Download and Set Up (Cooperative Runtime)

HJlib provides support for multiple runtimes. In this article, we will discuss how to set up the JDK11 compatible cooperative runtime. Instructions on the download and set up of the thread-blocking runtime is available in another article.

Here are the steps for running HJlib on Java 11 using an IDE:

Step 1: Java 11 Installation

You will also need a Java 11 installation on your machine and have your JAVA_HOME and PATH point to the new installation. Java 11 can be downloaded and installed from the Oracle website.

For e.g., I have the following on my Mac machine's .bash_profile:

```
JAVA11_HOME=/Library/Java/JavaVirtualMachines/jdk11.0.13.jdk/Contents/Home
export JAVA_HOME=${JAVA11_HOME}
export PATH=$JAVA_HOME/bin:$PATH
```

On Windows the environment variables have to be set up differently, refer to this stackoverflow question to see how it can be done.

Step 2: HJlib JAR File

Download the JDK11 compatible HJlib jar file and save it to a local directory.

Step 3: IDE like IntelliJ or Eclipse

HJlib is a simple Java library (jar file) and can be used in any Java project. As such a simple text editor can be used to write programs that use HJlib.

However, we recommend using an IDE like IntelliJ to do the Java development using HJlib in the labs and assignments.

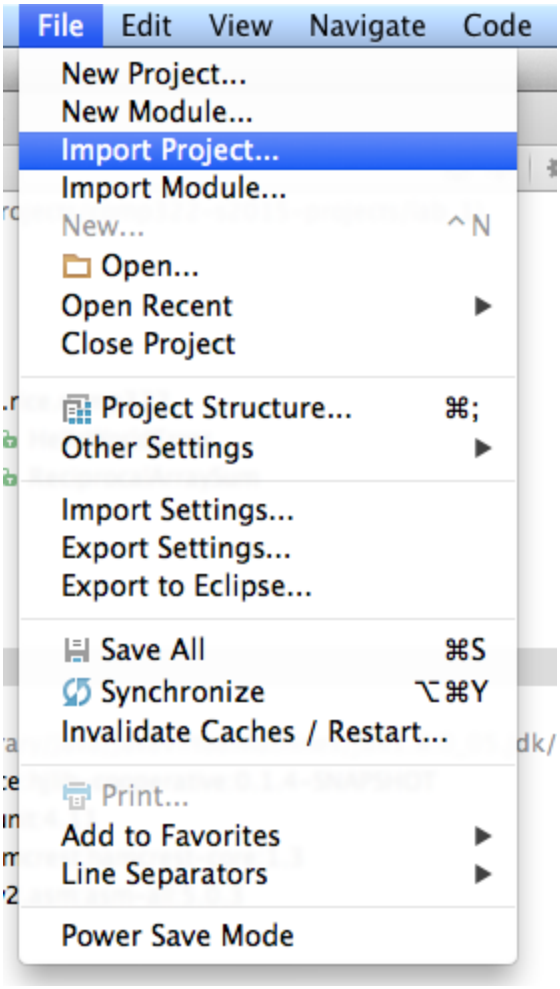
A free version of IntelliJ (Community Edition) can be downloaded and installed from the Jetbrains website.

Step 4: Your first project

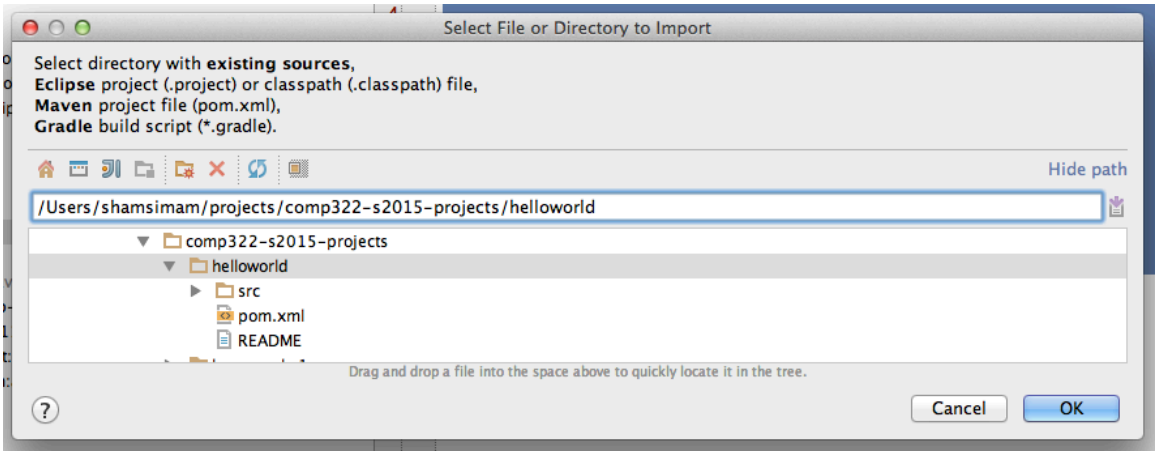
We show how to set up a simple Maven project with a HJlib HelloWorld program in IntelliJ. Similar steps can be followed for other IDEs like Eclipse.

