ΕΛΛΗΝΙΚΗ ΔΗΜΟΚΡΑΤΙΑ
ΠΑΝΕΠΙΣΤΗΜΙΟ ΚΡΗΤΗΣ

Εισαγωγή στα Δίκτυα Υπηρεσιών

Assisting Lecture 7 (Java Restful WS in Google App Engine)

Μύρων Παπαδάκης
Τμήμα Επιστήμης Υπολογιστών

CS-592: Introduction Service Networks Spring 2015

Assisting Lecture: Java Restful Web Services in the Google App Engine

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Creating and Deploying Web applications in Google App Engine

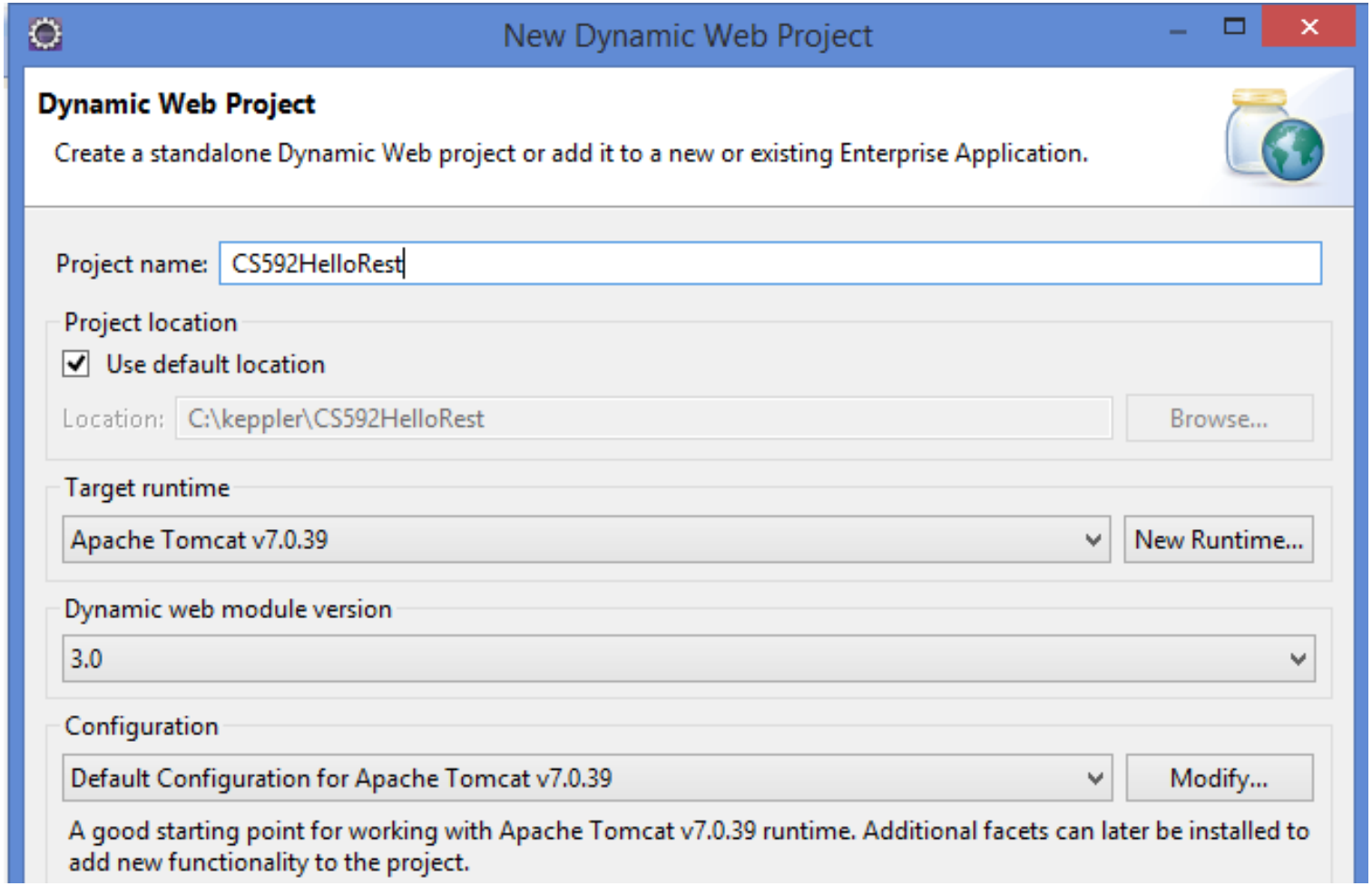
Example 1: Hello World Example using JAX-RS

Download Jersey

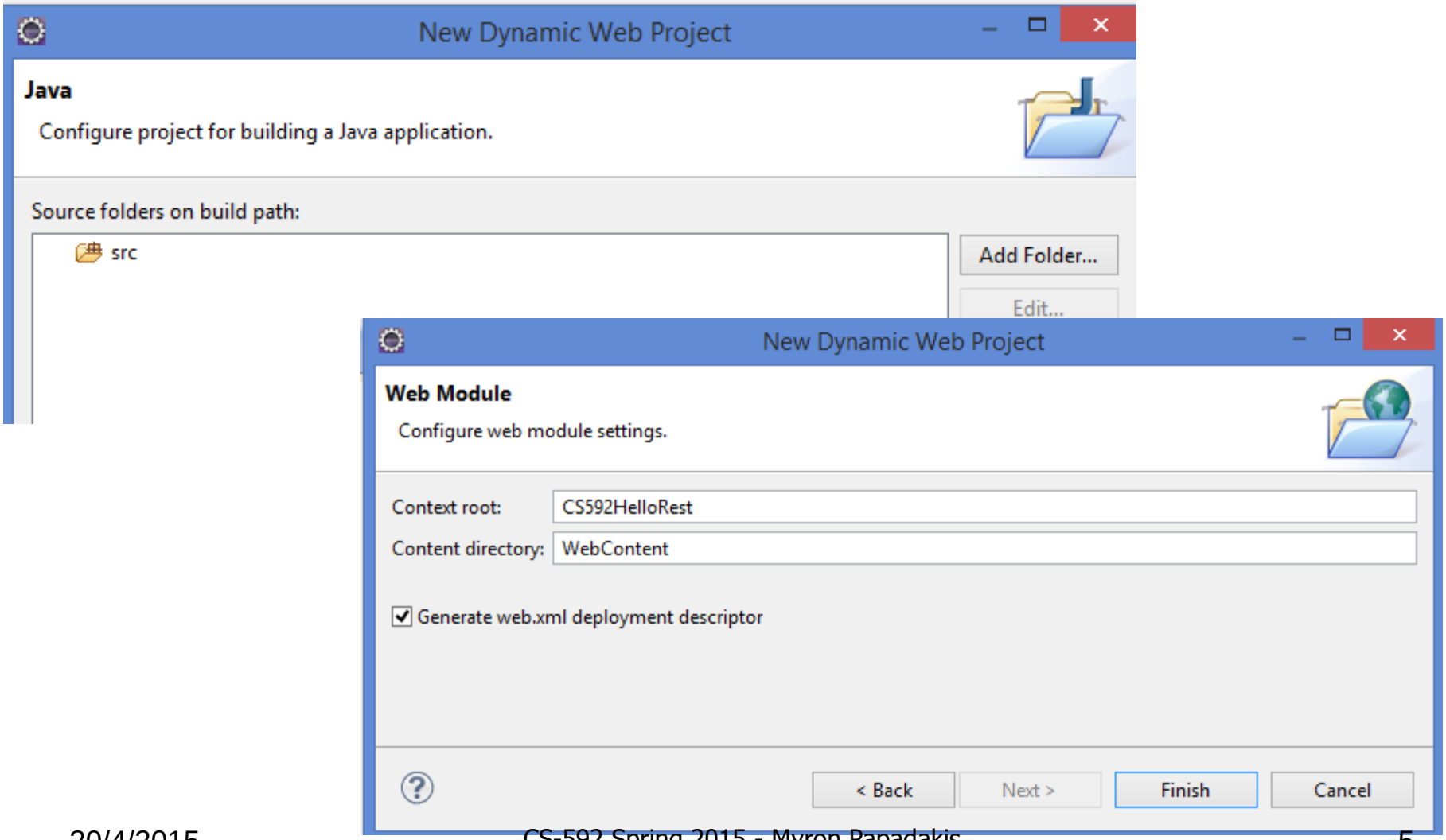
- Download the Jersey distribution as zip file from the Jersey download site.
  - jaxrs-ri-2.16 or jaxrs-ri-2.17.zip
  - It is a collection of jars..

- The zip contains the Jersey implementation JAR and its core dependencies.
  - It does not provide dependencies for third party JARs beyond those for JSON support and JavaDoc.
  - This means that in many cases we have to add some jars from external parties….(i.e. jaxb and gson)

Eclipse > Create new Dynamic Web Project

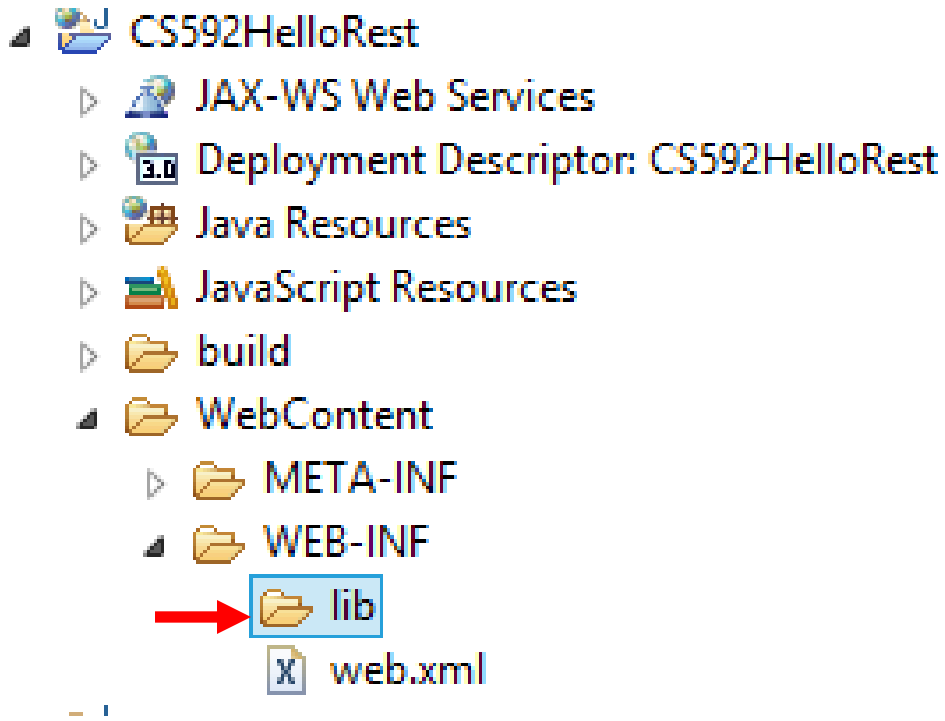


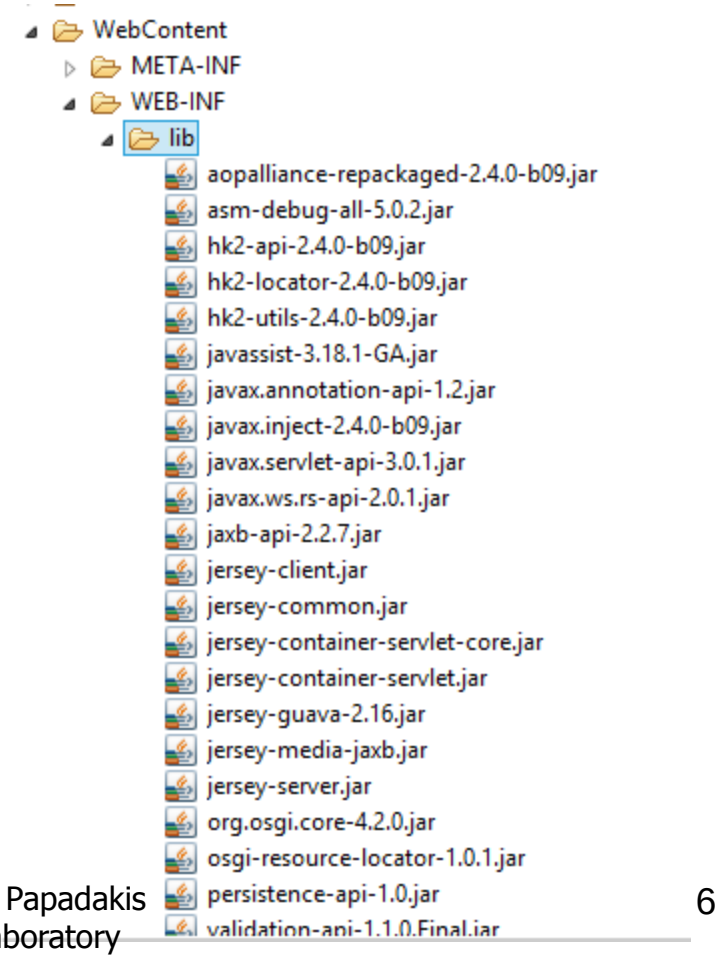
Eclipse > Create new Dynamic Web Project



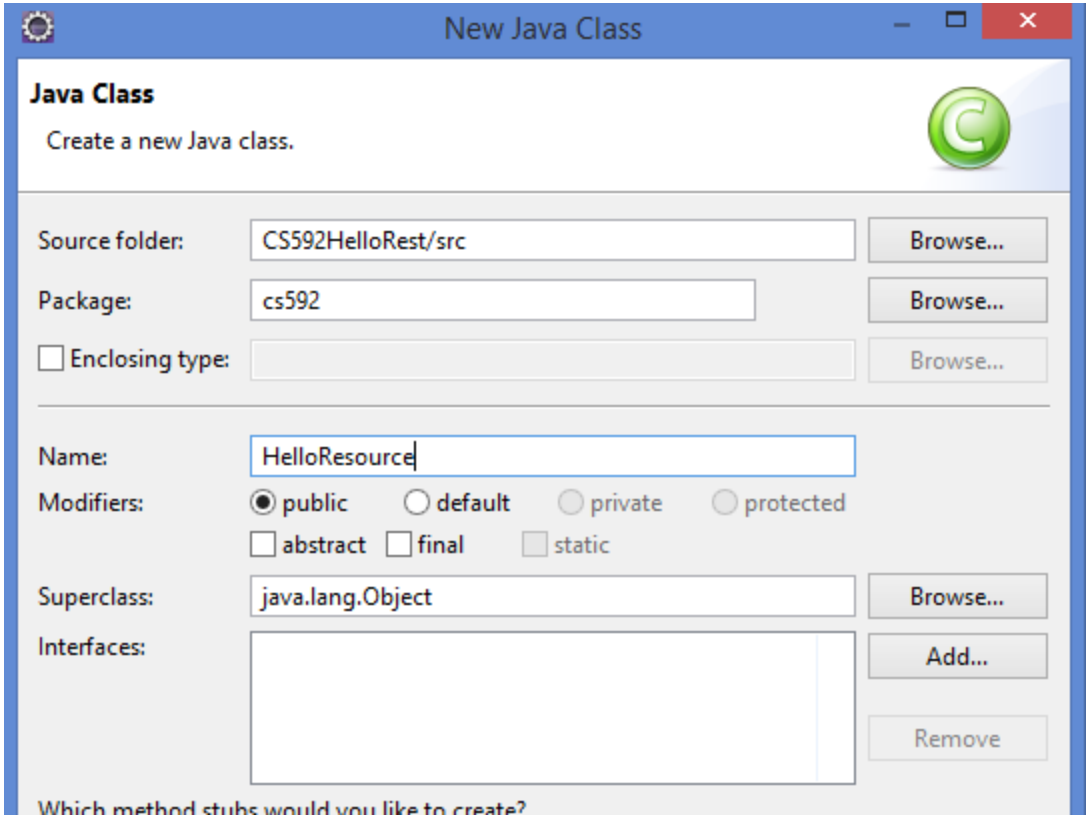
Jersey Jar Copy

- Copy **all JARs** from your Jersey download into the WEB-INF/lib folder.





Create New Class (Resource)



Create New Class (Resource)

```
package cs592;

import javax.ws.rs.GET;
import javax.ws.rs.Path;
import javax.ws.rs.Produces;
import javax.ws.rs.core.Response;
import javax.ws.rs.PathParam;
import javax.ws.rs.QueryParam;
import javax.ws.rs.FormParam;
import javax.ws.rs.POST;
@Path("/hello")
public class HelloResource {
```

Create New Class (Resource)

```
@GET
@Path("/query")
@Produces("text/html")
public String getGreetingQueryParam(@QueryParam("name")
  String name) {
        return "<html><body><h1>Hello " + name +
  "!</h1></body></html>";
}

@GET
@Path("{name}")
@Produces("text/html")
public String getGreetingParam(@PathParam("name") String
  name) {
      return "<html><body><h1>Hello " + name +
  "!</h1></body></html>";
}
```

Create New Class (Resource)

```
/*
   * Html File should be located to the WebContent
folder
   * Invoke: http://localhost:8080/HelloRest/form.html
   */
  @POST
  @Path("/form")
  public Response sayHiToUser(
          @FormParam("fname") String fname,
          @FormParam("lname") String lname) {

       String output = "<html><body><h1>Hello " + fname +
" "+lname+"!</h1></body></html>";

      return Response.status(200).entity(output).build();

  }
}
```

Create New HTML File

Define Jersey Servlet dispatcher > web.xml

- Default generated web.xml should look like the following
- We have to modify it to deploy it to Tomcat

HelloResource.java | form.html | web.xml

```
1  <?xml version="1.0" encoding="UTF-8"?>
2  <web-app xmlns:xsi="http://www.w3.org/2001/XMLSchemc
3    <display-name>CS592HelloRest</display-name>
4    <welcome-file-list>
5      <welcome-file>index.html</welcome-file>
6      <welcome-file>index.htm</welcome-file>
7      <welcome-file>index.jsp</welcome-file>
8      <welcome-file>default.html</welcome-file>
9      <welcome-file>default.htm</welcome-file>
10     <welcome-file>default.jsp</welcome-file>
11   </welcome-file-list>
12 </web-app>
```

Define Jersey Servlet dispatcher > web.xml

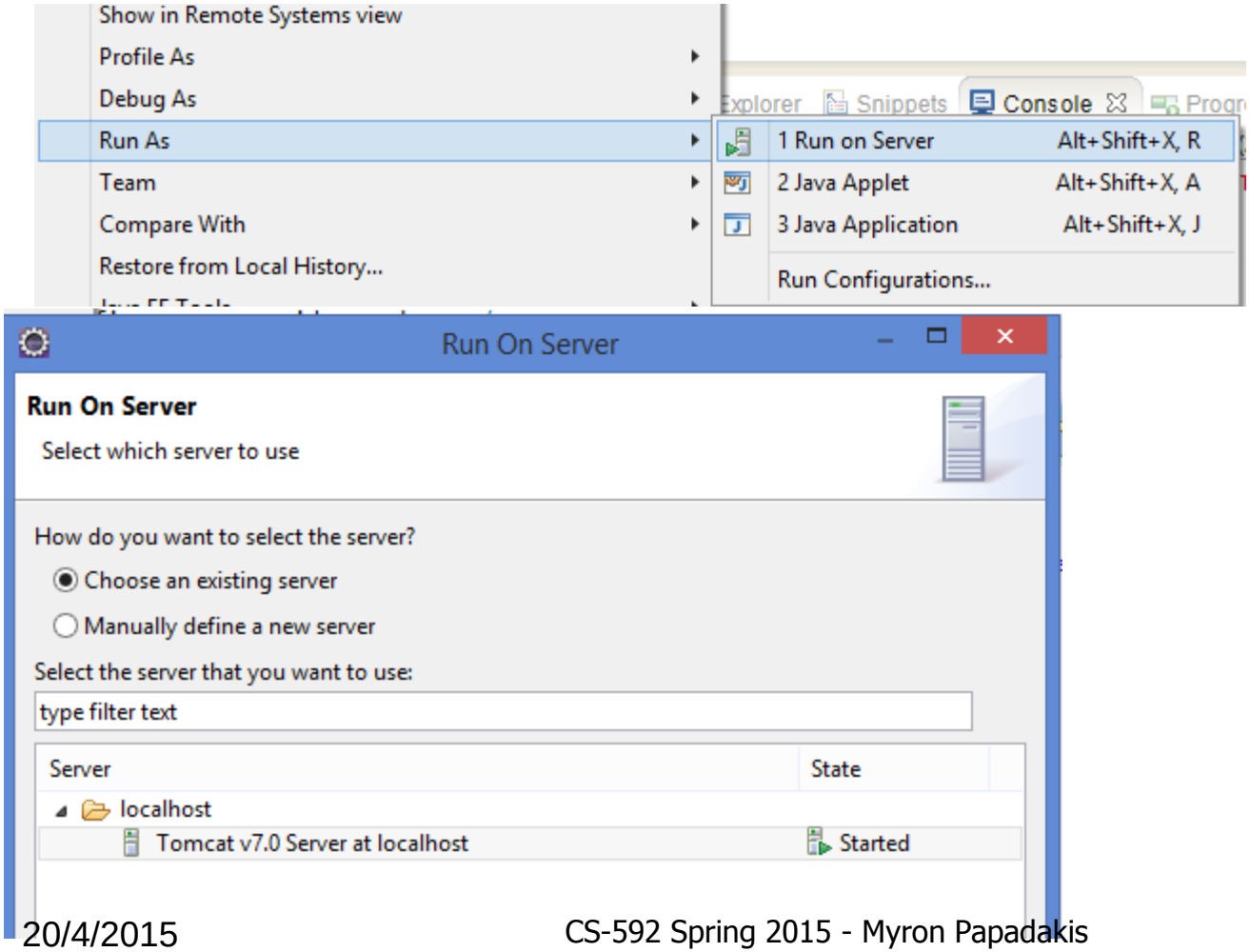
- You need to register Jersey as the servlet dispatcher for REST requests.
- The complete path to a resource is based on the base URL and the @PATh annotation in your class.

