CORSO DI LAUREA IN INFORMATICA

Tecnologie Software per il Web

DEPLOYING APPS WITH ECLIPSE AND TOMCAT

a.a. 2021-2022

Topics

- Setting up the required software
  - Installing Java SE
  - Getting Apache Tomcat
  - Installing Eclipse (Java EE version)
  - Telling Eclipse about Tomcat
- Creating a Dynamic Web Project
  - A project that can run on a Web server
- Deploying a Dynamic Web Project
  - Running it on Apache Tomcat

Need Web server

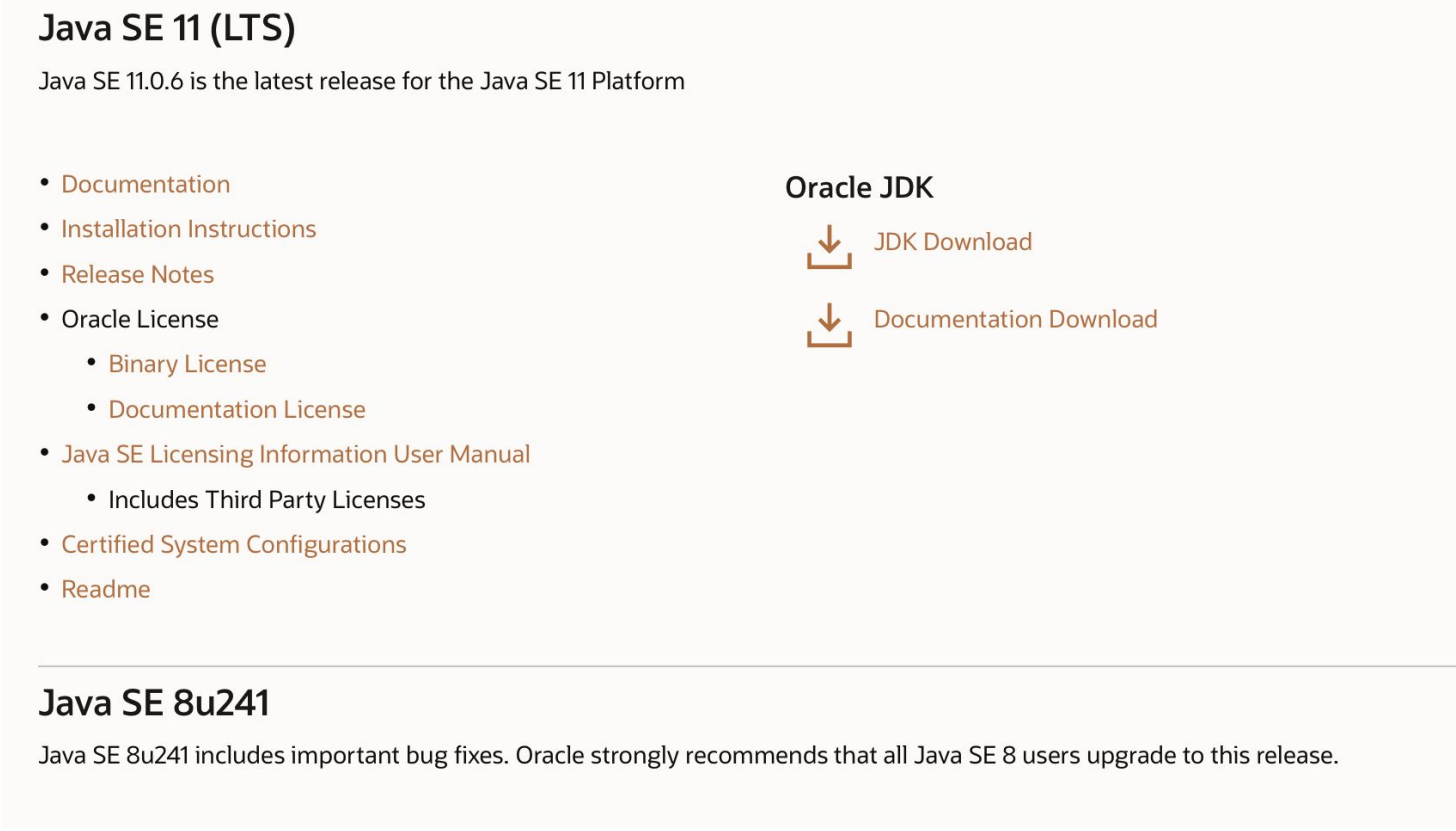
- Requirement: Using *Servlet, JSP, Ajax, Ajax in jQuery, JSON, JDBC, …*
- Required
  - Your Web page needs to run on a server that supports HTTP
    - For a static Web project, you could just drag HTML file onto browser to test everything
- Preferred
  - Your server can produce dynamic results (results that change each time or that are based on what is passed to the server)
    - Will work with PHP, .NET, Ruby, as well as Java
    - But even with static text files, your pages must run on server in order for Ajax calls to work

Steps

1. Install **Java**
   - The server will use Java even if you never write or see any Java code
2. Install **Apache Tomcat**
   - A simple Web server that supports Java
3. Install **Eclipse**
   - An editor (development environment) that is good at editing HTML, JavaScript, CSS, etc., but that also knows how to create and deploy applications to Tomcat
4. **Make a dynamic Web app** in Eclipse
   - An app that Eclipse knows how to send to Tomcat
5. **Deploy the Web app**
   - Launch it on Tomcat

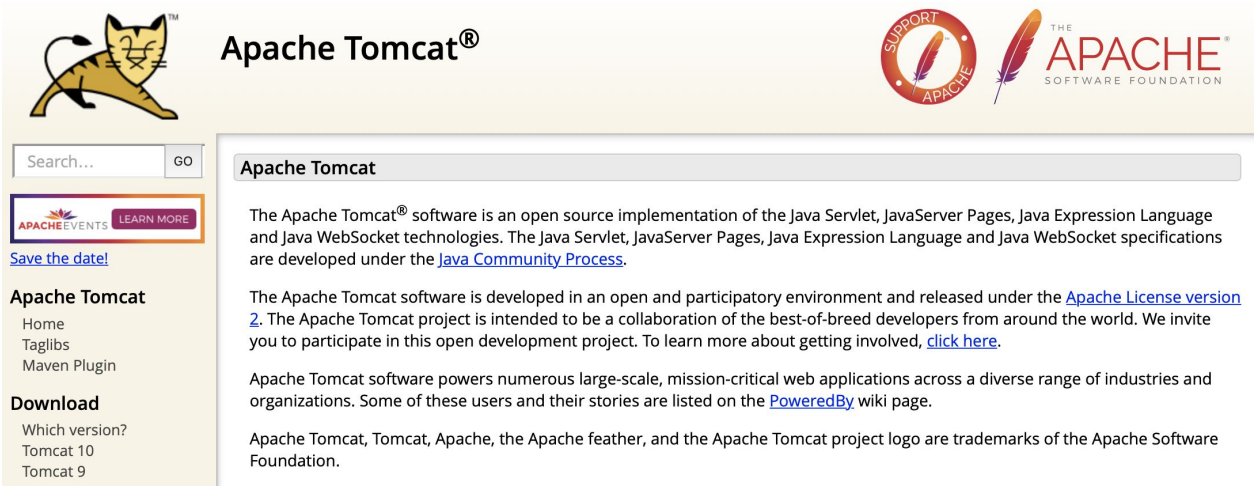
Installing Java SE (Standard Edition)

- Download Java SE 11 version from Oracle
  - https://www.oracle.com/java/technologies/javase/jdk11-archive-downloads.html
  - Or just Google “download java se”
- Install it
  - Run installer and accept all defaults



Download and unzip Apache Tomcat

- Start at http://tomcat.apache.org
  - Choose download link on left, then ZIP version
    - Tomcat 9
- Either way, just unzip the file (Windows)
  - E.g., resulting in something like C:\apache-tomcat-9.0.43
- Remember the location
  - You will tell Eclipse about it later

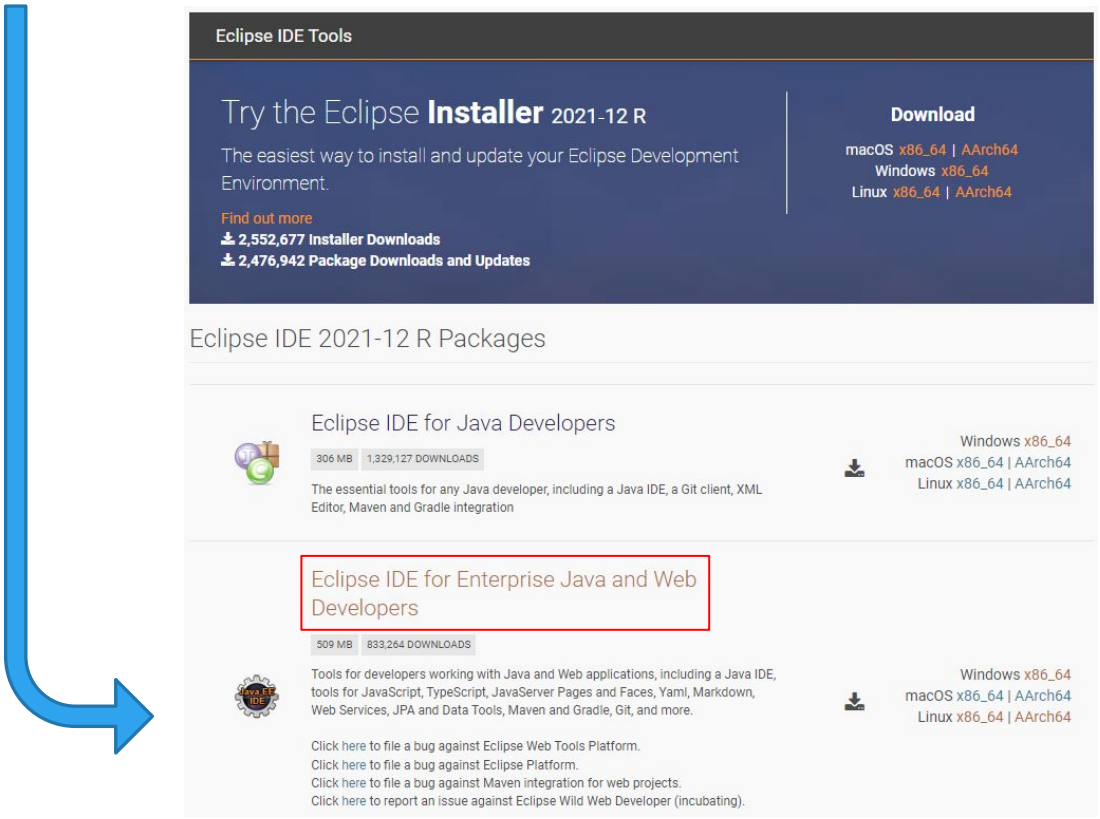


Installing Tomcat on Mac

1. Download a binary distribution of the core module: apache-tomcat-9.0.43.tar.gz in Binary Distributions / Core section
2. Opening/unarchiving the archive will create a folder structure in your Downloads folder ~/Downloads/apache-tomcat-9.0.43
3. Open to Terminal app to move the unarchived distribution to /usr/local:
   - **sudo mkdir -p /usr/local**
   - **sudo mv ~/Downloads/apache-tomcat-9.0.43 /usr/local**
4. To make it easy to replace this release with future releases, we are going to create a symbolic link that we are going to use when referring to Tomcat:
   - **sudo rm -f /Library/Tomcat**
   - **sudo ln -s /usr/local/apache-tomcat-9.0.43 /Library/Tomcat**
5. Change ownership of the /Library/Tomcat folder hierarchy:
   - **sudo chown -R <your_username> /Library/Tomcat**
6. Make all scripts executable:
   - **sudo chmod +x /Library/Tomcat/bin/*.sh**

Download and unzip Eclipse (Java EE Version)

- Start at http://www.eclipse.org/
  - Choose download link on top right,…
  - https://www.eclipse.org/downloads/packages



Download and unzip Eclipse (Java EE Version)

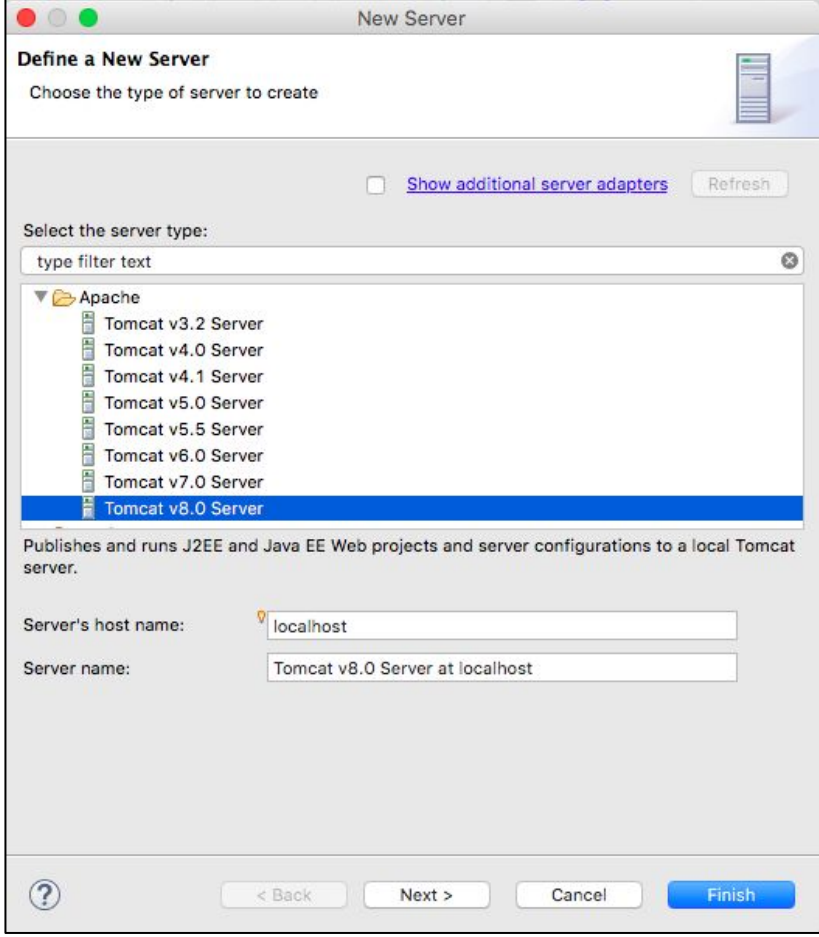
- Download Zip file: just unzip the file
  - E.g., resulting in something like C:\eclipse
- Remember the location
  - You will later launch Eclipse by clicking on **eclipse.exe** in the folder where you unzipped Eclipse

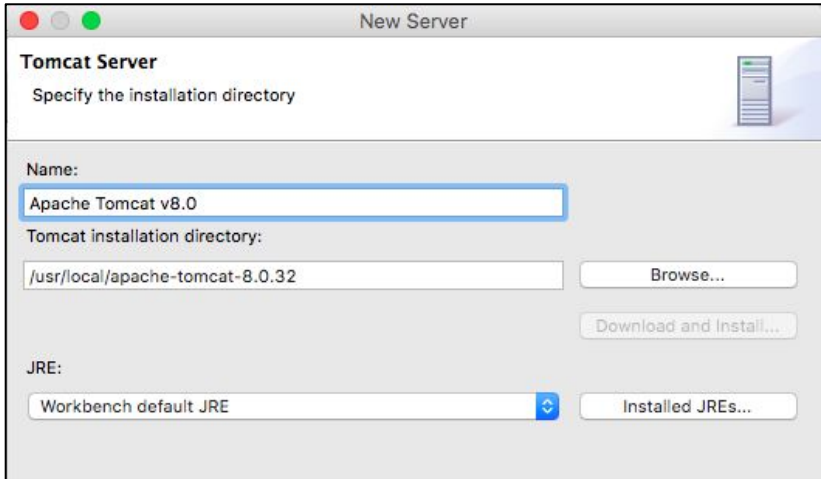
Running Eclipse

- Unzip the downloaded file (no installer!)
  - Unzip anywhere; call the folder you unzip into “installDir”
- Double click **eclipse.exe**
  - From *installDir*
- Shortcut
  - Many developers put Eclipse link on their desktop
    - R-click eclipse.exe, Copy, then go to desktop, R-click, and Paste Shortcut (not just Paste!)
- Set/switch workspace

Configuring Eclipse

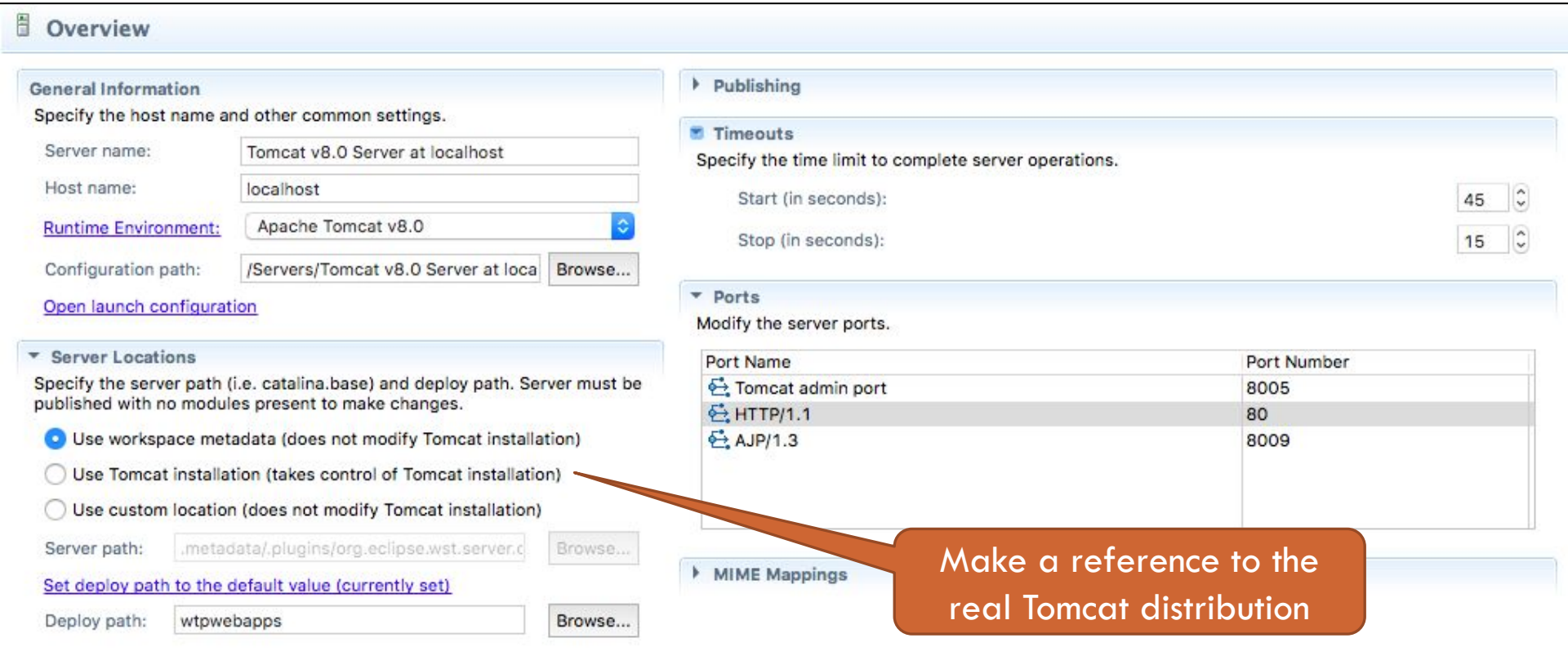
- Tell Eclipse about Tomcat
  - Open the "JavaEE" perspective
  - Click on **Servers tab** at bottom
    R-click in window
  - New, Server, Apache, Tomcat v9.0
    - Next, navigate to folder where you unzipped Tomcat
    - Next, finish





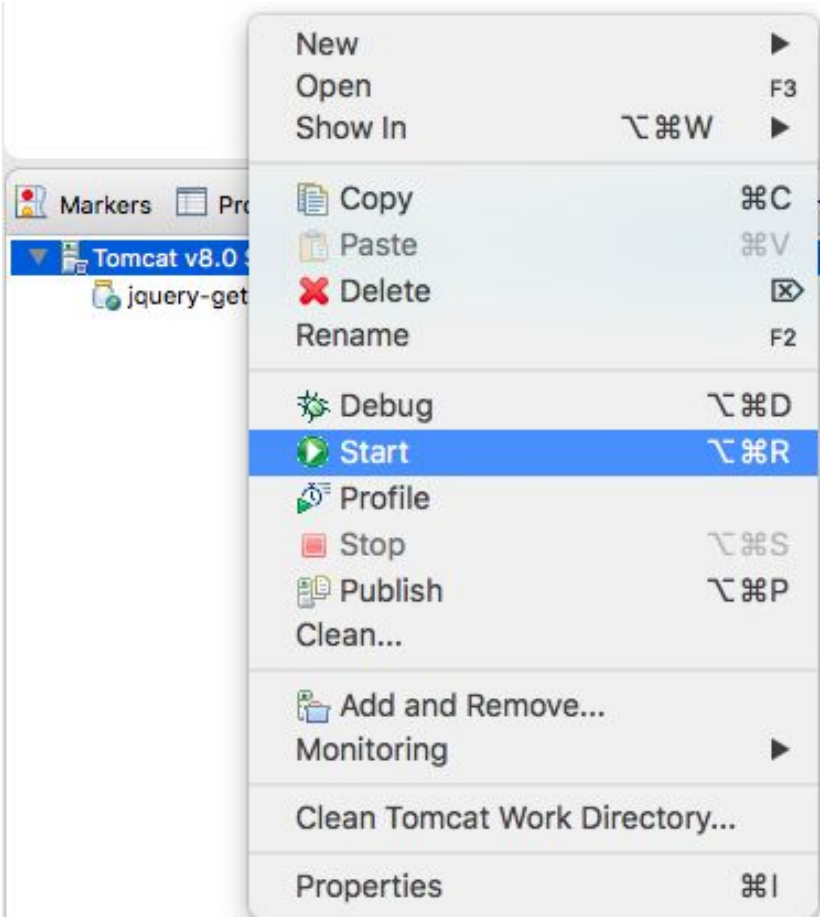
Configuring Eclipse

- Change the Tomcat port to 80
  - Double click Tomcat at the bottom
  - Change HTTP/1.1 port on right side from 8080 to 80, then Save
    - You can use: http://localhost/...
    - otherwise: http://localhost:**8080**/...



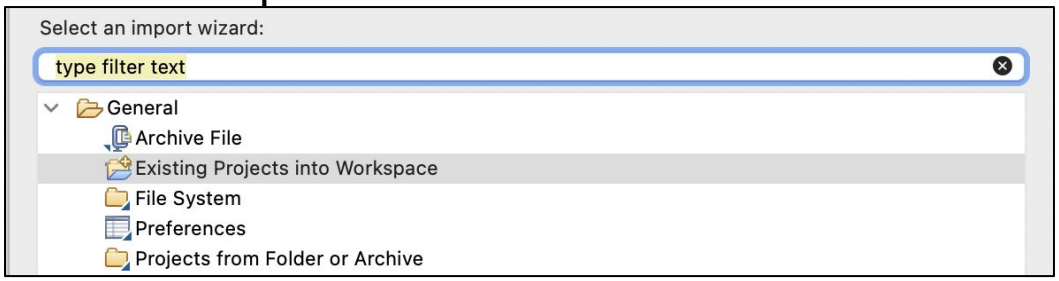
Deploy the App to Tomcat

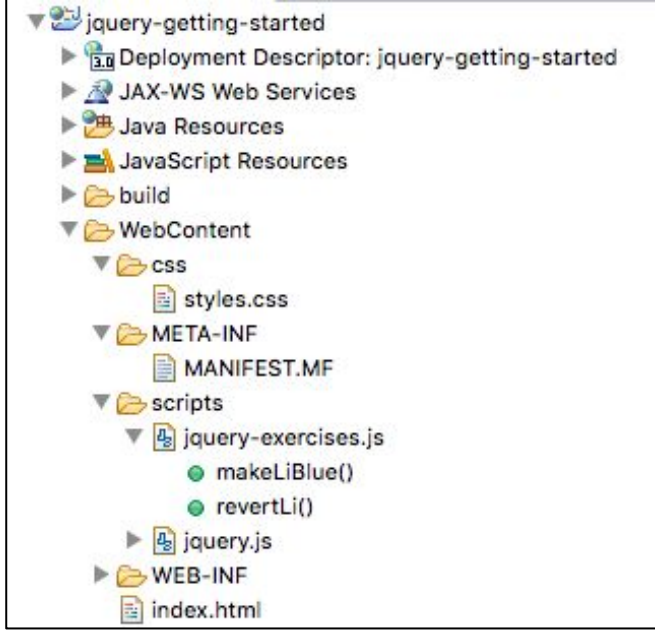
- Deploy project
  - Select **Servers tab** at bottom
  - R-click on Tomcat
  - Choose “Add and Remove”
  - Choose project
  - Press “Add”
  - Click “Finish”
- Start Server
  - R-click Tomcat at bottom
  - Start (use “Restart” if Tomcat already running)
- Test URL
  - ***http://localhost:port/your-project/your-file.html***



Example

- Import **jquery-getting-started**
  - File □ Import

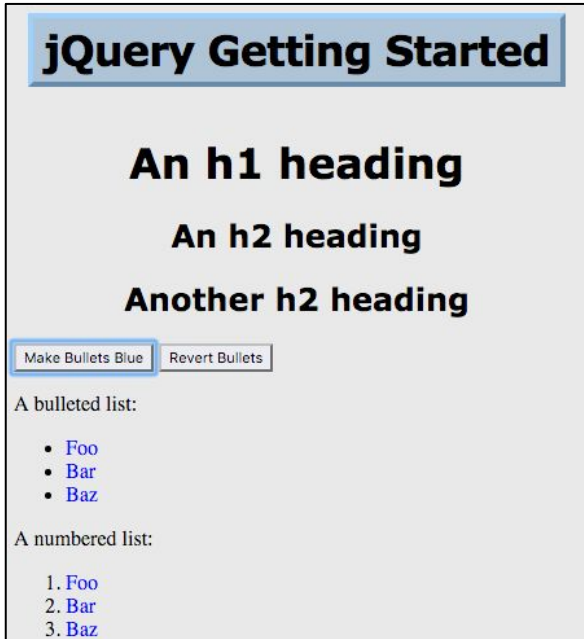




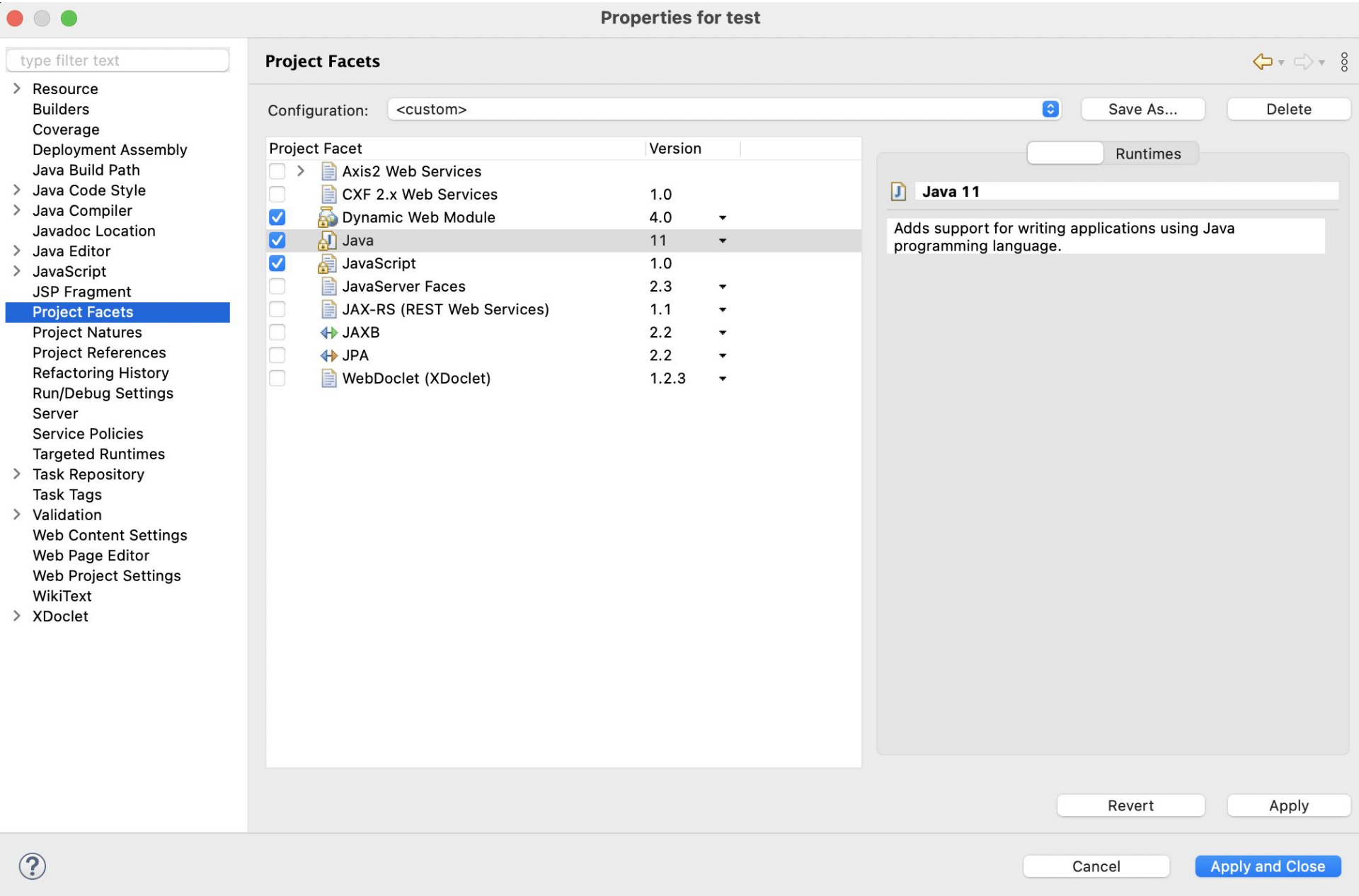
- Deploy app to Tomcat
  - R-click Tomcat at bottom
  - Chooce Add and Remove
  - Select *jquery-getting-started* and press Add arrow
  - Press Finish

- Start Tomcat
  - R-click Tomcat at bottom
  - Chooce Start (or Restart if running previously)

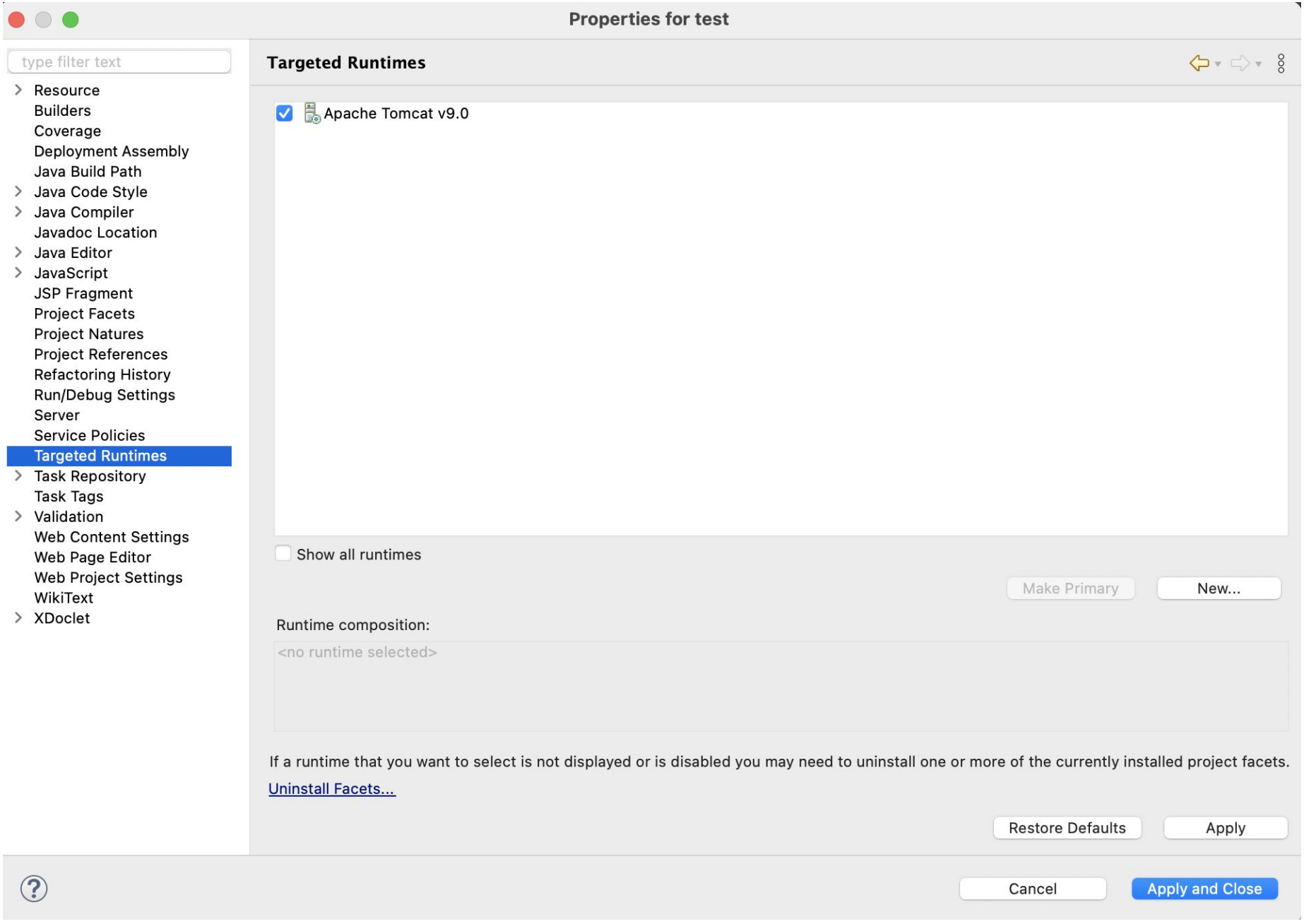
- Access page
  - **http://localhost/jquery-getting-started/index.html**
  - or **http://localhost:8080/jquery-getting-started/index.html** if you did not change Tomcat port



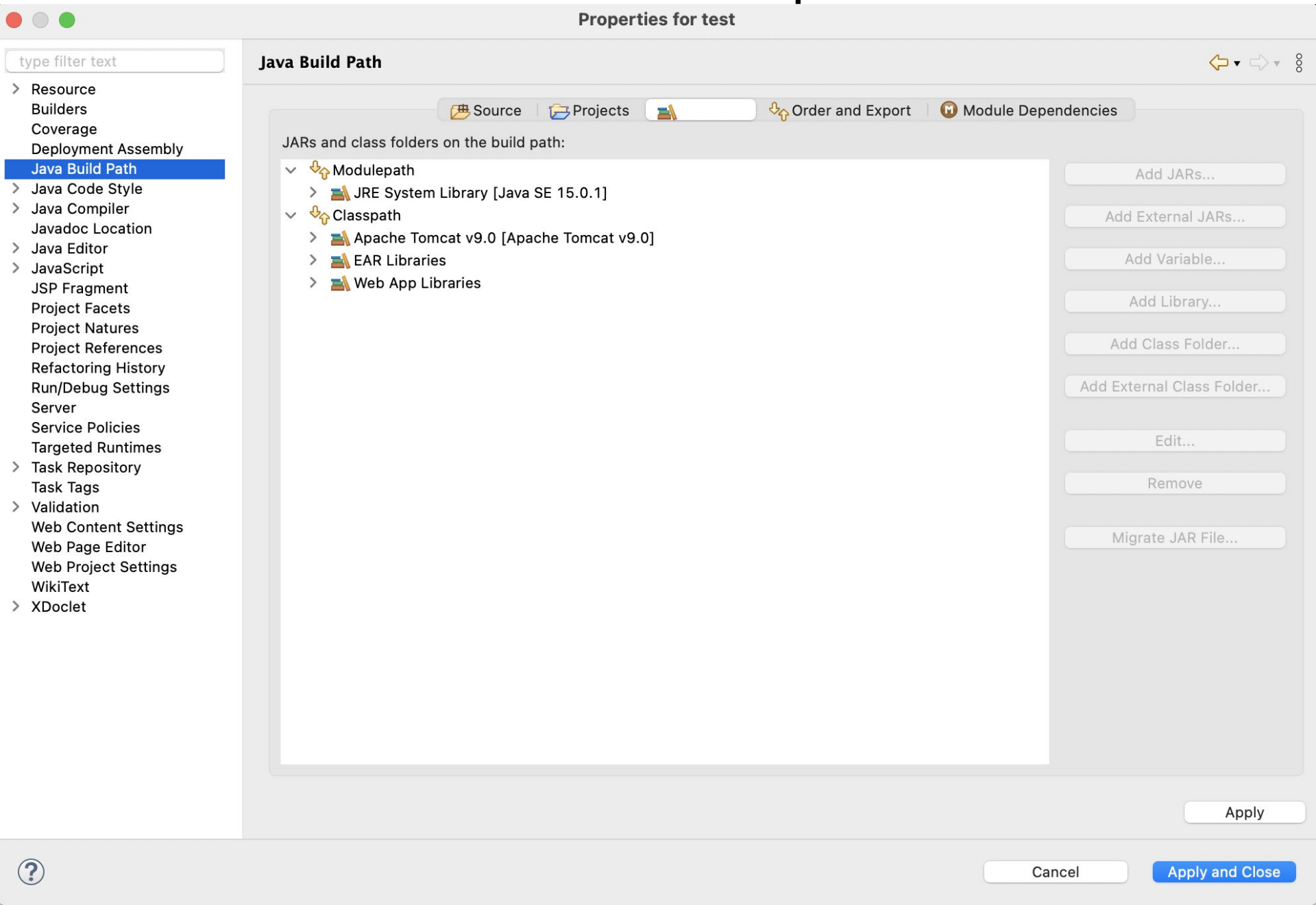
Setting the facets



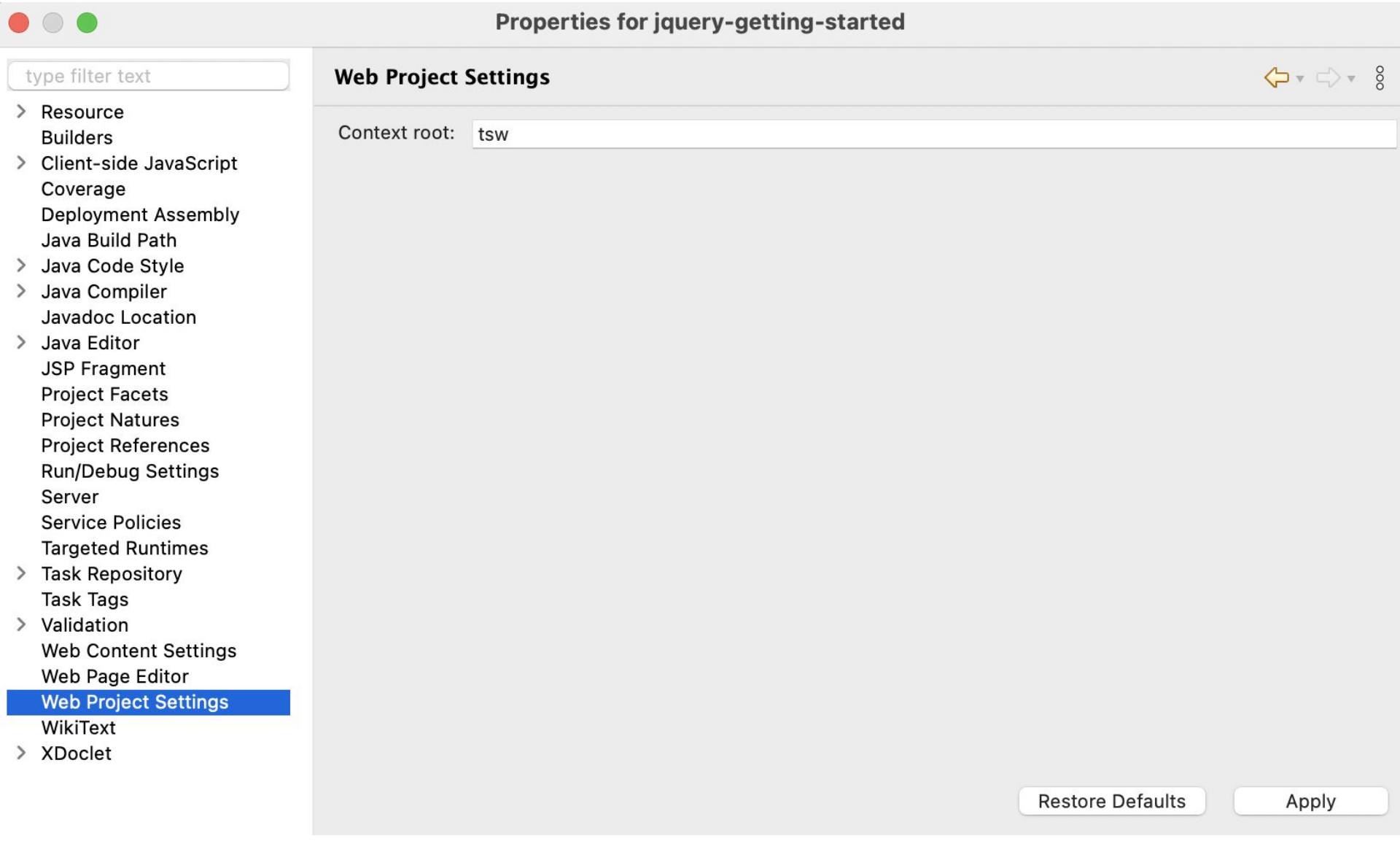
Setting the targeted runtimes



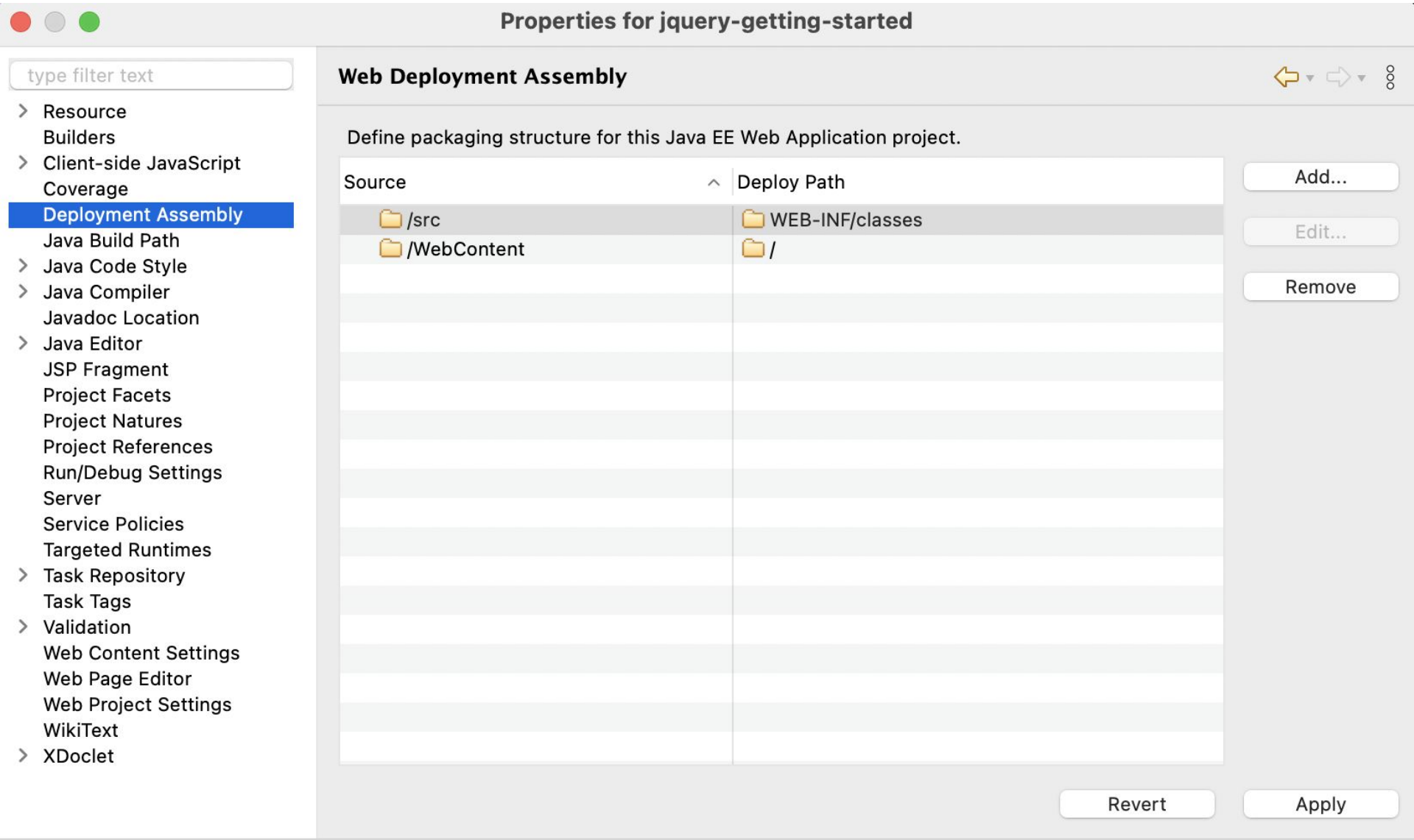
Check the build path



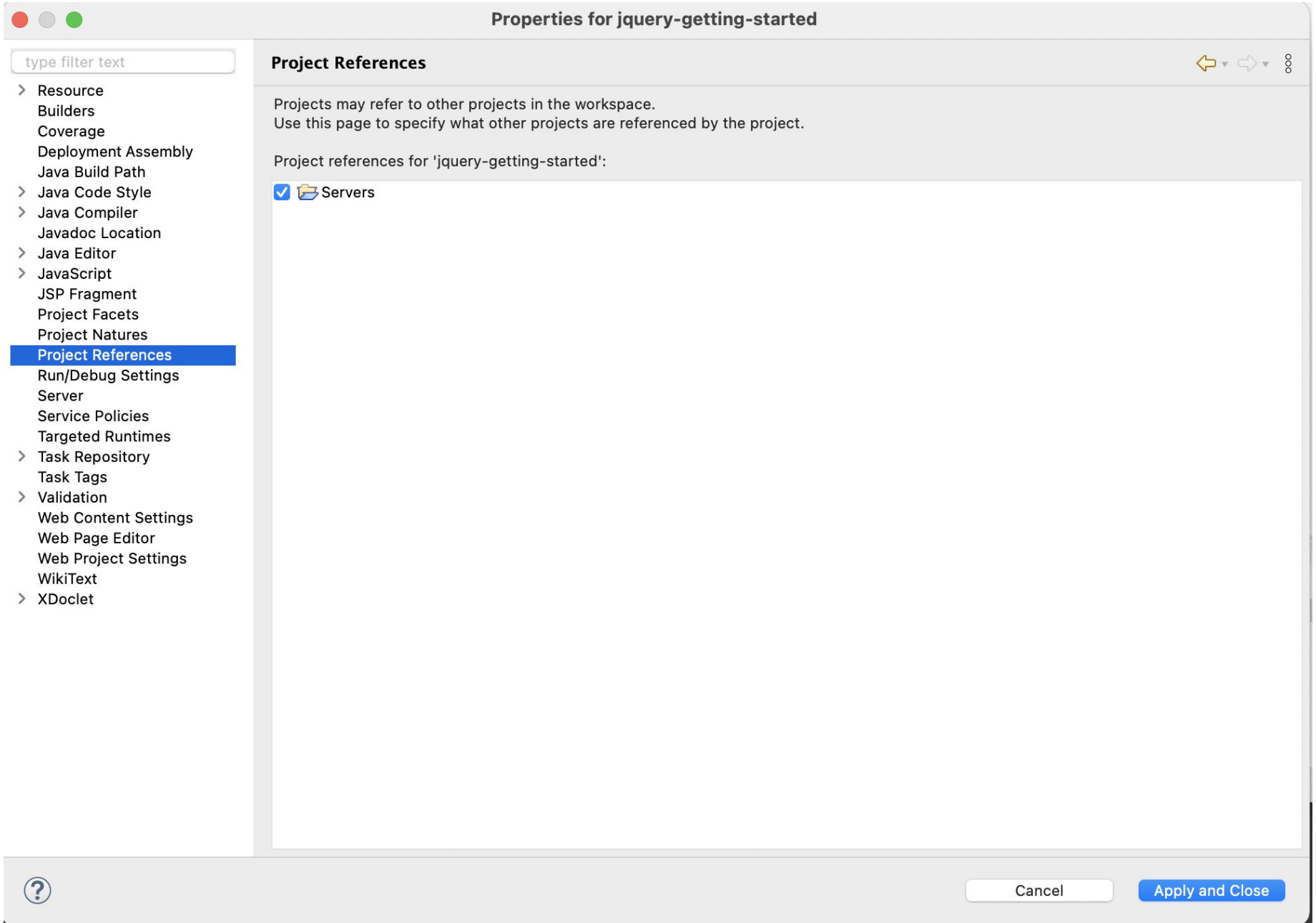
Context root setting



Deployment assembly



Project References

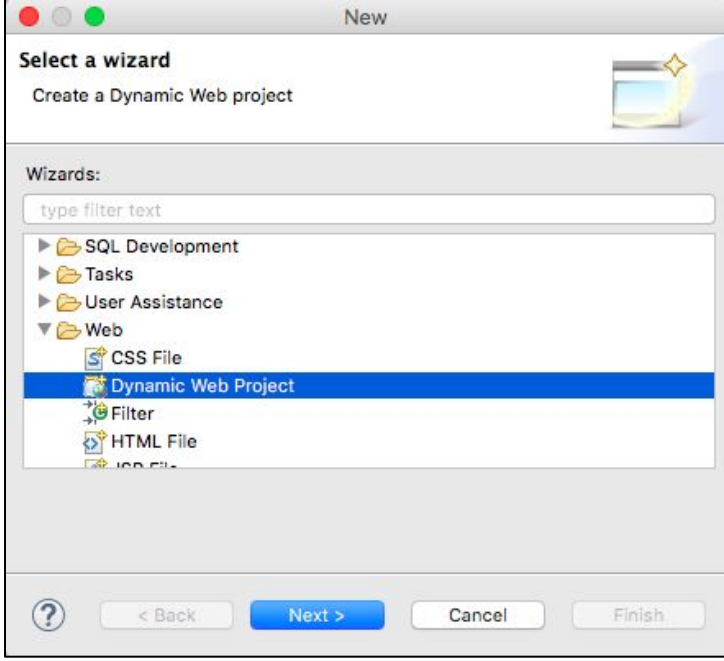


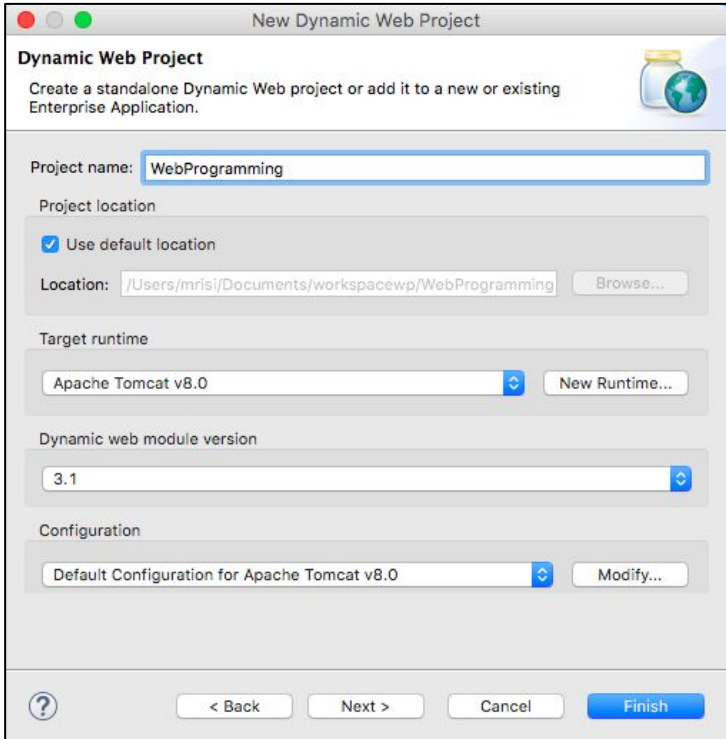
Example

- Import **test-app**
- Deploy app to Tomcat
  - R-click Tomcat at bottom
  - Choose Add and Remove
  - Select *test-app* and press Add arrow
  - Press Finish
- Start Tomcat
  - R-click Tomcat at bottom
  - Choose Start (or Restart if running previously)
- Access page
  - **http://localhost/test-app/index.html**

Create a Dynamic Web Project

- Create project
  - File □ New □ Project □ Web □ Dynamic Web Project
    - Next time, you can do File □ New □ Dynamic Web Project
- Give it a name
  - Choose a name that would be legal in a URL (no spaces)
- Specify it is for Tomcat
  - Choose “Default Configuration for Apache Tomcat 9.0”
- Finish





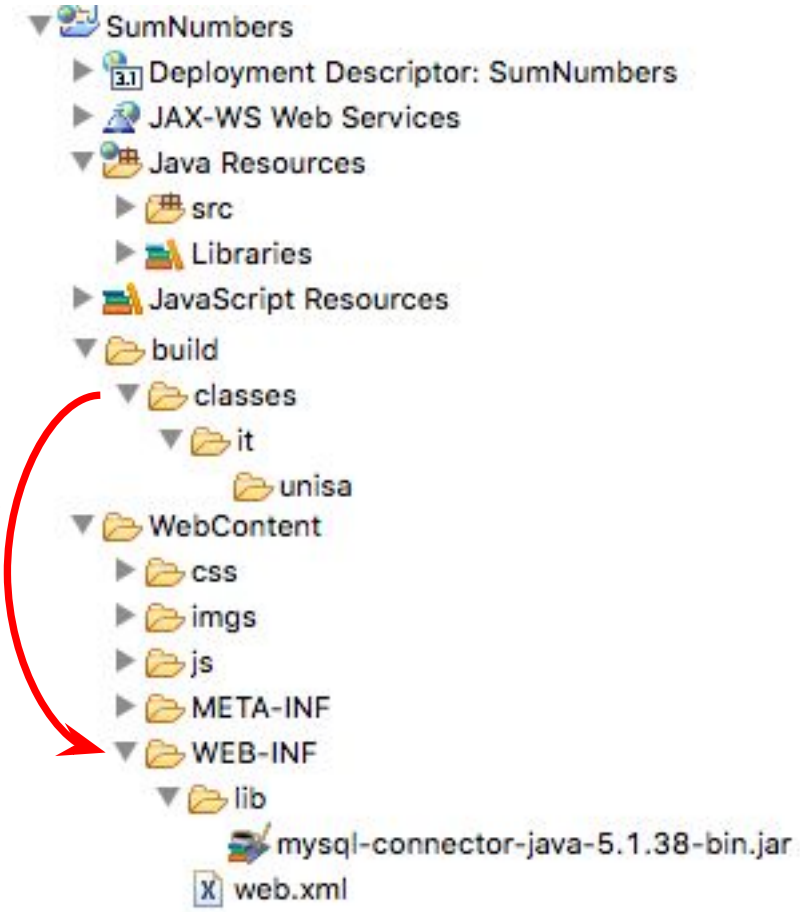
Put content in your project

- Main folder: **WebContent**
  - Other folders are only for Java developers and can be ignored
- Typical layout
  - WebContent
    - Your HTML files
    - For initial testing, just use a simple HTML file you created earlier in the course
  - WebContent/css
    - Your style sheets
  - WebContent/scripts
    - Your JavaScript files
  - WebContent/images
    - Your images
  - …

Deploy the App to Tomcat (manual and automatic)

- *È fondamentale copiare la cartella "classes" presente nella directory "build" all'interno della cartella "WEB-INF"*

1. Nella shell dei comandi:
   - Accedere alla cartella WebContent
   - Creare il file WAR:
     - **jar –cvf SumNumbers.war** *
2. Fermare il server Tomcat (se attivo)
3. Copiare il file WAR nella cartella "webapps" di Tomcat
4. Lanciare il server Tomcat

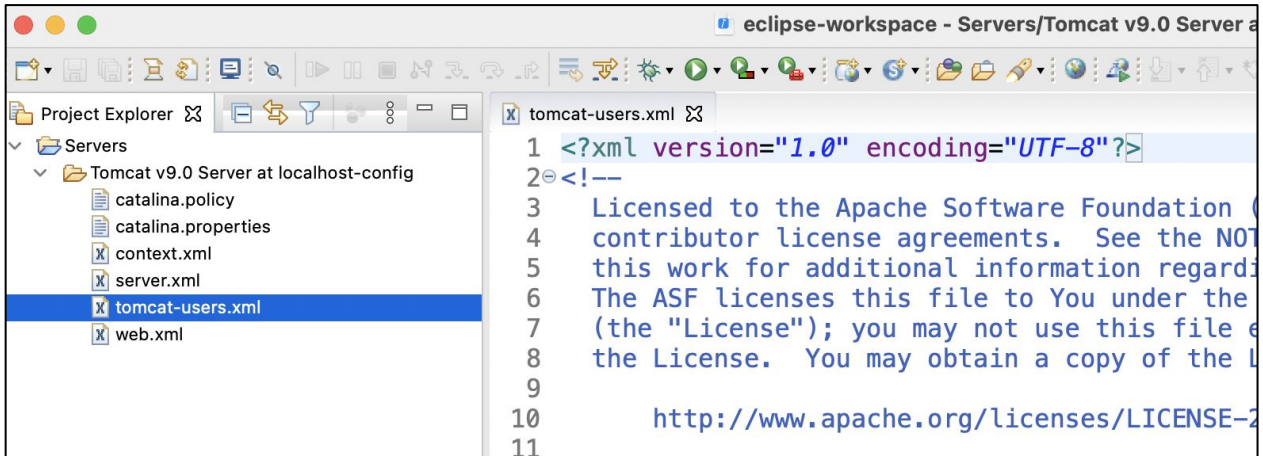


- Il file war si può creare anche da Eclipse (in maniera automatica) con tasto destro sul progetto: Export □ WAR file
  - Per il deploy si può anche utilizzare il **manager** di Tomcat

Configure Tomcat users (in tomcat/conf/tomcat-users.xml)

```
<?xml version='1.0' encoding='utf-8'?>
<tomcat-users>
    <role rolename="tomcat"/>
    <role rolename="manager"/>
    <role rolename="admin"/>
    <role rolename="admin-gui"/>
    <role rolename="manager-gui"/>

    <user username="tomcat" password="tomcat"
     roles="tomcat, admin, admin-gui, manager, manager-gui"/>
    <user username= "both" password="tomcat" roles="tomcat, manager"/>
    <user username="role1" password="tomcat" roles="manager-gui"/>
</tomcat-users>
```



Start Tomcat on Windows

For Windows

Launch a CMD shell. Set the current directory to "<TOMCAT_HOME>\bin", and run "startup.bat" as follows:

```
// Change the current directory to Tomcat's "bin"
// Assume that Tomcat is installed in "d:\myProject\tomcat"
d:                            // Change the current drive
cd \myProject\tomcat\bin  // Change Directory to YOUR Tomcat's "bin" directory

// Start Tomcat Server
startup
```

Definire il path JAVA_HOME e JRE_HOME

Windows 10

In Cerca cercate e selezionate: Sistema (Pannello di controllo)

Fate clic sul collegamento **Impostazioni di sistema avanzate**

Fate clic su **Variabili di ambiente**. Nella sezione **Variabili di sistema,** creare **Nuova variabile di sistema** specificare il valore della variabile di ambiente JAVA_HOME e JRE_HOME

(e.g., "C:\Program Files\Java\jdk1.XX" e "C:\Program Files\Java\jre1.XX")

Fate clic su **OK**. Chiudere tutte le altre finestre facendo clic su **OK**. Riavviare

*Eseguire **startup.bat***

Start Tomcat on Mac

- To start Tomcat, open a shell command prompt (using, for instance, the Terminal application)
- The path to Tomcat via the Finder is *Macintosh HD Library Tomcat*
- But to get to that directory using the Terminal, type in:

  cd /Library/Tomcat/bin

- you should see a file called ***startup.sh***
- Any file in this directory ending in .sh can be executed in the terminal by putting a period and a slash before the file name (e.g.: ./startup.sh)

Start Tomcat on Mac

- The following example executes the tomcat startup script:

  ./startup.sh && tail -f ../logs/catalina.out

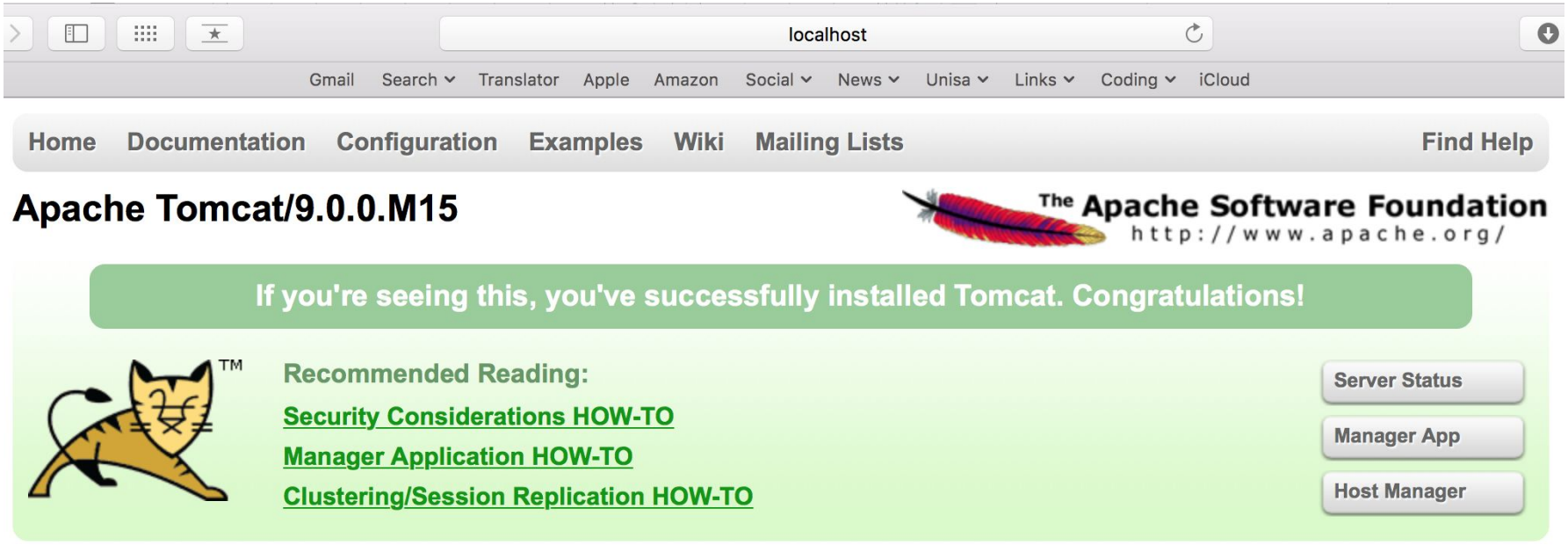
- Terminal should display four lines looking something like this:

```
Using CATALINA_BASE:   /usr/local/tomcat
Using CATALINA_HOME:   /usr/local/tomcat
Using CATALINA_TMPDIR: /usr/local/tomcat/temp
Using JRE_HOME:        /Library/Java/JavaVirtualMachines/jdk1.XX.jdk/Contents/Home
Using CLASSPATH:       /usr/local/tomcat/bin/bootstrap.jar:/usr/local/tomcat/bin/tomcat-juli.jar
Tomcat started.
```

Test installation (real Tomcat)

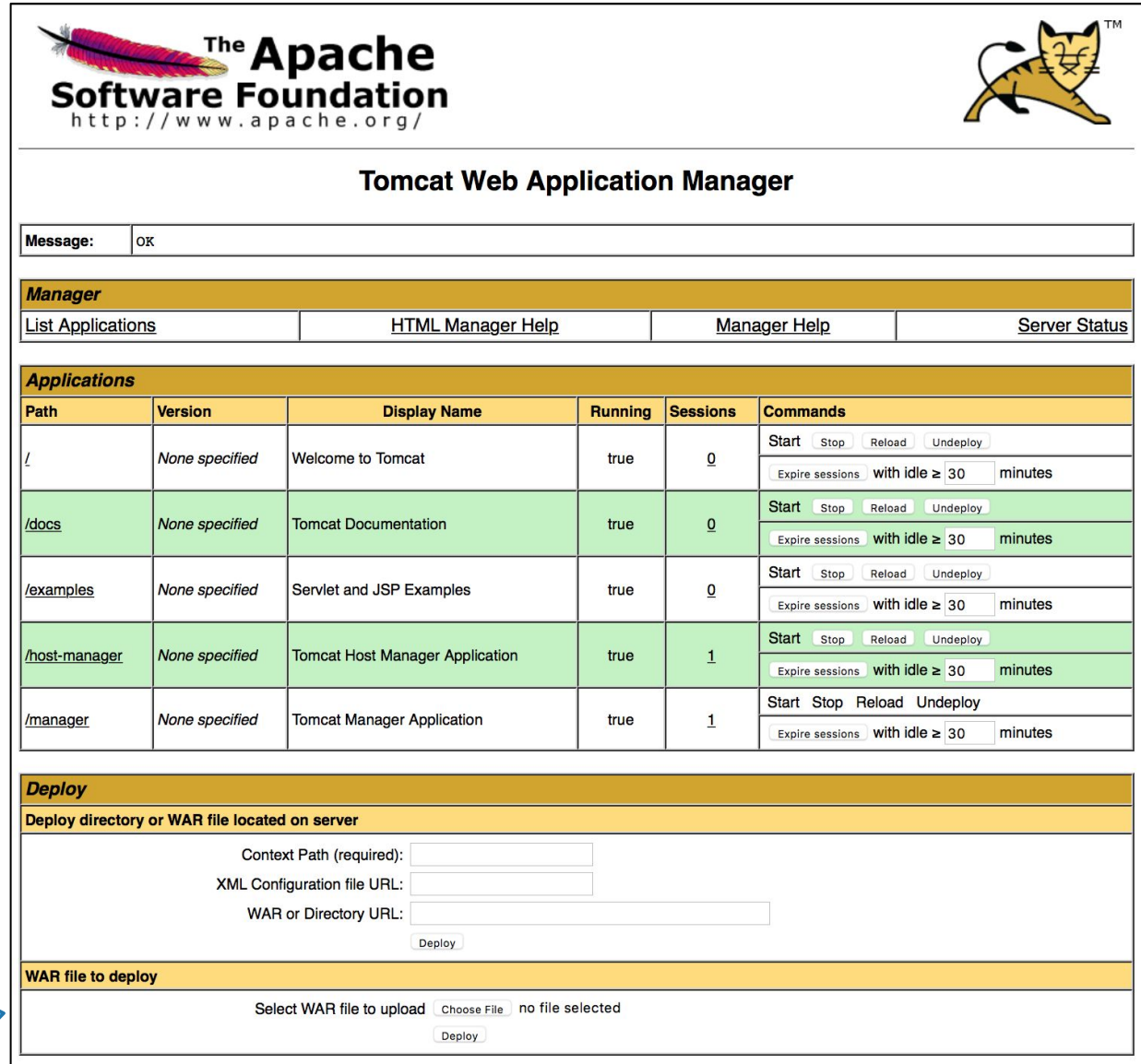
localhost

- Open a browser window, and enter http://127.0.0.1:8080 - the default Tomcat page should open
- If you click the *Manager* App links in the right hand side of the default Tomcat page, you will be asked for a user name and password
- As mentioned above, use ***tomcat*** for the user name, and ***tomcat*** for the password



Tomcat Manager

- http://localhost:8080/manager/html
- Upload and deploy the war file



Stop Tomcat

- Tomcat Server can be stopped from the command line with the following command:
  - Mac: **./shutdown.sh**
  - Windows: **shutdown.bat**

- Stop Tomcat in Eclipse
  - Select **Servers tab** at bottom
  - R-click Tomcat at bottom
  - Choose Stop

ROOT Web application

- Deploying a web application at the root of a Tomcat:
  - **The context path refers to the location relative to the server's address which represents the name of the web application**
- By default, Tomcat derives it from the name of the deployed war-file
  - if we deploy a file ExampleApp.war, it will be available at http://localhost:8080/ExampleApp
  - the context path is /ExampleApp
- Create the app with name ROOT, create ROOT.war, and deploy it
- Our app will now be available at *http://localhost:8080/*

Summary

- Install necessary software
  - Java (run installer)
  - Apache Tomcat (unzip)
  - Eclipse (unzip and then configure)
- Launch Eclipse
  - Click on .exe icon from install folder, or make shortcut on desktop and click that
- Make app in Eclipse
  - File □ New □ Dynamic Web Project
  - Put files in/under WebContent folder
- Deploy app
  - R-click Tomcat, Add and Remove, start Tomcat
  - Use http://localhost:port/project-name/file-name.html
- Deploy app manually
  - Jar the folder, Stop Tomcat, Copy, Start Tomcat

Check: SumNumbers

- Import and deploy **SumNumbers**

- **Run MySQL**
- Input login and password of the MySQL administrator account

- *SumNumbers accesses the DB and runs a comand that sums two numbers in case the login and password are correct*