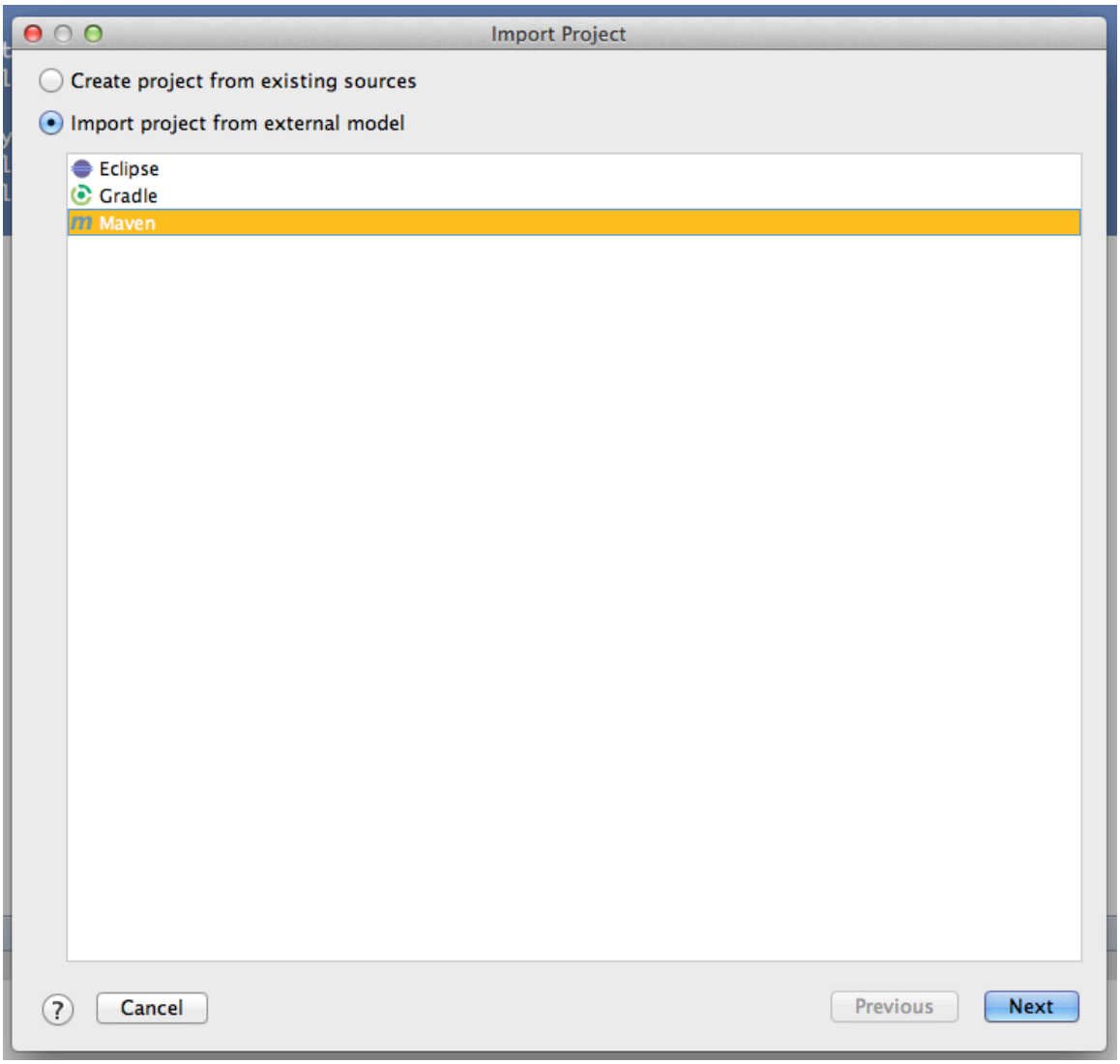
First, download the helloworld.zip file and unzip it into a directory of your choice (e.g. `/Users/shamsimam/projects/comp322-s2015-projects/helloworld`).

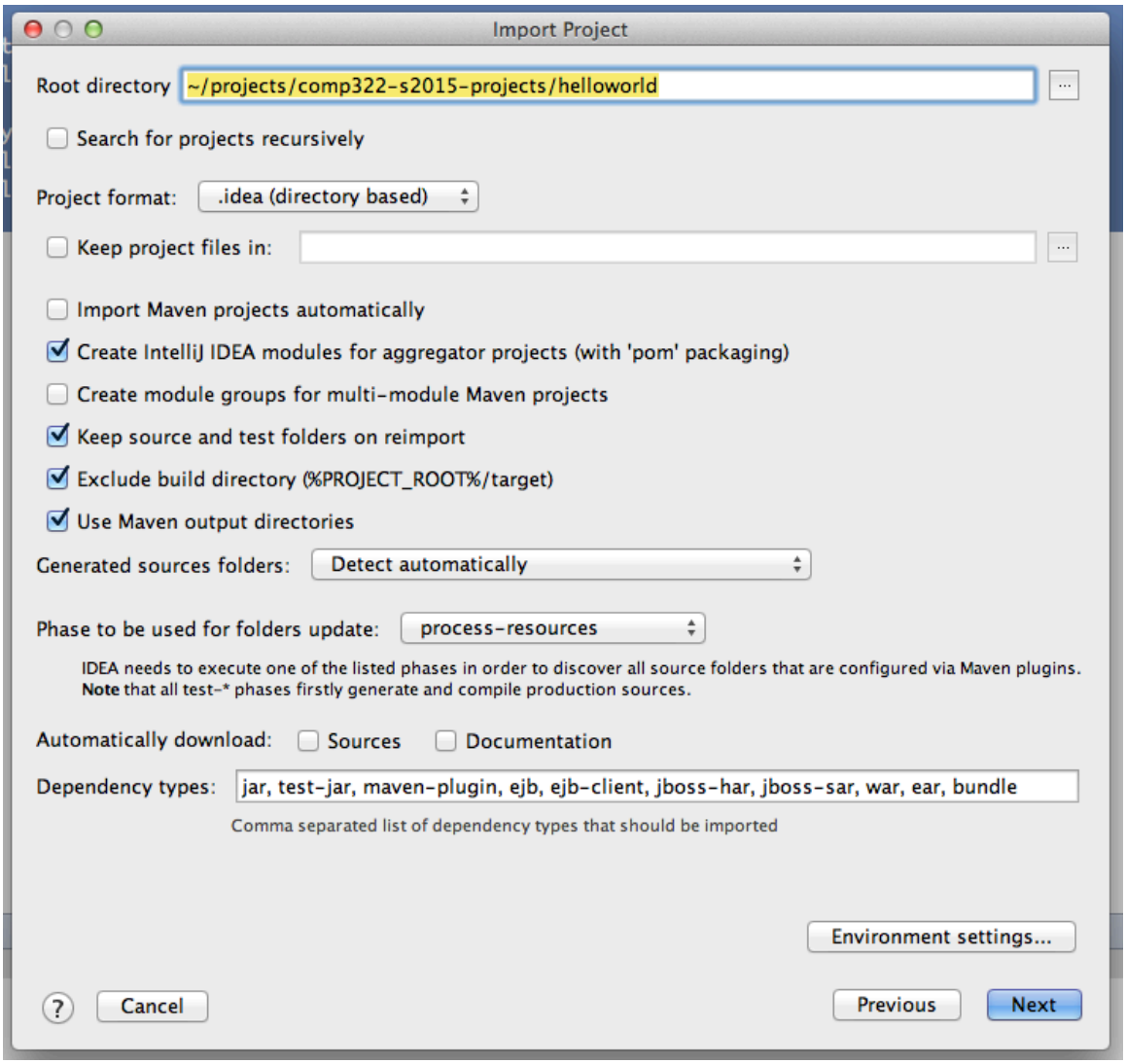
Next, import this project into IntelliJ using the File -> Import Project menu option.