- **http://your_domain:port/display-name/url-pattern/path_from_rest_class**

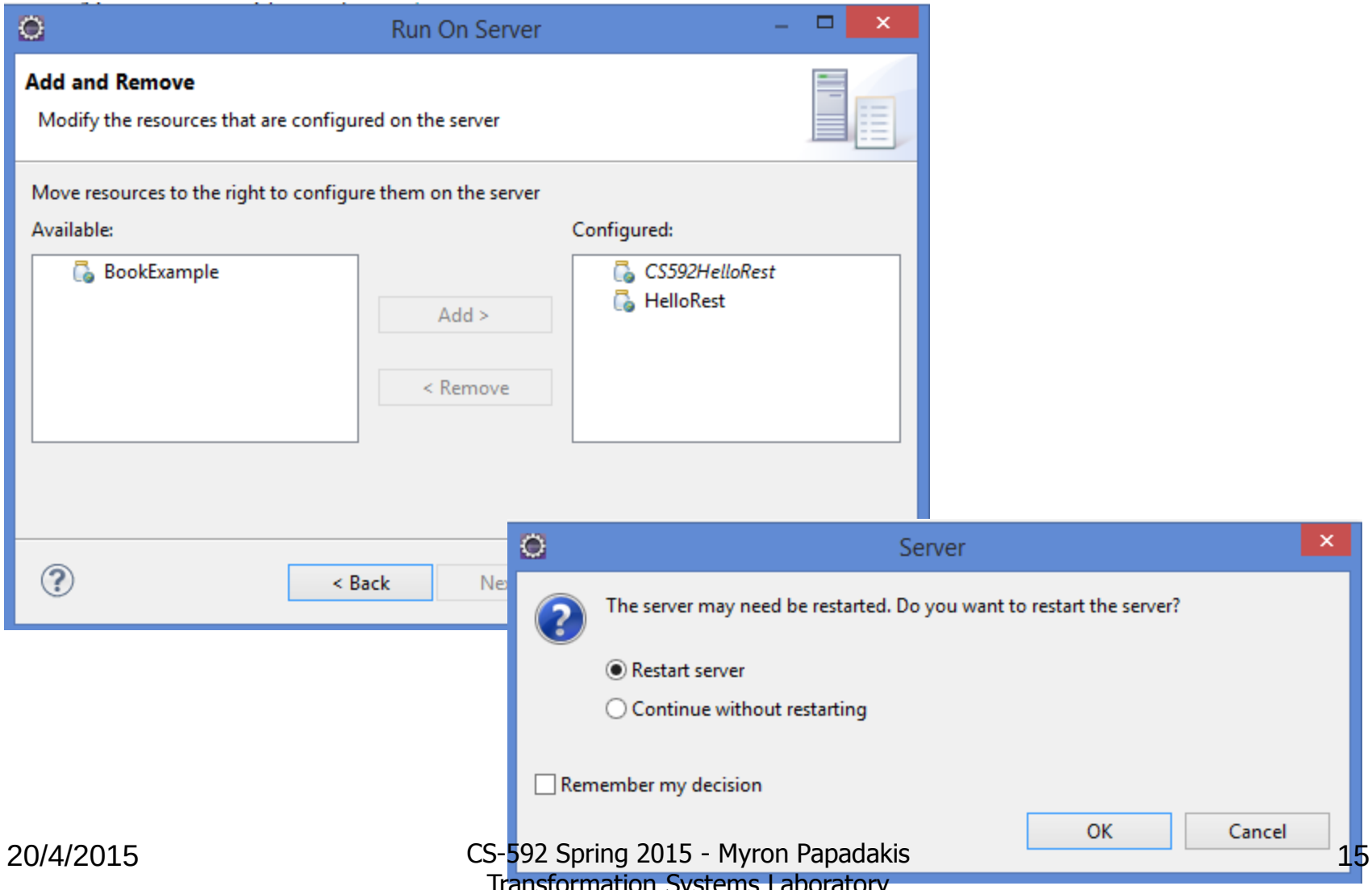
HelloResource.java | form.html | web.xml

```
1  <?xml version="1.0" encoding="UTF-8"?>
2  <web-app xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns="http://java.sun.com/
3    <display-name>CS592HelloRest</display-name>
4    <servlet>
5      <servlet-name>CS592HelloRest</servlet-name>
6      <servlet-class>org.glassfish.jersey.servlet.ServletContainer</servlet-class>
7       <!-- Register resources and providers under com.vogella.jersey.first package. -->
8      <init-param>
9          <param-name>jersey.config.server.provider.packages</param-name>
10         <param-value>cs592</param-value>
11     </init-param>
12     <load-on-startup>1</load-on-startup>
13   </servlet>
14   <servlet-mapping>
15     <servlet-name>CS592HelloRest</servlet-name>
16     <url-pattern>/rest/*</url-pattern>
17   </servlet-mapping>
18 </web-app>
```

Running in Tomcat



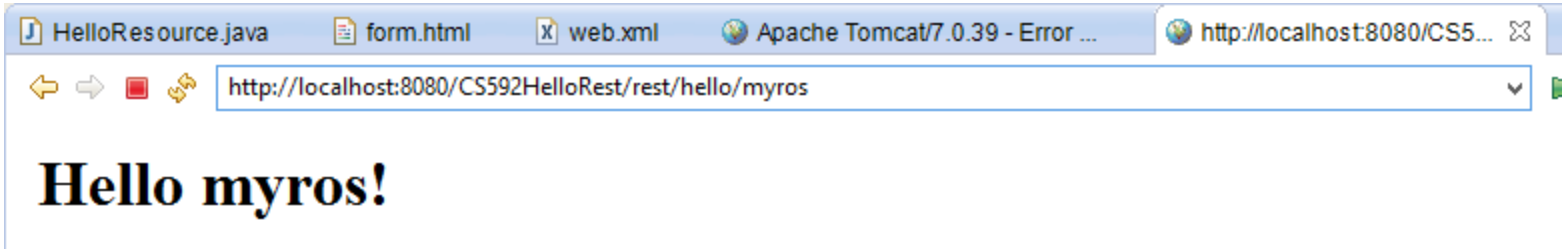
Running in Tomcat



Running in Tomcat

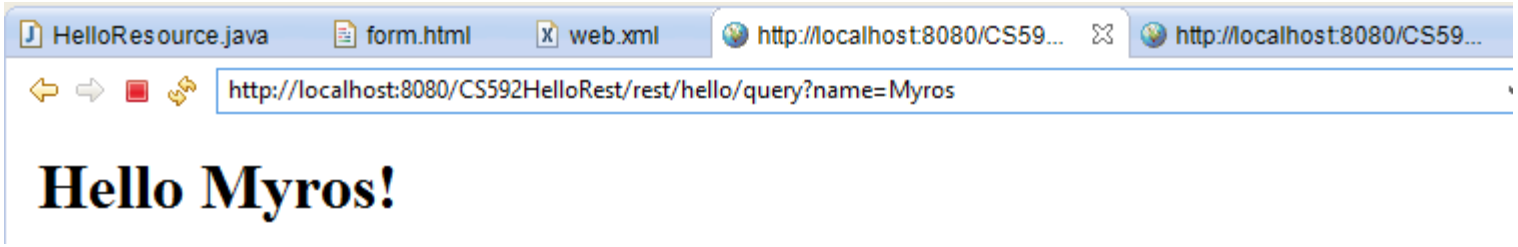
- Don’t worry if you see the following page
- Remember
- **http://your_domain:port/display-name/url-pattern/path_from_rest_class**

Running in Tomcat > PathParam



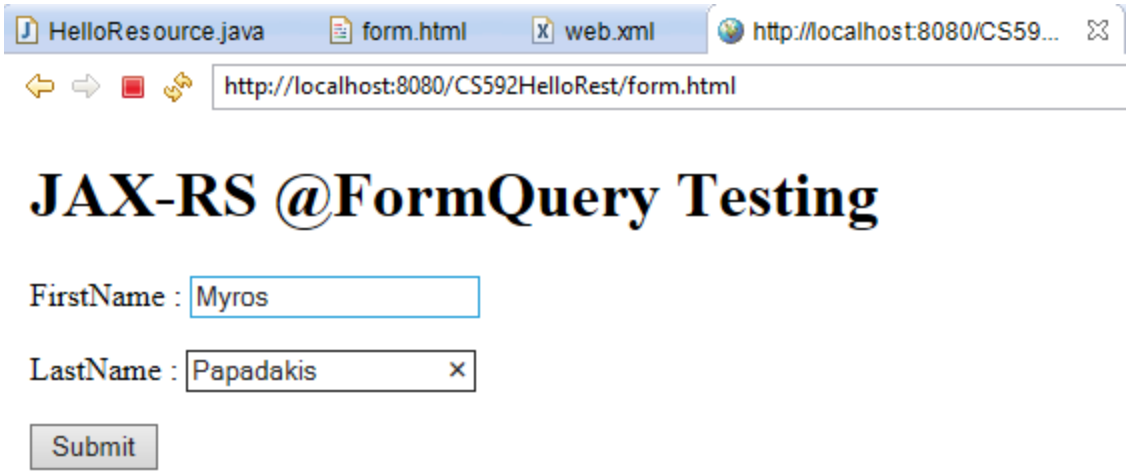

```
@GET
@Path("{name}")
@Produces("text/html")
public String getGreetingParam(@PathParam("name") String name) {
    return "<html><body><h1>Hello " + name + "!</h1></body></html>";
}
```

Running in Tomcat > QueryParam




```
@GET
@Path("/query")
@Produces("text/html")
public String getGreetingQueryParam(@QueryParam("name") String name) {
    return "<html><body><h1>Hello " + name + "!</h1></body></html>";
}
```

Running in Tomcat > FormParam




```
/*
 * Html File should be located to the WebContent folder
 * Invoke: http://localhost:8080/HelloRest/form.html
 */
@POST
@Path("/form")
public Response sayHiToUser(
        @FormParam("fname") String fname,
        @FormParam("lname") String lname) {

    String output = "<html><body><h1>Hello " + fname + " "+lname+"!</h1></body></html>";

   return Response.status(200).entity(output).build();
```

Google App Engine

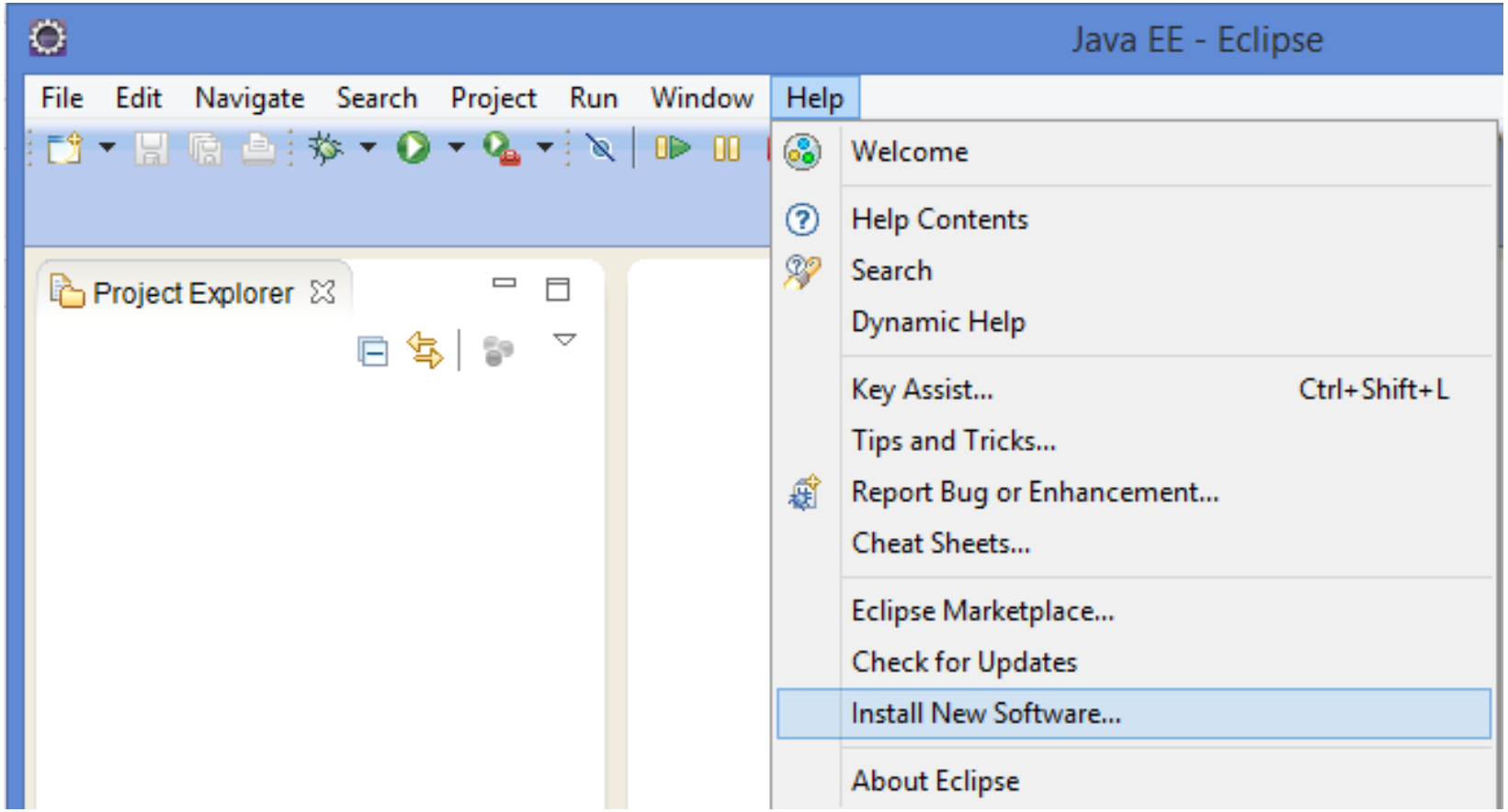
Note

- Unfortunately for Netbeans the google app engine plugin does not work smoothly.
- There are a lot of conflicts with libraries and it is very frustrating
- https://code.google.com/p/nb-gaelyk-plugin/downloads/list

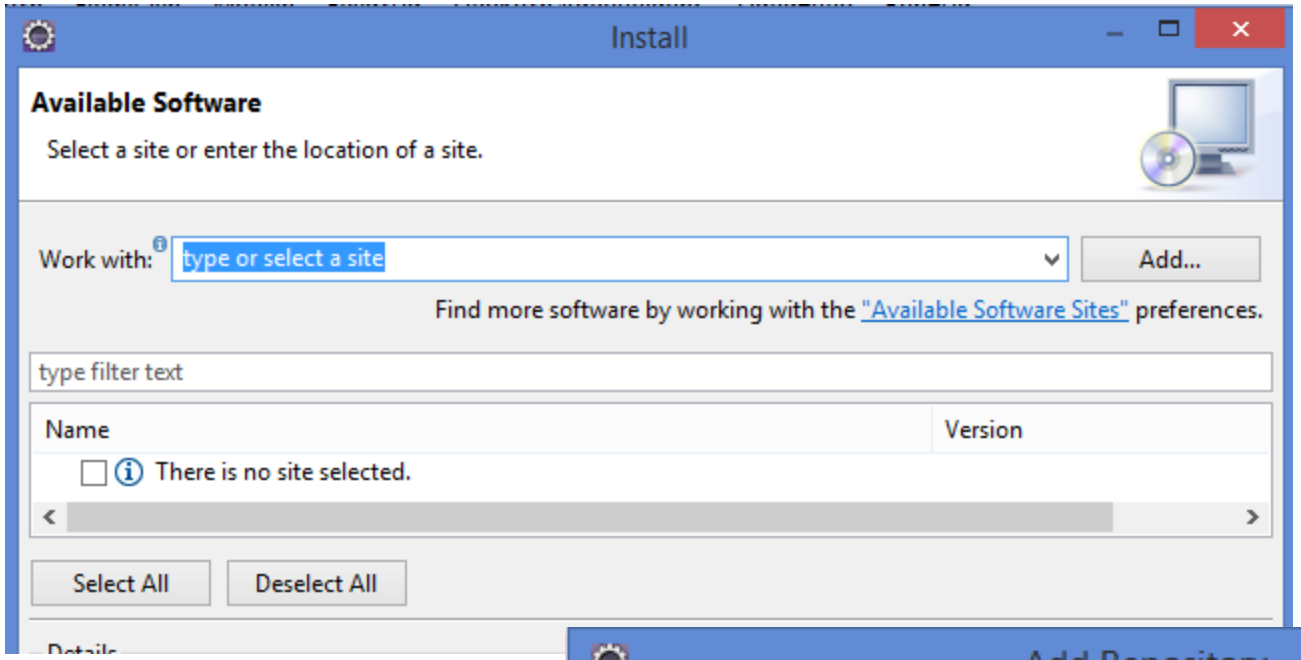
Google Plugin for Eclipse

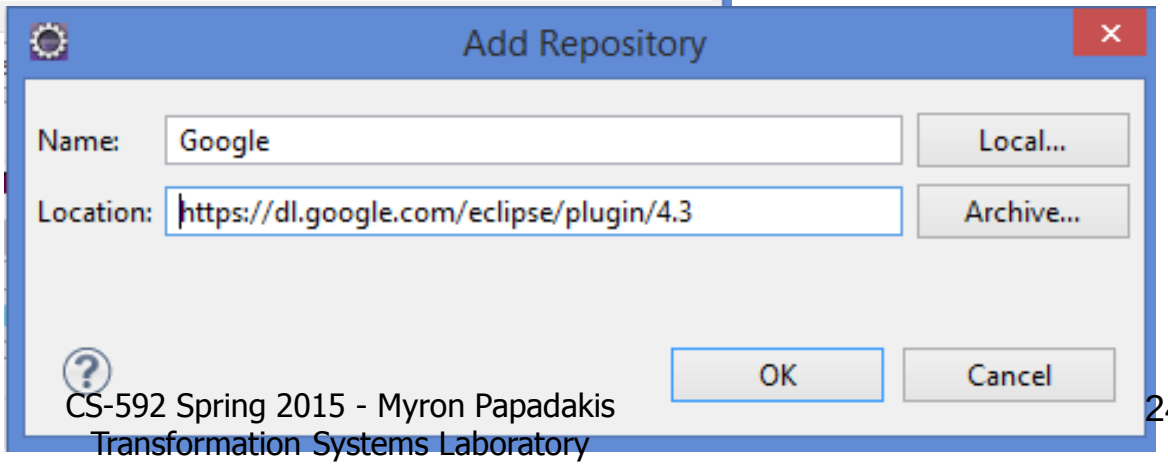
- https://developers.google.com/eclipse/docs/download
- Complete Instructions are given here (for example for Keppler)
  - https://developers.google.com/eclipse/docs/install-eclipse-4.3
- Install the plugin and Restart the Ide
- https://developers.google.com/eclipse/docs/signin

Google Plugin for Eclipse

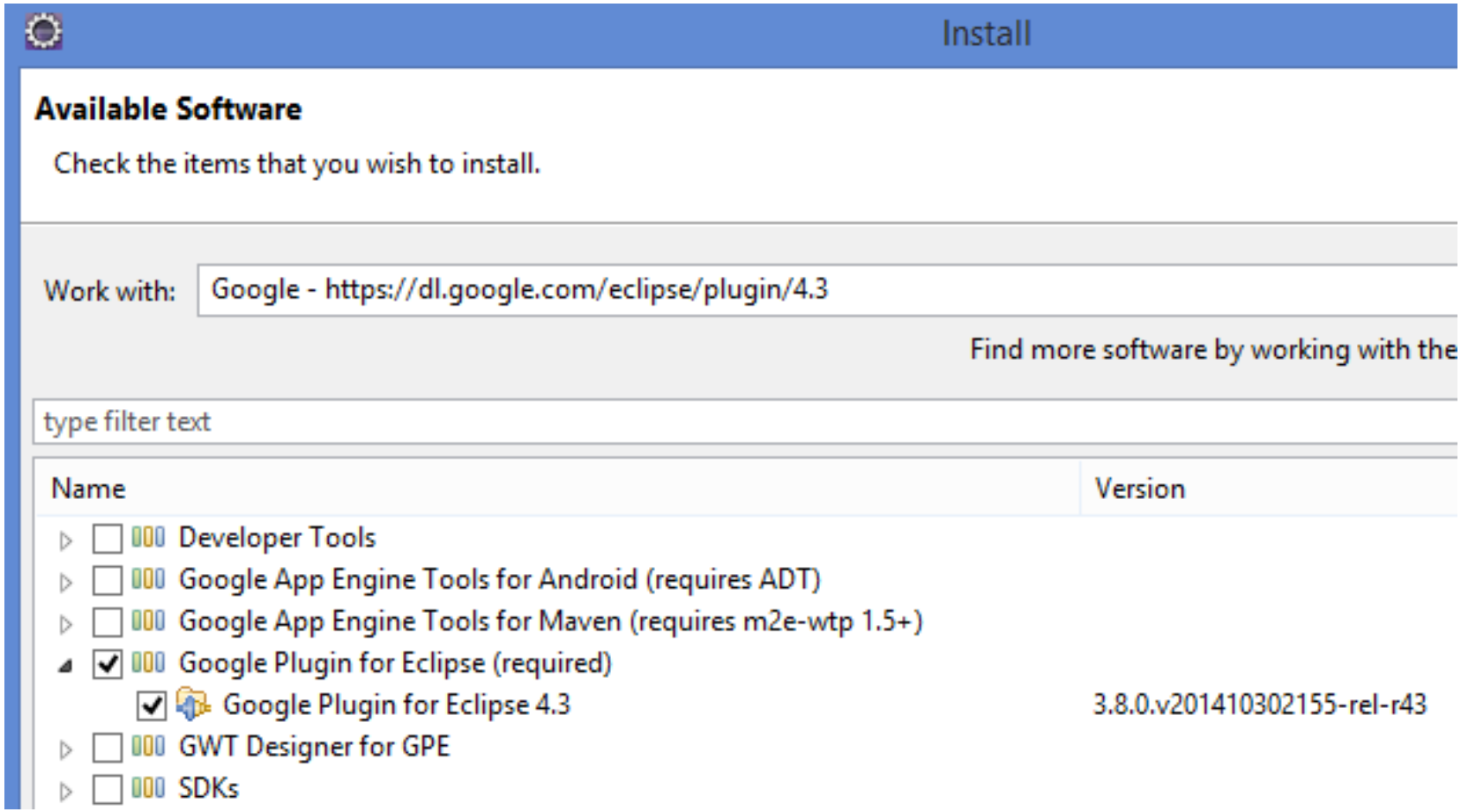


Google Plugin for Eclipse

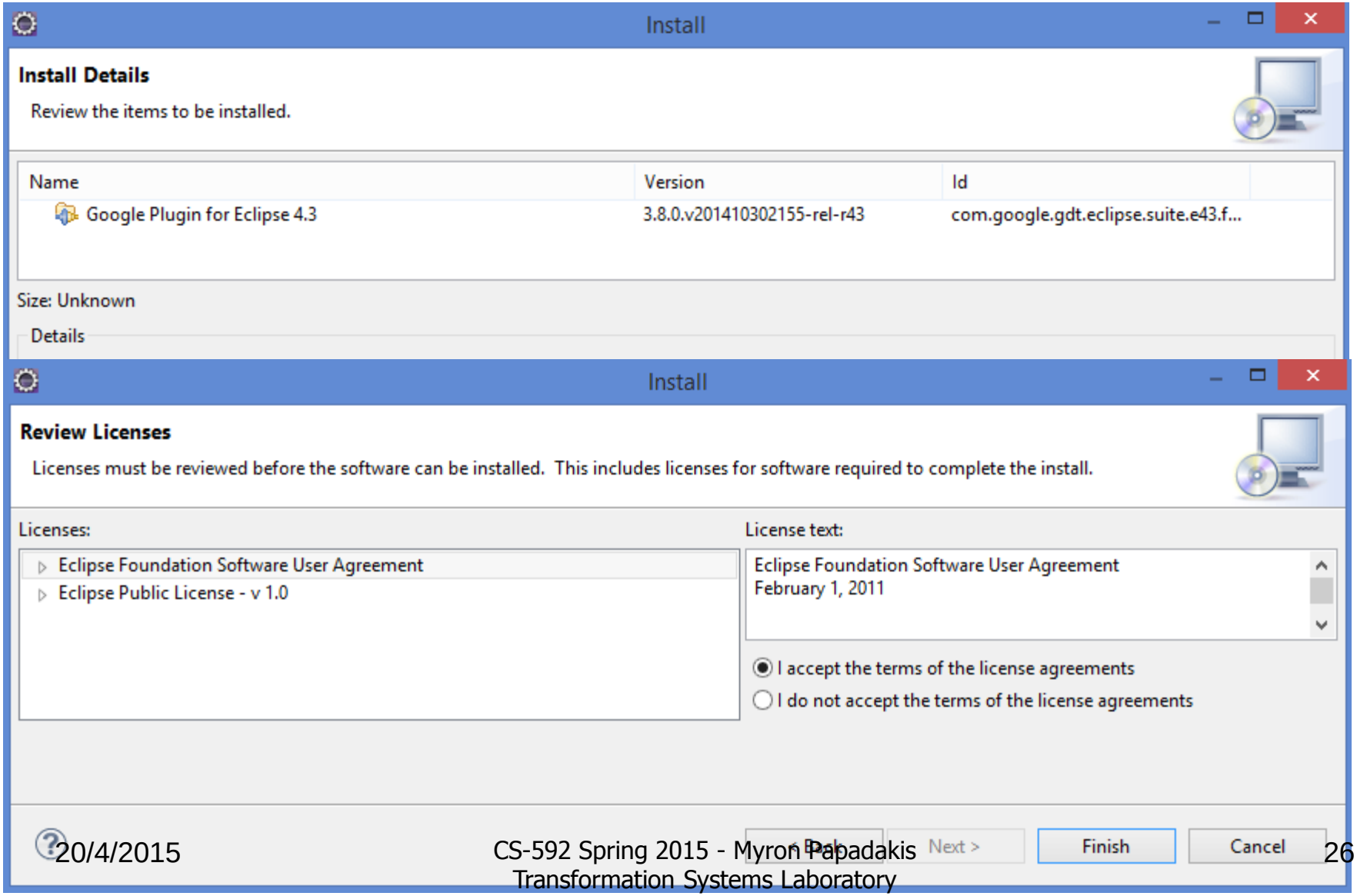




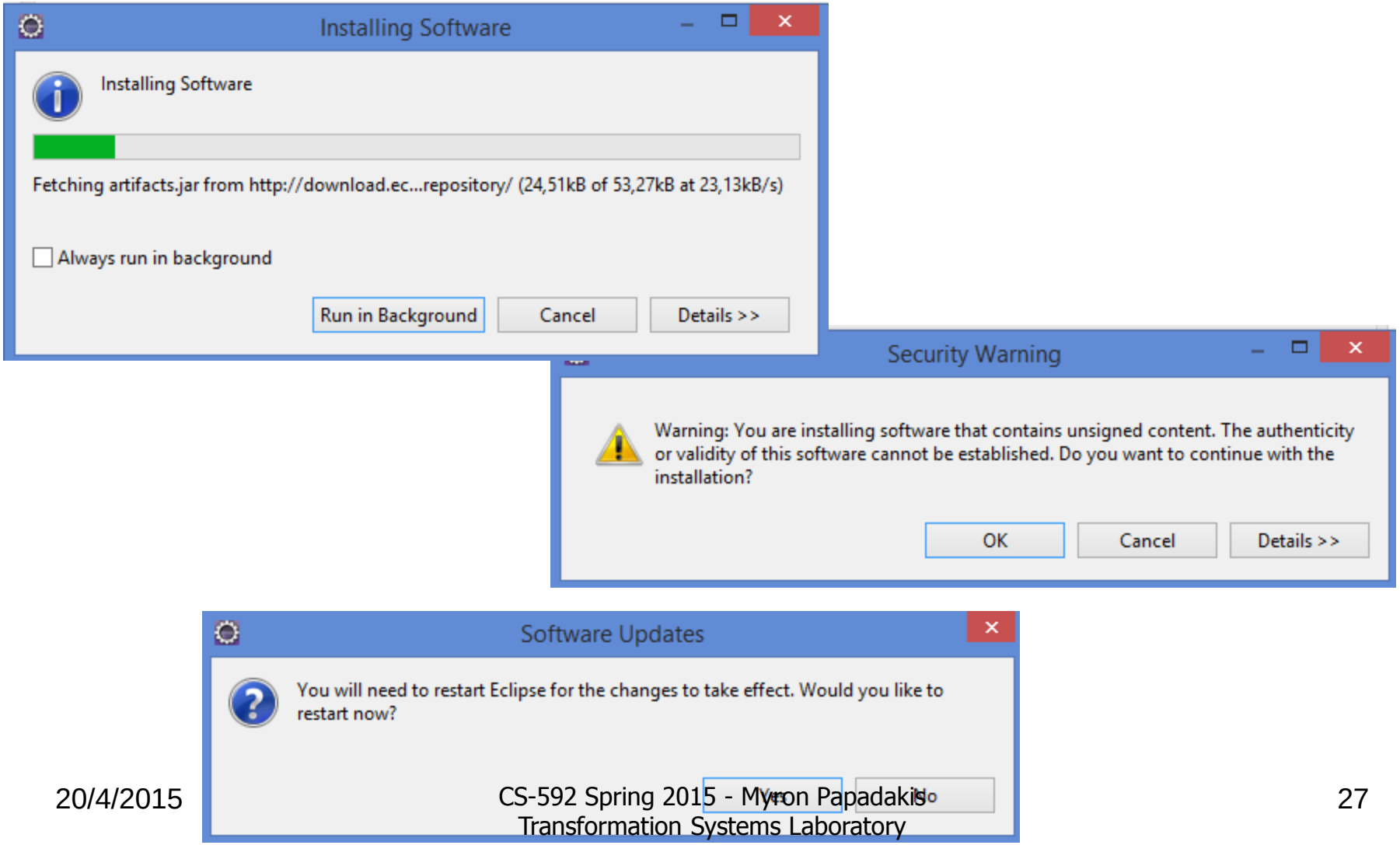
Google Plugin for Eclipse



Google Plugin for Eclipse



Google Plugin for Eclipse

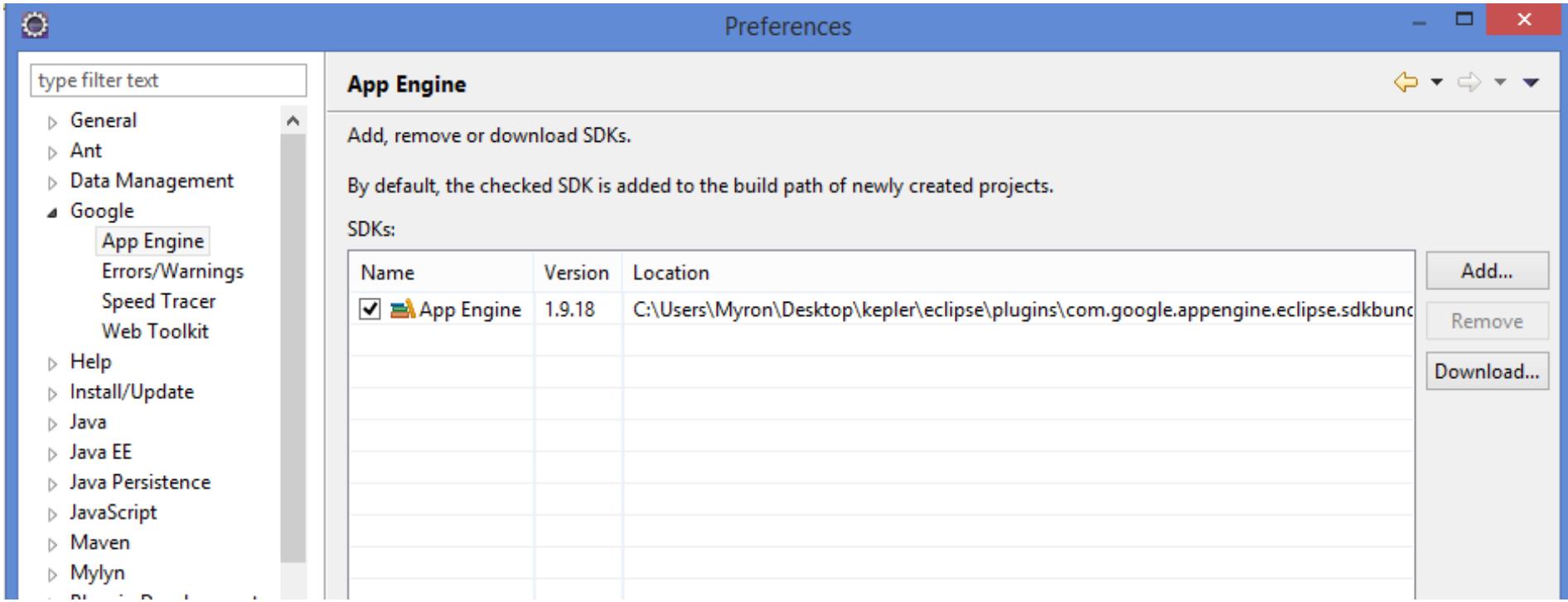


Google App Engine Java Support

Java:

• App Engine runs JAVA apps on a JAVA 7 virtual machine (currently supports JAVA 6 as well).
• Uses JAVA Servlet standard for web applications:
•WAR (Web Applications ARchive) directory structure.
• Servlet classes
• Java Server Pages (JSP)
• Static and data files
• Deployment descriptor (web.xml)
• Other configuration files
• Getting started :
https://developers.google.com/appengine/docs/java/gettingstarted/

Checking Installation



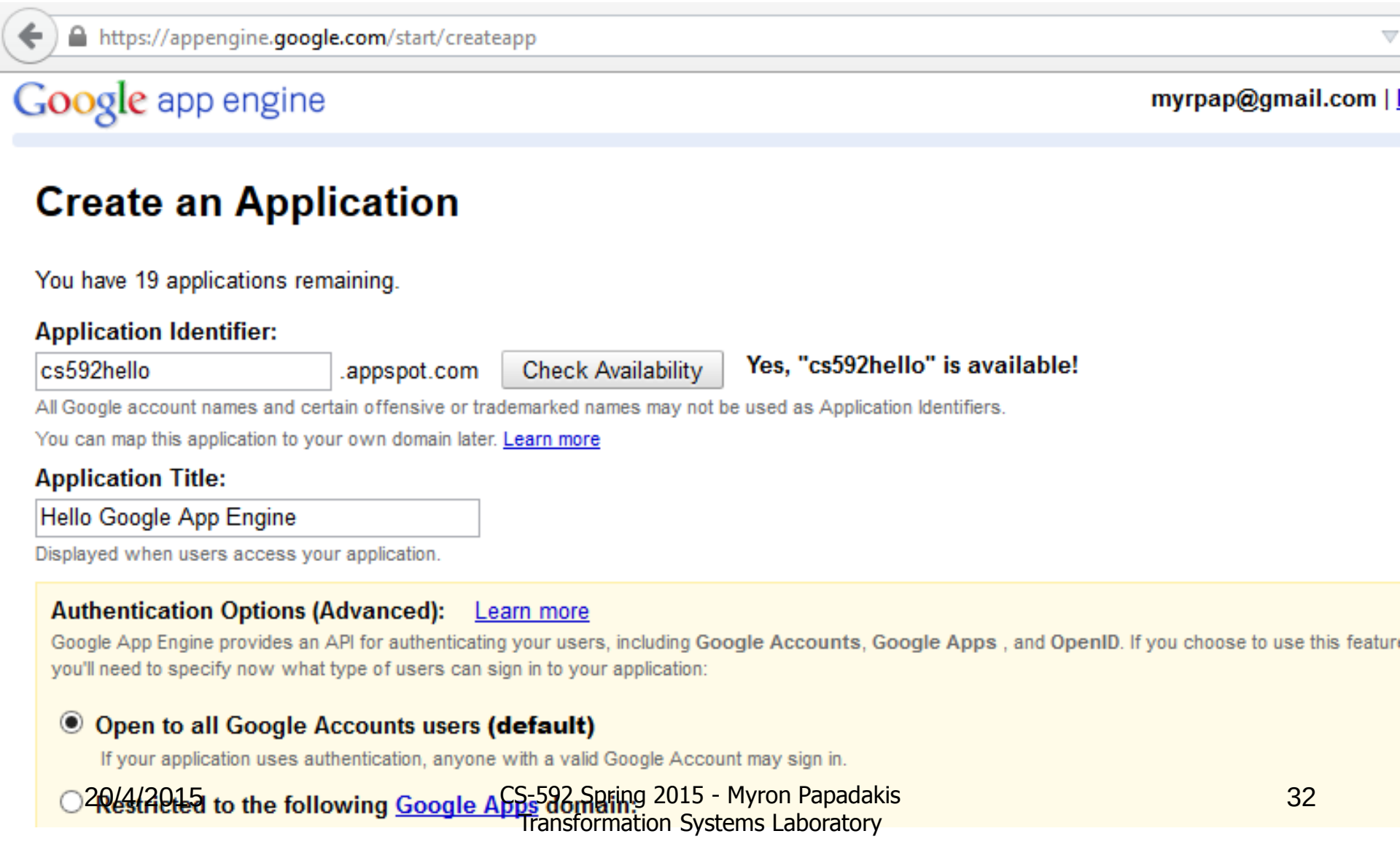
Eclipse Steps

- Create a new application with a certain id in the google app engine.
- Create a new Google Web Application Project
- Configure build path
- Copy to lib all the jersey jars…
- Change web.xml
- Check and fill in the application id in the appengine-web.xml
- There is no need to have Apache Tomcat or Glassfish installed!

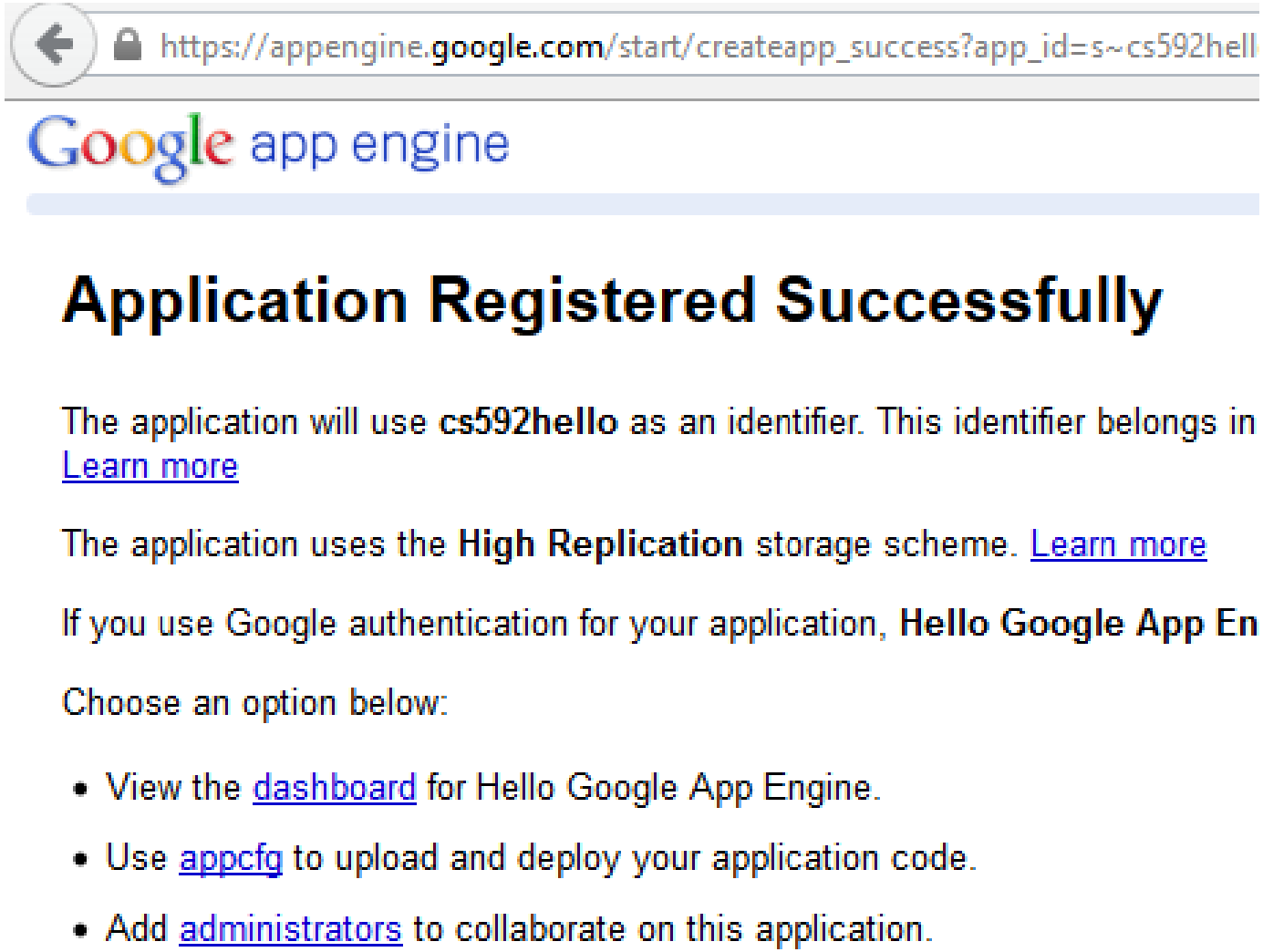
Google App Engine

Hello Example

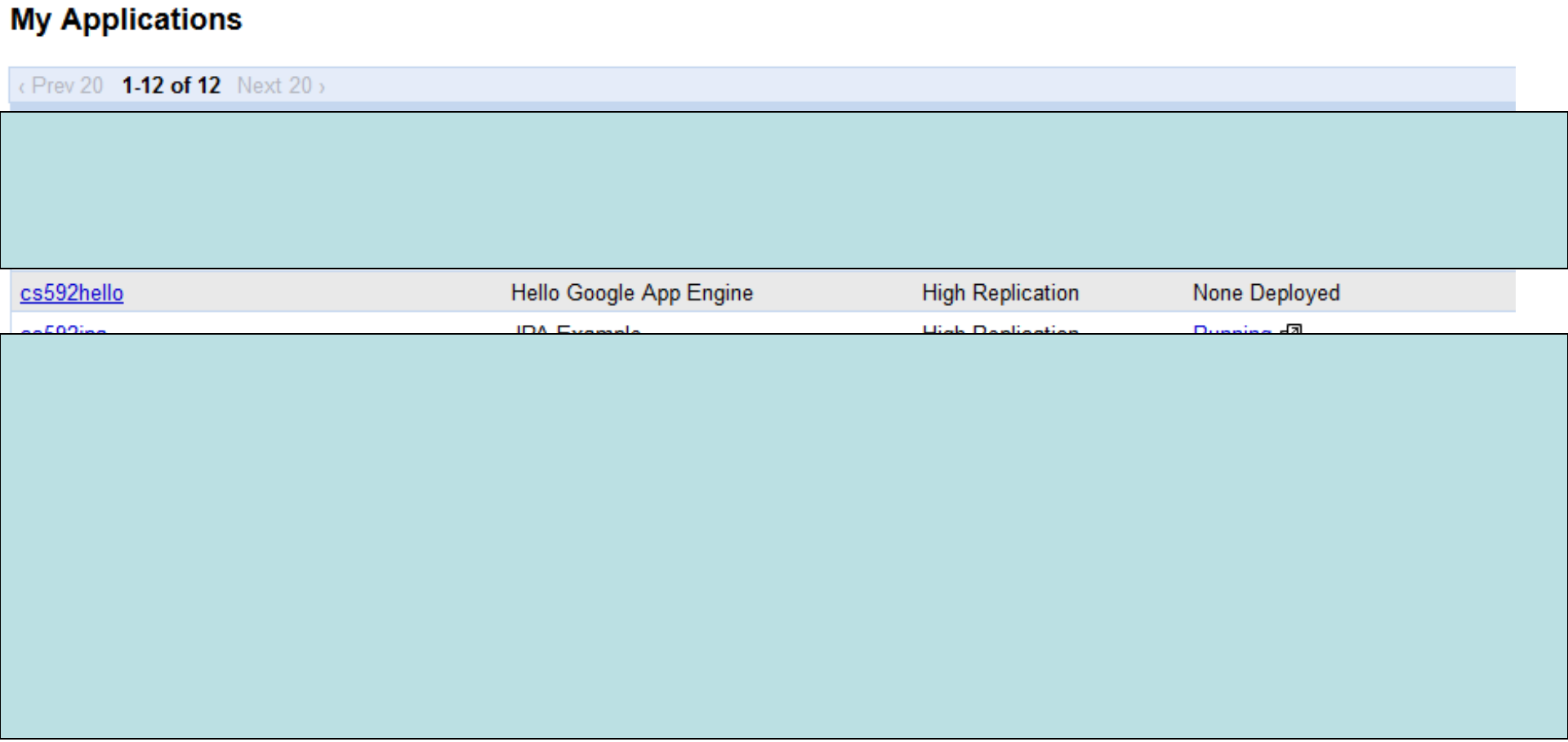
Google app engine > create app



Google app engine > create app

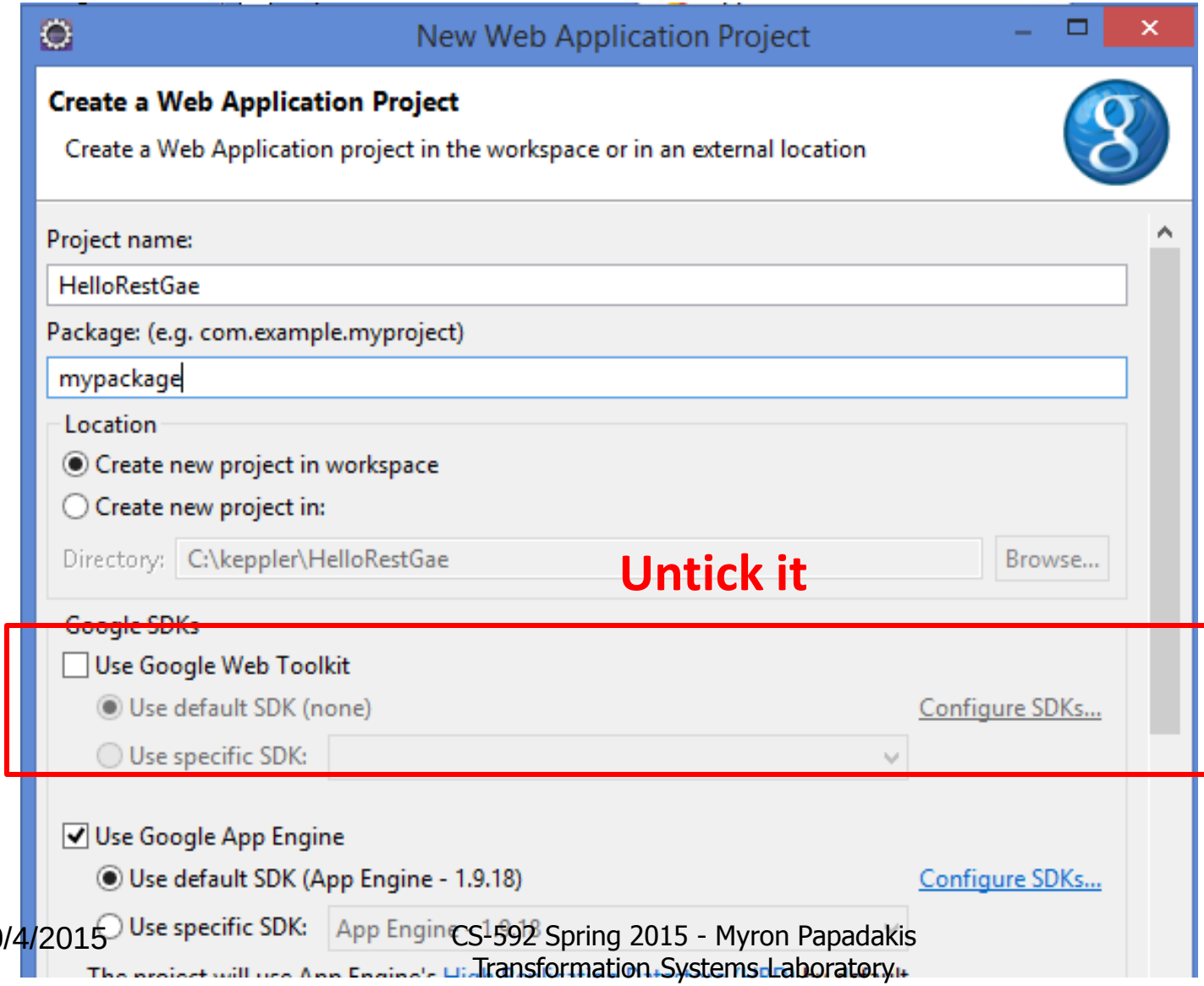


Google app engine > create app



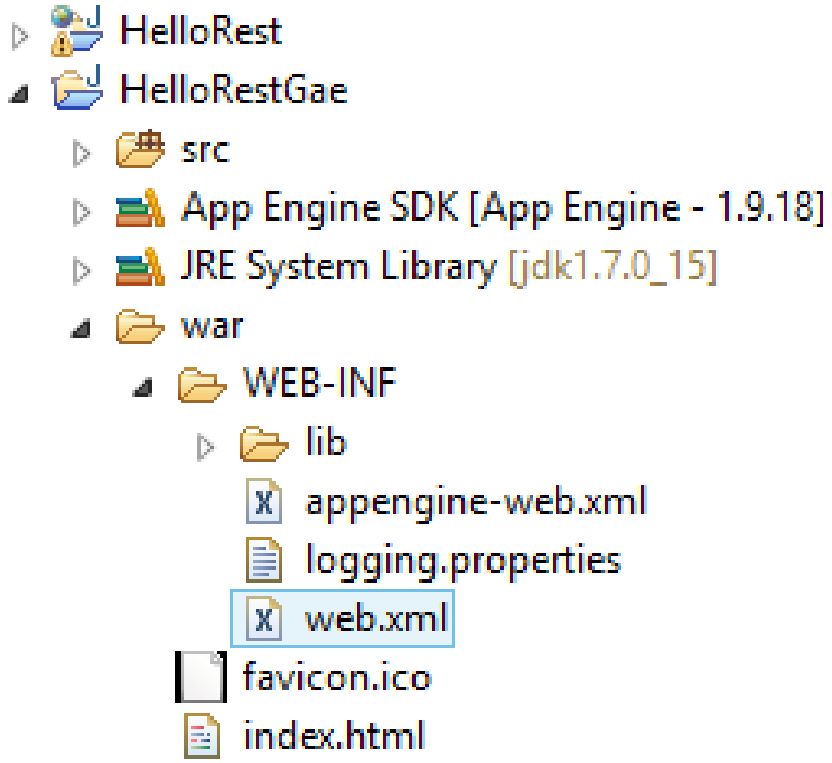
Google App Engine Project

Google App Engine Project



Google App Engine Project > Structure

```
$ tree guestbook/
guestbook/
├── eclipse-launch-profiles
│   ├── DevAppServer.launch
│   └── UpdateApplication.launch
├── nbactions.xml
├── pom.xml
├── README.md
└── src
    ├── main
    │   ├── java
    │   └── webapp
    │       └── WEB-INF
    │           ├── appengine-web.xml
    │           ├── logging.properties
    │           └── web.xml
    └── test
```



Creating the project

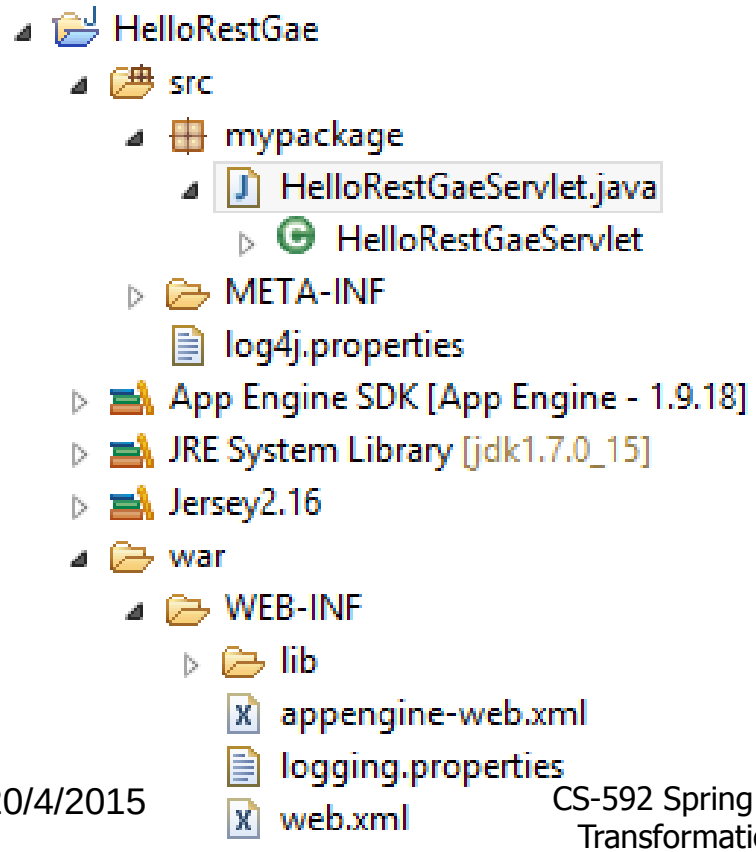
1. You'll add your own application Java classes to src/main/java/...

2. You'll configure your application using the file src/main/webapp/WEB-INF/appengine-web.xml

3. You'll configure your application deployment using the file src/main/webapp/WEB-INF/web.xml

Creating the project > Step1

- So first we will create the resources (actually copy them from the previous project)



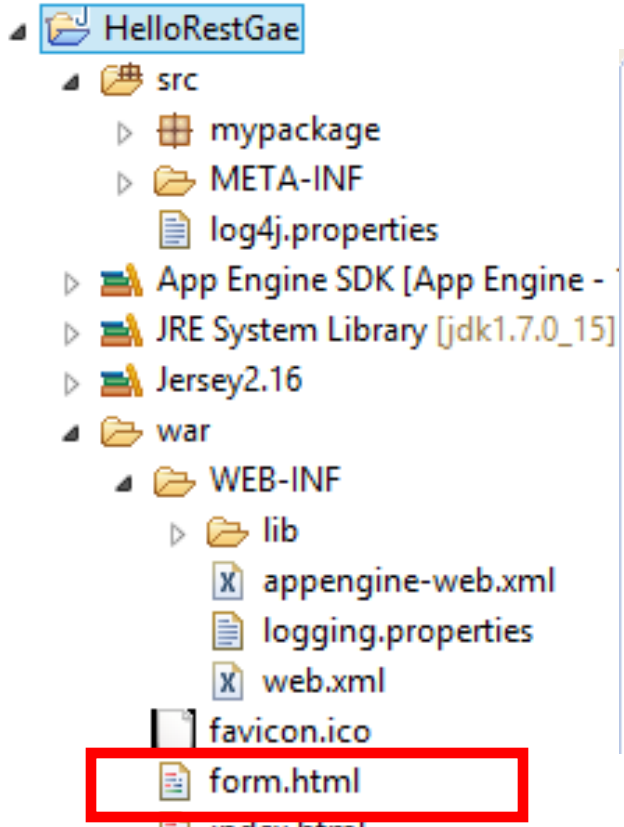
Creating the project > Step1

web.xml | appengine-web.xml | form.html | HelloRestGaeServlet.java | HelloResource.java

```
1  package mypackage;
2
3  import javax.ws.rs.GET;
11 @Path("/hello")
12 public class HelloResource {
13
14
15
16         @GET
17         @Path("/query")
18         @Produces("text/html")
19         public String getGreetingQueryParam(@QueryParam("name") String name) {
20             return "<html><body><h1>Hello " + name + "!</h1></body></html>";
21         }
22
26         public String getGreetingParam(@PathParam("name") String name) {
29
30         /*
31          * Html File should be located to the WebContent folder
32          */
35         public Response sayHiToUser(
44
45 }
```

Creating the project > Step1

- I will also copy the html for the form but I will have to change the path of the action



form.html

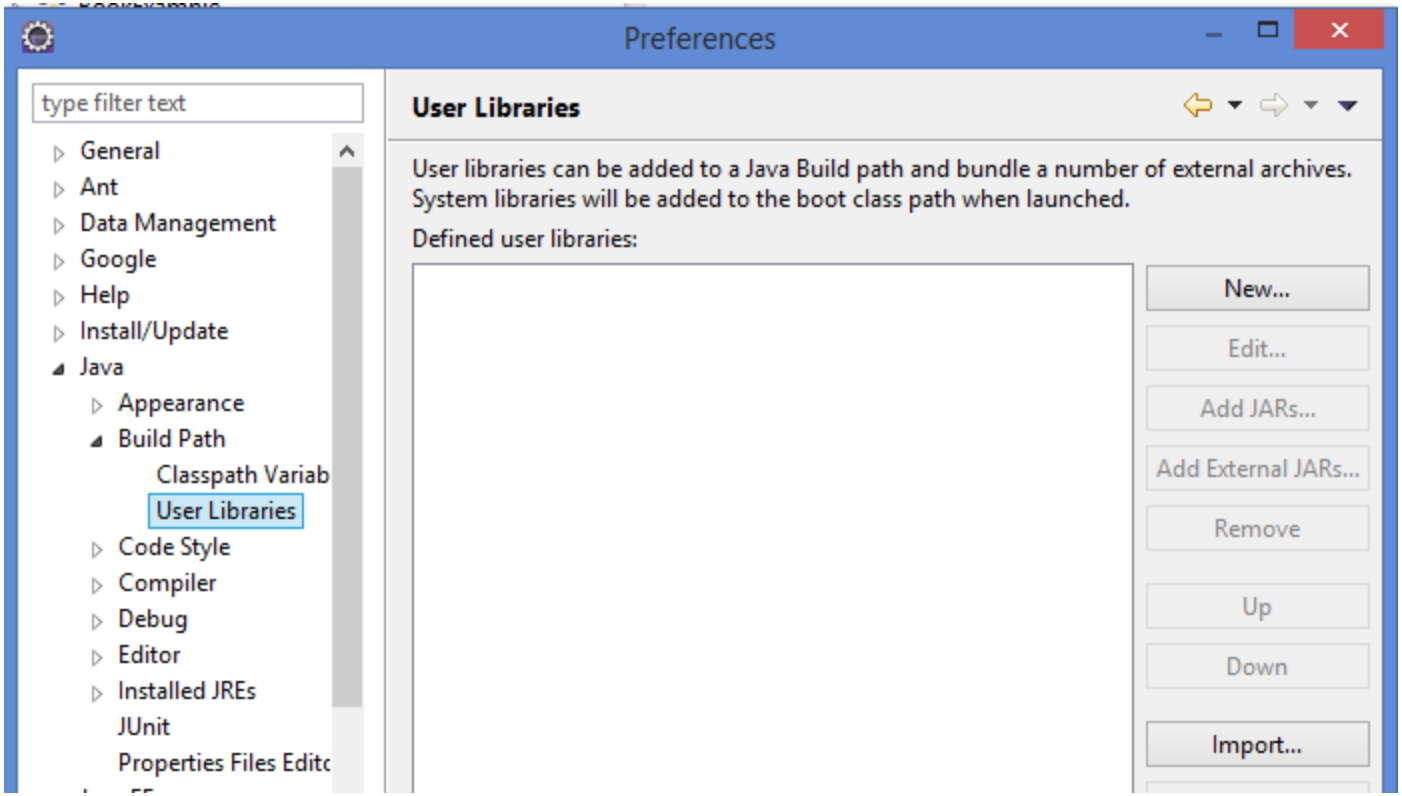
```
1  <!DOCTYPE html>
2  <html>
3  <body>
4      <h1>JAX-RS @FormQuery Testing</h1>
5
6      <form action="/hellorestgae/hello/form" method="post">
7          <p>
8              FirstName : <input type="text" name="lname" />
9          </p>
10         <p>
11             LastName : <input type="text" name="fname" />
12         </p>
13         <input type="submit" value="Submit" />
14     </form>
15
16 </body>
17 </html>
```

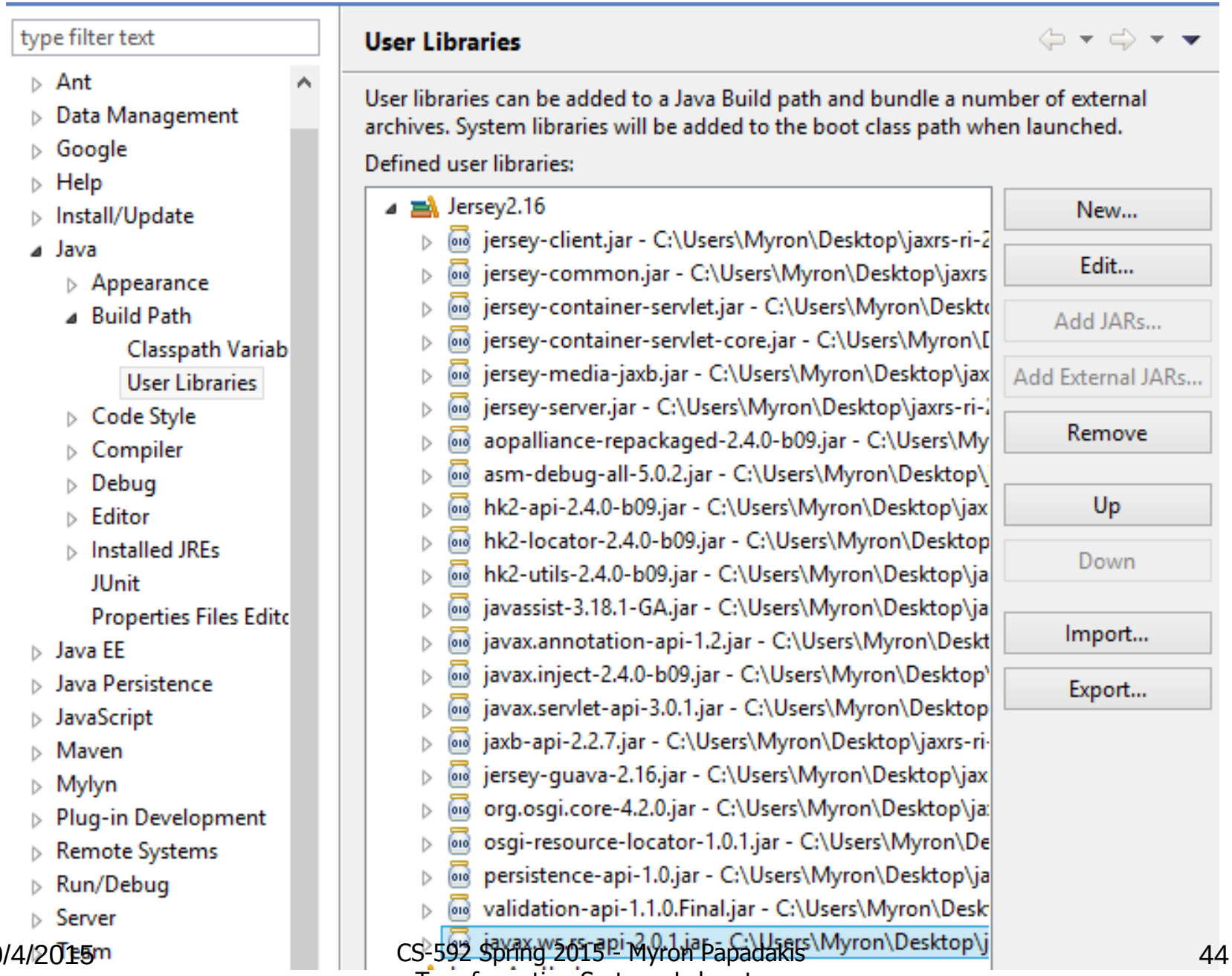
Configuration

- **Configuring the REST support in the application**
  - To be able to create and run REST services in your application you need to:
    Add the JAX-RS, JAXB Jars in your project and application
  - Configure the web application (web.xml) to handle REST requests
- **Add JAX-RS, JAXB to your project**
  Right click on the project and select menu entry **Build Path > Configure Build Path...**
- Click on the Add External JARs button
- Select all the JARs located in $JERSEY_HOME/lib and $JAXB_HOME/lib folders. You can for better visibility and reuse create a user library with all these JARs
- You also need to copy the JARs in the web-inf/lib directory of your application, this step is mandatory to be sure that the JARs are included in the application when deployed to App Engine.

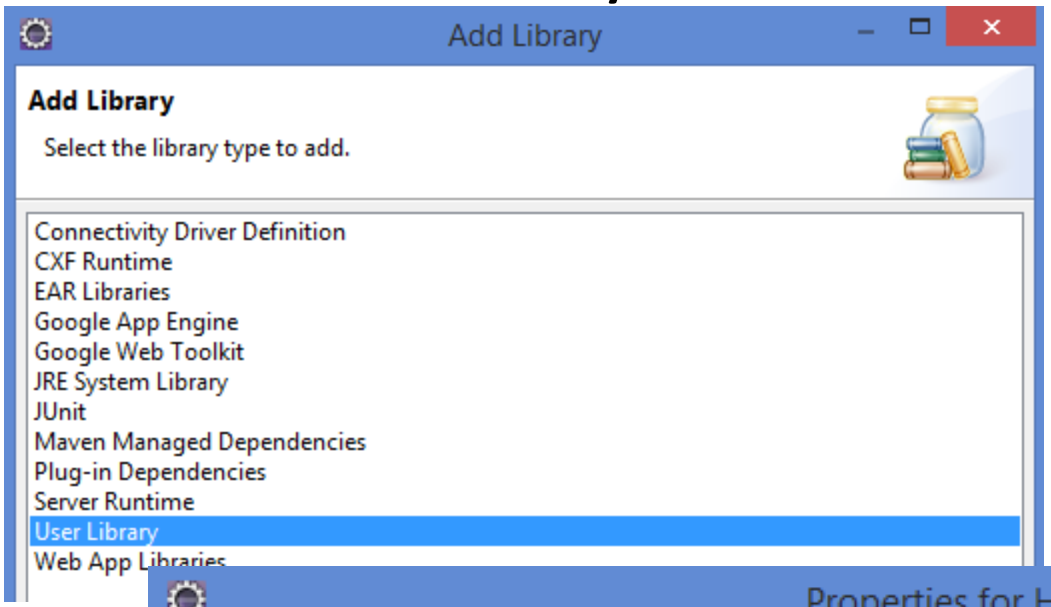
Create a user library for Jersey

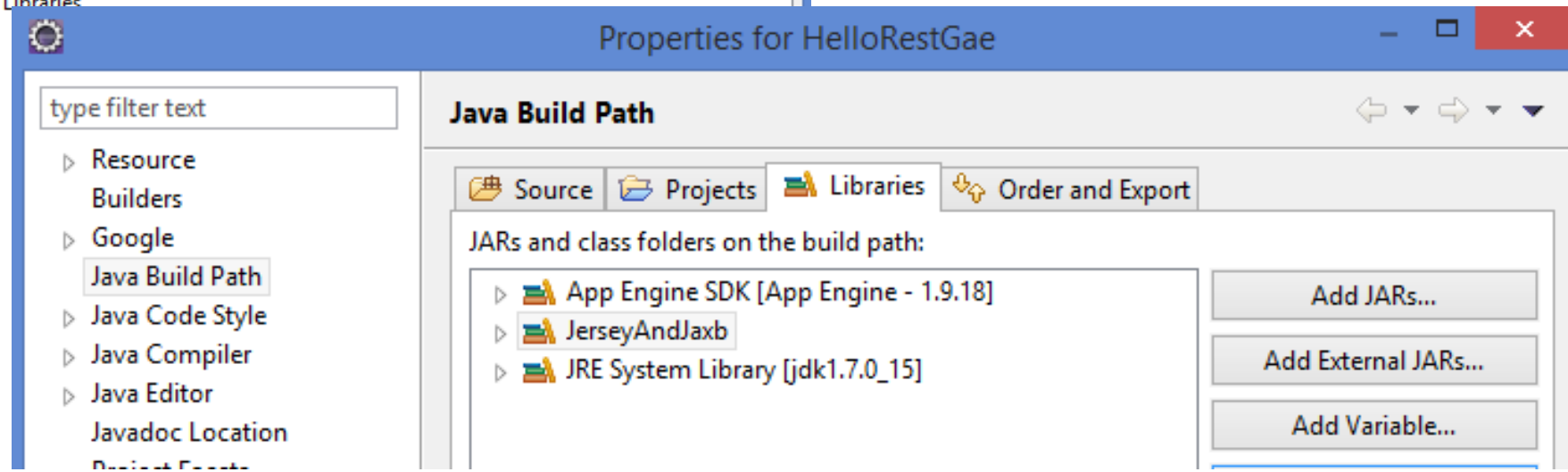
- Window > Preferences > Java > Build Path > User Libraries > New > .. Add External Jars > add the jersey jars




type filter text
Ant
Data Management
Google
Help
Install/Update
Java
Appearance
Build Path
Classpath Variab
User Libraries
Code Style
Compiler
Debug
Editor
Installed JREs
JUnit
Properties Files Editc
Java EE
Java Persistence
JavaScript
Maven
Mylyn
Plug-in Development
Remote Systems
Run/Debug
Server
User Libraries
User libraries can be added to a Java Build path and bundle a number of external archives. System libraries will be added to the boot class path when launched.
Defined user libraries:
Jersey2.16
jersey-client.jar - C:\Users\Myron\Desktop\jaxrs-ri-2
jersey-common.jar - C:\Users\Myron\Desktop\jaxrs
jersey-container-servlet.jar - C:\Users\Myron\Deskt
jersey-container-servlet-core.jar - C:\Users\Myron\D
jersey-media-jaxb.jar - C:\Users\Myron\Desktop\jax
jersey-server.jar - C:\Users\Myron\Desktop\jaxrs-ri-
aopalliance-repackaged-2.4.0-b09.jar - C:\Users\My
asm-debug-all-5.0.2.jar - C:\Users\Myron\Desktop\
hk2-api-2.4.0-b09.jar - C:\Users\Myron\Desktop\jax
hk2-locator-2.4.0-b09.jar - C:\Users\Myron\Desktop
hk2-utils-2.4.0-b09.jar - C:\Users\Myron\Desktop\ja
javassist-3.18.1-GA.jar - C:\Users\Myron\Desktop\ja
javax.annotation-api-1.2.jar - C:\Users\Myron\Deskt
javax.inject-2.4.0-b09.jar - C:\Users\Myron\Desktop\
javax.servlet-api-3.0.1.jar - C:\Users\Myron\Desktop
jaxb-api-2.2.7.jar - C:\Users\Myron\Desktop\jaxrs-ri
jersey-guava-2.16.jar - C:\Users\Myron\Desktop\jax
org.osgi.core-4.2.0.jar - C:\Users\Myron\Desktop\ja
osgi-resource-locator-1.0.1.jar - C:\Users\Myron\De
persistence-api-1.0.jar - C:\Users\Myron\Desktop\ja
validation-api-1.1.0.Final.jar - C:\Users\Myron\Desk
javax.ws.rs-api-2.0.1.jar - C:\Users\Myron\Desktop\j
New...
Edit...
Add JARs...
Add External JARs...
Remove
Up
Down
Import...
Export...

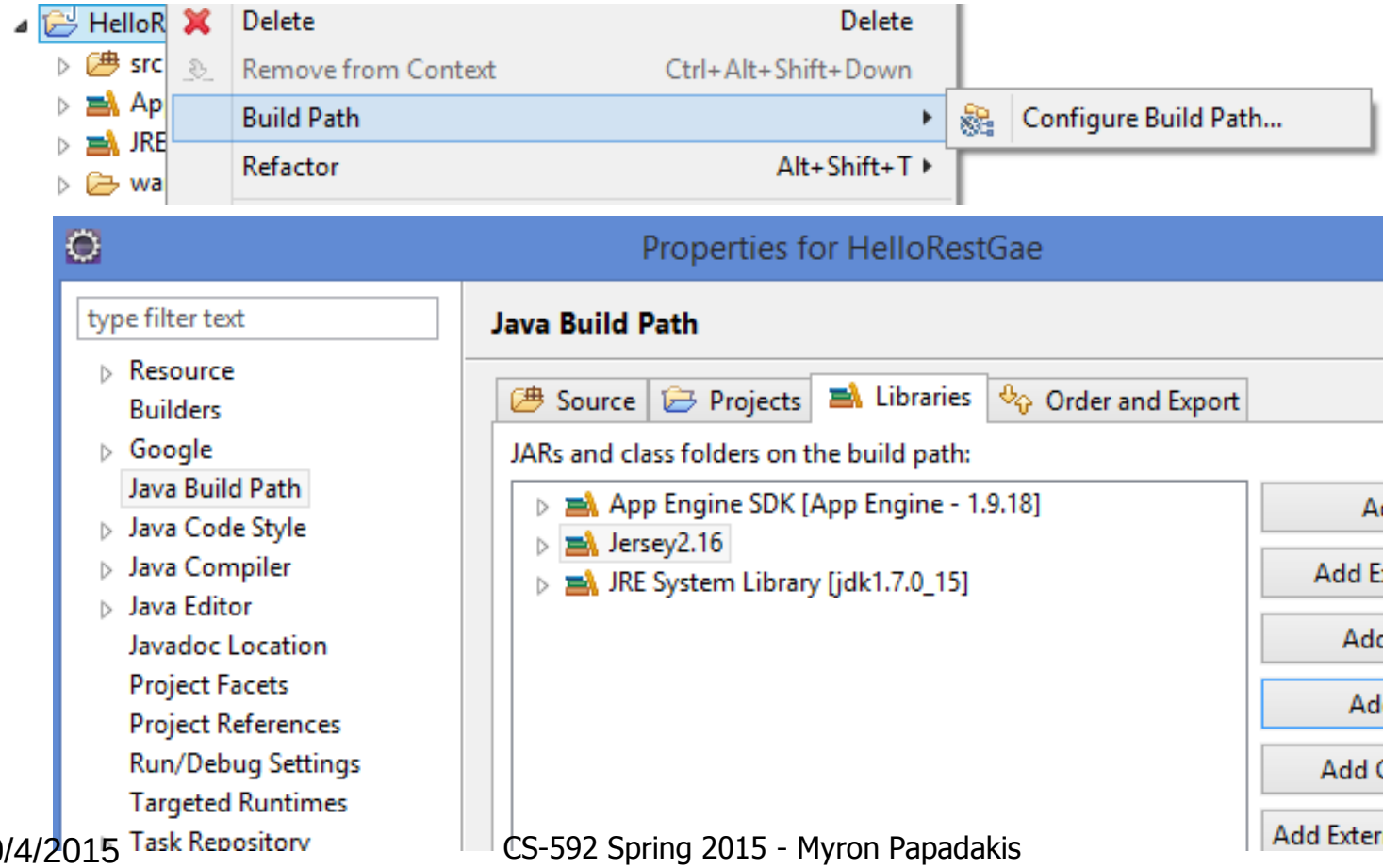
Library Loaded to build path

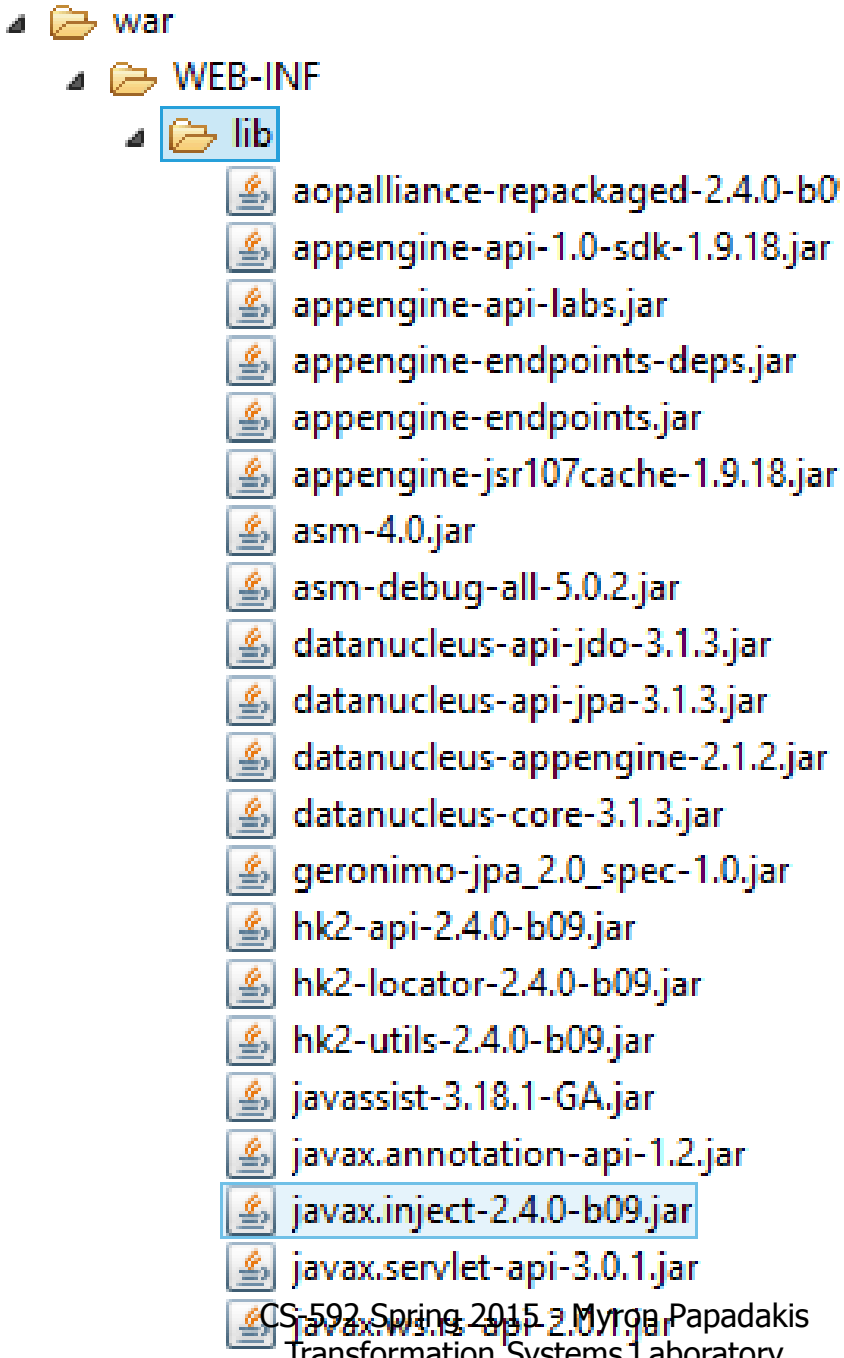




Configuring the build path

- You must also copy the jars to the lib folder




war
WEB-INF
lib
aopalliance-repackaged-2.4.0-b0
appengine-api-1.0-sdk-1.9.18.jar
appengine-api-labs.jar
appengine-endpoints-deps.jar
appengine-endpoints.jar
appengine-jsr107cache-1.9.18.jar
asm-4.0.jar
asm-debug-all-5.0.2.jar
datanucleus-api-jdo-3.1.3.jar
datanucleus-api-jpa-3.1.3.jar
datanucleus-appengine-2.1.2.jar
datanucleus-core-3.1.3.jar
geronimo-jpa_2.0_spec-1.0.jar
hk2-api-2.4.0-b09.jar
hk2-locator-2.4.0-b09.jar
hk2-utils-2.4.0-b09.jar
javassist-3.18.1-GA.jar
javax.annotation-api-1.2.jar
javax.inject-2.4.0-b09.jar
javax.servlet-api-3.0.1.jar

Configuration > Default generated xml file

web.xml

```xml
<?xml version="1.0" encoding="utf-8"?>
<web-app xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns="http://java.sun.com/xml/ns/javaee"
xmlns:web="http://java.sun.com/xml/ns/javaee/web-app_2_5.xsd"
xsi:schemaLocation="http://java.sun.com/xml/ns/javaee
http://java.sun.com/xml/ns/javaee/web-app_2_5.xsd" version="2.5">
    <servlet>
        <servlet-name>HelloRestGae</servlet-name>
        <servlet-class>mypackage.HelloRestGaeServlet</servlet-class>
    </servlet>
    <servlet-mapping>
        <servlet-name>HelloRestGae</servlet-name>
        <url-pattern>/hellorestgae</url-pattern>
    </servlet-mapping>
    <welcome-file-list>
        <welcome-file>index.html</welcome-file>
    </welcome-file-list>
</web-app>
```

Configuration > Modified web.xml

web.xml

```
1  <?xml version="1.0" encoding="utf-8"?>
2  <web-app xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
3  xmlns="http://java.sun.com/xml/ns/javaee"
4  xmlns:web="http://java.sun.com/xml/ns/javaee/web-app_2_5.xsd"
5  xsi:schemaLocation="http://java.sun.com/xml/ns/javaee
6  http://java.sun.com/xml/ns/javaee/web-app_2_5.xsd" version="2.5">
7      <servlet>
8          <servlet-name>HelloRestGae</servlet-name>
9          <servlet-class>org.glassfish.jersey.servlet.ServletContainer</servlet-class>
10         <init-param>
11             <param-name>jersey.config.server.provider.packages</param-name>
12             <param-value>mypackage</param-value>
13         </init-param>
14     </servlet>
15     <servlet-mapping>
16         <servlet-name>HelloRestGae</servlet-name>
17         <url-pattern>/hellorestgae/*</url-pattern>
18     </servlet-mapping>
19     <welcome-file-list>
20         <welcome-file>form.html</welcome-file>
21     </welcome-file-list>
22 </web-app>
```

- The configuration parameter jersey.config.server.provider.packages is used by Jersey to list the packages where REST services implementation are located.
- You can put as many package as you need to, you just need to separate the package names by a ;

Deploying the application to Google App Engine

- Before deploying the application you need
  - to register a new application in Google App Engine using the Administration Console (see next slide).
  - In my example I have used “cs592hello" as Application ID.

- You can easily now deploy the application to Google App Engine by clicking on the "Deploy App Engine Project" button available in the Eclipse toolbar.

- To be able to deploy your application to Google App Engine, you need to check that your application can be registered, the application ID is stored in the WEB-INF/lib/appengine-web.xml.

Deploying the application to Google App Engine > appengine.web-xml

- Has extra configuration file appengine-web.xml which specifies:
  - Name of application:
    - <application name>.appspot.com
  - Version of application
  - Logging
  - Enabling HTTP Sessions
  - Enabling SSL
  - System properties and environment variables
  - Differentiating between static and resource files
    - By default all files under /war directory are both resource and static files except .JSP and those under /WEB-INF

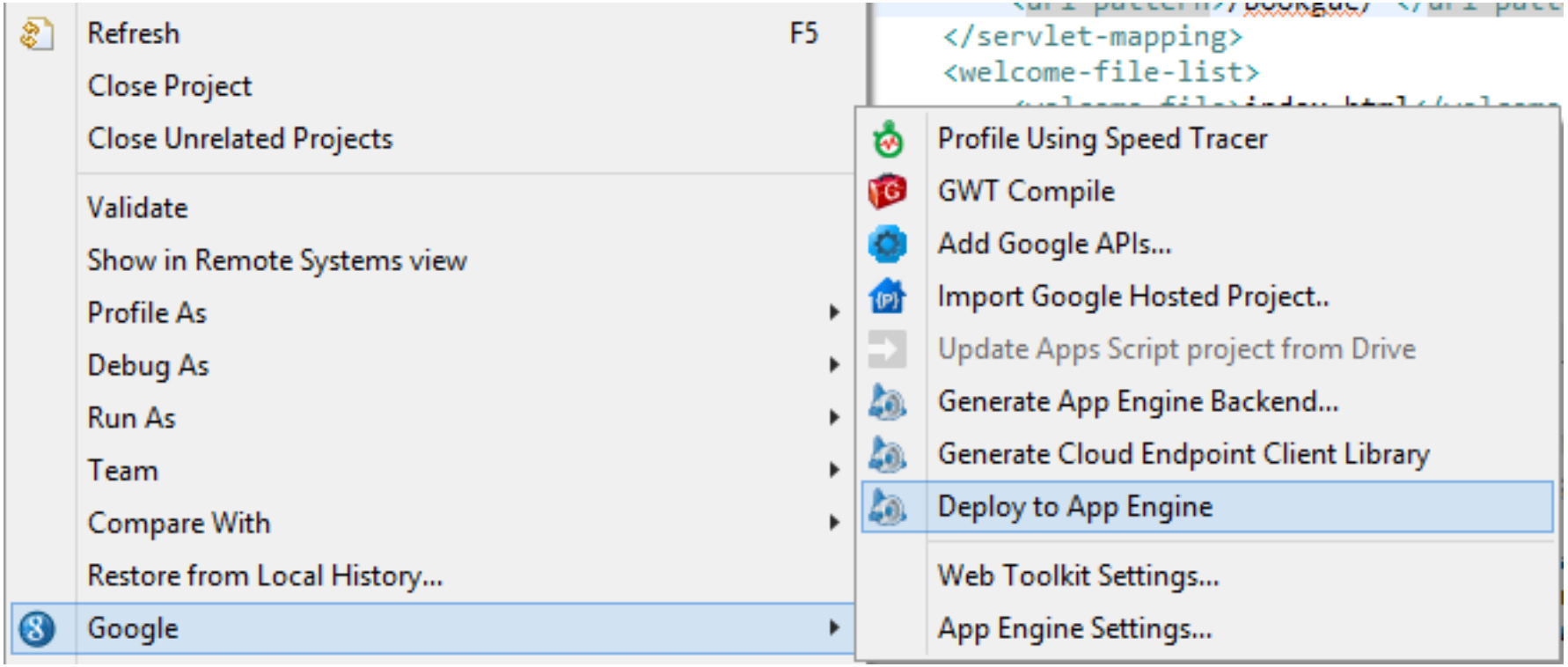
Deploying the application to Google App Engine > appengine.web-xml

web.xml | web.xml | appengine-web.xml

```
1  <?xml version="1.0" encoding="utf-8"?>
2  <appengine-web-app xmlns="http://appengine.google.com/ns/1.0">
3    <application>cs592hello</application>
4    <version>1</version>
5
6    <!--
7      Allows App Engine to send multiple requests to one instance in parallel:
8    -->
9    <threadsafe>true</threadsafe>
10
11   <!-- Configure java.util.logging -->
12   <system-properties>
13     <property name="java.util.logging.config.file" value="WEB-INF/logging.prop
14   </system-properties>
15
```

Deploying the application to Google App Engine

- Right click on the project



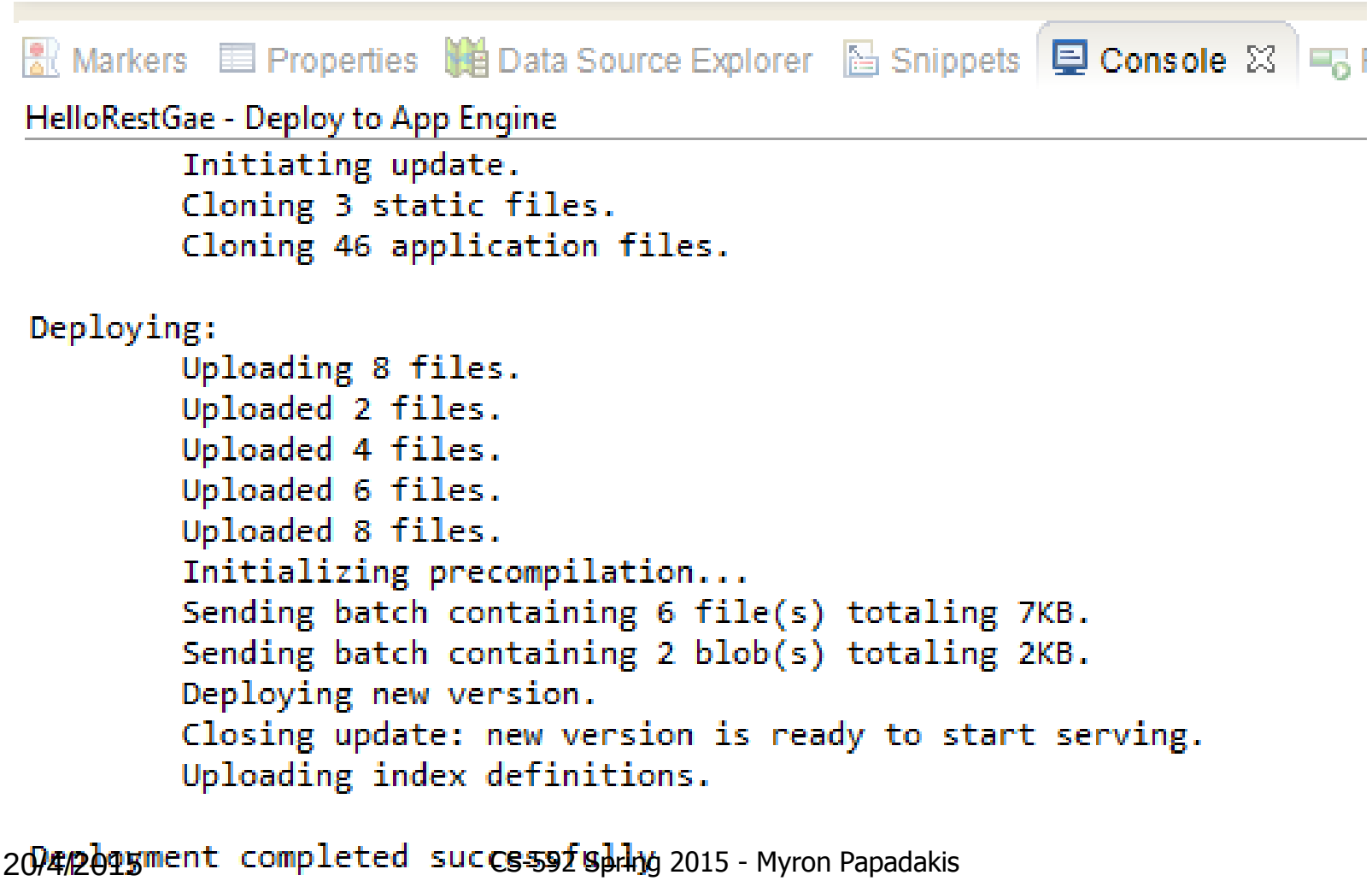
Deploying the application to Google App Engine > Credentials

- The App Engine deploy button prompts you for multiple informations:
  - username (your Google account) and password.

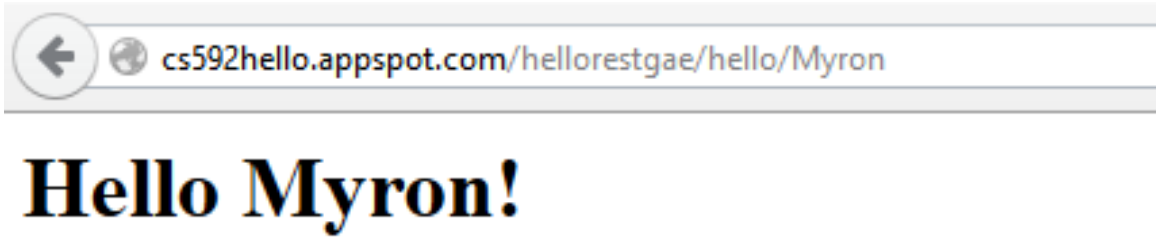
- When the deployment is complete you can access your application using the following URL: http://[your-application-id].appspot.com/url-pattern/resourcepath/methodpath

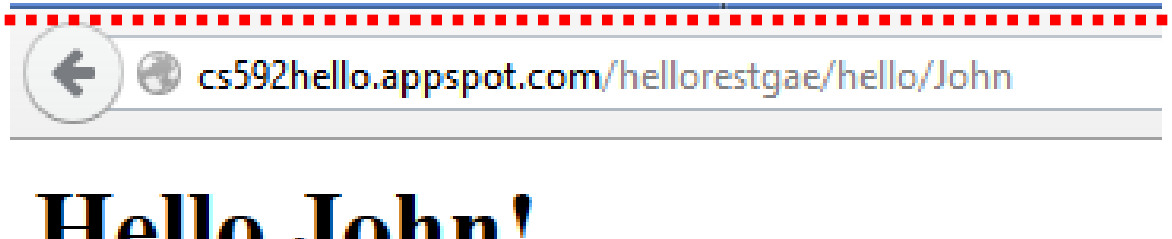
- http://cs592hello.appspot.com/hellorestgae/hello/Myron

Deploying and uploading…



GAE success ☺


cs592hello.appspot.com/hellorestgae/hello/Myron
Hello Myron!


cs592hello.appspot.com/hellorestgae/hello/John
Hello John!


cs592hello.appspot.com/hellorestgae/hello/query?name=myrpap
Hello myrpap!

GAE success ☺


cs592hello.appspot.com
JAX-RS @FormQuery Testing
FirstName : Myron
LastName : Papadakis
Submit
cs592hello.appspot.com/hellorestgae/hello/form
Hello Papadakis Myron!

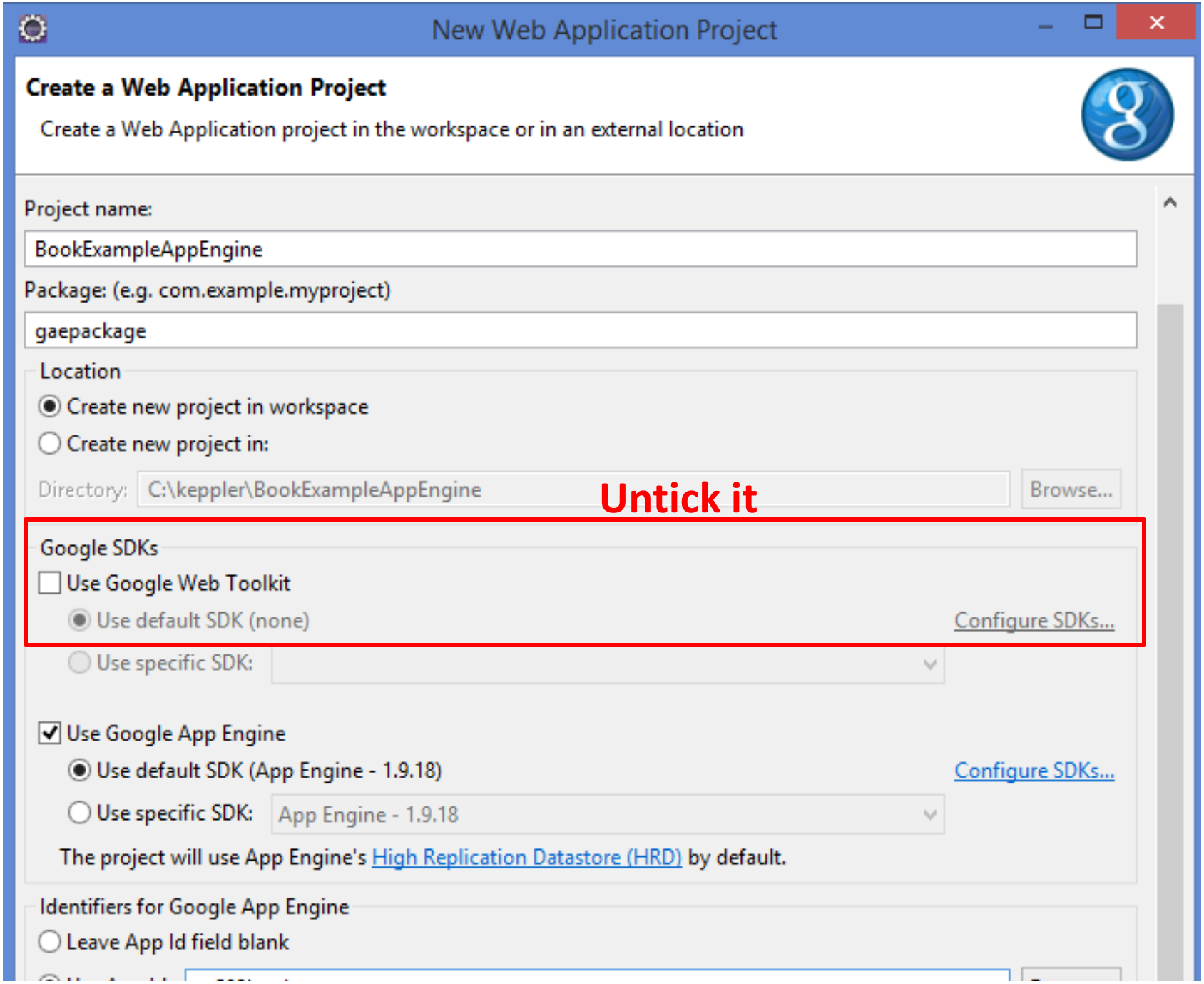
Book Example

Book Restful Web Service

- Remember the Book Example?
- See Assisting Lecture 7b to recall…
  - We have developed it in Netbeans…
  - Now we will develop it in Eclipse
- We want to deploy this example to the Google App Engine
- No need to modify existing Java code (packages etc)

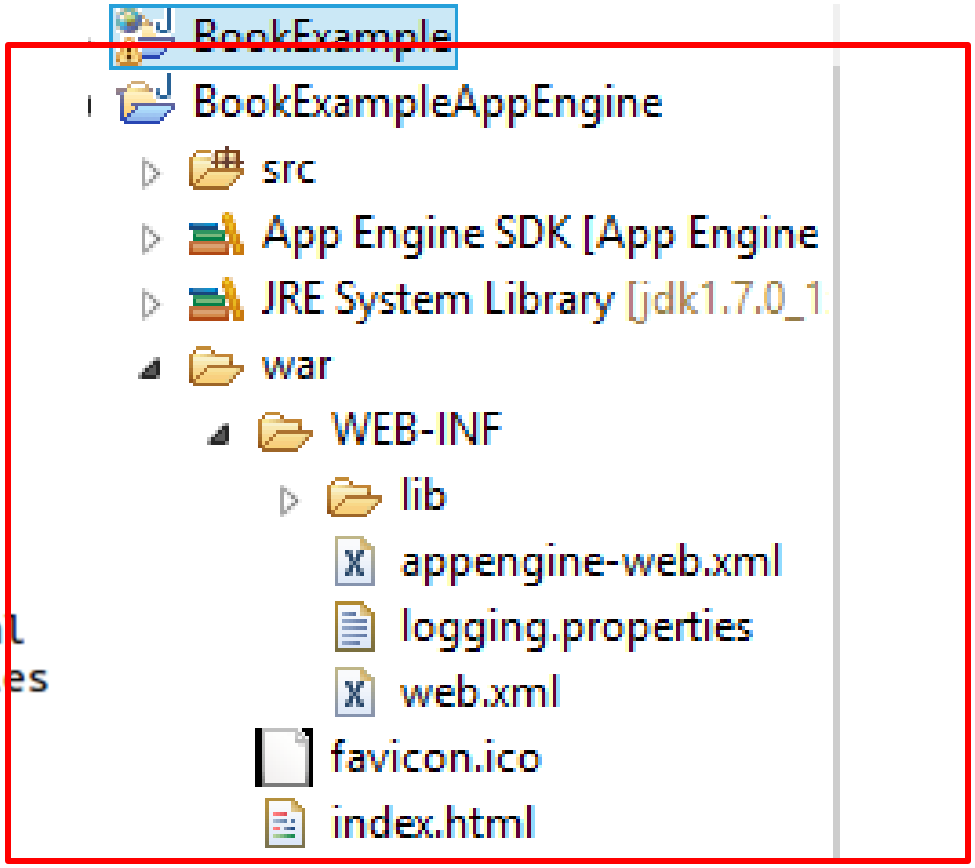
Book Restful Web Service

- For starters develop a Restful Service that
  - Returns all books
  - Returns a book with a given id
  - Adds a book
- Obviously we will need a structure for the books (list, map or whatever)
- Firstly, the Restful Web Service must create a dummy book
- Each book has
  - Id
  - Name
  - Author
  - Isbn
  - Price


New Web Application Project
Create a Web Application Project
Create a Web Application project in the workspace or in an external location
Project name:
BookExampleAppEngine
Package: (e.g. com.example.myproject)
gaepackage
Location
Create new project in workspace
Create new project in:
Directory:
C:\keppler\BookExampleAppEngine
Browse...
Untick it
Google SDKs
Use Google Web Toolkit
Use default SDK (none)
Configure SDKs...
Use specific SDK:
Use Google App Engine
Use default SDK (App Engine - 1.9.18)
Configure SDKs...
Use specific SDK:
App Engine - 1.9.18
The project will use App Engine's High Replication Datastore (HRD) by default.
Identifiers for Google App Engine
Leave App Id field blank

Creating the project

```
$ tree guestbook/
guestbook/
├── eclipse-launch-profiles
│   ├── DevAppServer.launch
│   └── UpdateApplication.launch
├── nbactions.xml
├── pom.xml
├── README.md
└── src
    ├── main
    │   ├── java
    │   └── webapp
    │       └── WEB-INF
    │           ├── appengine-web.xml
    │           ├── logging.properties
    │           └── web.xml
    └── test
```



*Book.java | BookResource.java | web.xml

```
1  package gaepackage;
2
3  import javax.xml.bind.annotation.XmlRootElement;
4
5
6  @XmlRootElement(name = "book")
7  public class Book {
8
9      private int id;
10     private String bookName;
11     private String bookAuthor;
12     private String bookISBN;
13     private double price;
14
15     public int getId() {
16         return id;
17     }
18
19     public void setId(int id) {
20         this.id = id;
21     }
22
23     public String getBookName() {
24         return bookName;
25     }
26
27     public void setBookName(String bookName) {
28         this.bookName = bookName;
29     }
30
31     public String getBookAuthor() {
32         return bookAuthor;
```

BookResource Class

Book.java | BookResource.java | web.xml

```
22   * myrpap@gmail.com
23   */
24  @Path("bookresource")
25  @Singleton
26  public class BookResource {
27
28      @Context
29      private UriInfo context;
30      private TreeMap<Integer, Book> bookMap = new TreeMap<Integer, Book>();
31
32      public BookResource() {
33          Book book = new Book();
34          book.setBookAuthor("Bhaveh Thaker");
35          book.setBookName("Introduction to RESTful Web Services");
36          book.setBookISBN("ISBN 10: 0-596-52926-0");
37          addBook(book);
38      }
39
40      @GET
41      @Path("books")
42      @Produces(MediaType.APPLICATION_XML)
43      public List<Book> getBooks() {
```

BookResource Class

```
@GET
@Path("books")
@Produces(MediaType.APPLICATION_XML)
public List<Book> getBooks() {
    List<Book> books = new ArrayList<Book>();
    books.addAll(bookMap.values());
    return books;
}

@GET
@Path("{id}")
public Book getBook(@PathParam("id") int bookId) {
    return bookMap.get(bookId);
}

@POST
@Path("add")
public String addBook(Book book) {
    int id = bookMap.size();
```

```
@POST
@Path("add")
public String addBook(Book book) {
    int id = bookMap.size();
    if (book == null) {
        return "Book is null";
    } else {
        book.setId(id);
        bookMap.put(id, book);
        return "Book \"" + book.getBookName() + "\" added with Id "
                + id + " size=" + bookMap.size();
    }

}
@DELETE
@Path("delete/{delId}")
public String deleteBook(@PathParam("delId") int bookid) {
    if (bookMap.containsKey(bookid)) {
        bookMap.remove(bookid);
        return "Book successfully deleted";
    } else {
        return "No such key";
    }
}

@PUT
@Path("update/{bookid}/{price}")
public String updateBook(@PathParam("bookid") int bookid,
        @PathParam("price") double price ) {
```

Configuration > Default generated xml file

web.xml

```
1  <?xml version="1.0" encoding="utf-8"?>
2  <web-app xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
3  xmlns="http://java.sun.com/xml/ns/javaee"
4  xmlns:web="http://java.sun.com/xml/ns/javaee/web-app_2_5.xsd"
5  xsi:schemaLocation="http://java.sun.com/xml/ns/javaee
6  http://java.sun.com/xml/ns/javaee/web-app_2_5.xsd" version="2.5">
7      <servlet>
8          <servlet-name>BookExampleAppEngine</servlet-name>
9          <servlet-class>gaepackage.BookExampleAppEngineServlet</servlet-class>
10     </servlet>
11     <servlet-mapping>
12         <servlet-name>BookExampleAppEngine</servlet-name>
13         <url-pattern>/bookexampleappengine</url-pattern>
14     </servlet-mapping>
15     <welcome-file-list>
16         <welcome-file>index.html</welcome-file>
17     </welcome-file-list>
18 </web-app>
```

Configuration > Modified web.xml

web.xml | web.xml | BookResource.java | persistence.xml

```
1  <?xml version="1.0" encoding="utf-8"?>
2  <web-app xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance
3  xmlns="http://java.sun.com/xml/ns/javaee"
4  xmlns:web="http://java.sun.com/xml/ns/javaee/web-app_2_5.xsd"
5  xsi:schemaLocation="http://java.sun.com/xml/ns/javaee
6  http://java.sun.com/xml/ns/javaee/web-app_2_5.xsd" version="2
7      <servlet>
8          <servlet-name>BookExampleAppEngine</servlet-name>
9          <servlet-class>org.glassfish.jersey.servlet.ServletCo
10         <init-param>
11             <param-name>jersey.config.server.provider.package
12             <param-value>gaepackage</param-value>
13         </init-param>
14     </servlet>
15     <servlet-mapping>
16         <servlet-name>BookExampleAppEngine</servlet-name>
17         <url-pattern>/bookgae/*</url-pattern>
18     </servlet-mapping>
19     <welcome-file-list>
20         <welcome-file>index.html</welcome-file>
21     </welcome-file-list>
22 </web-app>
23
```

- This servlet that will answer all request the /bookgae/* URL and redirect them to classes representing RESTfull services
- The configuration parameter com.sun.jersey.config.property.packages is used by Jersey to list the packages where REST services implementation are located.
- You can put as many package as you need to, you just need to separate the package names by a ;
- You do not need the welcome file too (since you will not use a servlet)

Optional (If you want to use servlets)

```
<servlet>
    <servlet-name>BookExampleAppEngineServlet</servlet-name>
    <servlet-class>gaepackage.BookExampleAppEngineServlet</servlet-class>
</servlet>
<servlet-mapping>
    <servlet-name>BookExampleAppEngineServlet</servlet-name>
    <url-pattern>/BookExampleAppEngineServlet</url-pattern>
</servlet-mapping>
```

```
<!-- but

<html>
  <head>
    <meta http-equiv="content-type" content="text/html; charset=UTF-8">
    <title>Hello App Engine</title>
  </head>

  <body>
    <h1>Hello App Engine!</h1>

    <table>
      <tr>
        <td colspan="2" style="font-weight:bold;">Available Servlets:</td>
      </tr>
      <tr>
        <td><a href="BookExampleAppEngineServlet">BookExampleAppEngine</a></td>
      </tr>
    </table>
  </body>
</html>
```

Deploying the application to Google App Engine

- Before deploying the application you need
  - to register a new application in Google App Engine using the Administration Console (see next slide).
  - In my example I have used "**cs592book**" as Application ID.

- You can easily now deploy the application to Google App Engine by clicking on the "Deploy App Engine Project" button available in the Eclipse toolbar.

- To be able to deploy your application to Google App Engine, you need to check that your application can be registered, **the application ID is stored in the WEB-INF/lib/appengine-web.xml.**

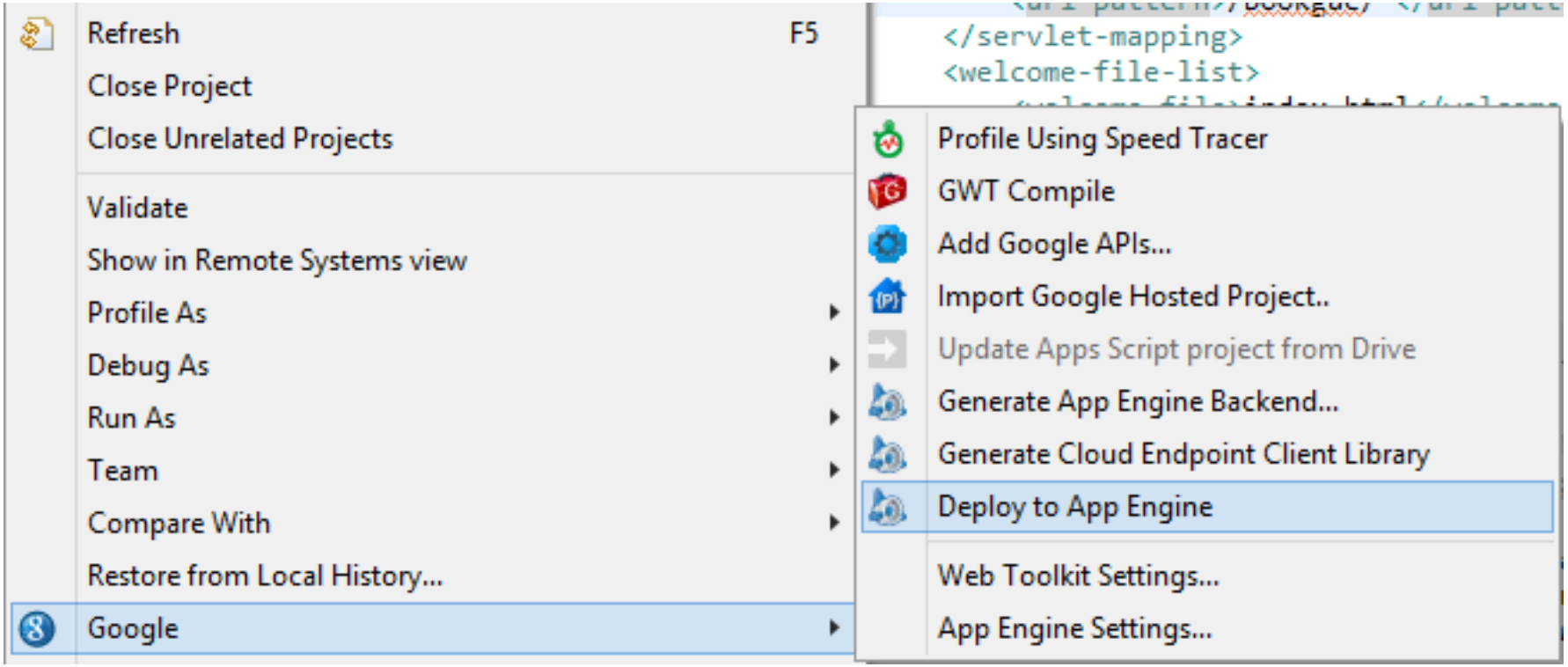
Deploying the application to Google App Engine > appengine.web-xml

main.js | Tomcat v7.0... | web.xml | BookResource... | appengine-we...

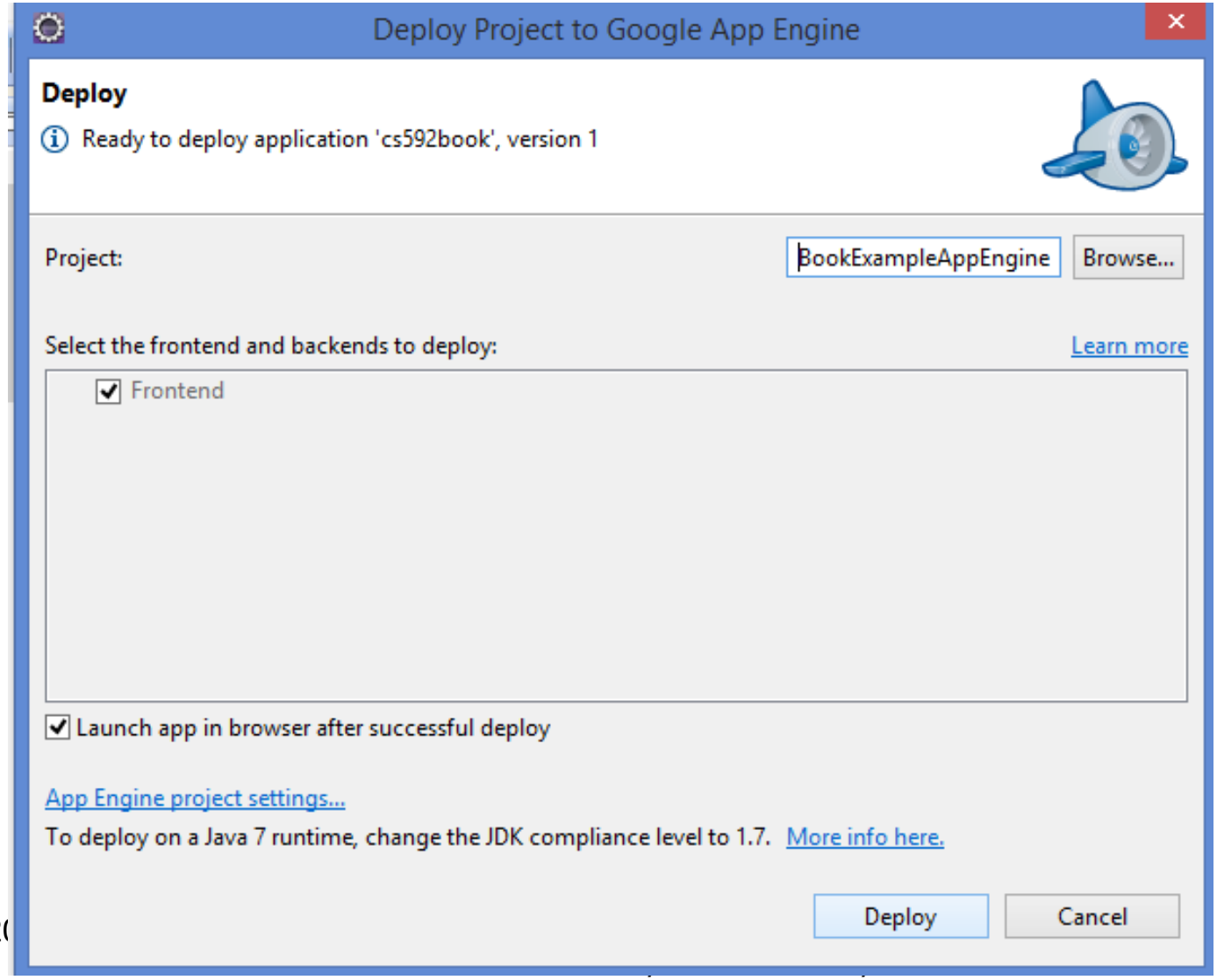
```
1  <?xml version="1.0" encoding="utf-8"?>
2  <appengine-web-app xmlns="http://appengine.google.com/ns/1.0">
3    <application>cs592book</application>
4    <version>1</version>
5
6    <!--
7      Allows App Engine to send multiple requests to one instance in parallel:
8    -->
9    <threadsafe>true</threadsafe>
10
11   <!-- Configure java.util.logging -->
12   <system-properties>
13     <property name="java.util.logging.config.file" value="WEB-INF/logging.properties"/>
14   </system-properties>
15
16   <!--
17     HTTP Sessions are disabled by default. To enable HTTP sessions specify:
18
19       <sessions-enabled>true</sessions-enabled>
20
21     It's possible to reduce request latency by configuring your application to
22     asynchronously write HTTP session data to the datastore:
23
24       <async-session-persistence enabled="true" />
25
```

Deploying the application to Google App Engine

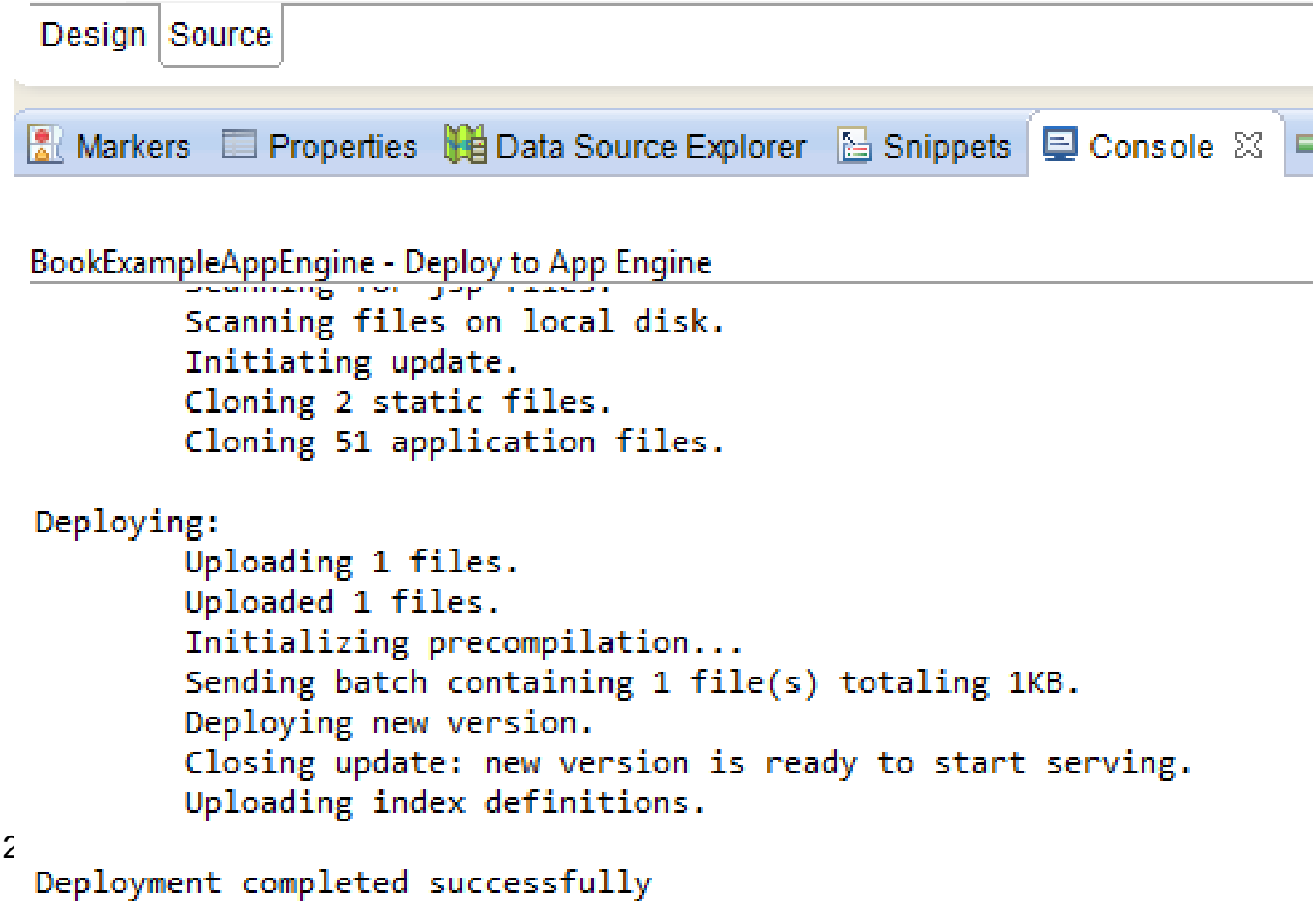
- Right click on the project



Deploying the application to Google App Engine

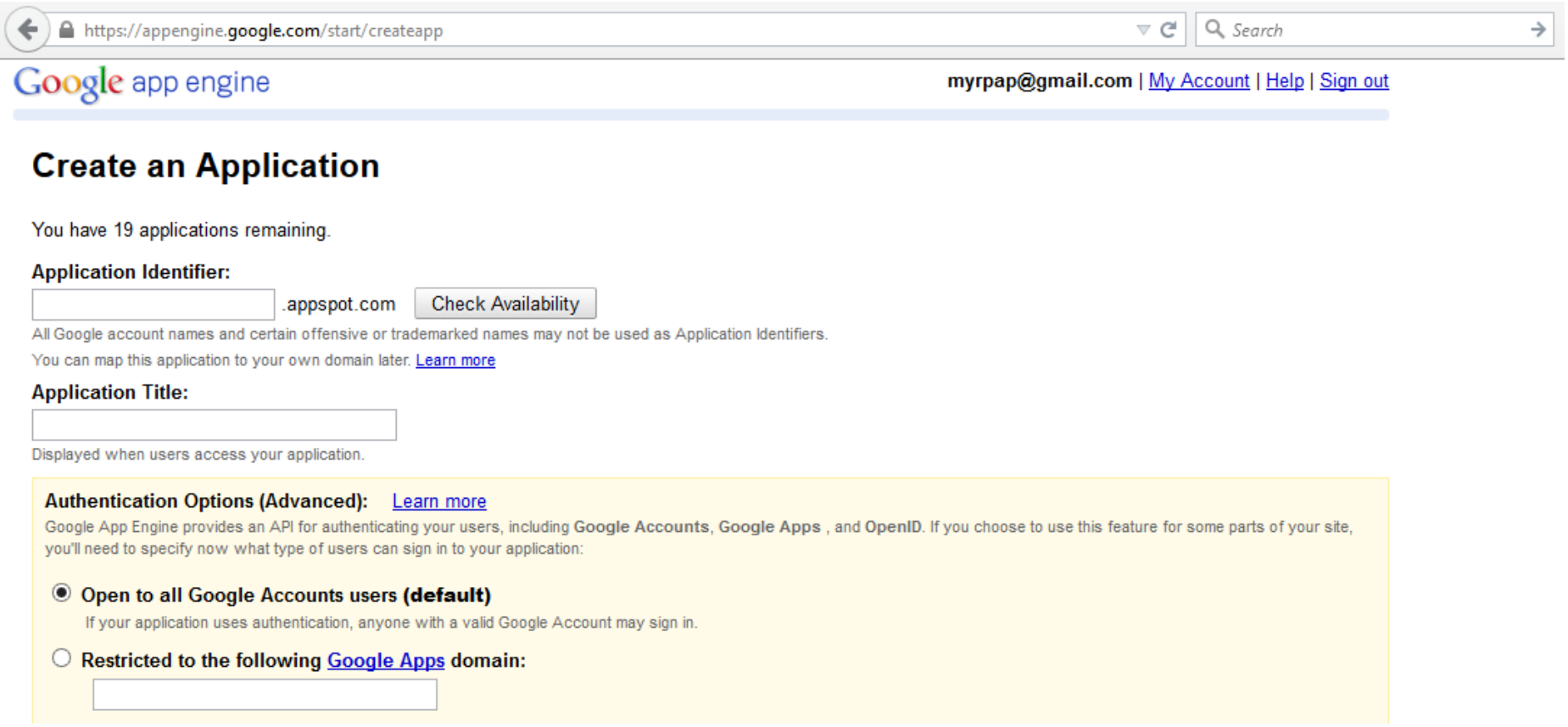


Deploying the application to Google App Engine > Uploading



Google App Engine > Create Application

25 Applications for free ☺

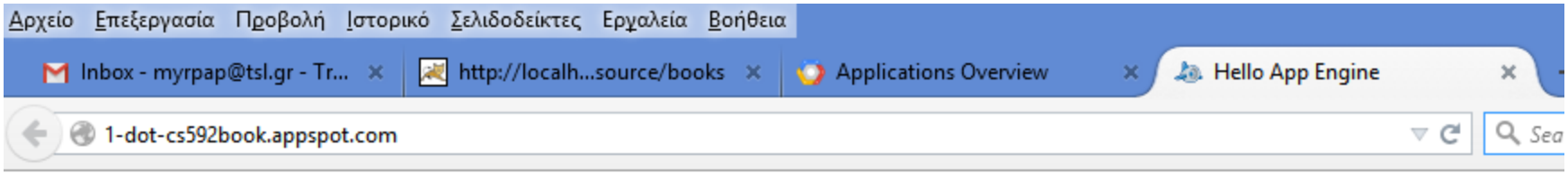


Deploying the application to Google App Engine > Credentials

- The App Engine deploy button prompts you for multiple informations:
  - username (your Google account) and password.

- When the deployment is complete you can access your application using the following URL: http://[your-application-id].appspot.com/url-pattern/resourcepath/methodpath

- http://cs592book.appspot.com/bookgae/bookresource/books

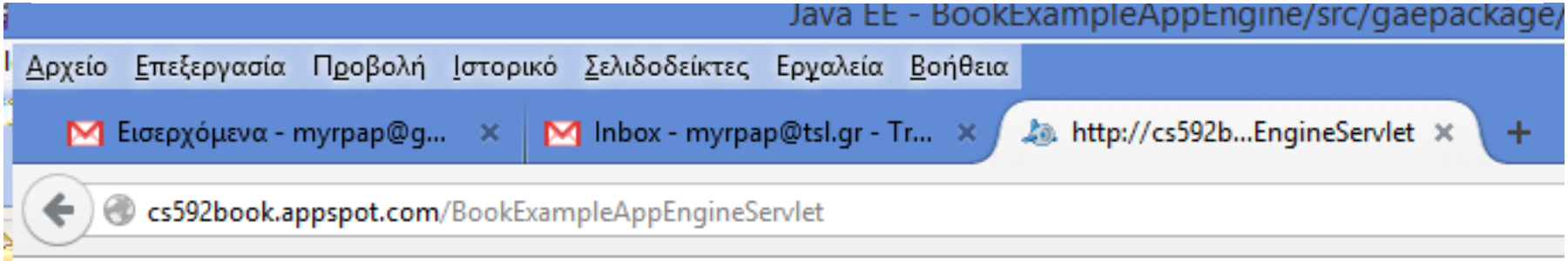


Hello App Engine!

Available Servlets:

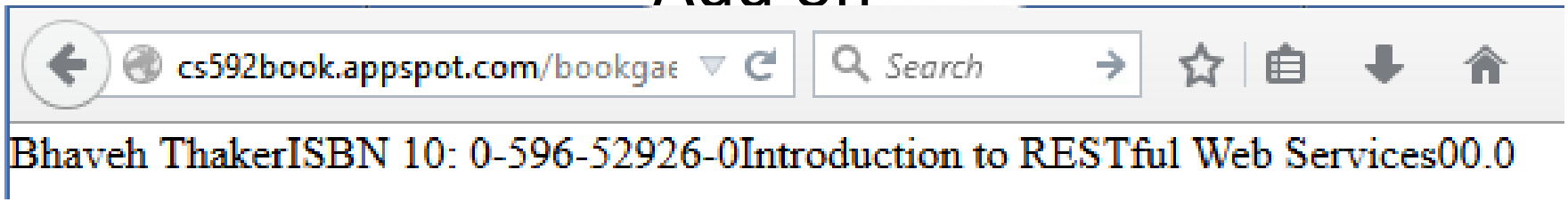
BookExampleAppEngine

Initial page as set from the index.html (which is the welcome file)

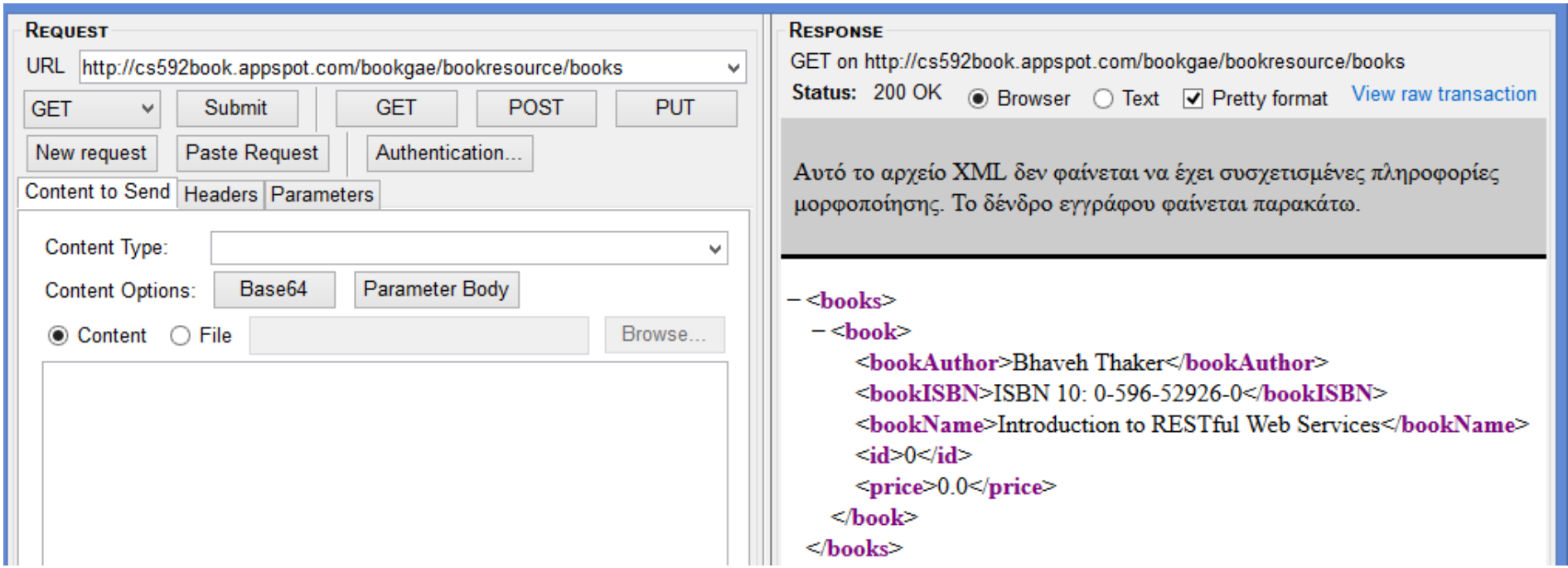



```
1  package gaepackage;
2
3  import java.io.IOException;
5
6  @SuppressWarnings("serial")
7  public class BookExampleAppEngineServlet extends HttpServlet {
8      public void doGet(HttpServletRequest req, HttpServletResponse resp)
9              throws IOException {
10         resp.setContentType("text/plain");
11         resp.getWriter().println("Hello, world");
12     }
13 }
14
```

Testing on HttpRequester Mozilla Add on

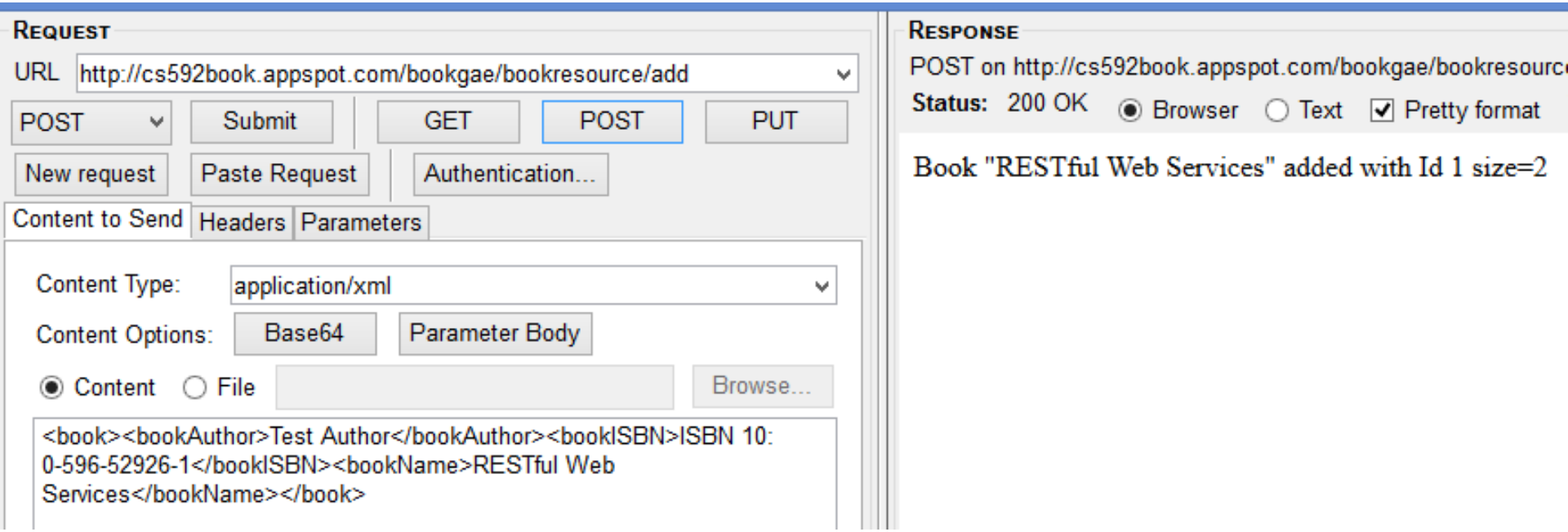


- http://cs592book.appspot.com/bookgae/bookresource/books



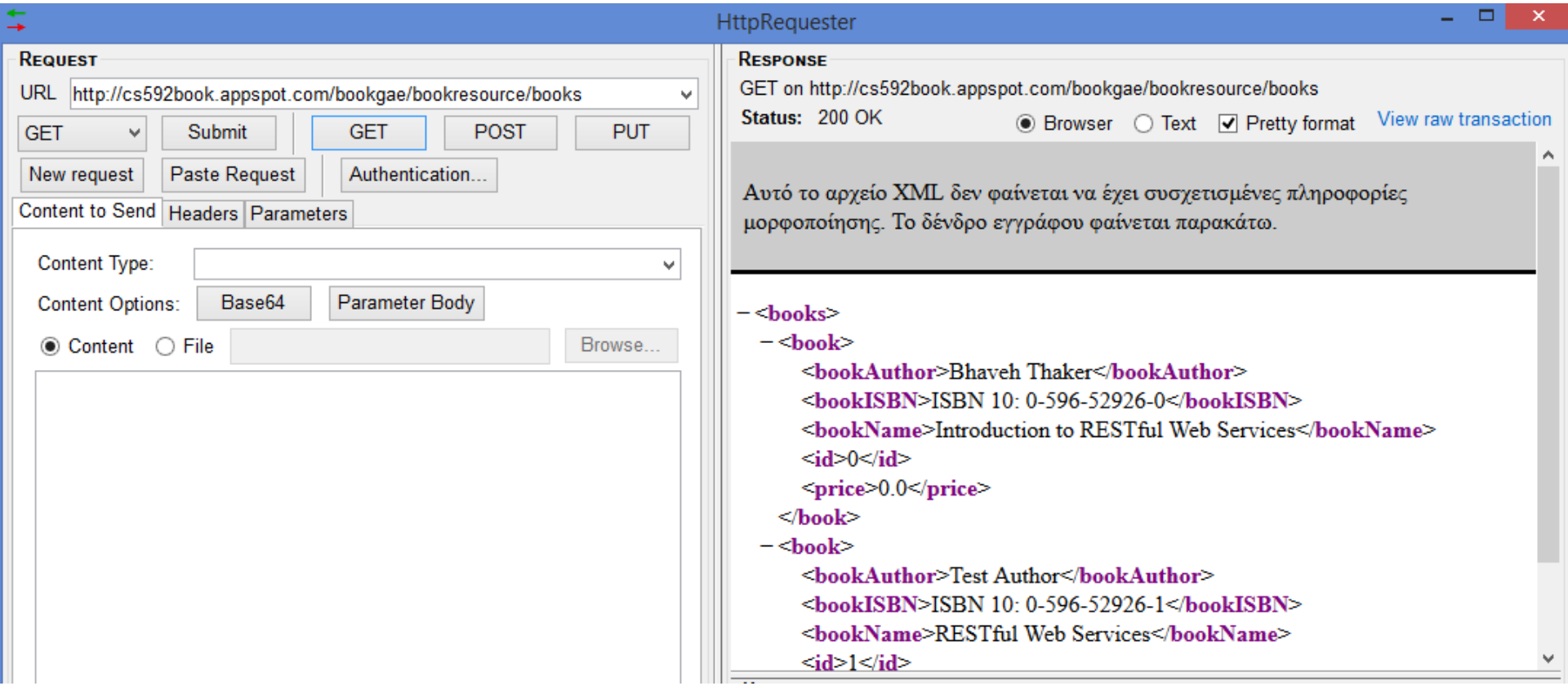
Post Example

- Post a Book (in XML format)



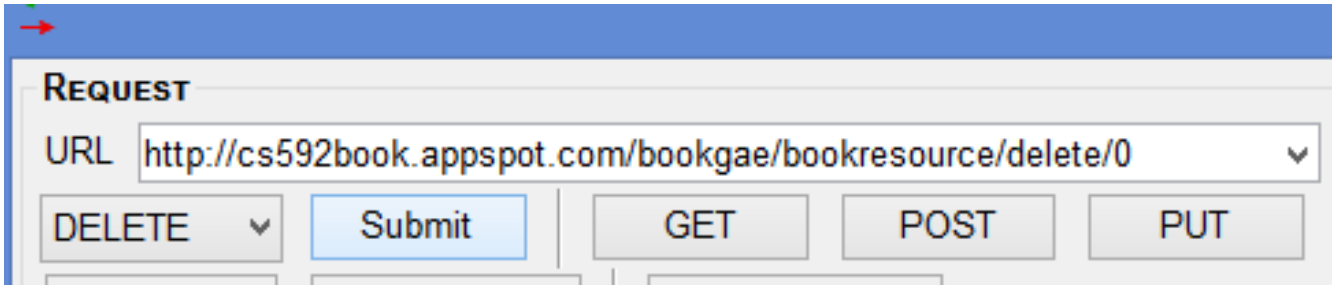
Get Example > Book is added

- The second book has been added successfully

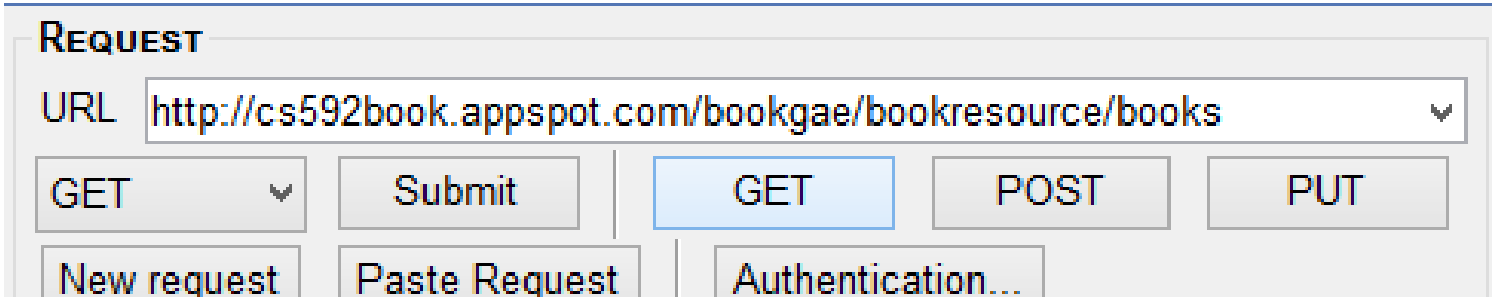


Delete a book

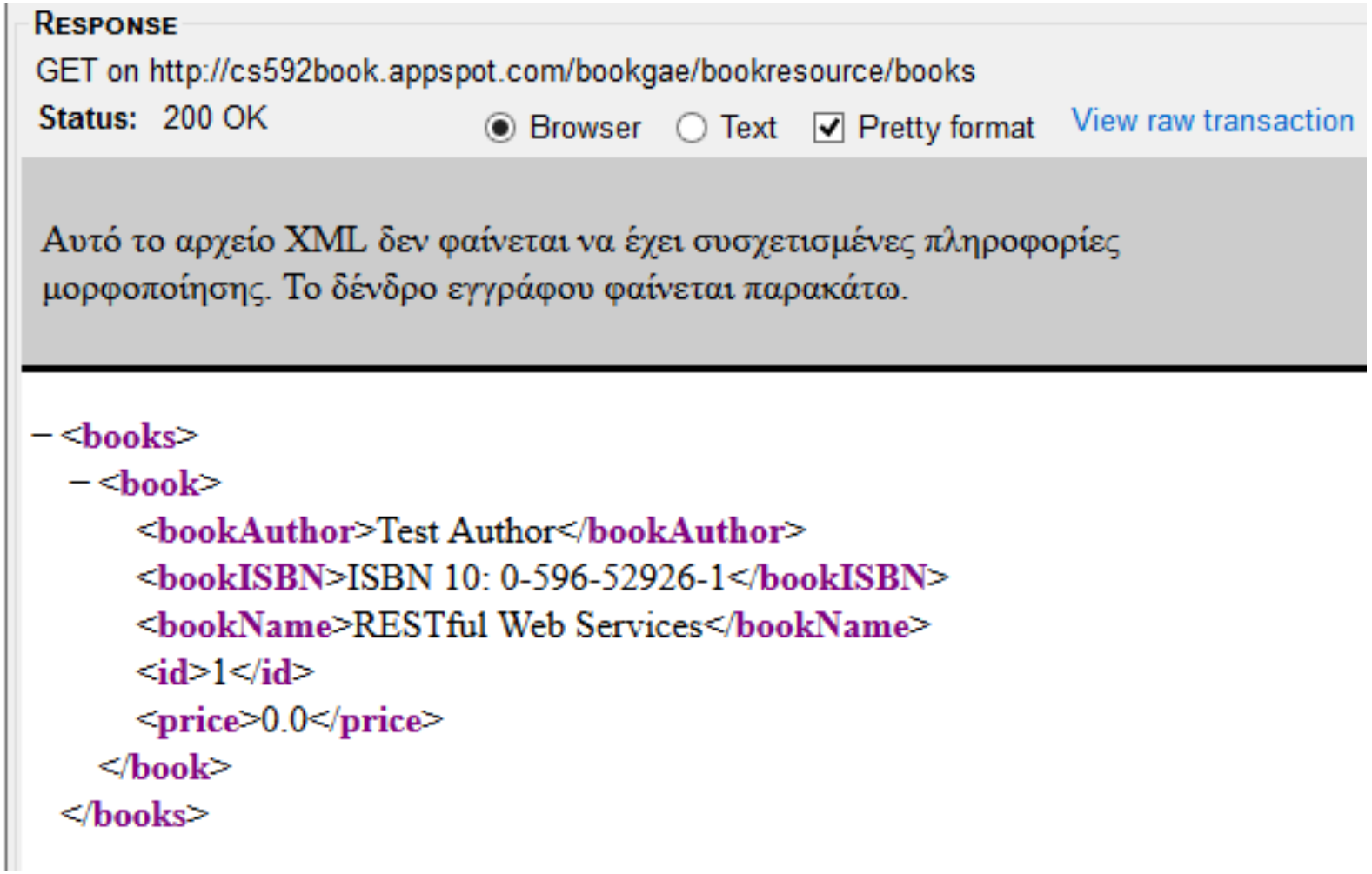
- Delete the first book



- Get back all books (to check if deleted)



Get books (after deletion)



Google Gson


google-gson
A Java library to convert JSON to Java objects and vice-versa

GSON

- Gson is a Java library that can be used
  - to convert Java Objects into their JSON representation.
  - It can also be used to convert a JSON string to an equivalent Java object.

    https://code.google.com/p/google-gson/

    http://www.studytrails.com/java/json/java-google-json-introduction.jsp

Gson Example (for Book)

```
1  package gson;
2
3  import com.google.gson.Gson;
4  import gaepackage.Book;
5
6  public class GSONDemo {
7
8      public static void convertJavaToJSON(){
9          Book book = new Book();
.0         book.setBookAuthor("Bhaveh Thaker");
.1         book.setBookName("Introduction to RESTful Web Services");
.2         book.setBookISBN("ISBN 10: 0-596-52926-0");
.3         Gson gson = new Gson();
.4         System.out.println(gson.toJson(book));
.5     }
.6     public static void convertJSONtoJava(){
.7         Gson gson = new Gson();
.8
.9         System.out.println(
!0 gson.fromJson("{'id':1,'bookName':'RESTful Java Web Services','bookAuth
!1         Book.class));
!2     }
```

Gson Example (for Book)

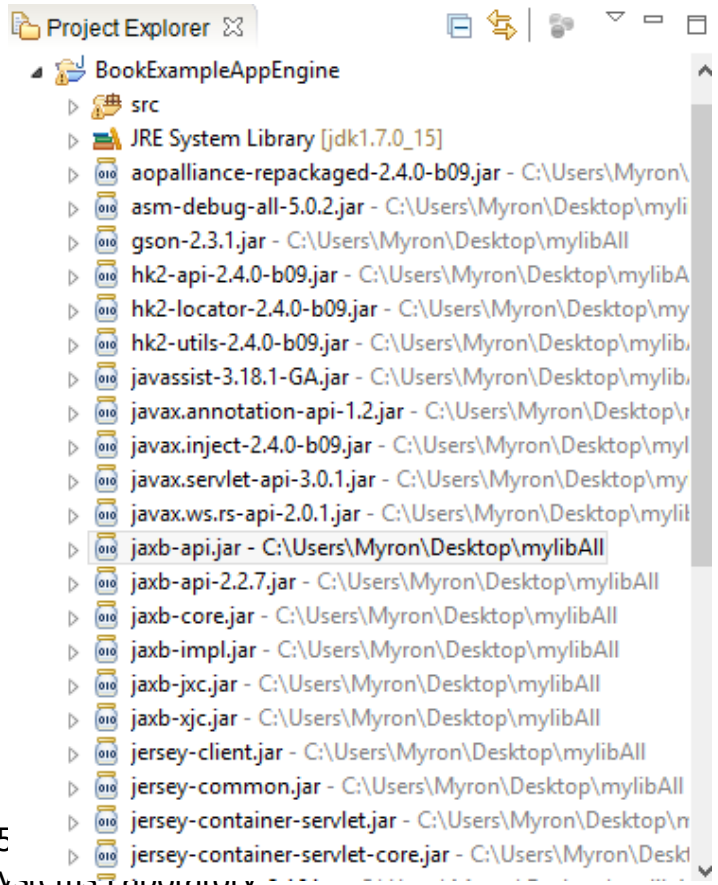
```
23    public static void main(String[] args) {
24        convertJavaToJSON();
25        convertJSONtoJava();
```

Markers | Properties | Data Source Explorer | Snippets | Console | Progress | Remote Systems | His

```
<terminated> GSONDemo [Java Application] C:\Program Files\Java\jdk1.7.0_15\bin\javaw.exe (18 Απρ 2015 - 10:51:33 π.μ.)
{"id":0,"bookName":"Introduction to RESTful Web Services","bookAuthor":"Bhaveh Thaker","bookISBN":"IS
Book [id=1, bookName=RESTful Java Web Services, bookAuthor=bookISBN,bookISBN=1847196462, price=50.0]
```

Add Gson Code

- Right click on project->Property->java build path->Add jars and then go to src->jars->gson-2.3.1.jar.

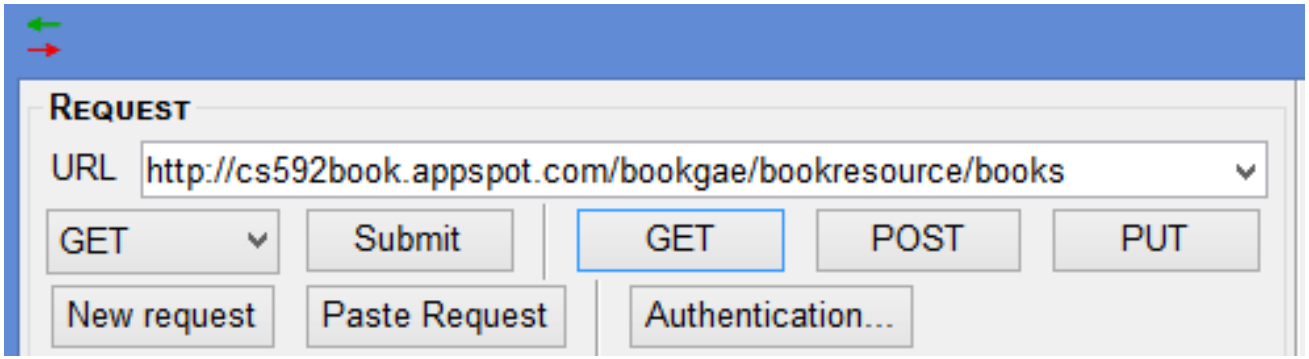


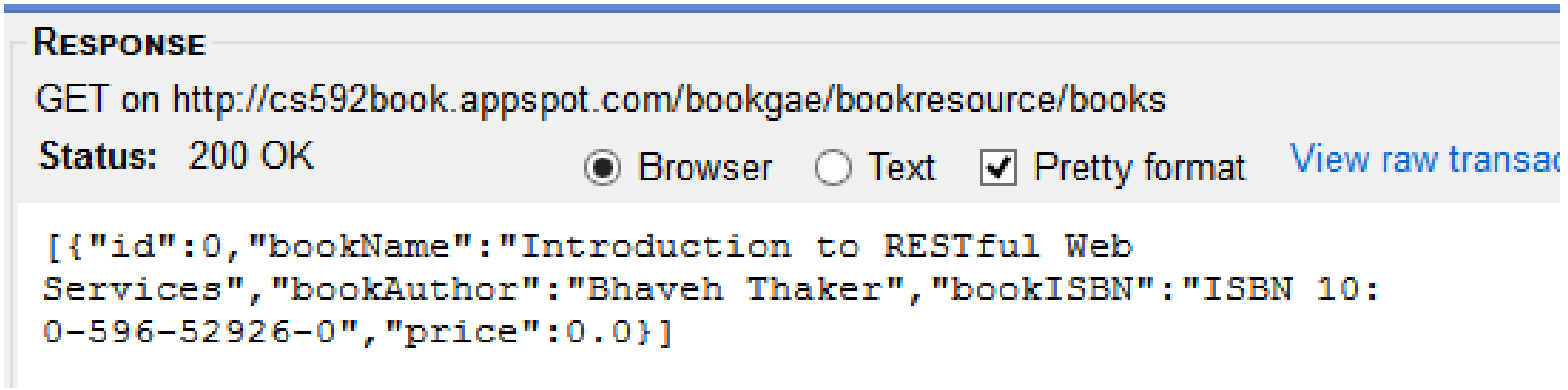
BookExample with GSON > get all books

```
private TreeMap<Integer, Book> bookMap = new TreeMap<Integer, Book>();

public BookResource() {
    Book book = new Book();
    book.setBookAuthor("Bhaveh Thaker");
    book.setBookName("Introduction to RESTful Web Services");
    book.setBookISBN("ISBN 10: 0-596-52926-0");
    addBook(book);

}

@GET
@Path("books")
@Produces(MediaType.APPLICATION_JSON)
public String getBooks() {
    List<Book> books = new ArrayList<Book>();
    books.addAll(bookMap.values());
    Gson gson = new Gson();
    String jsonArray = gson.toJson(books);
    return jsonArray;
}
```

BookExample with GSON > get all books

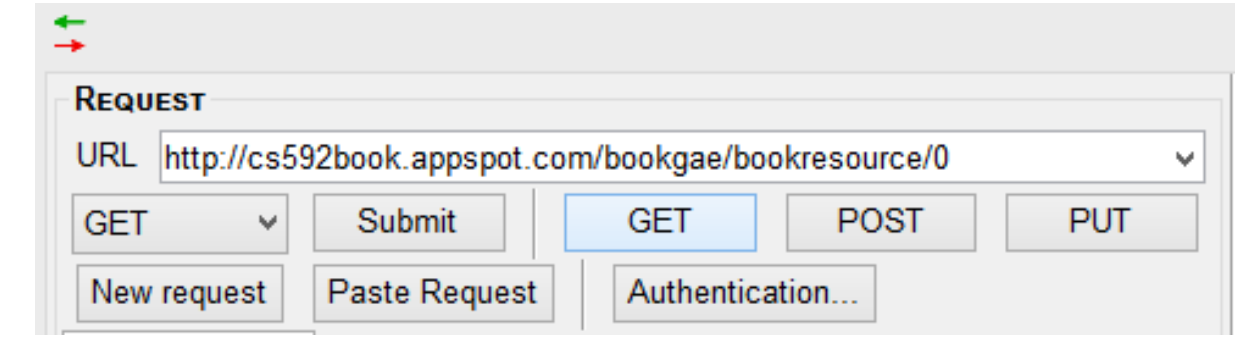
- Returned in JSON format

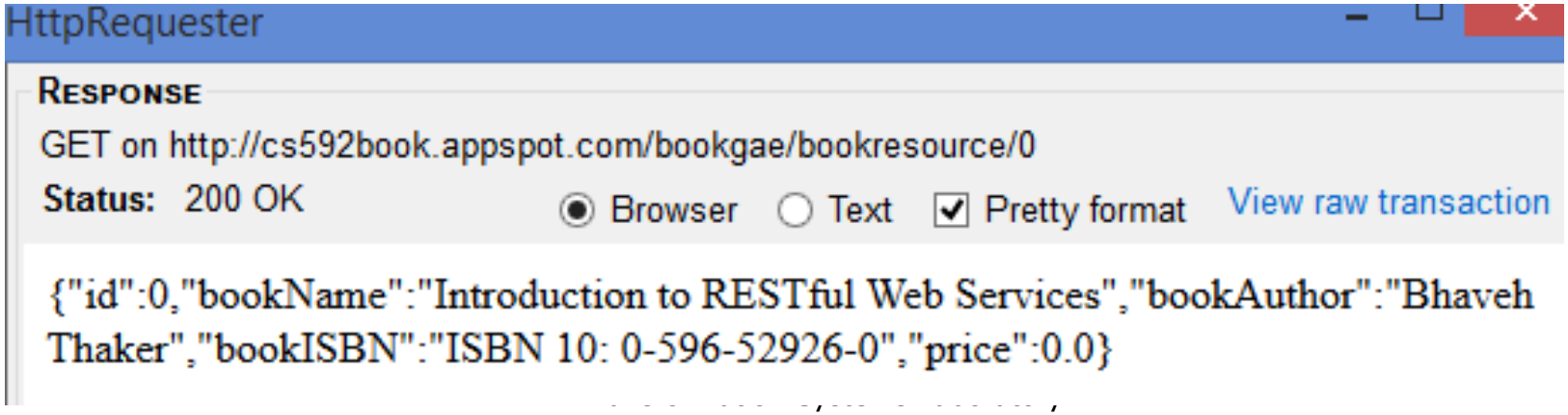




BookExample with GSON > get a book

```
@GET
@Path("{id}")
public String getBook(@PathParam("id") int bookId) {
    Gson gson = new Gson();
    String jsonArray = gson.toJson(bookMap.get(bookId));
    return jsonArray;
}
```





References

- http://howtodoinjava.com/2014/06/17/google-gson-tutorial-convert-java-object-to-from-json/

Τέλος Ενότητας

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