



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 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



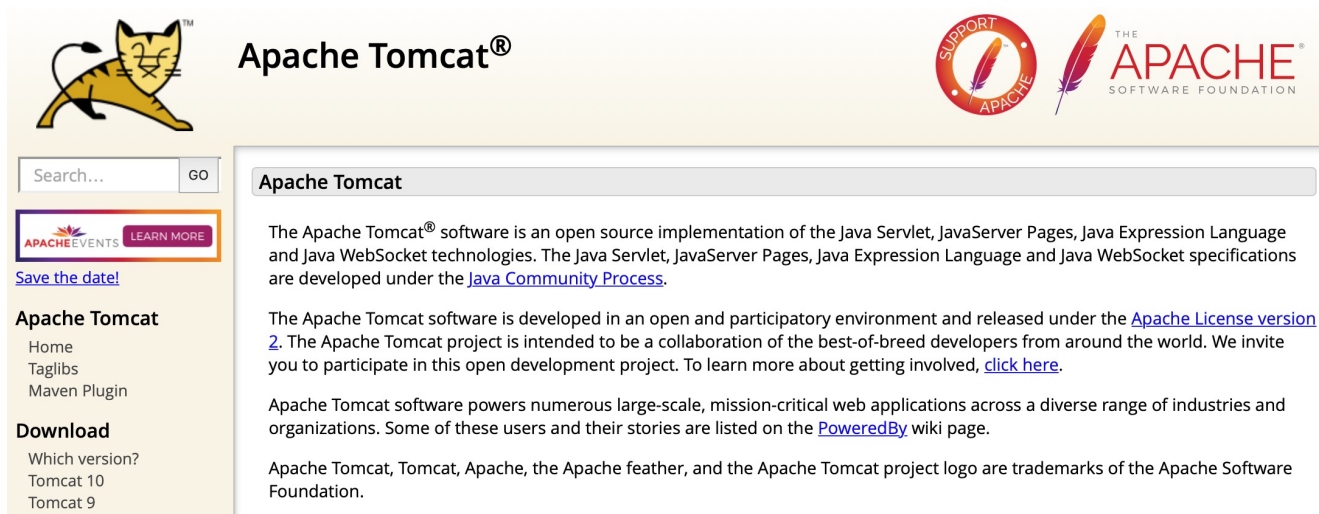
Documentation Download

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



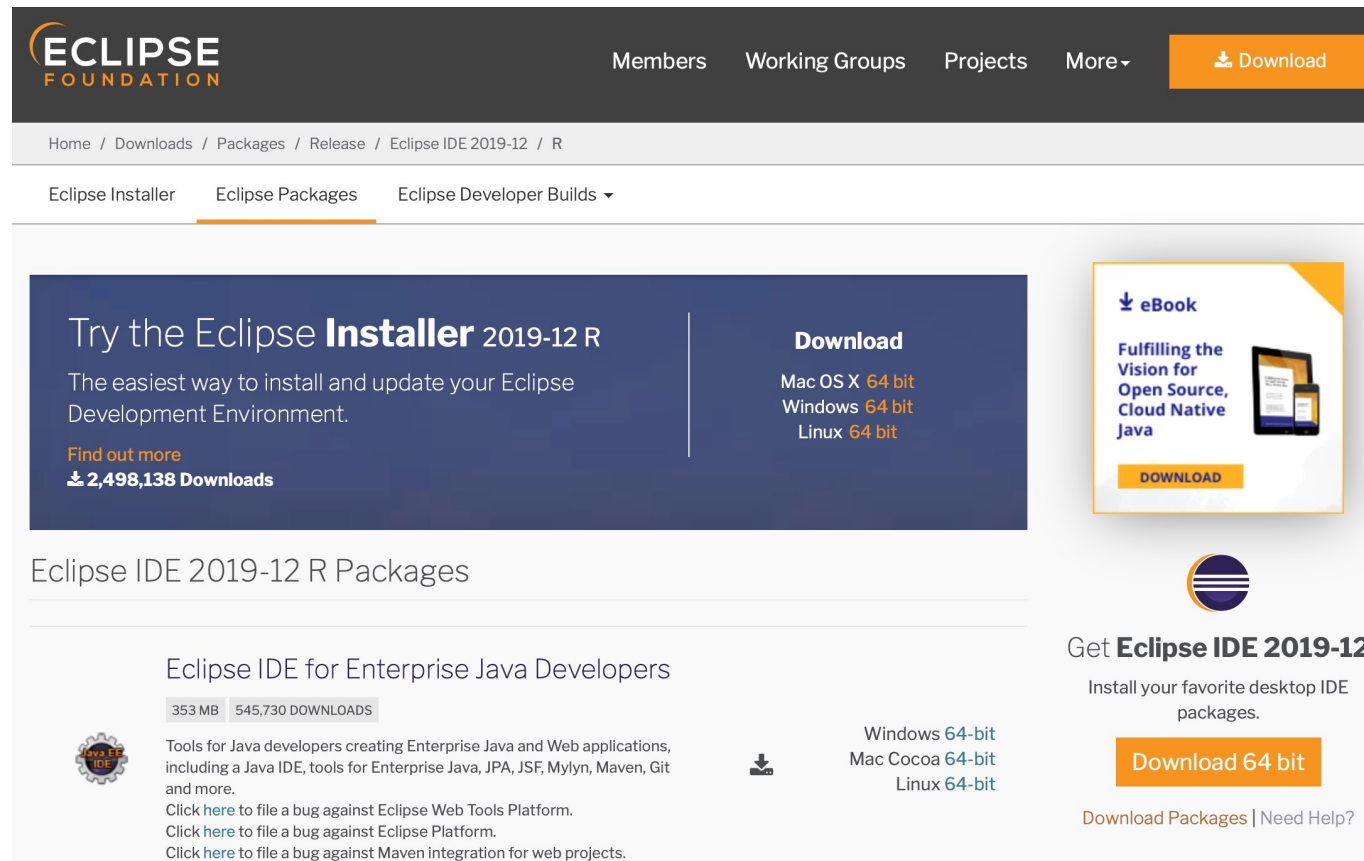
The screenshot shows the Apache Tomcat website. At the top left is the Tomcat logo (a yellow cat). To its right is the text "Apache Tomcat®". Further right are the "SUPPORT" logo (a red circle with a white feather) and "THE APACHE SOFTWARE FOUNDATION" logo (a red feather). Below the logo is a search bar with "Search..." and a "GO" button. On the left side, there is a sidebar with a "APACHE EVENTS" banner, a "Save the date!" link, and a "Apache Tomcat" section with links for "Home", "Taglibs", and "Maven Plugin". Below that is a "Download" section with "Which version?", "Tomcat 10", and "Tomcat 9". The main content area has a heading "Apache Tomcat" and three paragraphs of text. The first paragraph describes the software as an open source implementation of Java Servlet, JSP, EL, and WebSocket technologies, developed under the Java Community Process. The second paragraph states the software is developed in an open and participatory environment and released under the Apache License version 2.0, inviting participation and providing a link to learn more. The third paragraph mentions that the software powers numerous large-scale, mission-critical web applications across various industries and organizations, with a link to the PoweredBy wiki page. The fourth paragraph lists trademarks: Apache Tomcat, Tomcat, Apache, the Apache feather, and the Apache Tomcat project logo.