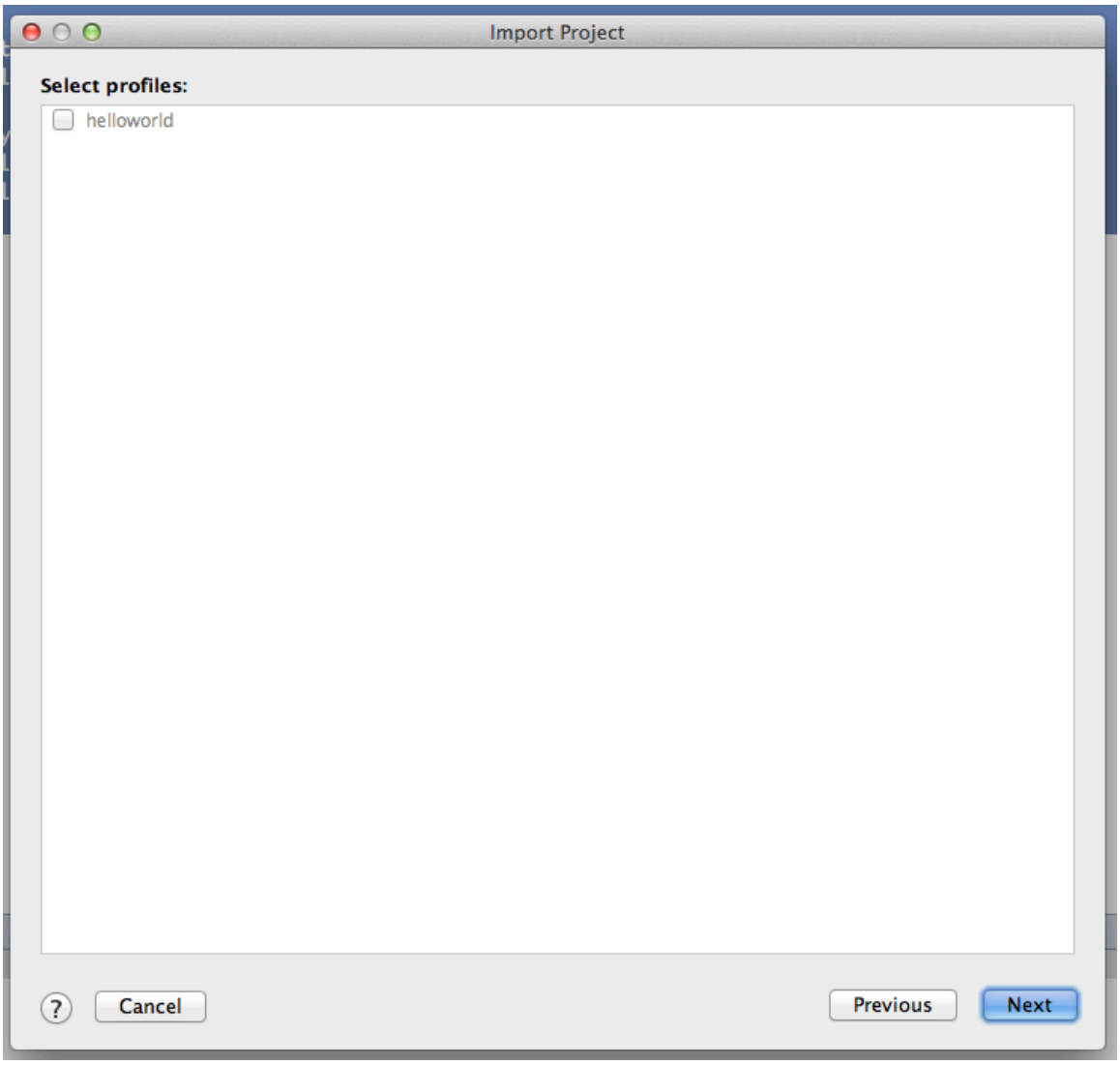


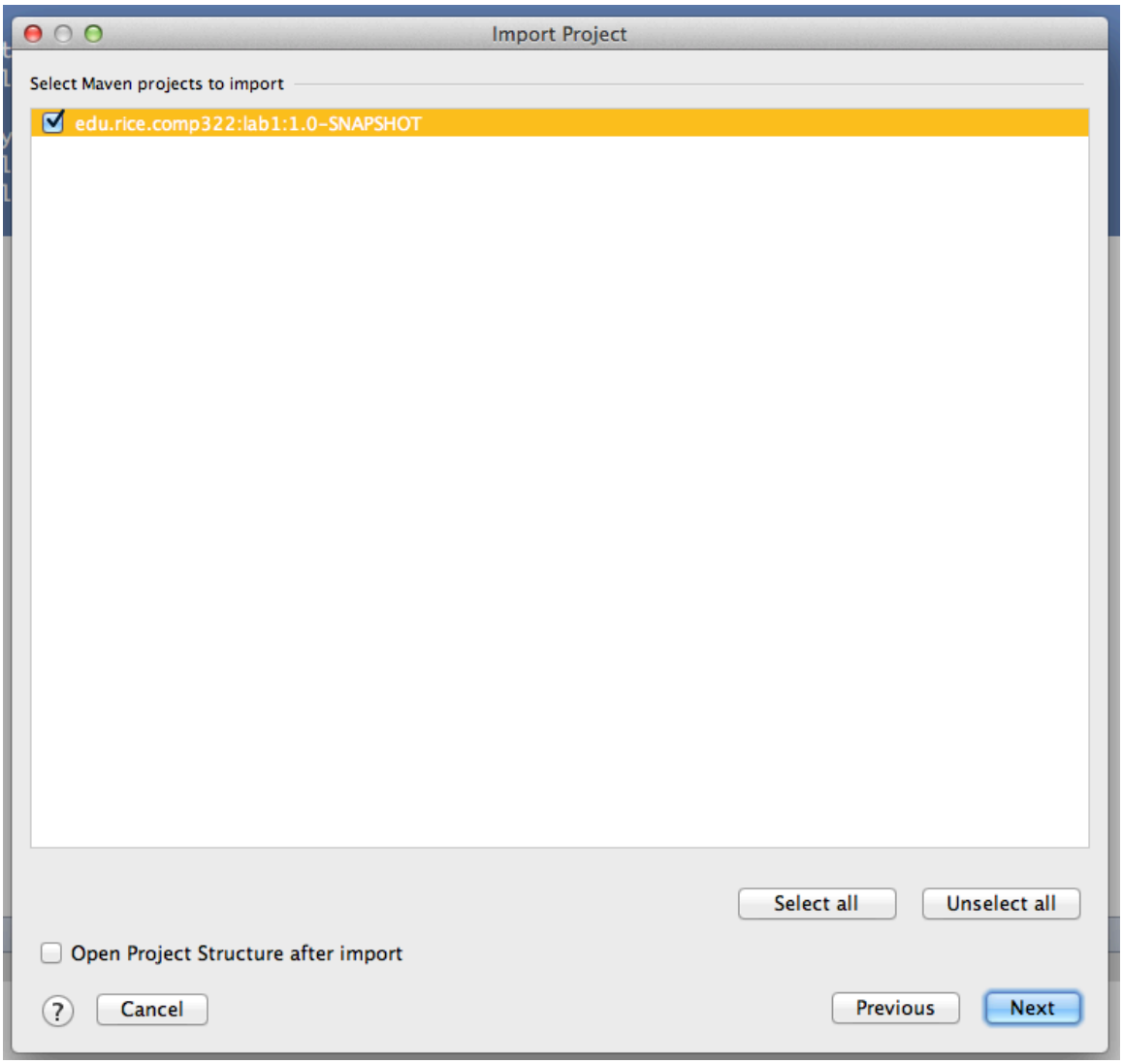
This should show the following series of popups:

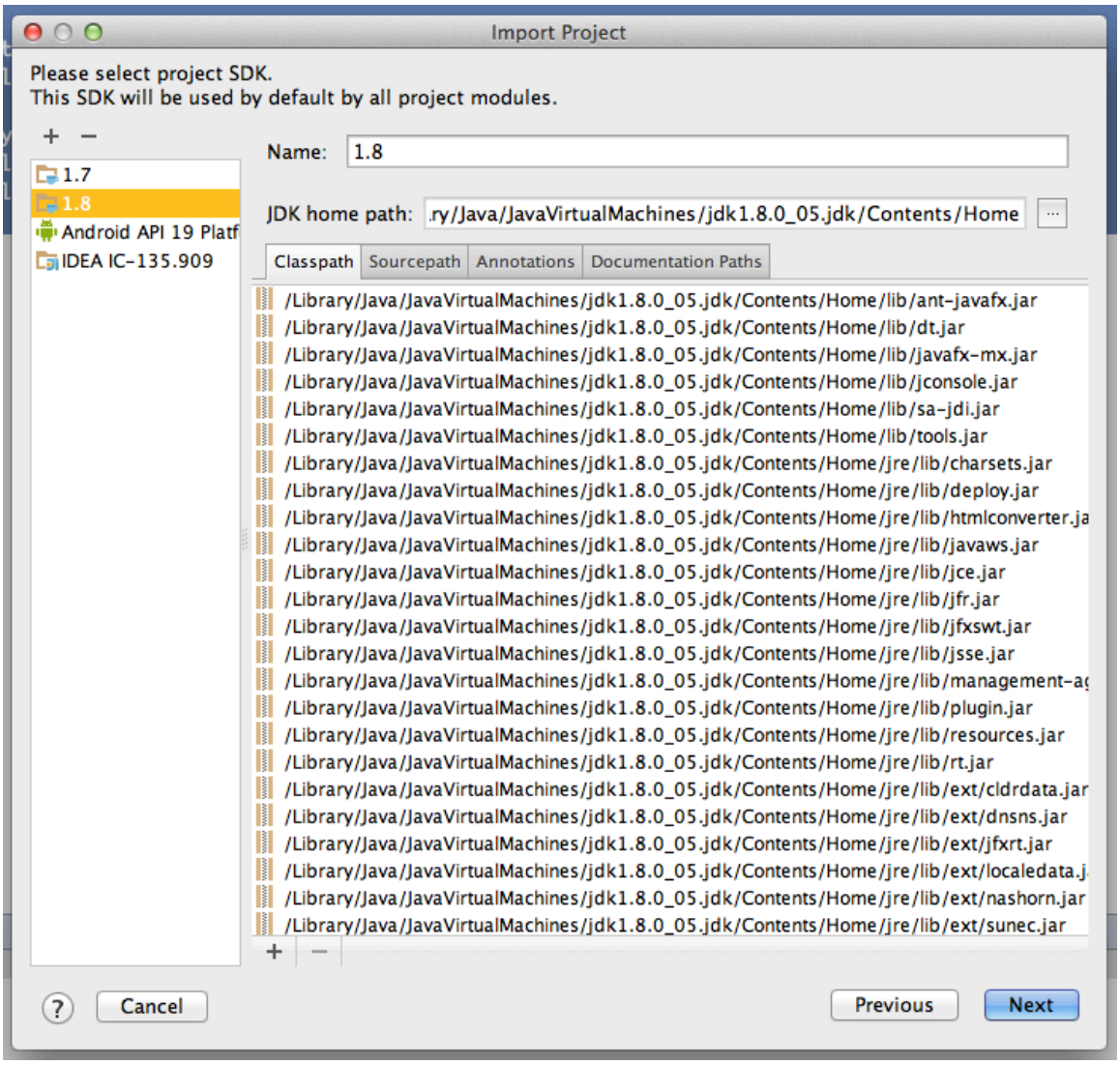


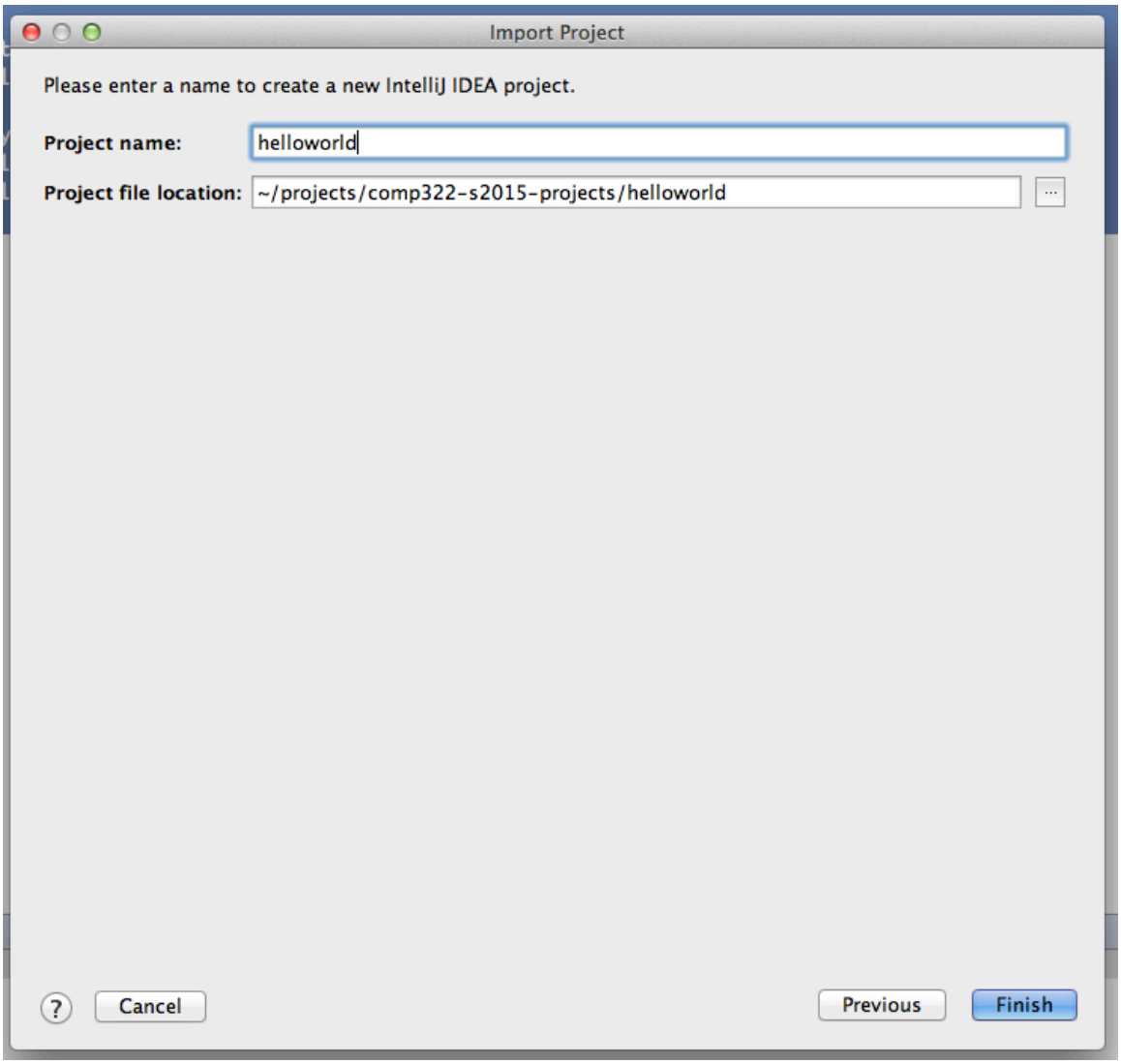

Import Project
Create project from existing sources
Import project from external model
Eclipse
Gradle
Maven
Cancel
Previous
Next


Import Project
Root directory
~/projects/comp322-s2015-projects/helloworld
Search for projects recursively
Project format:
.idea (directory based)
Keep project files in:
Import Maven projects automatically
Create IntelliJ IDEA modules for aggregator projects (with 'pom' packaging)
Create module groups for multi-module Maven projects
Keep source and test folders on reimport
Exclude build directory (%PROJECT_ROOT%/target)
Use Maven output directories
Generated sources folders:
Detect automatically
Phase to be used for folders update:
process-resources
IDEA needs to execute one of the listed phases in order to discover all source folders that are configured via Maven plugins.
Note that all test-* phases firstly generate and compile production sources.
Automatically download:
Sources
Documentation
Dependency types:
jar, test-jar, maven-plugin, ejb, ejb-client, jboss-har, jboss-sar, war, ear, bundle
Comma separated list of dependency types that should be imported
Environment settings...
Cancel
Previous
Next

