Exercise 7

Making our service into a single JAR microservice with a Redis backend

Prior Knowledge
Exercise 6b

Objectives
Looking at deployment models for Services
NoSQL backends

Software Requirements
(see separate document for installation of these)

- Java Development Kit 8
- Gradle build system
- Jetty and Jersey
- Eclipse Luna and Buildship
- curl
- Google Chrome/Chromium plus Chrome Advanced REST extension
- Redis

Overview
We have built a reasonable RESTful service, but which can be exported as a WAR and run. It has no real backend as it is based on an in-memory singleton. However, we would like to create a simpler deployment model based on a single JAR, and we would like a reasonable backend database to house the results.

Steps

1. You can do this to your existing POResource project. However, because I'd like us to add *redis* support, I propose that we start from my completed version of Exercise 6.
   You can checkout this version by doing the following command-line magic.

   mkdir ~/ex7
   cd ~/ex7
   git clone https://github.com/pzfreo/POResourceMS.git
   cd POResourceMS

2. We would like to change the build to support creating a single JAR file. We also need to create a new class that supports this.

3. First, lets add some new parts to the build.gradle file.
   Hint: You could load the project into Eclipse, but I propose that we get the gradle build improved first, so I would suggest using a Linux editor like Atom, gedit or nano. This means that when we load the project into Eclipse, it will be aware of the new plugins.

   In the `plugins {}` section, add the following additional line:

   ```
   plugins {
     id 'com.github.johnrengelman.shadow' version '1.2.3'
   }
   ```

   This is a plugin that mirrors the shadow plugin for maven. This packages all the code required including all dependencies into a single JAR file. The result is a JAR file that has no external dependencies.

4. Having defined the plugin (using the gradle plugin extension mechanism) we now need to use it:
   Add the line to the main section of the gradle build (under the other similar lines)

   ```
   apply plugin: 'com.github.johnrengelman.shadow'
   ```

5. We also need the *application* plugin, which works with shadow to build self-contained executable JARs (see https://en.wikipedia.org/wiki/JAR_(file_format)#Executable_JAR_files)

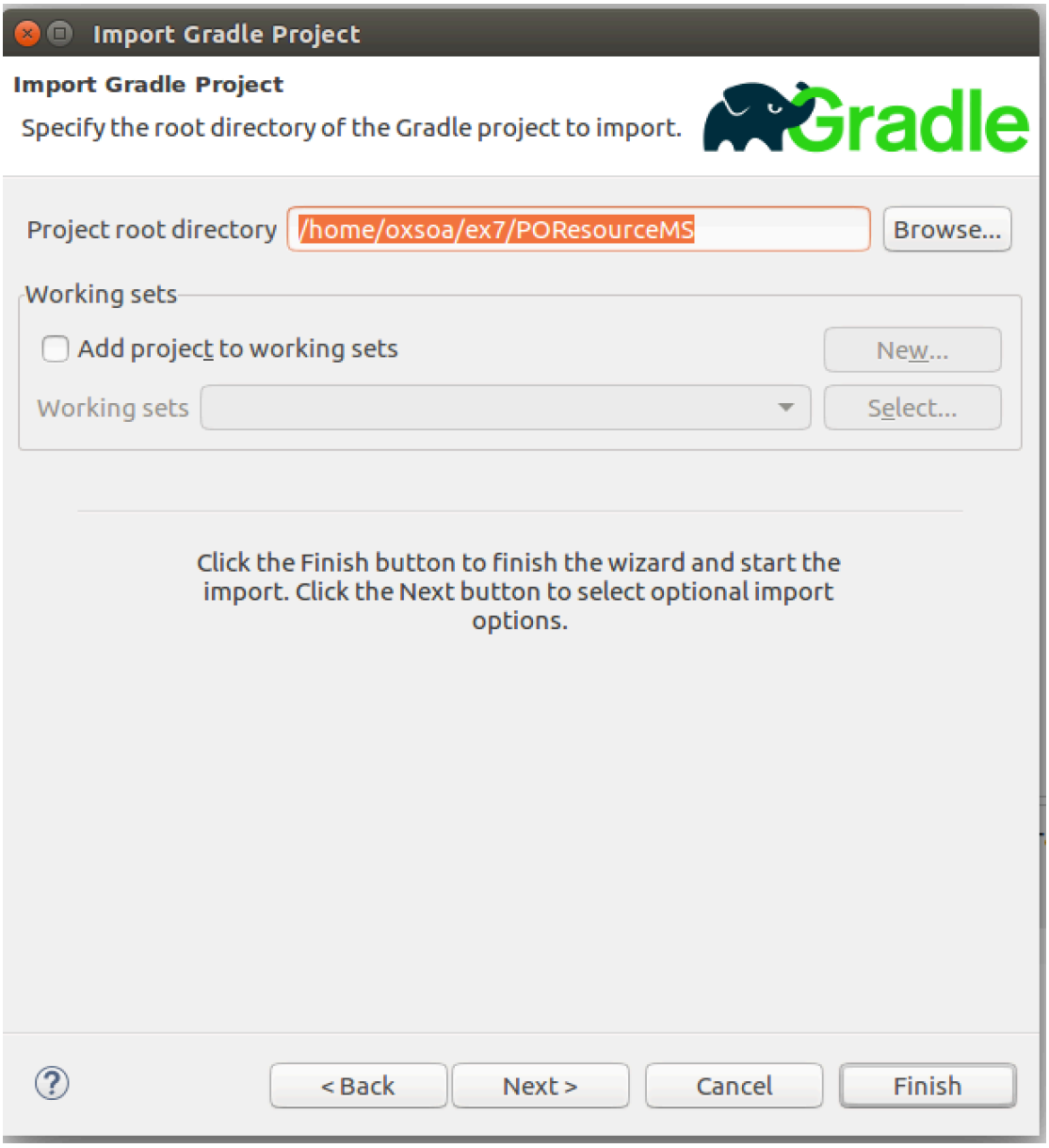
   Add the line:
   ```
   apply plugin: 'application'
   ```

