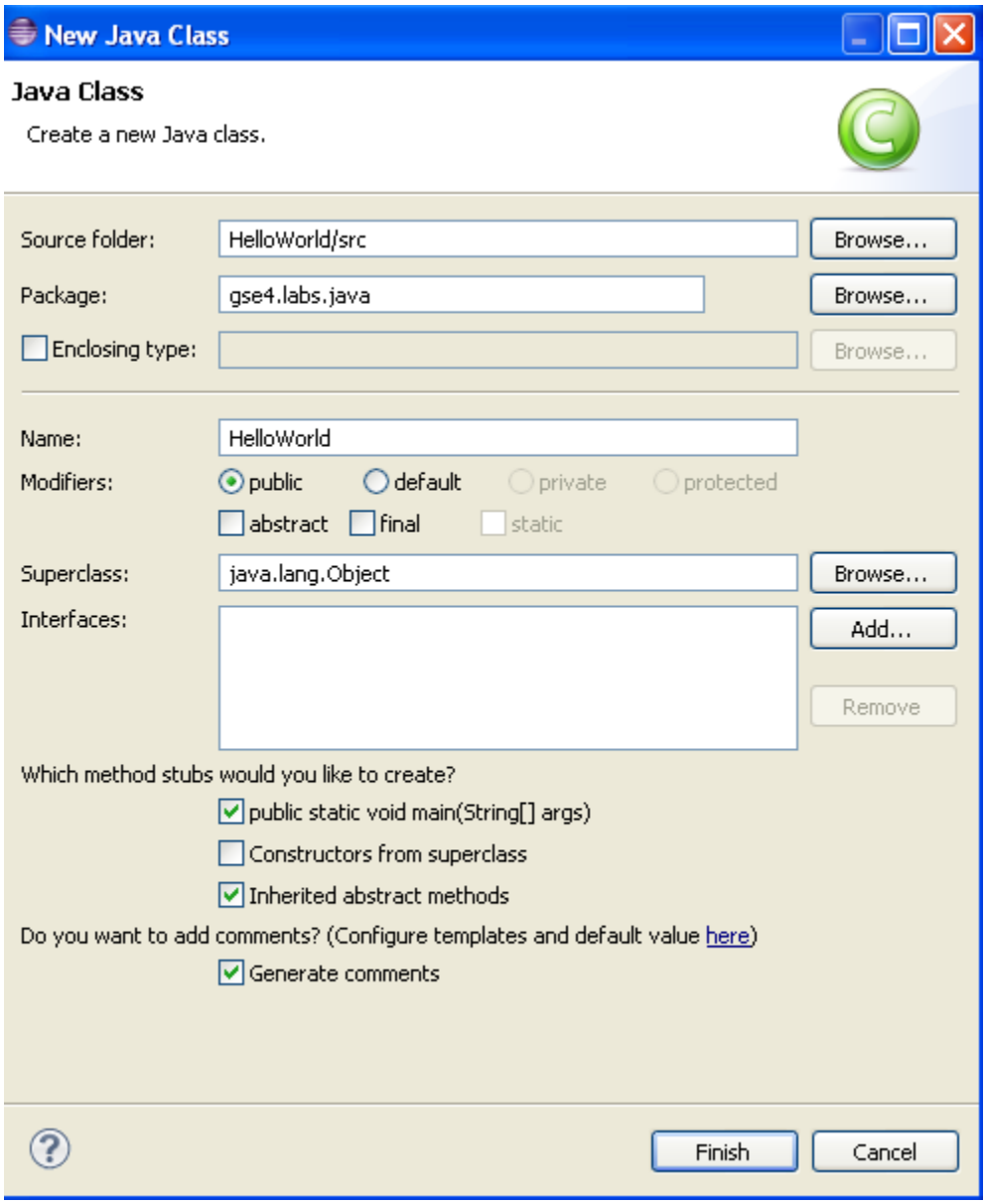
- Fill the following fields and click on Finish
  - Package: “gse4.labs.java” (for example)
  - Name: “HelloWorld” (the name of your class)
  - Request the tool to automatically create the main method
  - Request the tool to automatically add comments
  - 

Figure 16 Eclipse New Class Config

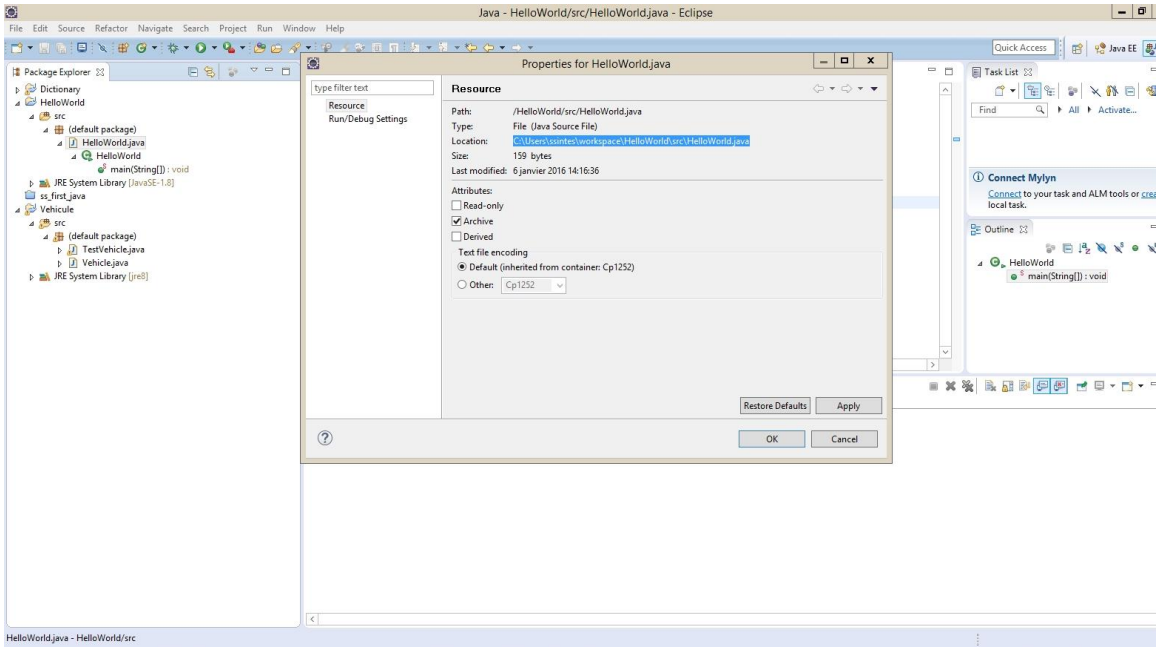


Figure 17 File Properties

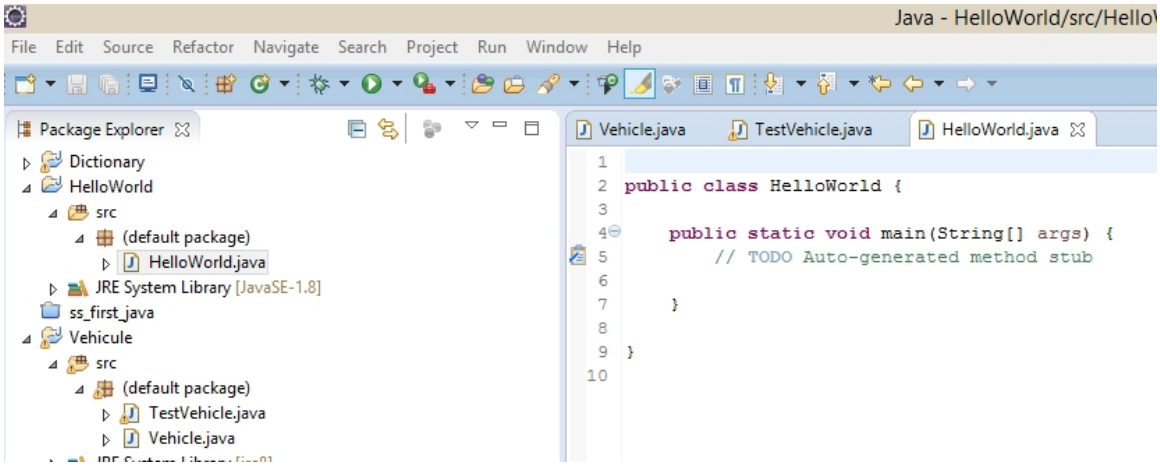


Figure 18 HelloWord.java

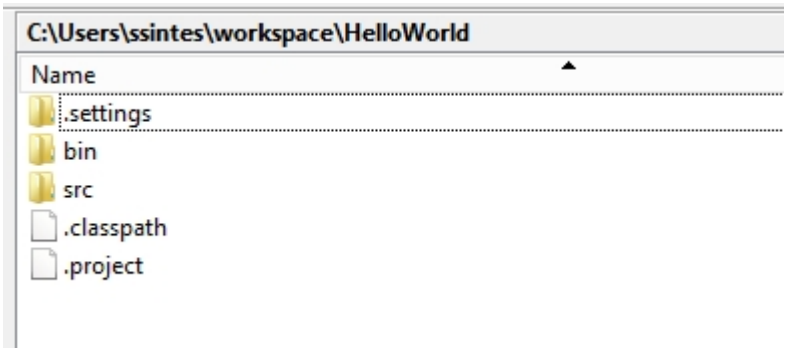


Figure 19 Hello Word Folder Tree

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

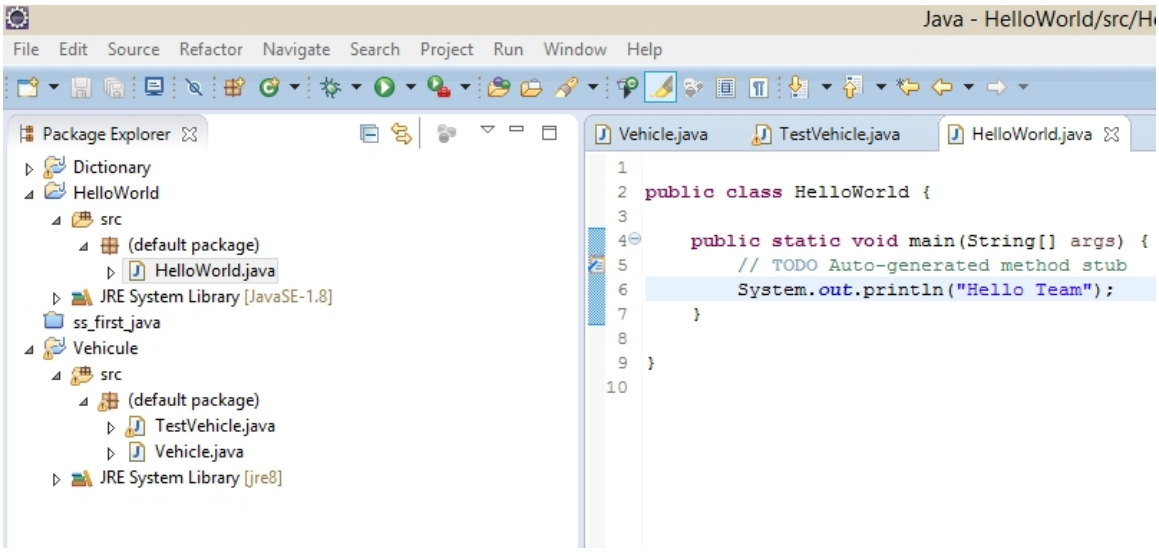


Figure 20 HelloWorld.java to complete

- 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

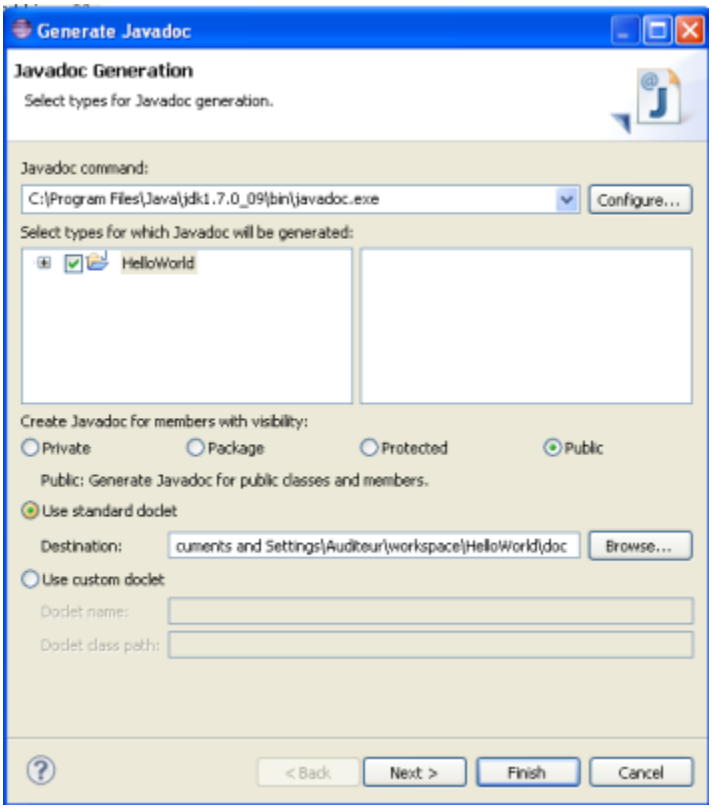


Figure 21: JavaDoc

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