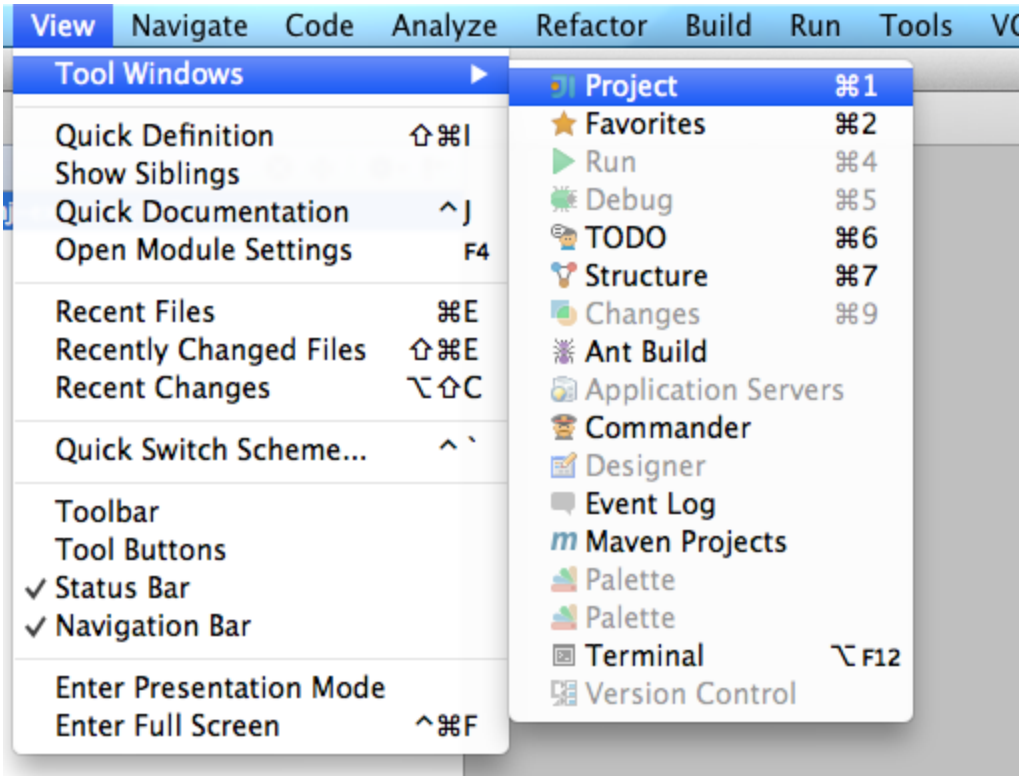

Import Project
Select profiles:
helloworld
Cancel
Previous
Next

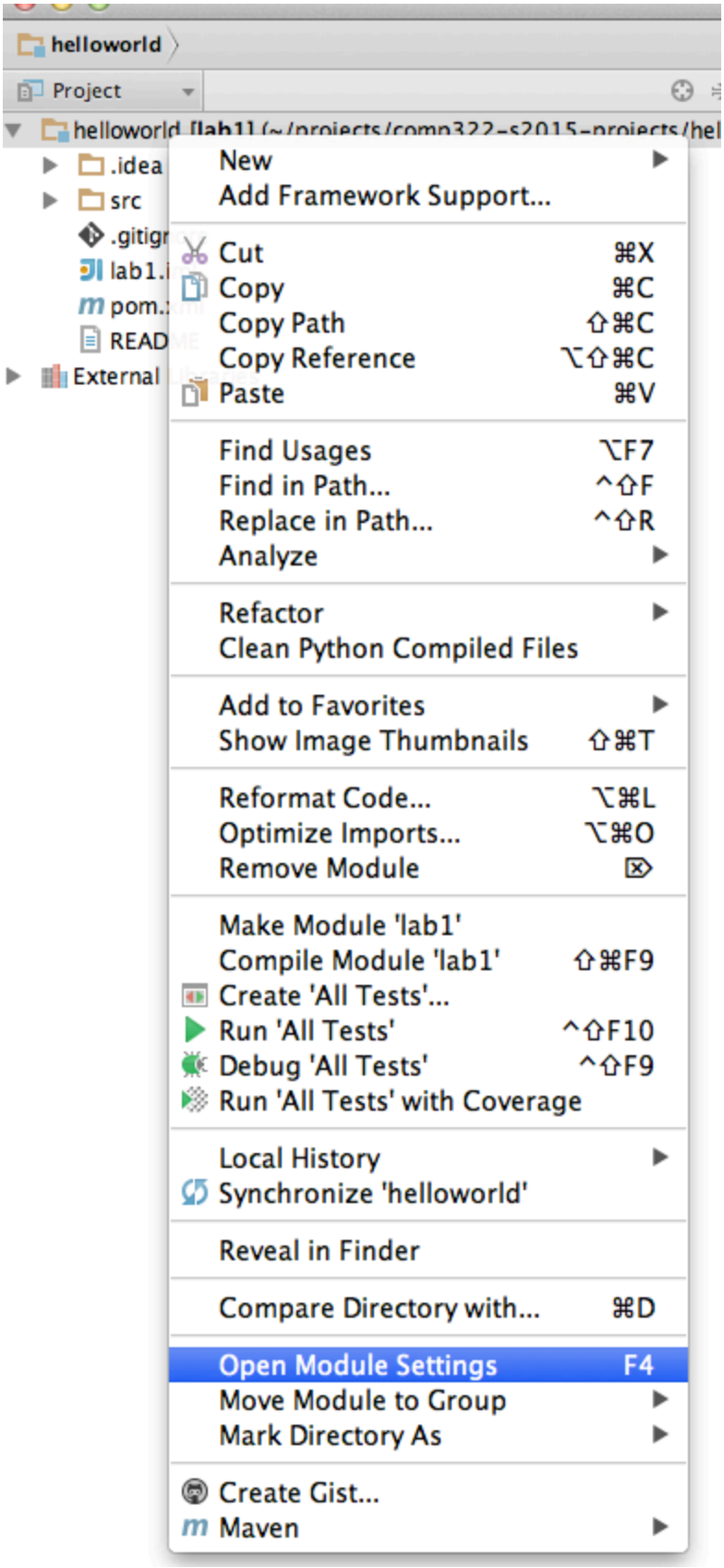

Import Project
Select Maven projects to import
edu.rice.comp322:lab1:1.0-SNAPSHOT
Select all
Unselect all
Open Project Structure after import
Cancel
Previous
Next


Import Project
Please select project SDK.
This SDK will be used by default by all project modules.
1.7
1.8
Android API 19 Platf
IDEA IC-135.909
Name: 1.8
JDK home path: ry/Java/JavaVirtualMachines/jdk1.8.0_05.jdk/Contents/Home
Classpath
Sourcepath
Annotations
Documentation Paths
/Library/Java/JavaVirtualMachines/jdk1.8.0_05.jdk/Contents/Home/lib/ant-javafx.jar
/Library/Java/JavaVirtualMachines/jdk1.8.0_05.jdk/Contents/Home/lib/dt.jar
/Library/Java/JavaVirtualMachines/jdk1.8.0_05.jdk/Contents/Home/lib/javafx-mx.jar
/Library/Java/JavaVirtualMachines/jdk1.8.0_05.jdk/Contents/Home/lib/jconsole.jar
/Library/Java/JavaVirtualMachines/jdk1.8.0_05.jdk/Contents/Home/lib/sa-jdi.jar
/Library/Java/JavaVirtualMachines/jdk1.8.0_05.jdk/Contents/Home/lib/tools.jar
/Library/Java/JavaVirtualMachines/jdk1.8.0_05.jdk/Contents/Home/jre/lib/charsets.jar
/Library/Java/JavaVirtualMachines/jdk1.8.0_05.jdk/Contents/Home/jre/lib/deploy.jar
/Library/Java/JavaVirtualMachines/jdk1.8.0_05.jdk/Contents/Home/jre/lib/htmlconverter.ja