6. We need to tell the application plugin the name of our "Main" executable class:

   Add the following line underneath the "apply plugin" lines
   ```
   mainClassName = 'freo.me.rest.Main'
   ```

7. Save your changes to the file.

8. Now import the project into Eclipse:
   File->Import Gradle->Gradle Project
   Next>
   Browse to the Project root directory: /home/oxsoa/ex7/POResourceMS
   Finish



9. Now go to the class called **Main** in the package freo.me.rest. Uncomment it.

   Here is a code listing:

```
package freo.me.rest;

import java.net.URI;
import javax.ws.rs.core.UriBuilder;
import org.eclipse.jetty.server.Server;
import org.glassfish.jersey.jetty.JettyHttpContainerFactory;
import org.glassfish.jersey.server.ResourceConfig;

public class Main {

      public static void main(String[] args) throws Exception {
            URI baseUri = UriBuilder.fromUri("http://localhost/")
              .port(8080).build();
            // This is fairly self-explanatory.
            // You can define the URL on which the server will listen.

            ResourceConfig config =
                new ResourceConfig(POResource.class);
            // This is where we identify that the class
            // POResource is the JAX-RS
            // Resource (aka Service) that we want to expose.

            Server server = JettyHttpContainerFactory.
                  createServer(baseUri, config);
            // Here is where we create the Jetty Server object.

            try {
                  server.start();
                  // This initiates the startup of the server.
                  server.join();
                  // Wait until the server finishes initiation

            } finally {
                  server.destroy();
                  // Obvious!
            }
      }
}
```

   The code is available here:
   http://freo.me/ex7-main

10. Now you can build this into a shadowJar. You can either use the gradle plugin, or the command line:

```
cd ~/ex7/POResourceMS
gradle clean shadowJar
```

11. This creates a file:
    `build/libs/POResourceMS-all.jar`

12. Try it out by executing:
    `java -jar build/libs/POResourceMS-all.jar`

13. Test it. The URL is http://localhost:8080/purchase

14. Extension: Check out the other build targets:
    ```
    gradle runShadow
    gradle distShadowZip
    gradle installShadowApp
    ```
    Hint: execute these with –info to see more of what is happening

15. *Adding Redis support*

Redis is a high-performance in-memory datastore which also supports different levels of on-disk persistence. It is a highly featured solution that supports clustering, replication and many other useful capabilities.

We are going to use it as a sample backend for our Microservice, replacing the existing singleton Java object.

If you have checked out my version of the service, you will already have a new backend class OrderRedis.java. If not, you can find a copy here: http://freo.me/OrderRedis

Review the code. I have chosen a simple way of storing the data in redis which is to create three keys for each entry:

```
e078c9ce-c7f4-4a23-9bd3-04e60b3d8a95:json -> { the json }
e078c9ce-c7f4-4a23-9bd3-04e60b3d8a95:complete -> true/false
e078c9ce-c7f4-4a23-9bd3-04e60b3d8a95:deleted -> true/false
```

This is probably not the best implementation, but it meant very few changes from the in-memory implementation. Note also that I did not implement paging in the getAllOrders and unlike the singleton version, this will not return all orders but a paged set. This would need fixing in a production system.

You can simply replace the singleton usage of OrderInMemory with an instance of OrderRedis. It is thread safe so you can simply instantiate a single object and call it from the POResource service with impunity.

16. Make sure the jedis client is part of the gradle build.

    If you need to uncomment it or add it then select the Project and Right-click **Gradle->Refresh Gradle Project** to let Eclipse know about the new dependency.

17. Let's check redis is running before we try to test anything. On the command line type:

```
redis-cli
```

    If redis is running you will see:

```
127.0.0.1:6379>
```

    If redis is *not* running you will see:

```
Could not connect to Redis at 127.0.0.1:6379: Connection
refused
not connected>
```

    To start redis type:

```
sudo service redis-server start
```

18. You can do a gradle build to re-run the tests with the redis backend.

19. In a terminal window start the redis-cli and type
    SCAN 0 MATCH '*:json'

    You should see a response like this:

```
127.0.0.1:6379> scan 0 MATCH '*:json'
1) "288"
2) 1) "528551f0-810b-4c74-ab89-0d20bde584c1:json"
   2) "e685fa1f-cdd4-4ace-87e4-6421c67f54fb:json"
   3) "e078c9ce-c7f4-4a23-9bd3-04e60b3d8a95:json"
   4) "a235c1f9-da10-4be8-b9c3-29a6ef1d7894:json"
   5) "43d90e04-2c1c-40d5-9ab1-ac254ed310a2:json"
```

20. Build into a shadow JAR and test using java –jar

21. Congratulations the lab is over!