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>



The screenshot shows the Eclipse IDE 2019-12 R Packages page. The top navigation bar includes links for Members, Working Groups, Projects, and More, along with a Download button. The main content area features a large blue box with the text 'Try the Eclipse Installer 2019-12 R' and 'The easiest way to install and update your Eclipse Development Environment.' Below this, it says 'Find out more' and '2,498,138 Downloads'. To the right, there is a 'Download' section with links for Mac OS X 64 bit, Windows 64 bit, and Linux 64 bit. Further right, there is an 'eBook' section with the title 'Fulfilling the Vision for Open Source, Cloud Native Java' and a 'DOWNLOAD' button. Below the main content, there is a section for 'Eclipse IDE 2019-12 R Packages' with a sub-section for 'Eclipse IDE for Enterprise Java Developers'. This sub-section includes a download button, a list of tools (Java IDE, tools for Enterprise Java, JPA, JSF, Mylyn, Maven, Git and more), and links to file bugs against the Eclipse Web Tools Platform, Eclipse Platform, and Maven integration for web projects. On the right side of the page, there is a 'Get Eclipse IDE 2019-12' section with the text 'Install your favorite desktop IDE packages.' and a 'Download 64 bit' button. At the bottom right, there is a link to 'Download Packages | Need Help?'.

ECLIPSE FOUNDATION Members Working Groups Projects More [Download](#)

Home / Downloads / Packages / Release / Eclipse IDE 2019-12 / R

Eclipse Installer Eclipse Packages Eclipse Developer Builds ▾

Try the Eclipse **Installer** 2019-12 R
The easiest way to install and update your Eclipse Development Environment.
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Download
Mac OS X **64 bit**
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Eclipse IDE 2019-12 R Packages

Eclipse IDE for Enterprise Java Developers
353 MB 545,730 DOWNLOADS
Tools for Java developers creating Enterprise Java and Web applications, including a Java IDE, tools for Enterprise Java, JPA, JSF, Mylyn, Maven, Git and more.
Click [here](#) to file a bug against Eclipse Web Tools Platform.
Click [here](#) to file a bug against Eclipse Platform.
Click [here](#) to file a bug against Maven integration for web projects.

Windows **64-bit**
Mac Cocoa **64-bit**
Linux **64-bit**

Get **Eclipse IDE 2019-12**
Install your favorite desktop IDE packages.
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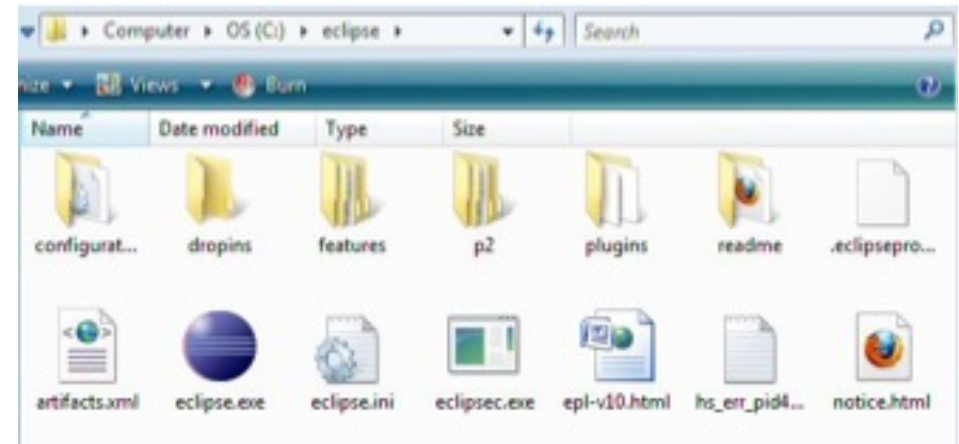
Download and unzip Eclipse (Java EE Version)

- 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

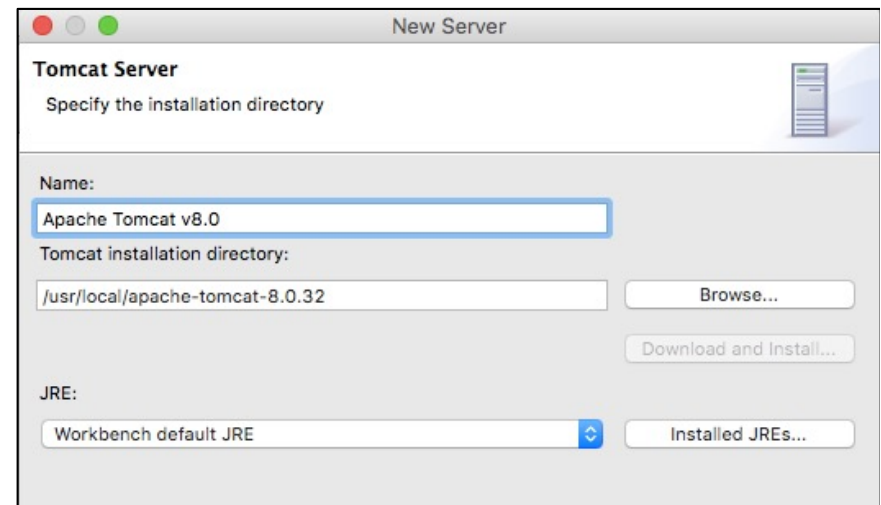
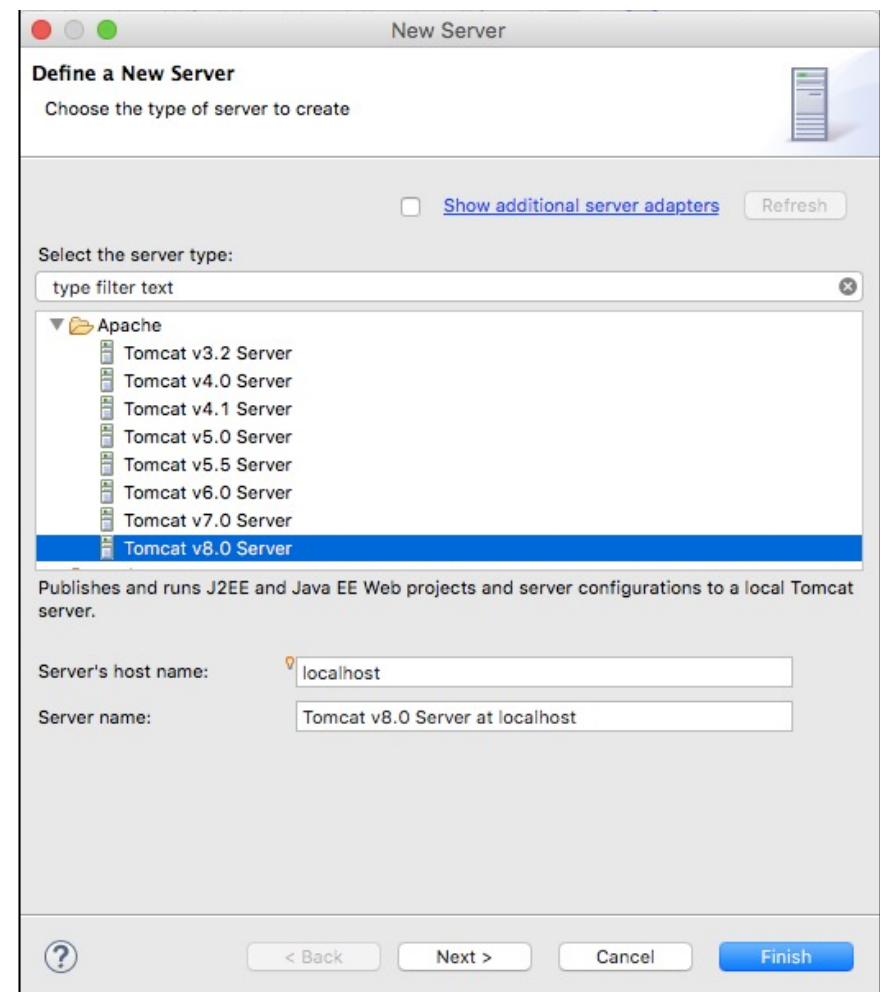
- Unzip the downloaded file (no installer!)
 - Unzip anywhere; call the folder you unzip into “installDir”
- Double click **eclipse.exe**
 - From *installDir*
- Click on “Workbench” icon
 - Next time you bring up Eclipse, it will come up in workbench automatically
- Shortcut
 - Many developers put Eclipse 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/...`

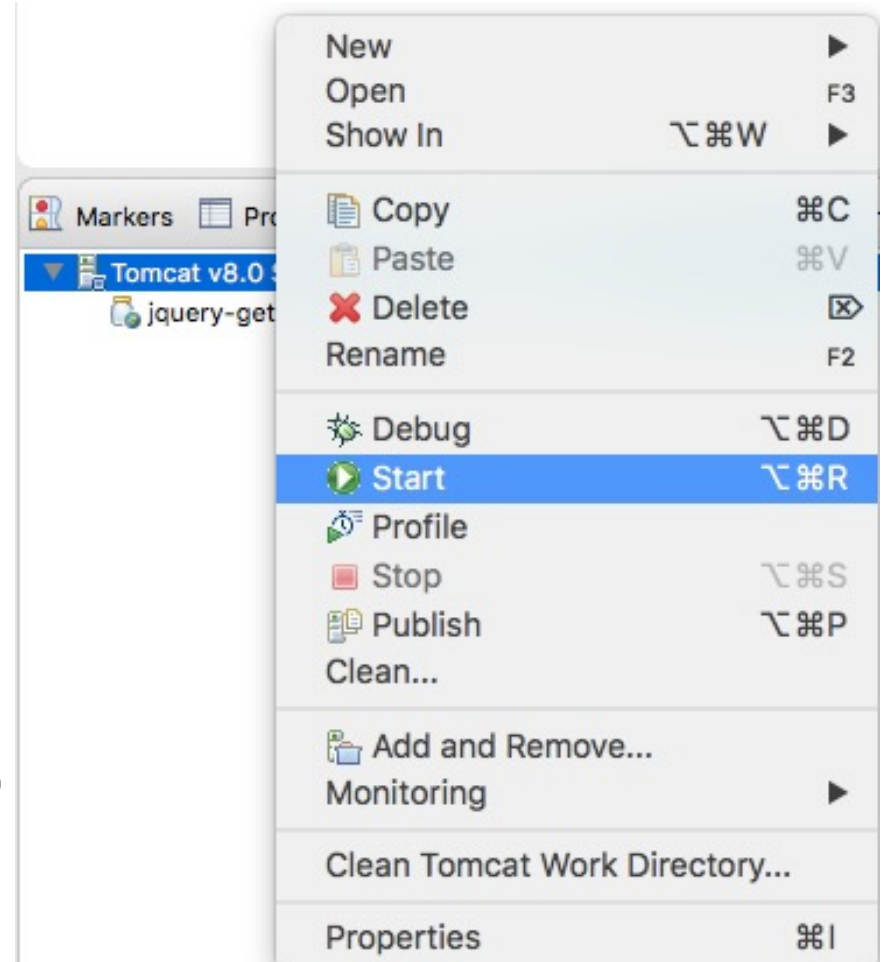
The screenshot shows the 'Overview' window in Eclipse, which is used for configuring the Tomcat server. The window is divided into several sections:

- General Information:** This section allows specifying the host name and other common settings. It includes fields for 'Server name' (Tomcat v8.0 Server at localhost), 'Host name' (localhost), 'Runtime Environment' (Apache Tomcat v8.0), and 'Configuration path' (/Servers/Tomcat v8.0 Server at loca). There is a 'Browse...' button for the configuration path and a link to 'Open launch configuration'.
- Server Locations:** This section allows specifying the server path (i.e. catalina.base) and deploy path. It includes three radio buttons: 'Use workspace metadata (does not modify Tomcat installation)' (selected), 'Use Tomcat installation (takes control of Tomcat installation)', and 'Use custom location (does not modify Tomcat installation)'. It also includes fields for 'Server path' (.metadata/.plugins/org.eclipse.wst.server.c) and 'Deploy path' (wtpwebapps), both with 'Browse...' buttons. A link 'Set deploy path to the default value (currently set)' is also present.
- Publishing:** This section contains a 'Timeouts' subsection where you can specify the time limit to complete server operations. It has two spinners: 'Start (in seconds)' set to 45 and 'Stop (in seconds)' set to 15.
- Ports:** This section allows modifying the server ports. It contains a table with two columns: 'Port Name' and 'Port Number'. The table lists three ports: 'Tomcat admin port' (8005), 'HTTP/1.1' (80), and 'AJP/1.3' (8009). The 'HTTP/1.1' row is highlighted.
- MIME Mappings:** This section is currently collapsed.

Port Name	Port Number
Tomcat admin port	8005
HTTP/1.1	80
AJP/1.3	8009

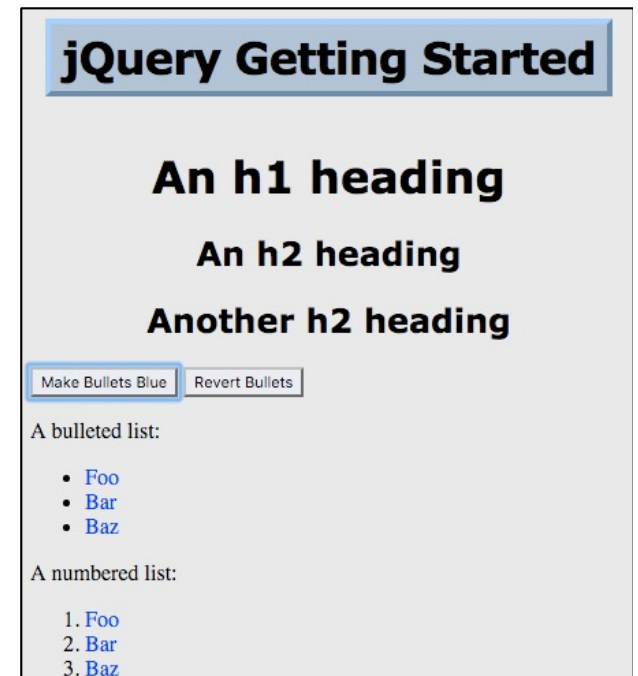
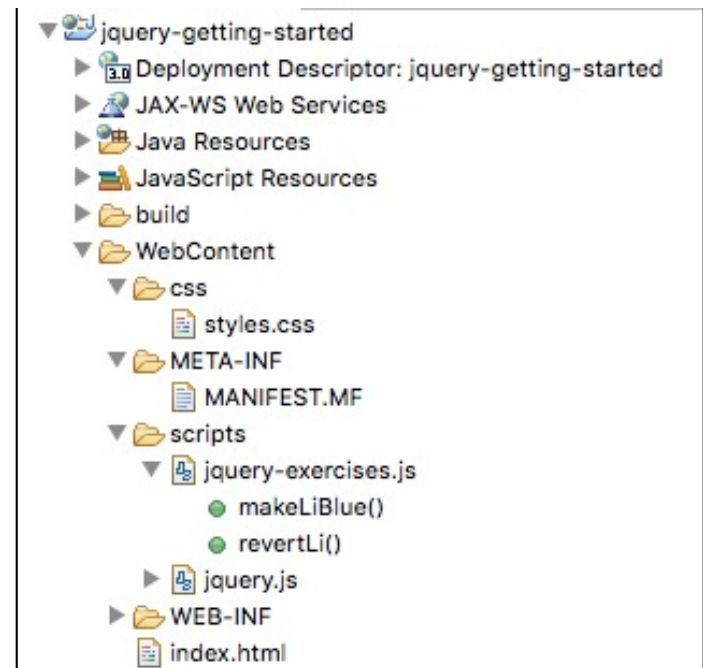
Deploy the App to Tomcat

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

Properties for SumNumbers

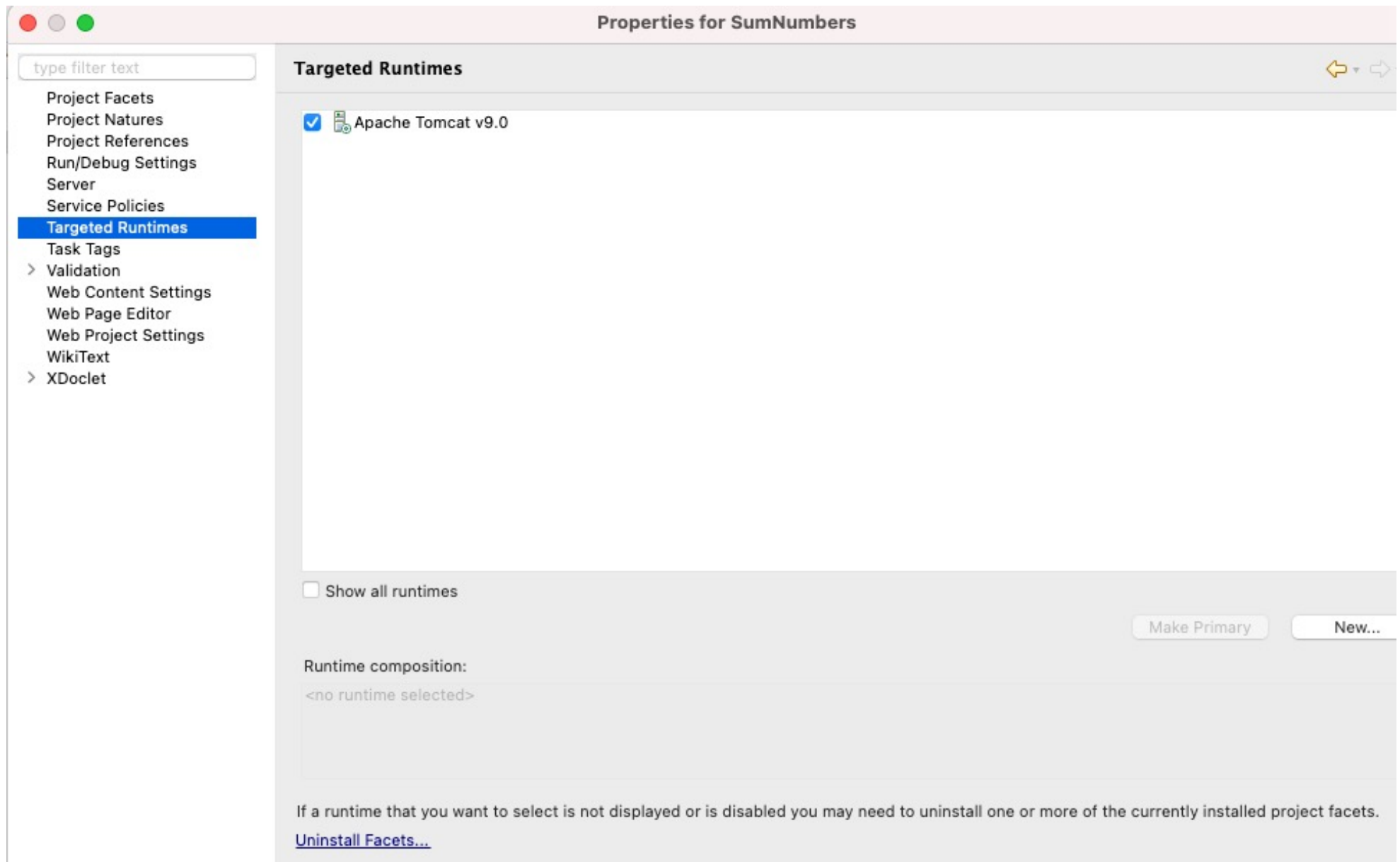
type filter text

Project Facets

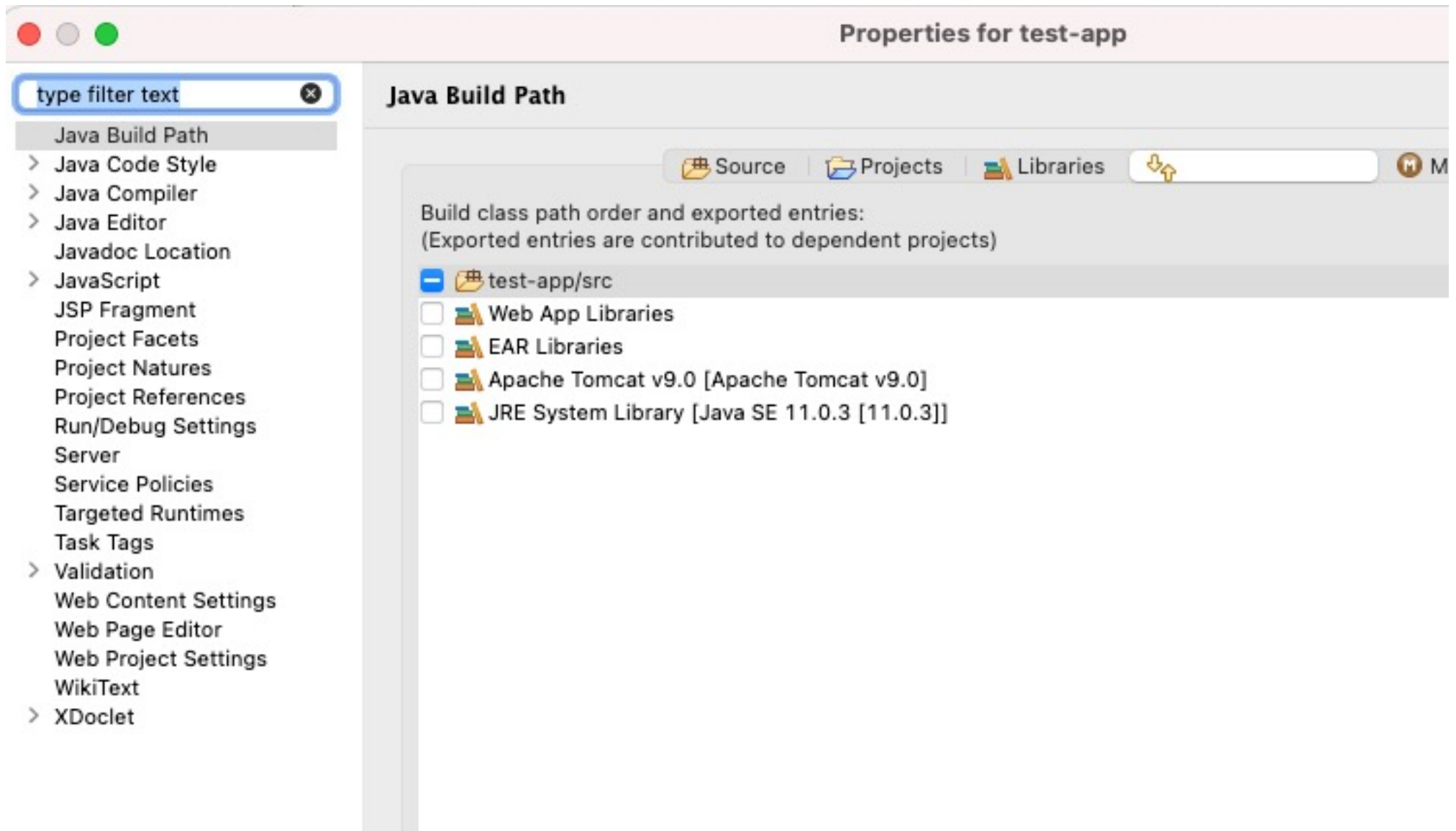
Configuration: <custom>

Project Facet	Version
<input type="checkbox"/> > Axis2 Web Services	
<input type="checkbox"/> CXF 2.x Web Services	1.0
<input checked="" type="checkbox"/> Dynamic Web Module	3.1 ▼
<input checked="" type="checkbox"/> Java	11 ▼
<input checked="" type="checkbox"/> JavaScript	1.0
<input type="checkbox"/> JavaServer Faces	2.3 ▼
<input type="checkbox"/> JAX-RS (REST Web Services)	1.1 ▼
<input type="checkbox"/> JAXB	2.2 ▼
<input type="checkbox"/> JPA	2.1 ▼
<input type="checkbox"/> WebDoclet (XDoclet)	1.2.3 ▼