/Library/Java/JavaVirtualMachines/jdk1.8.0_05.jdk/Contents/Home/jre/lib/javaws.jar
/Library/Java/JavaVirtualMachines/jdk1.8.0_05.jdk/Contents/Home/jre/lib/jce.jar
/Library/Java/JavaVirtualMachines/jdk1.8.0_05.jdk/Contents/Home/jre/lib/jfr.jar
/Library/Java/JavaVirtualMachines/jdk1.8.0_05.jdk/Contents/Home/jre/lib/jfxswt.jar
/Library/Java/JavaVirtualMachines/jdk1.8.0_05.jdk/Contents/Home/jre/lib/jsse.jar
/Library/Java/JavaVirtualMachines/jdk1.8.0_05.jdk/Contents/Home/jre/lib/management-ag
/Library/Java/JavaVirtualMachines/jdk1.8.0_05.jdk/Contents/Home/jre/lib/plugin.jar
/Library/Java/JavaVirtualMachines/jdk1.8.0_05.jdk/Contents/Home/jre/lib/resources.jar
/Library/Java/JavaVirtualMachines/jdk1.8.0_05.jdk/Contents/Home/jre/lib/rt.jar
/Library/Java/JavaVirtualMachines/jdk1.8.0_05.jdk/Contents/Home/jre/lib/ext/cldrdata.jar
/Library/Java/JavaVirtualMachines/jdk1.8.0_05.jdk/Contents/Home/jre/lib/ext/dnsns.jar
/Library/Java/JavaVirtualMachines/jdk1.8.0_05.jdk/Contents/Home/jre/lib/ext/jfxrt.jar
/Library/Java/JavaVirtualMachines/jdk1.8.0_05.jdk/Contents/Home/jre/lib/ext/localedata.j
/Library/Java/JavaVirtualMachines/jdk1.8.0_05.jdk/Contents/Home/jre/lib/ext/nashorn.jar
/Library/Java/JavaVirtualMachines/jdk1.8.0_05.jdk/Contents/Home/jre/lib/ext/sunec.jar
Cancel
Previous
Next

