CORSO DI LAUREA IN INFORMATICA

Tecnologie Software per il Web

DEPLOYING APPS WITH ECLIPSE AND TOMCAT

a.a. 2023-2024

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, 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 latest version from Oracle
  - http://www.oracle.com/technetwork/java/javase/downloads/
    - Or just Google “download java se”
- Install it
  - Run installer and accept all defaults

Java SE 11 (LTS)

Java SE 11.0.6 is the latest release for the Java SE 11 Platform

- Documentation
- Installation Instructions
- Release Notes
- Oracle License
  - Binary License
  - Documentation License
- Java SE Licensing Information User Manual
  - Includes Third Party Licenses
- Certified System Configurations
- Readme

Oracle JDK

JDK Download

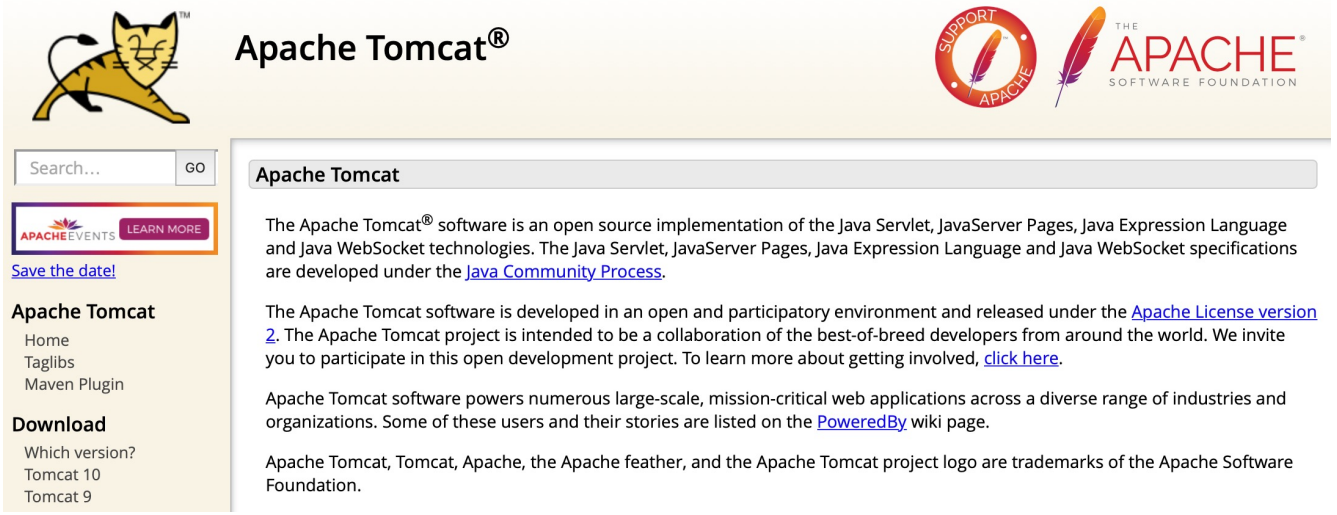
Documentation Download

Java SE 8u241

Java SE 8u241 includes important bug fixes. Oracle strongly recommends that all Java SE 8 users upgrade to this release.

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-9.0.31
- Remember the location
  - You will tell Eclipse about it later

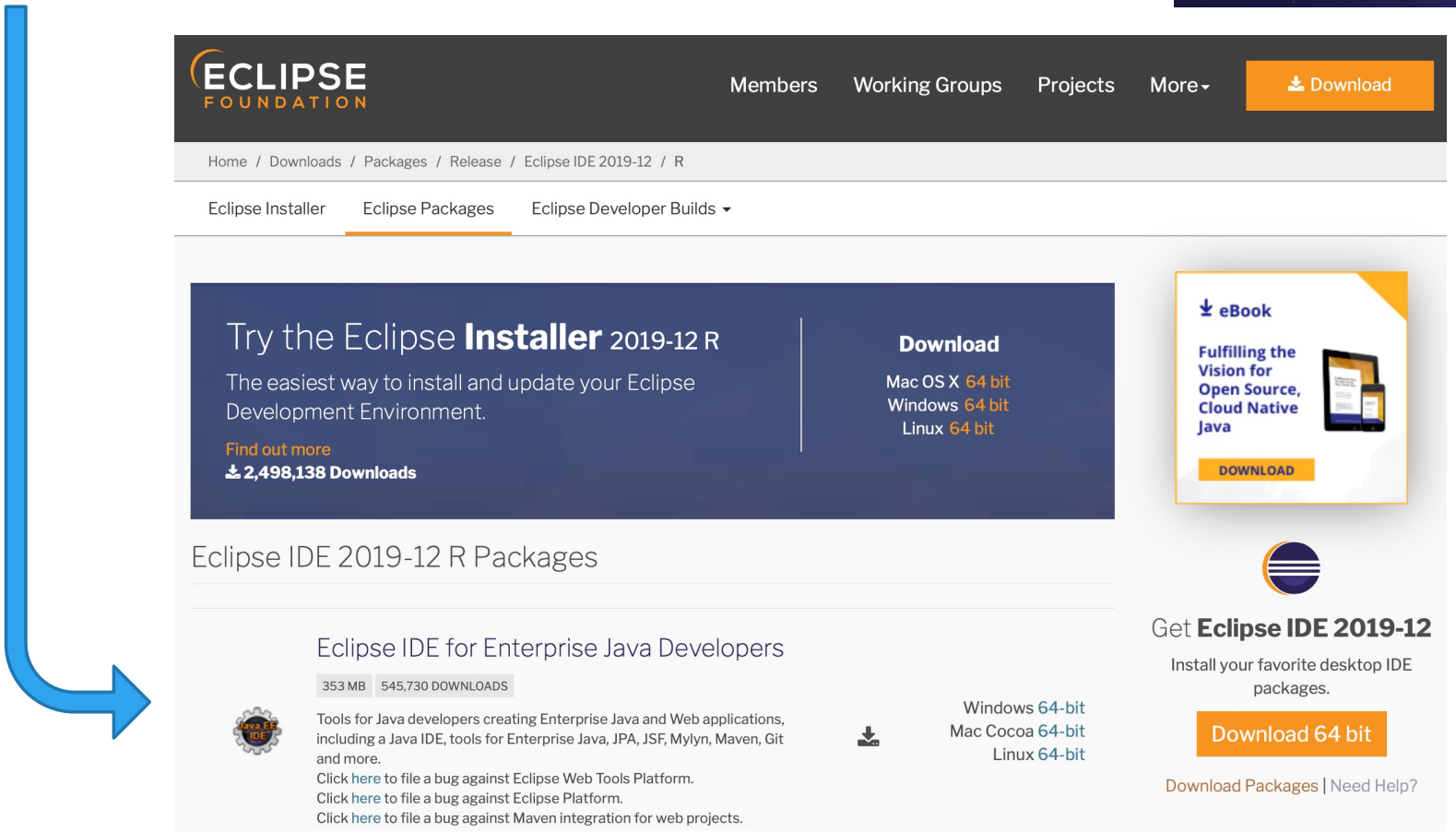


Installing Tomcat on Mac

1. Download a binary distribution of the core module: apache-tomcat-9.0.31.tar.gz in Binary Distributions / Core section
2. Opening/unarchiving the archive will create a folder structure in your Downloads folder ~/Downloads/apache-tomcat-9.0.31
3. Open to Terminal app to move the unarchived distribution to /usr/local:
   - **sudo mkdir -p /usr/local**
   - **sudo mv ~/Downloads/apache-tomcat-9.0.31 /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-9.0.31 /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

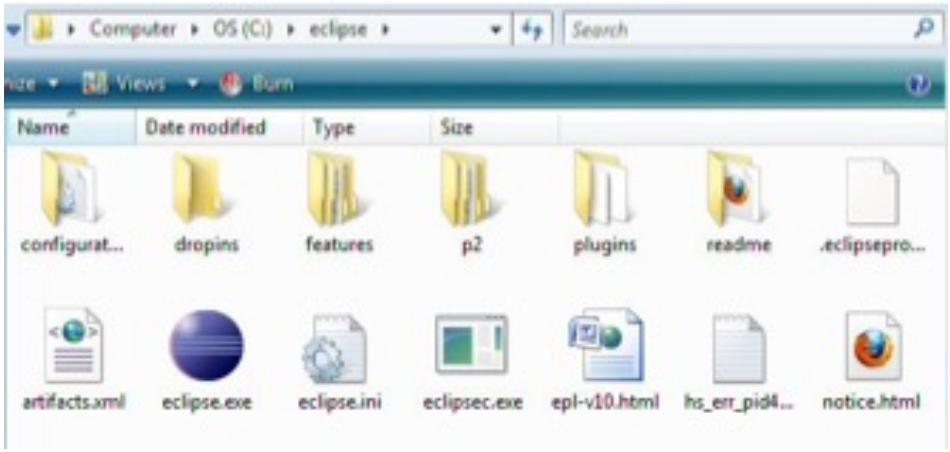


Download and unzip Eclipse (Java EE Version)

- Get installer
  - Run installer, resulting in something like C:\eclipse
- Or, get Zip version: 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*
- Click on “Workbench” icon
  - Next time you bring up Eclipse, it will come up in workbench automatically

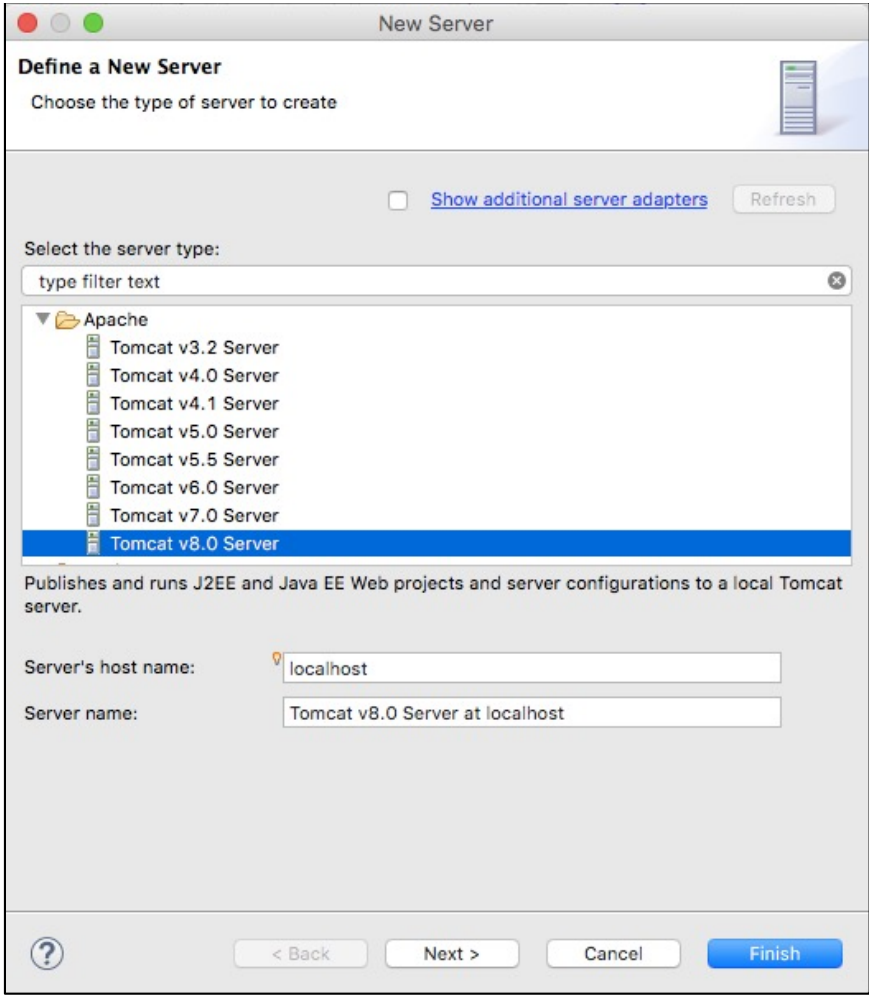


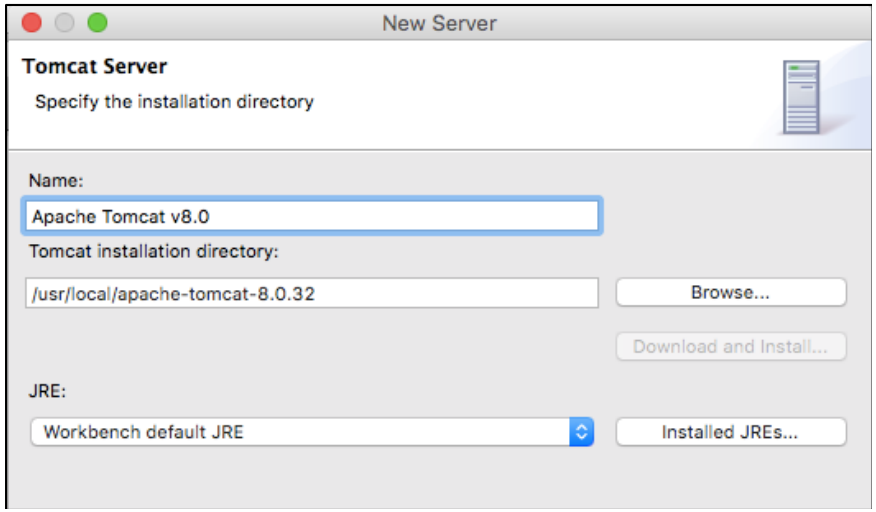
- Shortcut
  - Many developers put Eclipse link on their desktop
    - R-click eclipse.exe, Copy, then go to desktop, R-click, and Paste Shortcut (not just Paste!)

Set/Switch Workspace

Configuring Eclipse

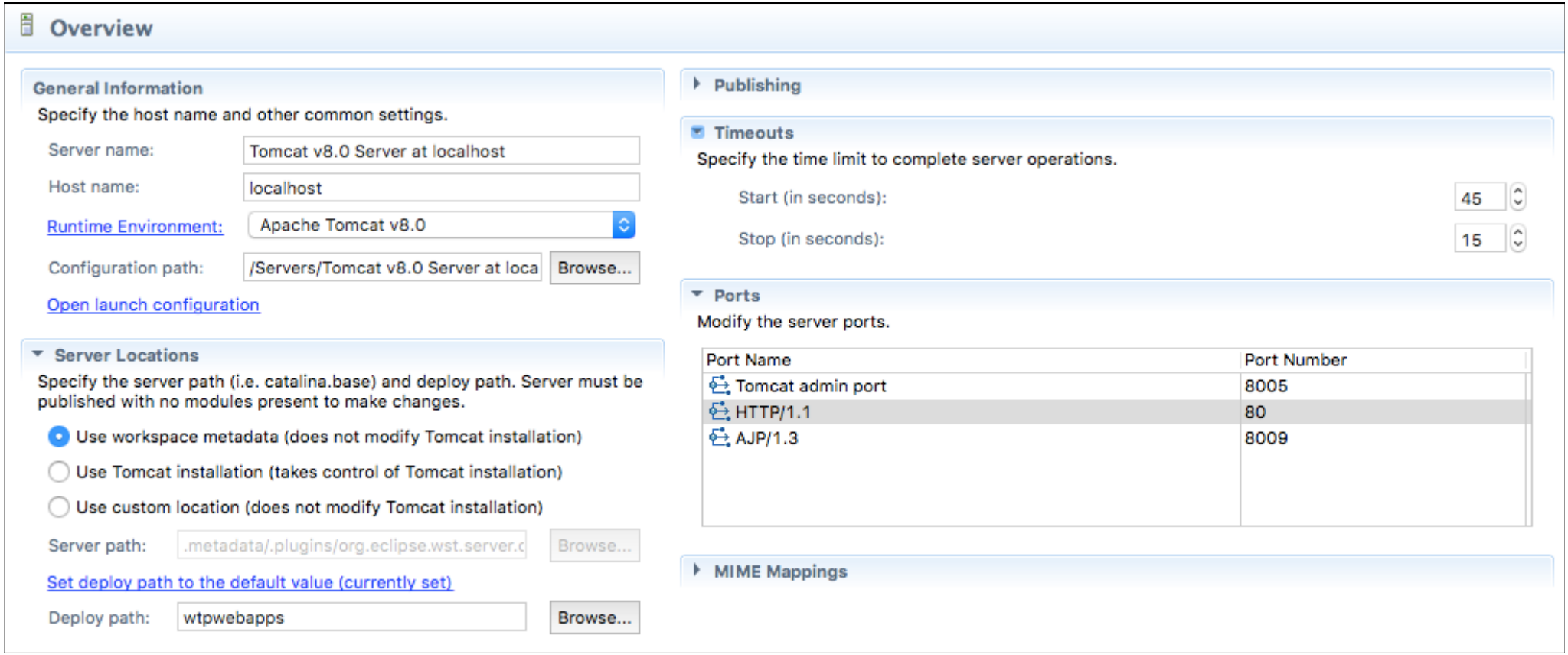
- Tell Eclipse about Tomcat
  - Open the "JavaEE" perspective
  - Click on **Servers tab** at bottom
    R-click in window
  - New, Server, Apache, Tomcat v9.0
    - Next, navigate to folder where you unzipped Tomcat
    - Next, finish





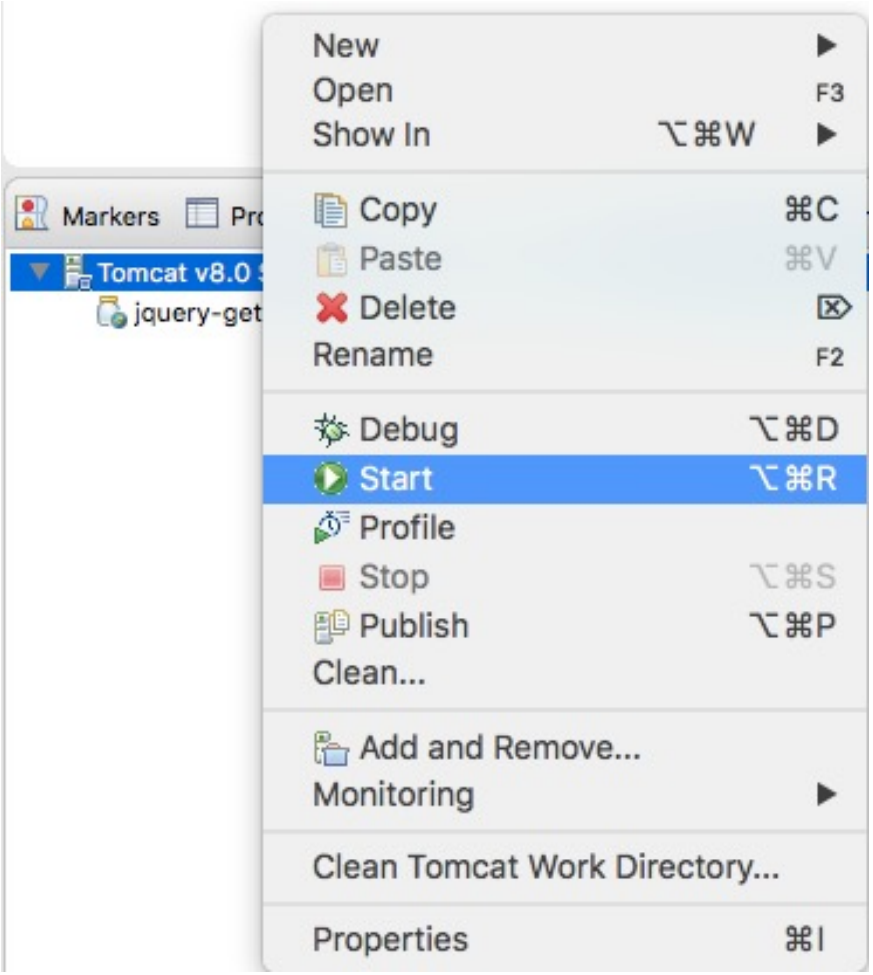
Configuring Eclipse

- 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**/...



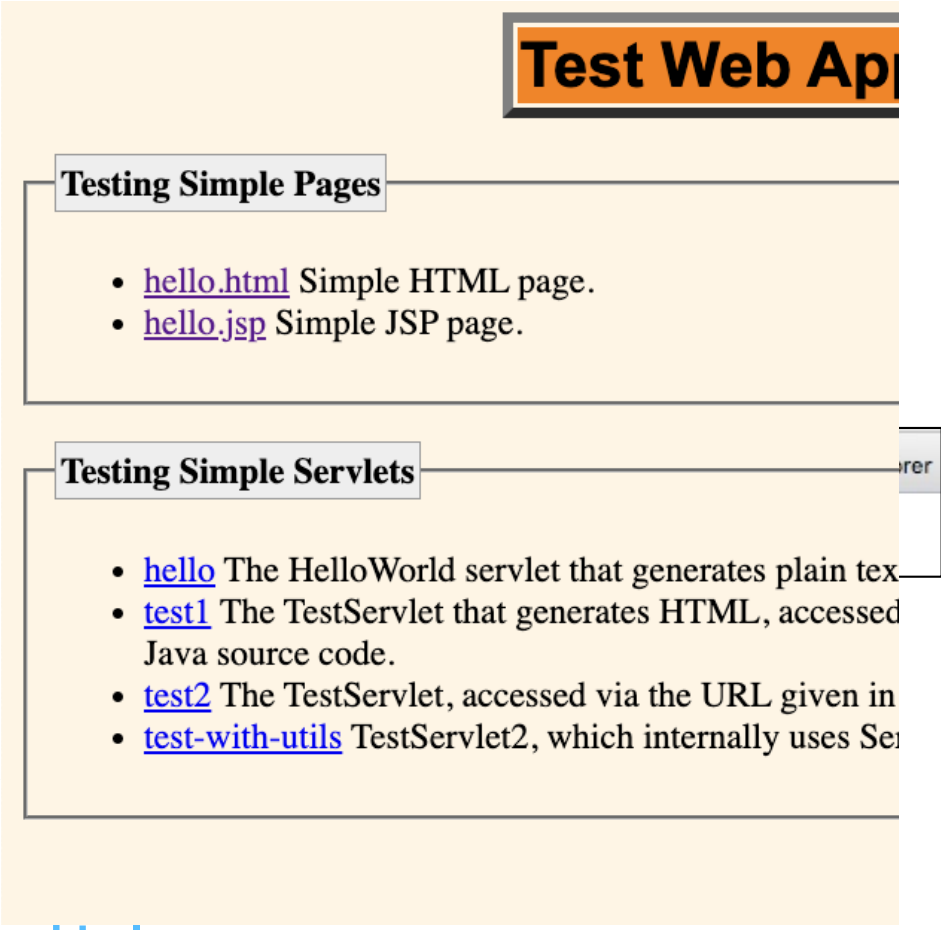
Deploy the App to Tomcat

- 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

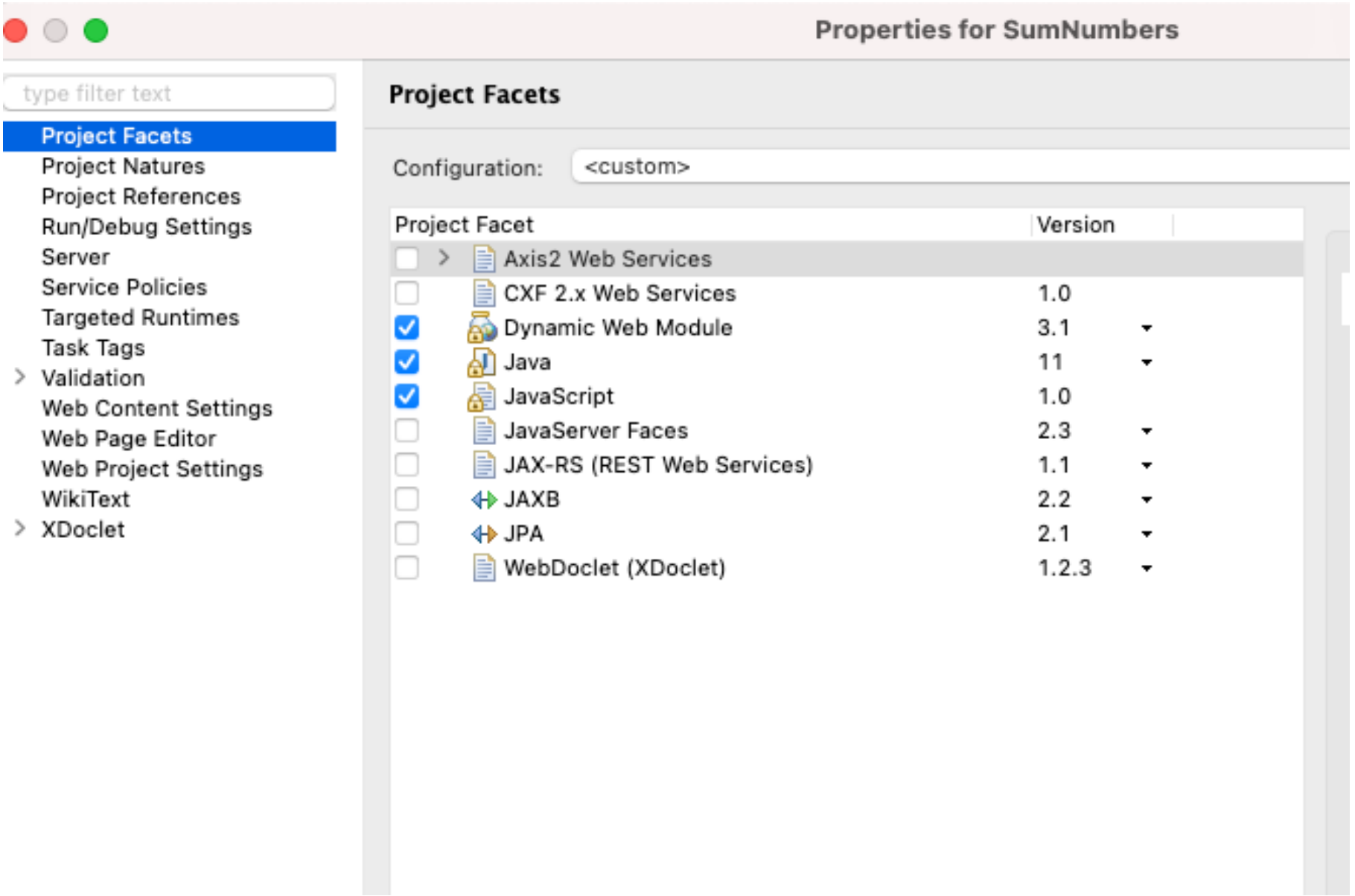


Example

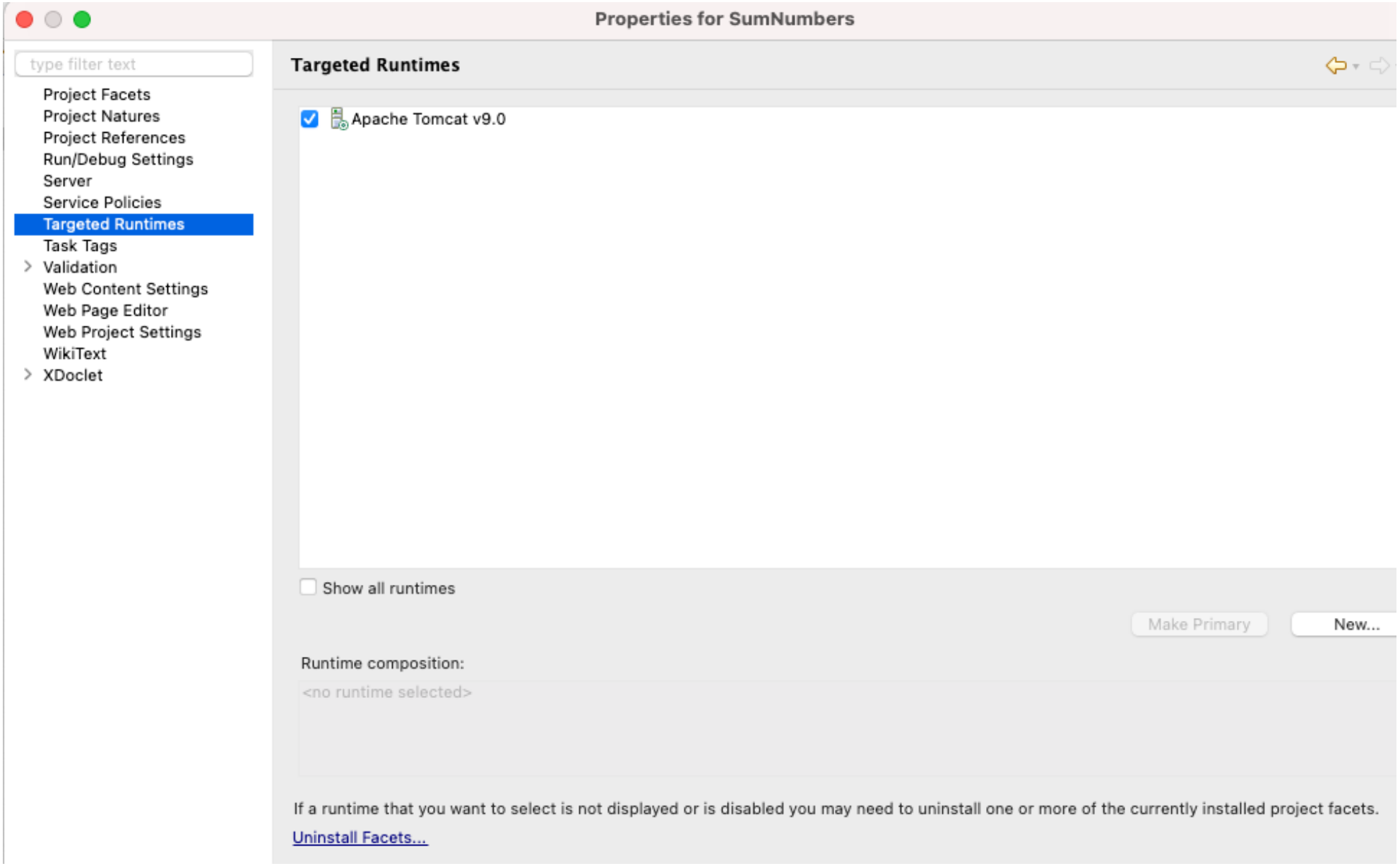
- Import **test-app**
- Deploy app to Tomcat
  - R-click Tomcat at bottom
  - Chooce Add and Remove
  - Select *test-app* and press Add arrow
  - Press Finish
- Start Tomcat
  - R-click Tomcat at bottom
  - Chooce Start (or Restart if running previou
- Access page
  - http://http://localhost:8080/test-app/index.html
  - if you did not change Tomcat port



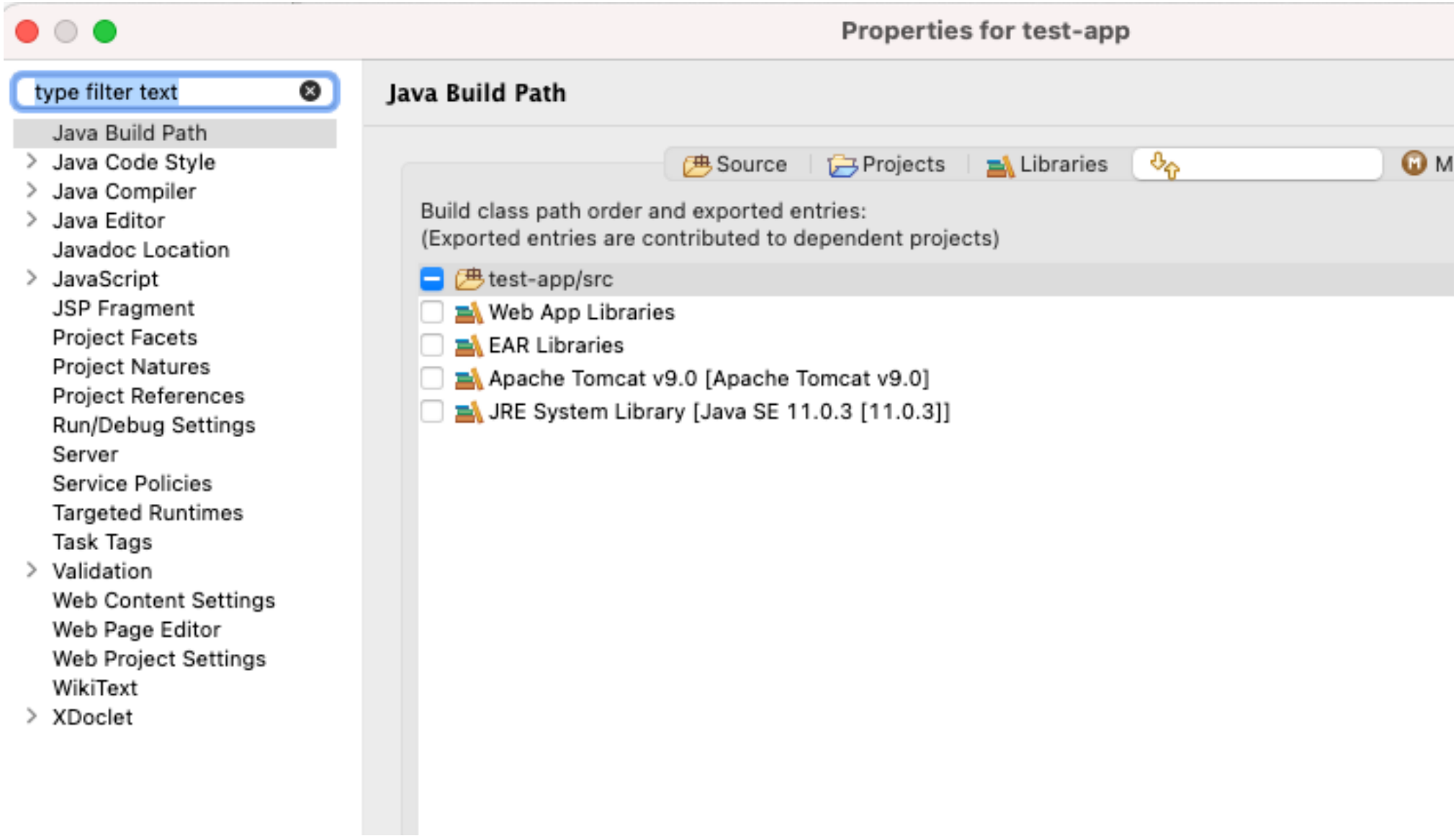
Setting the facets



Setting the targeted runtimes

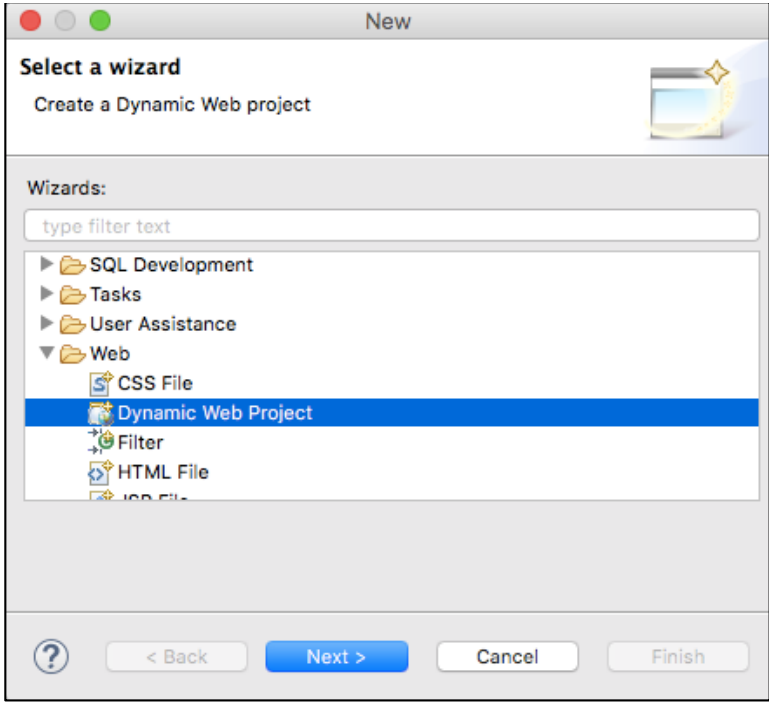


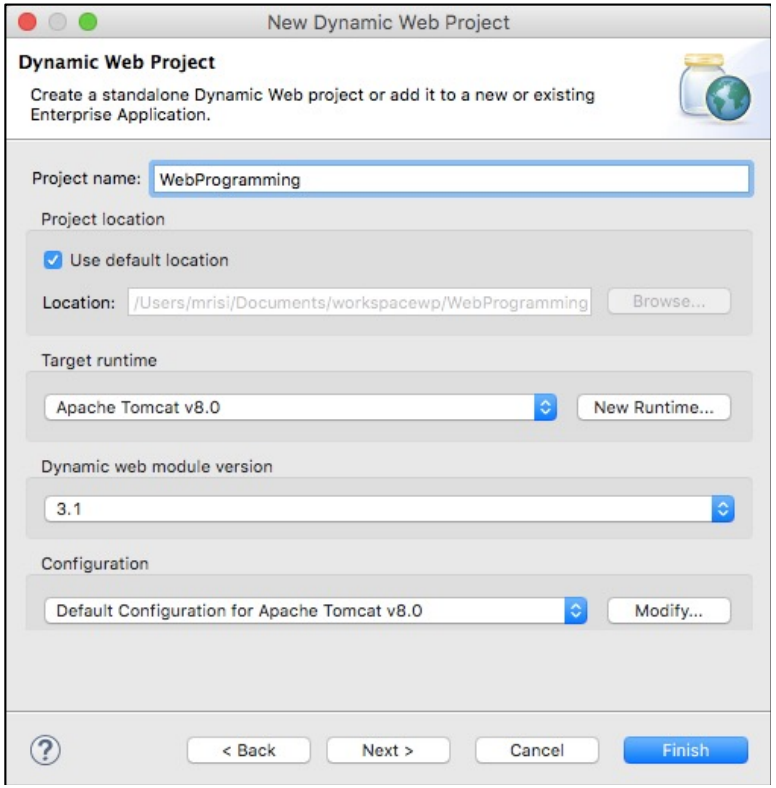
Check the build path



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





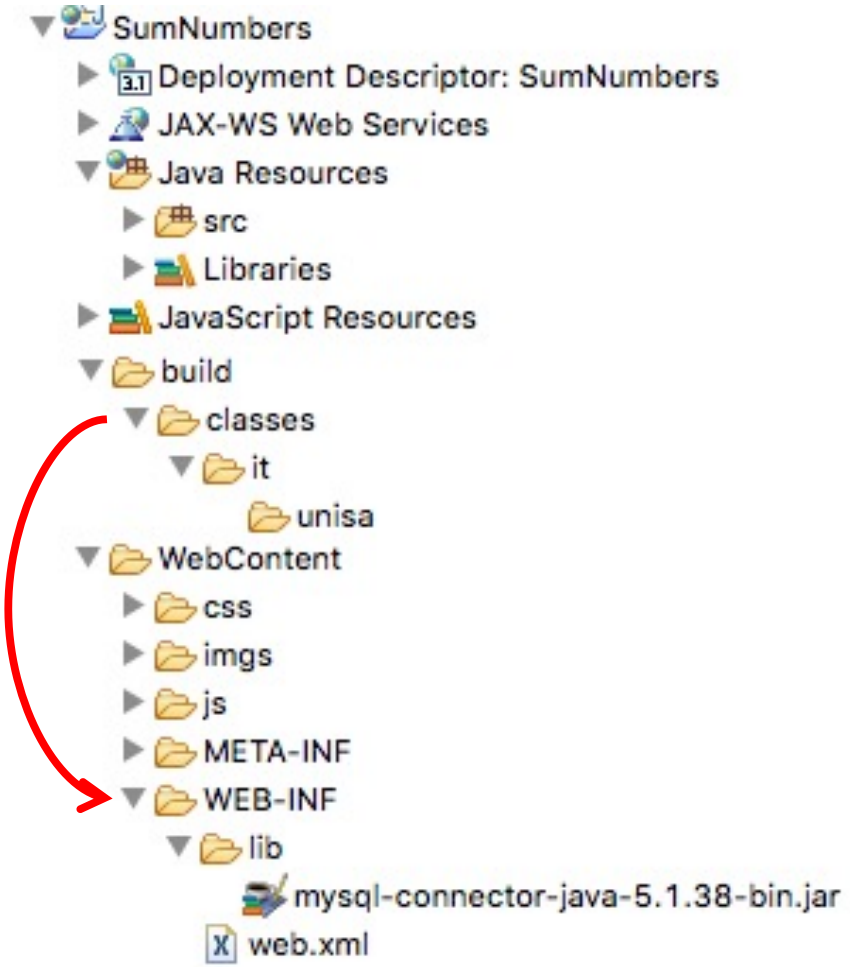
Put content in your project

- 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
  - WebContent/css
    - Your style sheets
  - WebContent/scripts
    - Your JavaScript files
  - WebContent/images
    - Your images
  - …

Deploy the App to Tomcat (manually)

- *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 con tasto destro sul progetto: Export > Web>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 e Windows 8

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 (eg: ./startup.sh)

Start Tomcat on Mac

- The following example executes the tomcat startup script:

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

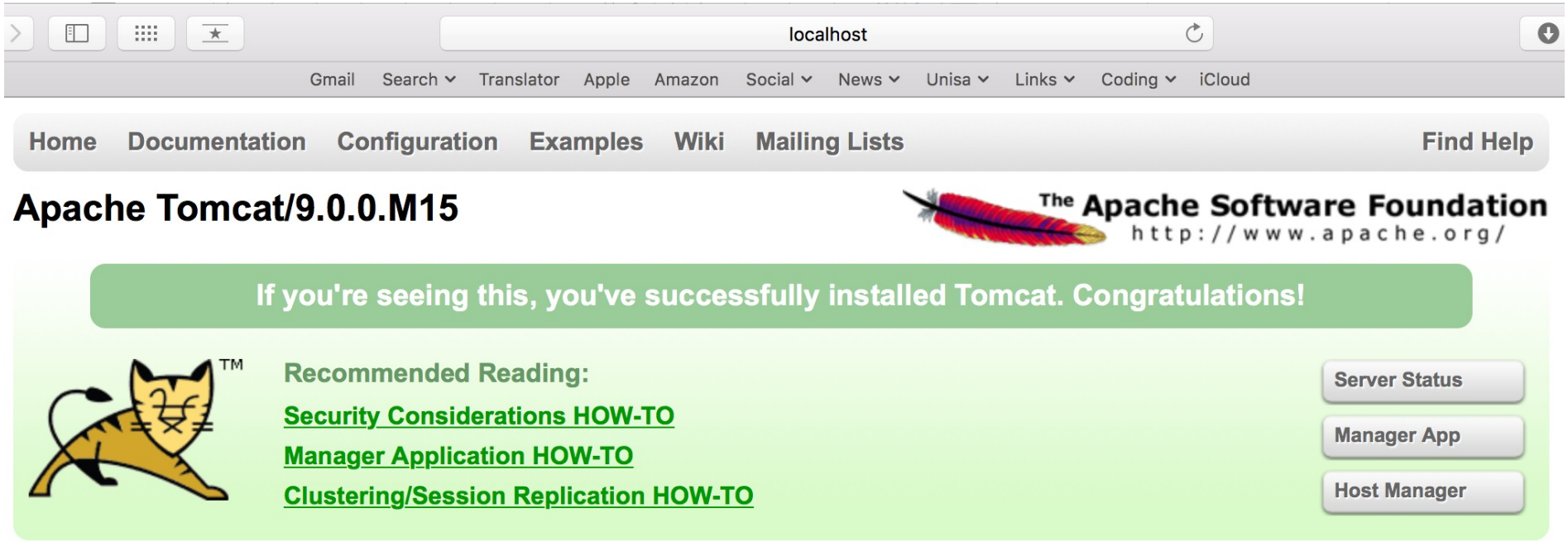
- Terminal should display four lines looking something like this:

```
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

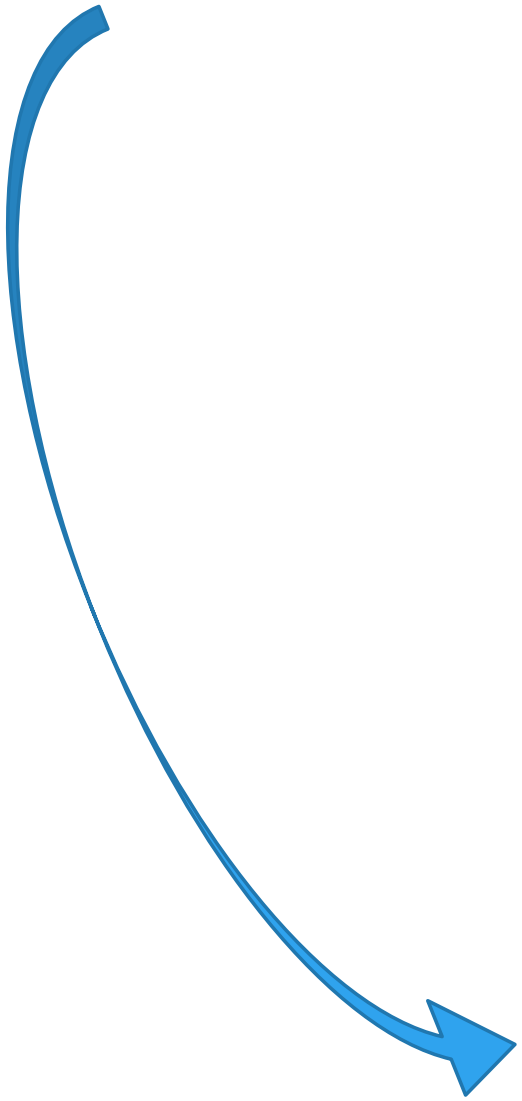
localhost

- 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



The Apache Software Foundation
http://www.apache.org/

Tomcat Web Application Manager

Message:	OK

Manager			
List Applications	HTML Manager Help	Manager Help	Server Status

Applications

Path	Version	Display Name	Running	Sessions	Commands
/	*None specified*	Welcome to Tomcat	true	0	Start Stop Reload Undeploy Expire sessions with idle ≥ 30 minutes
/docs	*None specified*	Tomcat Documentation	true	0	Start Stop Reload Undeploy Expire sessions with idle ≥ 30 minutes
/examples	*None specified*	Servlet and JSP Examples	true	0	Start Stop Reload Undeploy Expire sessions with idle ≥ 30 minutes
/host-manager	*None specified*	Tomcat Host Manager Application	true	1	Start Stop Reload Undeploy Expire sessions with idle ≥ 30 minutes
/manager	*None specified*	Tomcat Manager Application	true	1	Start Stop Reload Undeploy Expire sessions with idle ≥ 30 minutes

Deploy

Deploy directory or WAR file located on server

Context Path (required):
XML Configuration file URL:
WAR or Directory URL:
Deploy

WAR file to deploy

Select WAR file to upload Choose File no file selected
Deploy

Stop Tomcat

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

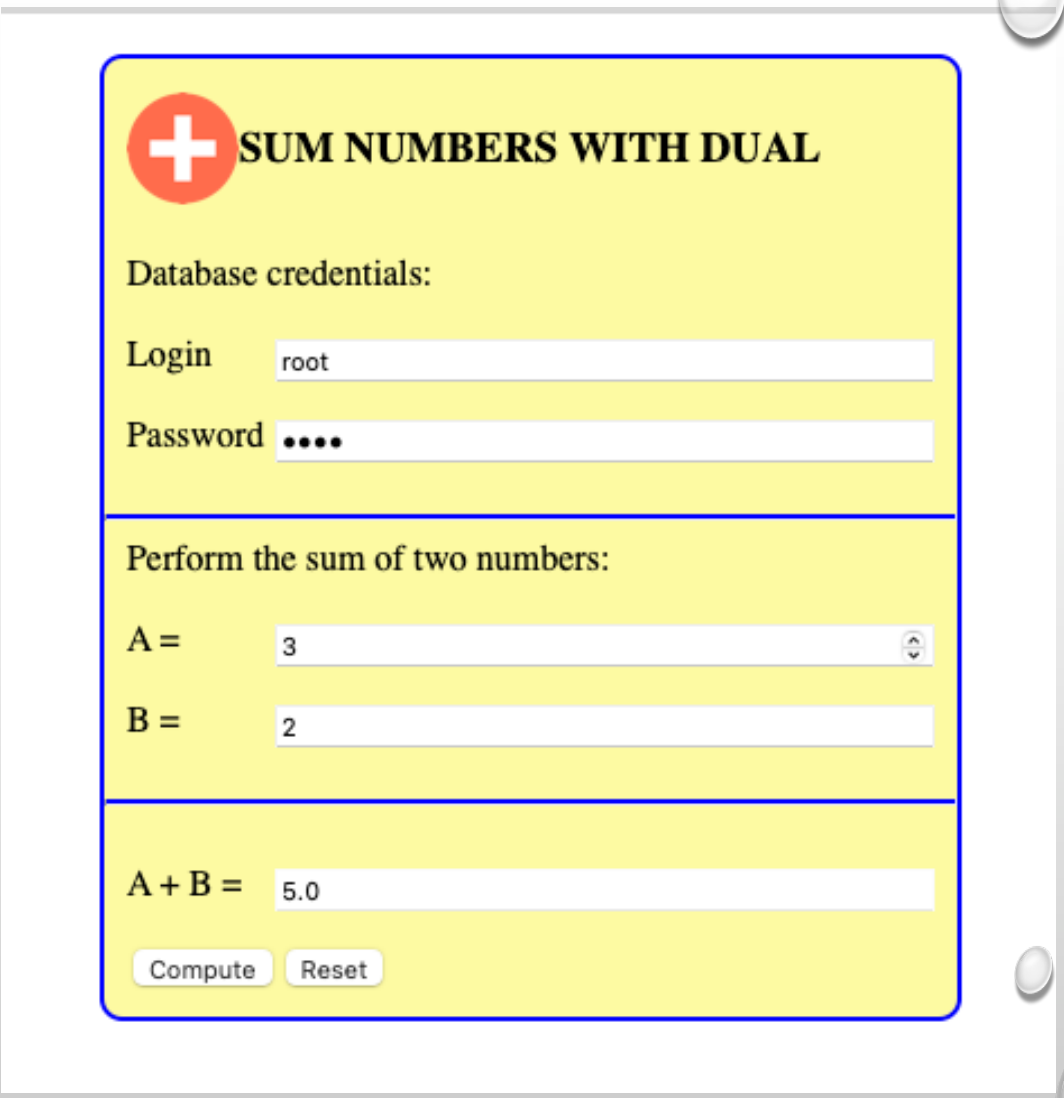
- Stop Tomcat in Eclipse
  - Select **Servers tab** at bottom
  - R-click Tomcat at bottom
  - Choose Stop

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*



Summary

- Install necessary software
  - Java (run installer)
  - Apache Tomcat (unzip)
  - Eclipse (unzip and then configure or use installer 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