Setting the targeted runtimes



Check the build path

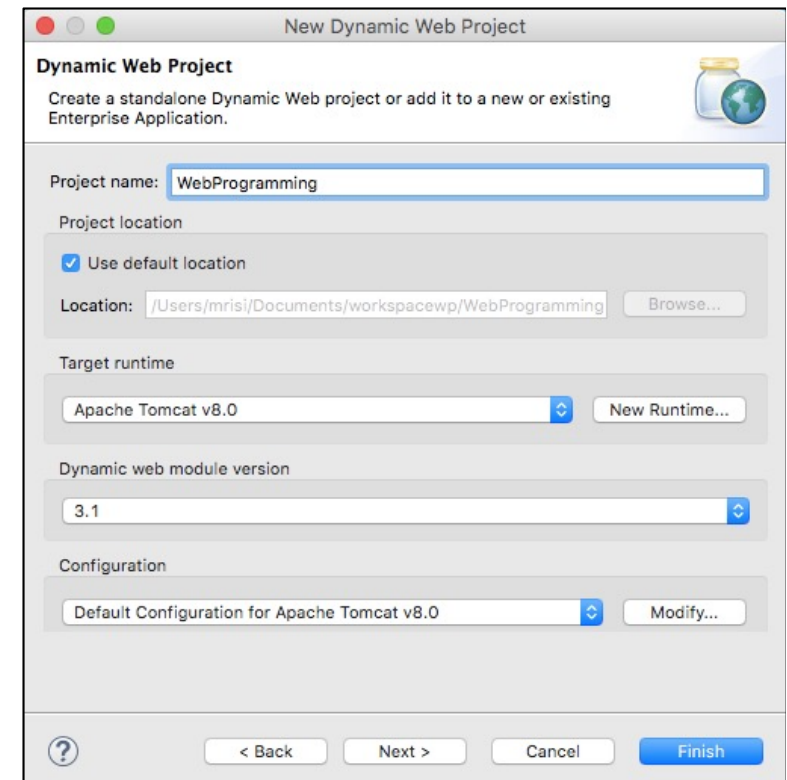
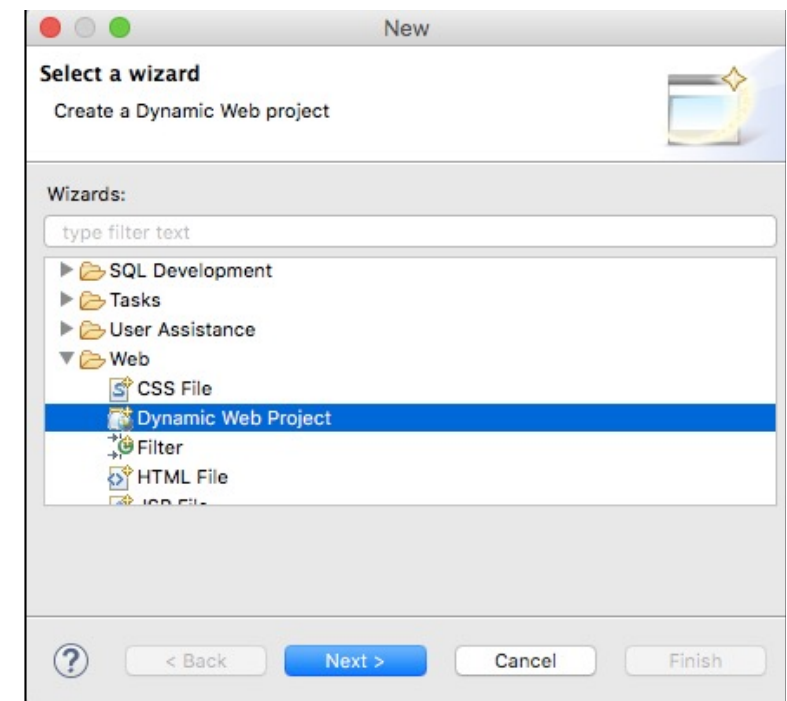


Example

- 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:8080/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
 - WebContent/css
 - Your style sheets
 - WebContent/scripts
 - Your JavaScript files
 - WebContent/images
 - Your images
 - ...

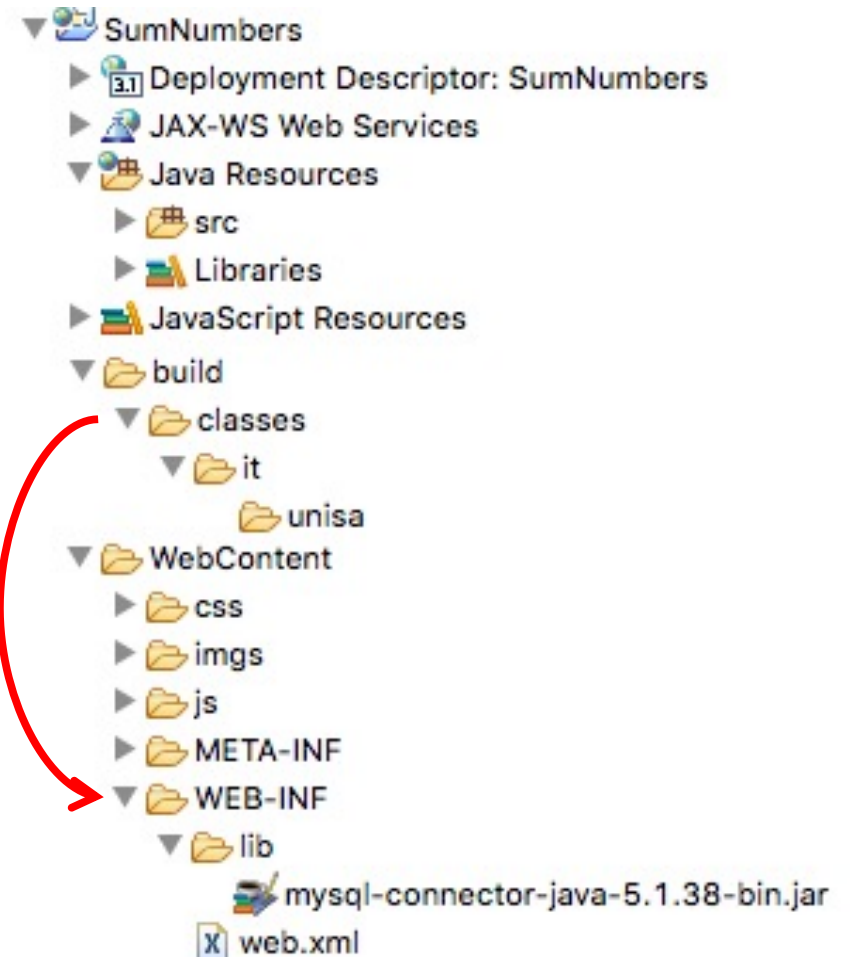
Deploy the App to Tomcat (manually)

- 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

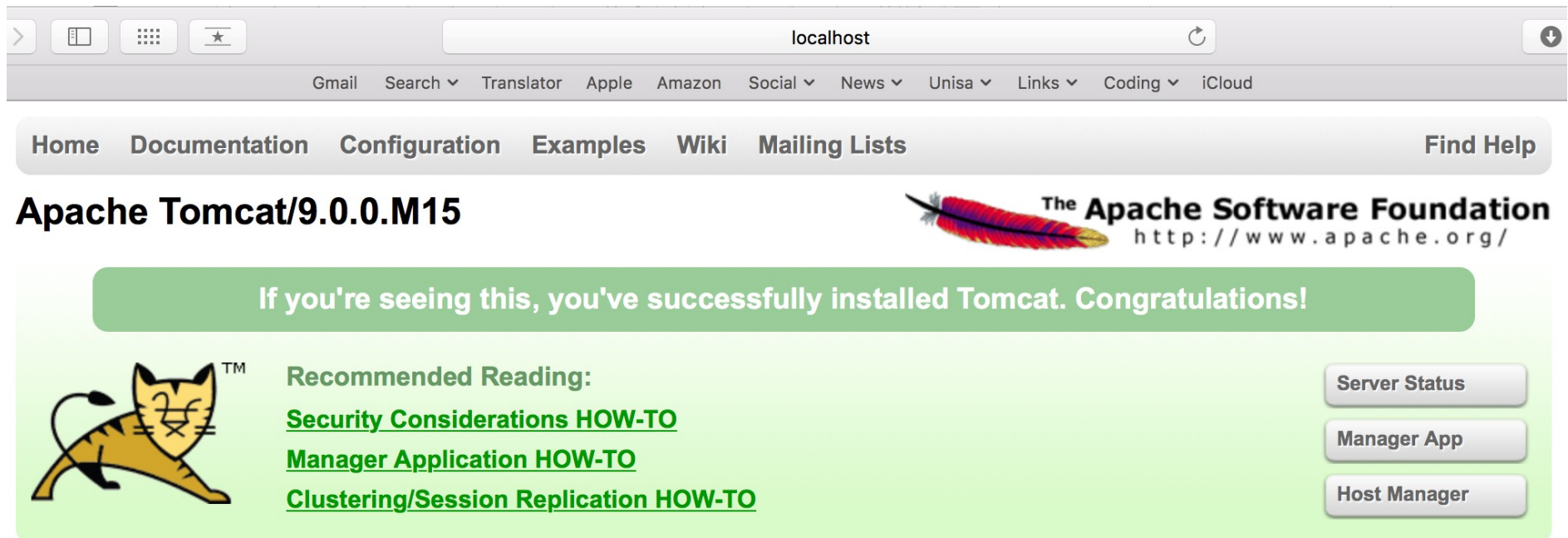
Using CLASSPATH: /usr/local/tomcat/bin/bootstrap.jar:/usr/local/tomcat/bin/tomcat-juli.jar

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



localhost


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Home Documentation Configuration Examples Wiki Mailing Lists Find Help

Apache Tomcat/9.0.0.M15

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

If you're seeing this, you've successfully installed Tomcat. Congratulations!



Recommended Reading:

- [Security Considerations HOW-TO](#)
- [Manager Application HOW-TO](#)
- [Clustering/Session Replication HOW-TO](#)

Server Status

Manager App

Host Manager

Tomcat Manager

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



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*

 **SUM NUMBERS WITH DUAL**

Database credentials:

Login

Password

Perform the sum of two numbers:

A =

B =

A + B =

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