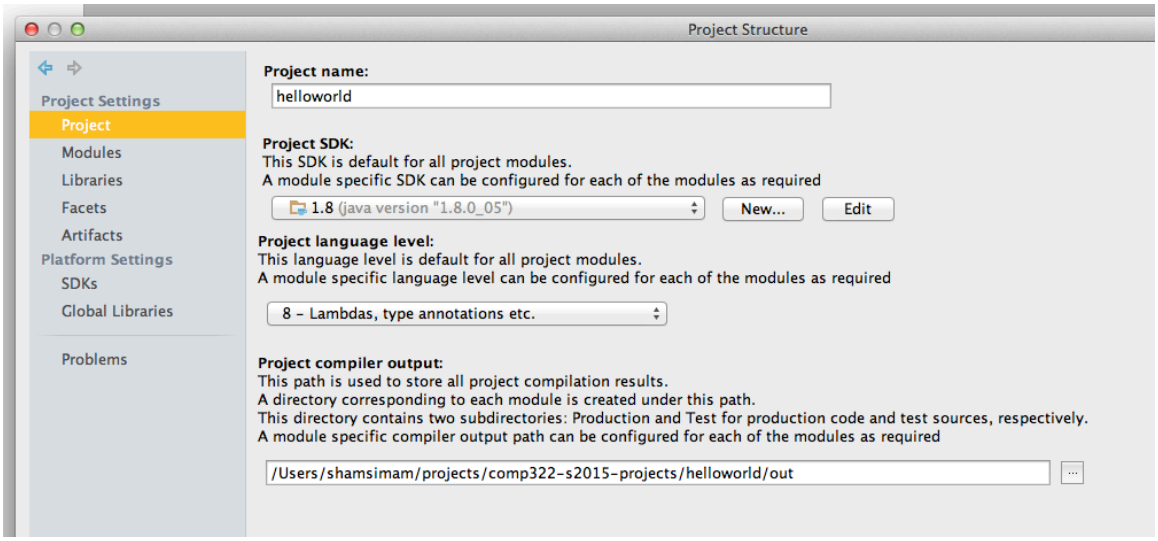


First enable the project view, then right-clicking on the root folder to change the module settings.

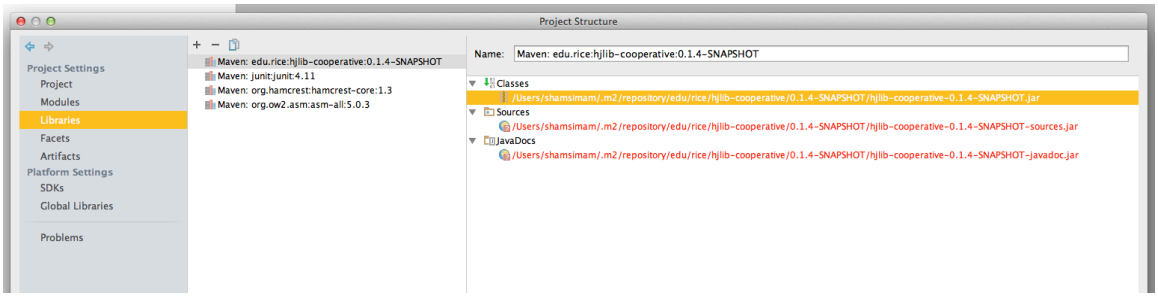

View
Navigate
Code
Analyze
Refactor
Build
Run
Tools
Tool Windows
Quick Definition ⇧⌘I
Show Siblings
Quick Documentation ^J
Open Module Settings F4
Recent Files ⌘E
Recently Changed Files ⇧⌘E
Recent Changes ⌥⇧C
Quick Switch Scheme... ^`
Toolbar
Tool Buttons
✓ Status Bar
✓ Navigation Bar
Enter Presentation Mode
Enter Full Screen ^⌘F
Project ⌘1
Favorites ⌘2
Run ⌘4
Debug ⌘5
TODO ⌘6
Structure ⌘7
Changes ⌘9
Ant Build
Application Servers
Commander
Designer
Event Log
Maven Projects
Palette
Palette
Terminal ⌥F12
Version Control



We will be using Java 8 lambdas while developing with HJlib, so we need to ensure the language level settings in the project:

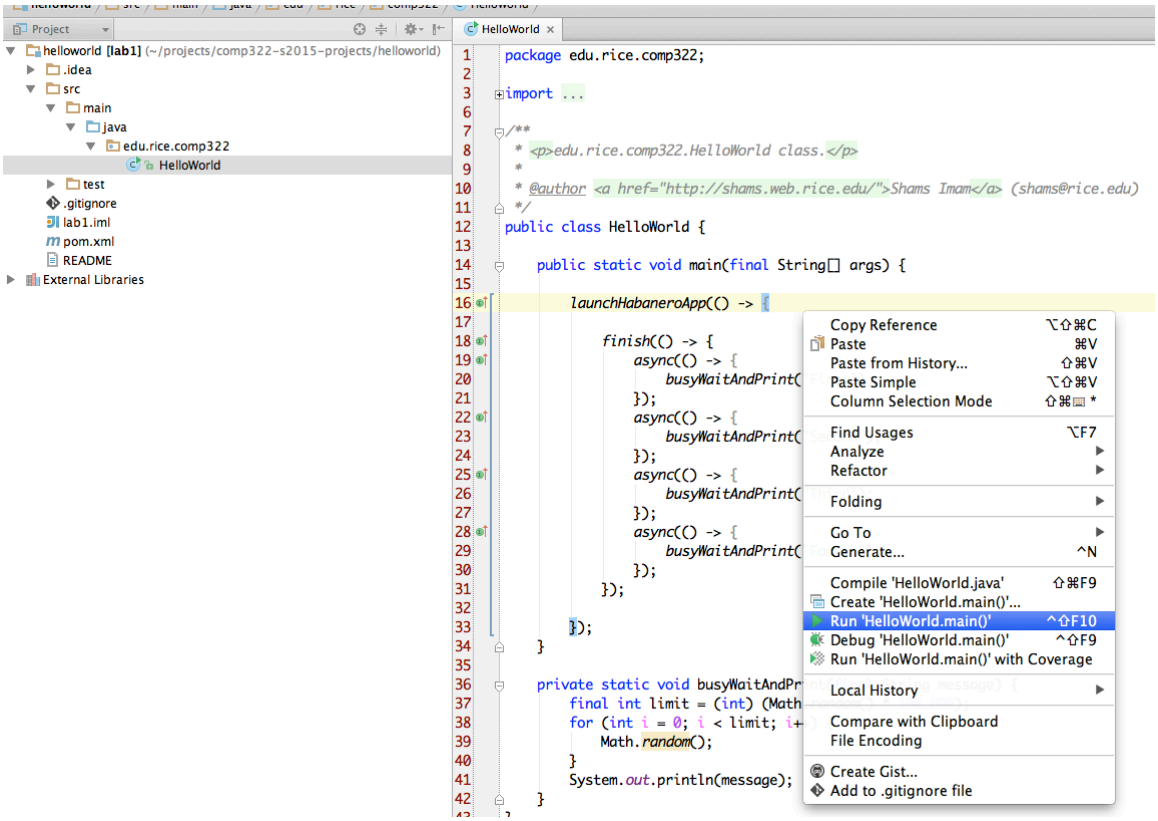


Notice, the library dependencies have already been resolved thanks to maven:

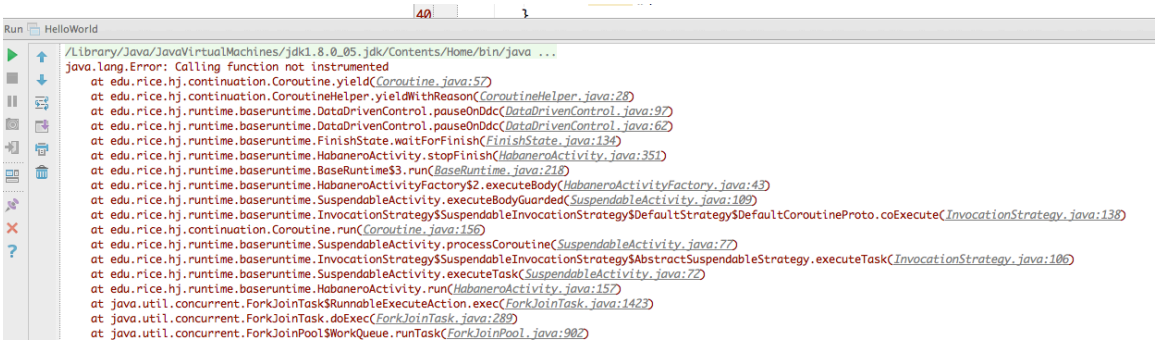


You will need to note the path of the HJlib jar file as we will need it to be able to run the `HelloWorld.java` program from IntelliJ.
On my machine it is at `/Users/shamsimam/.m2/repository/edu/rice/hjlib-cooperative/0.1.4-SNAPSHOT/hjlib-cooperative-0.1.4-SNAPSHOT.jar`

Open the HelloWorld.java file in the editor and attempt to run it by right clicking on it and choosing the Run option:



Since we are running `HelloWorld.java` without configuring the javaagent option, it is likely to intermittently fail with an error as follows: `java.lang.Error: Calling function not instrumented`



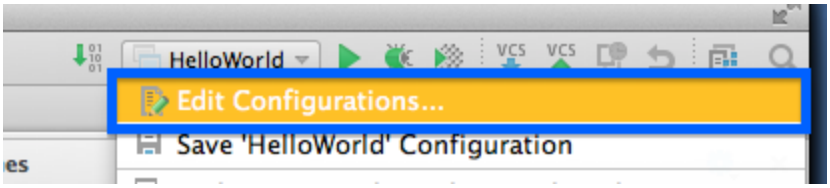
Or the following error:

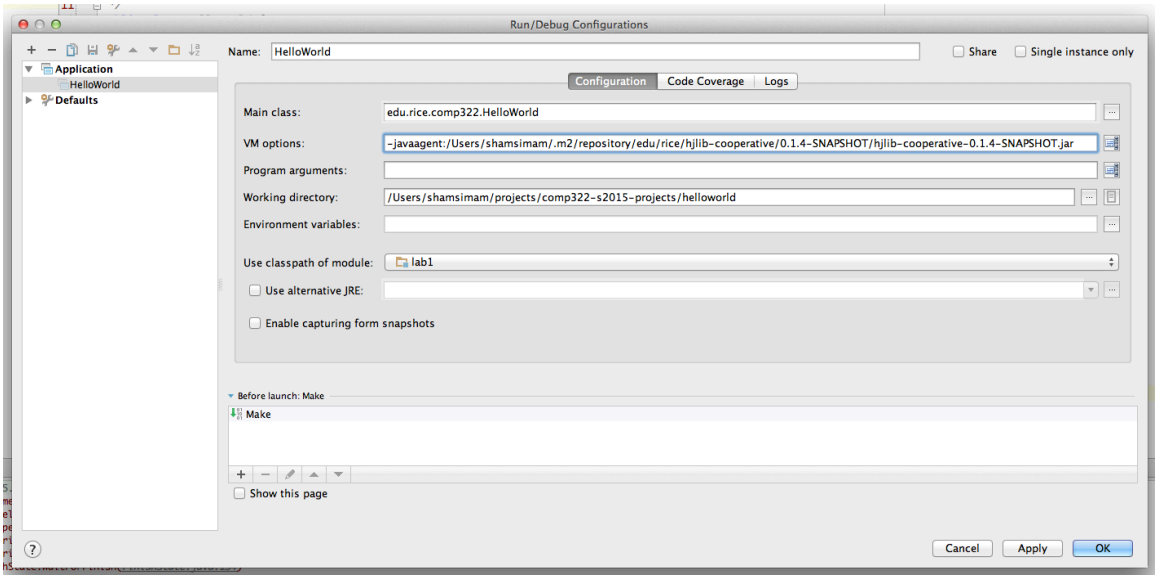
```
Error occurred during initialization of VM
agent library failed to init: instrument
```

To fix this error, we need to correct set up the javagent JVM option before attempting to run `HelloWorld.java`.
Java agents provide services that allow Java programming language agents to instrument programs running on the JVM. To run HJlib programs under the cooperative runtime we need to configure the JVM to use agents available in the HJlib jar. An agent is started by adding this option to the command-line:

> ***-javaagent:***jarpath[=options]

We need to configure this in IntelliJ to be able to successfully run HJlib programs. Below is an image of what the configuration looks like after editing the run configuration:





Now we can run the program by clicking on the green play button.
Running the file on my machine produces the following output for example: