



CORSO DI LAUREA IN INFORMATICA

# Tecnologie Software per il Web

DEPLOYING APPS WITH ECLIPSE AND TOMCAT

a.a. 2019-2020

# Topics in This Section

- 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



The screenshot shows the Oracle Java SE Downloads page. The Oracle logo is at the top left. The page title is "Java SE Downloads". A red dashed circle highlights the "DOWNLOAD" button for "Java Platform (JDK) 11". Below this, the "Java Platform, Standard Edition" section is visible, showing "Java SE 11.0.2(LTS)" as the latest release. A sidebar on the left lists various Java products, and a sidebar on the right lists Java SDKs and Tools. The main content area has tabs for Overview, Downloads, Documentation, Community, Technologies, and Training.

Oracle Technology Network / Java / Java SE / Downloads

Java SE Downloads

Overview Downloads Documentation Community Technologies Training

Java SE 11.0.2(LTS)  
Java SE 11.0.2 is the latest release for the Java SE 11 Platforms  
[Learn more](#)

Installation Instructions  
Release Notes

Oracle JDK  
DOWNLOAD

Java SDKs and Tools

- Java SE
- Java EE and Glassfish
- Java ME
- Java Card
- NetBeans IDE
- Java Mission Control

Java Resources

- Java APIs
- Technical Articles
- Demos and Videos
- Forums
- Java Magazine
- Developer Training
- Tutorials
- Java.com

# 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, then “*Eclipse IDE for Java EE Developers*” --- Eclipse IDE

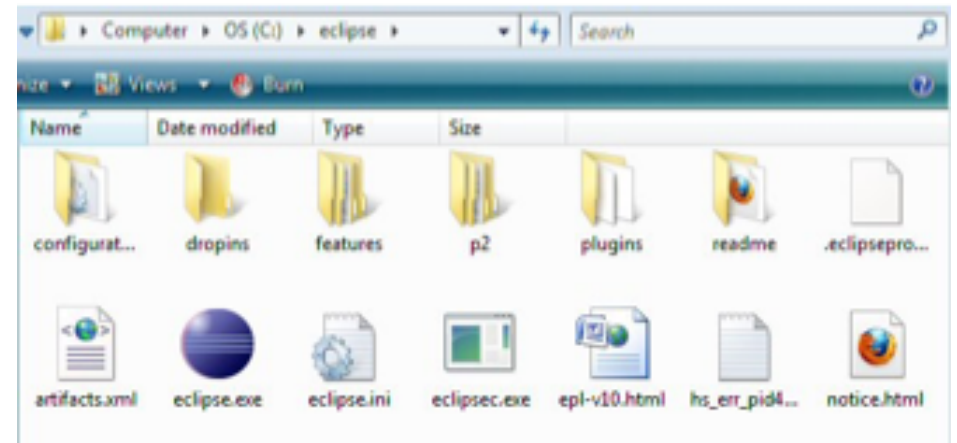
<https://www.eclipse.org/downloads/packages>
- Get installer
  - Run installer, resulting in something like C:\eclipse
- Or, get Zip version: just unzip the file
  - E.g., resulting in something like C:\eclipse
- Remember the location
  - You will later launch Eclipse by clicking on **eclipse.exe** in the folder where you unzipped Eclipse





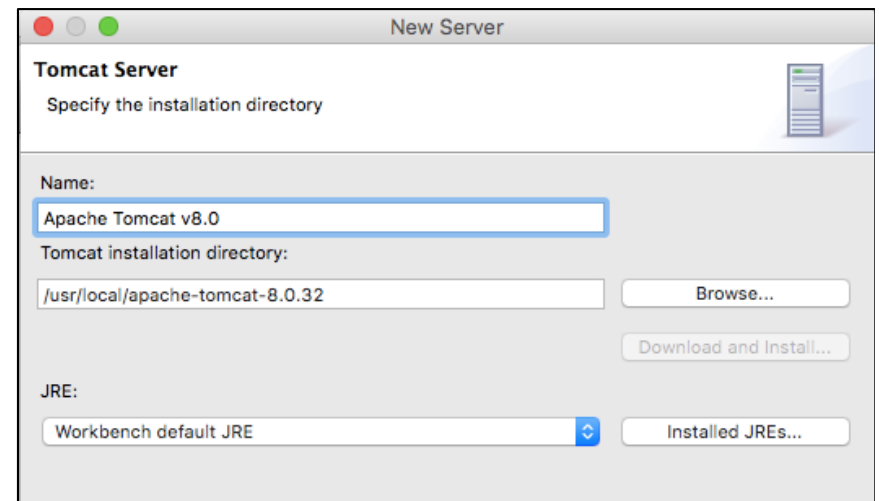
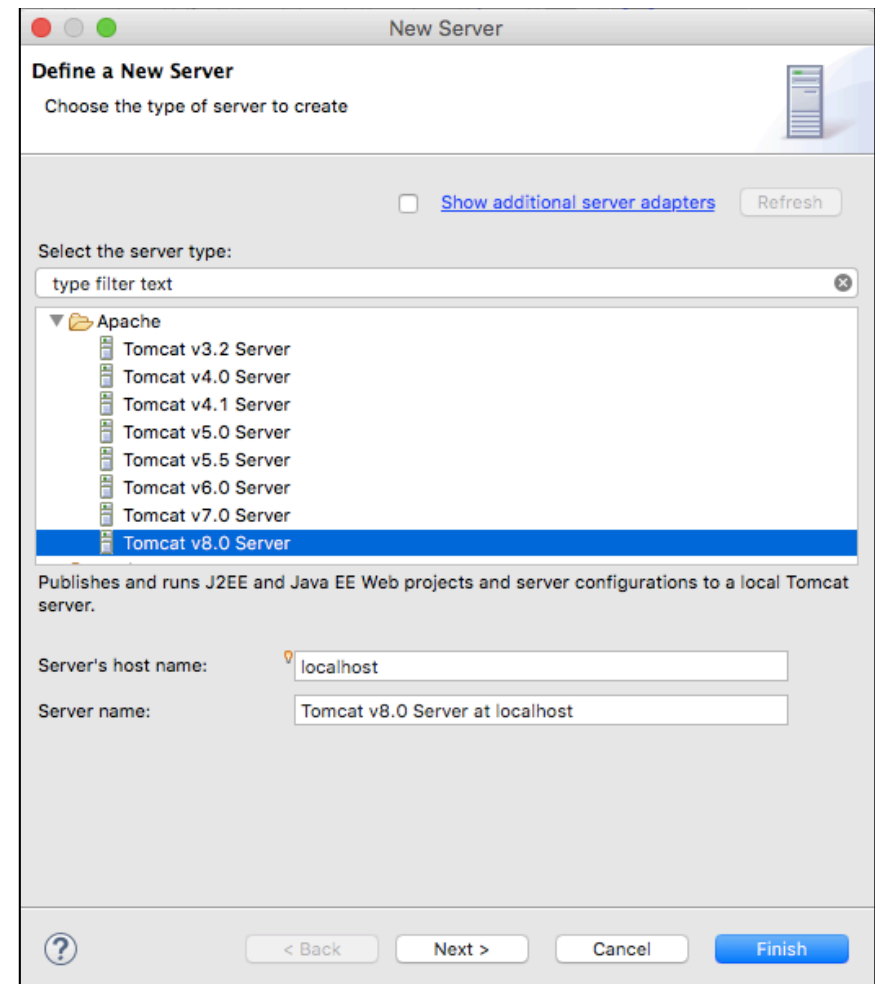
# Running Eclipse

- 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!)



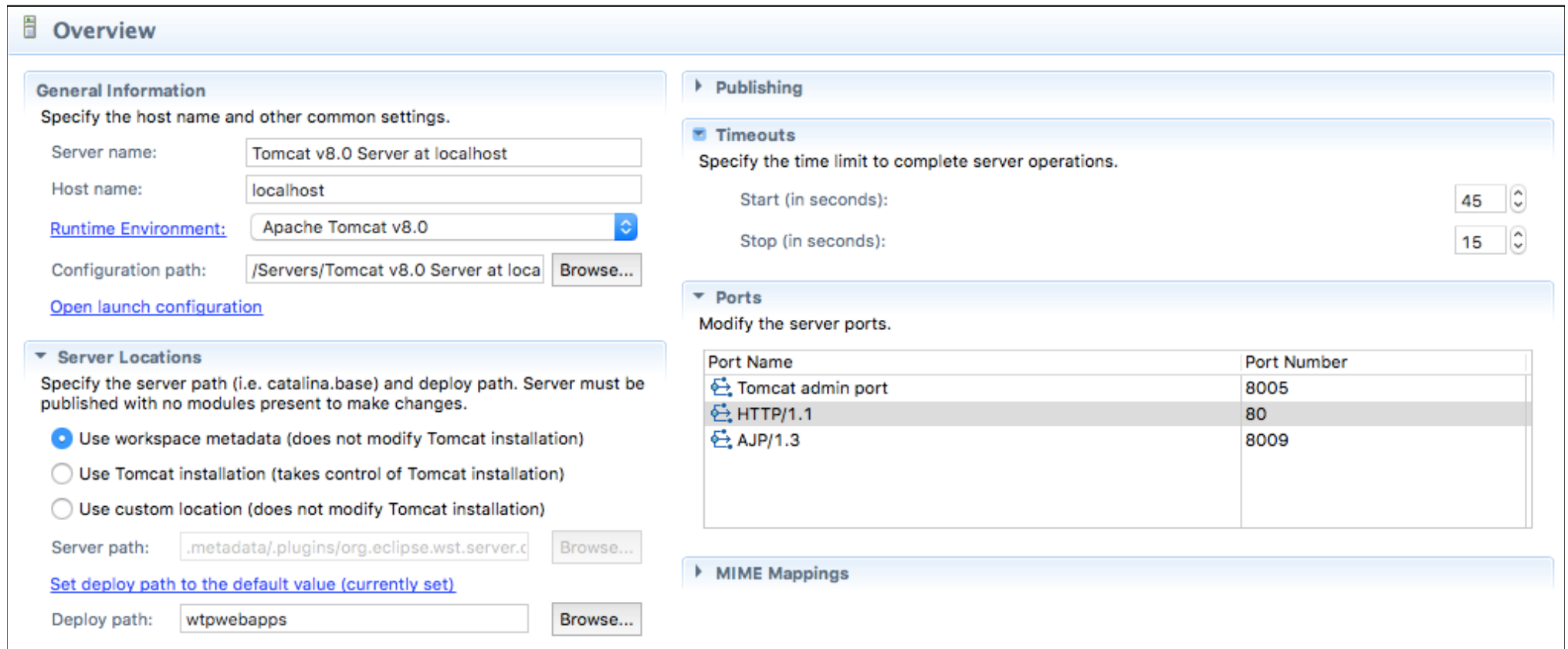
# Configuring Eclipse

- 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/...`



**Overview**

**General Information**  
Specify the host name and other common settings.

Server name:

Host name:

Runtime Environment:

Configuration path:

[Open launch configuration](#)

**Server Locations**  
Specify the server path (i.e. catalina.base) and deploy path. Server must be published with no modules present to make changes.

☒ Use workspace metadata (does not modify Tomcat installation)

☐ Use Tomcat installation (takes control of Tomcat installation)

☐ Use custom location (does not modify Tomcat installation)

Server path:

[Set deploy path to the default value \(currently set\)](#)

Deploy path:

**Publishing**

**Timeouts**  
Specify the time limit to complete server operations.

Start (in seconds):

Stop (in seconds):

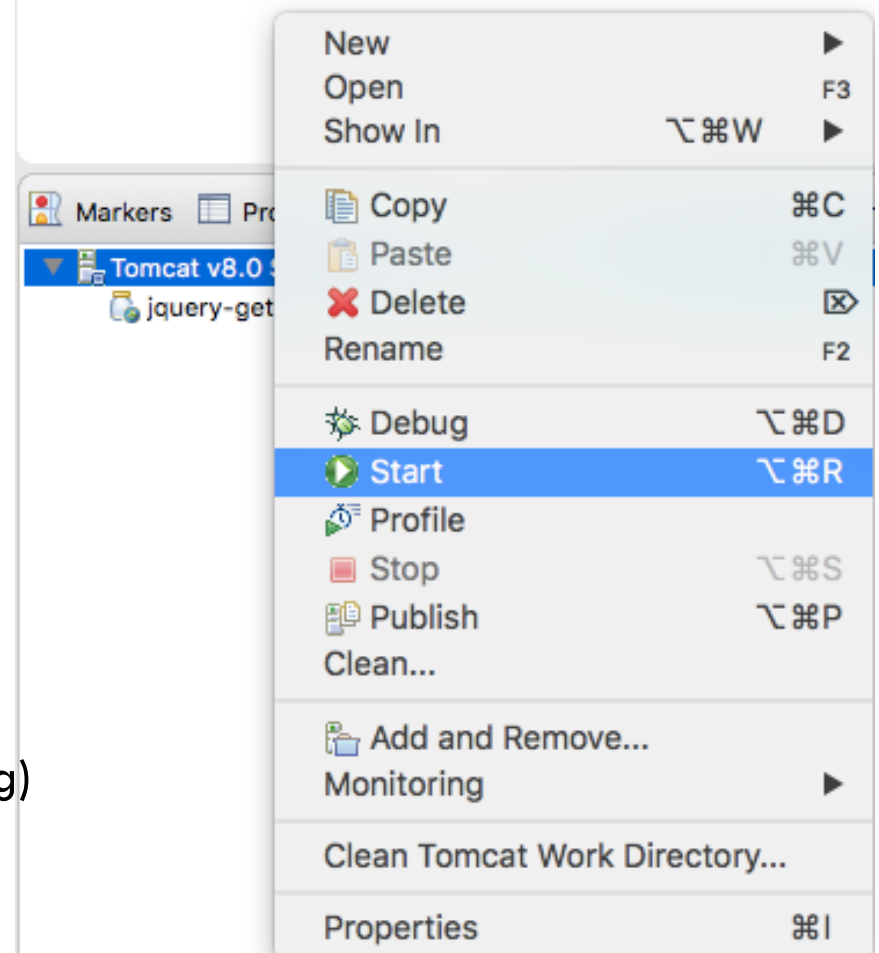
**Ports**  
Modify the server ports.

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

**MIME Mappings**

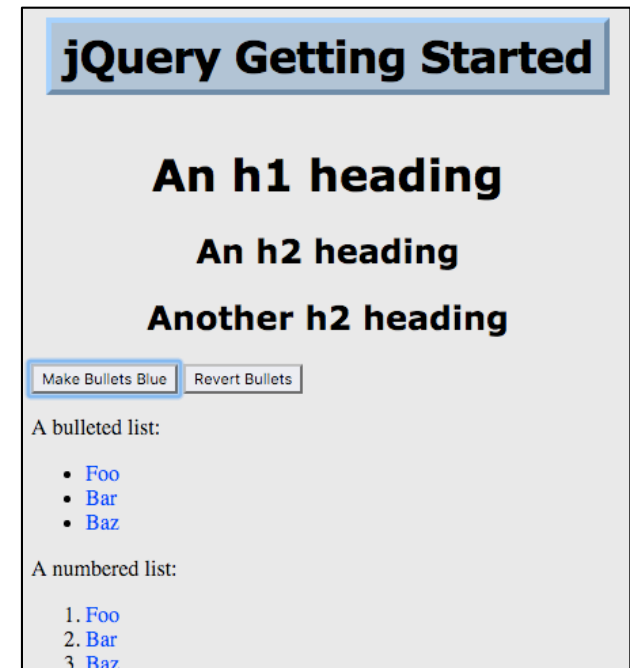
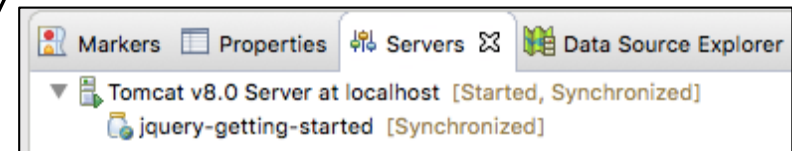
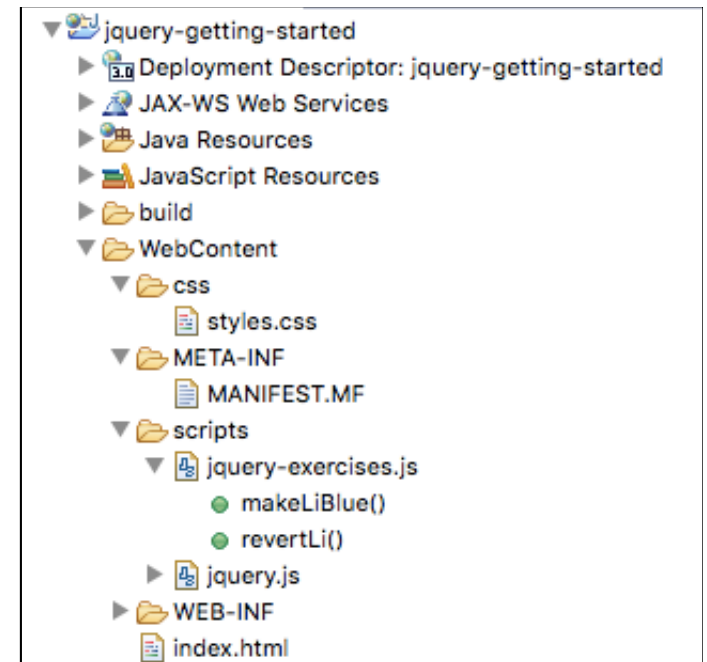
# Deploy the App to Tomcat

- 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/your-project/your-file.html>



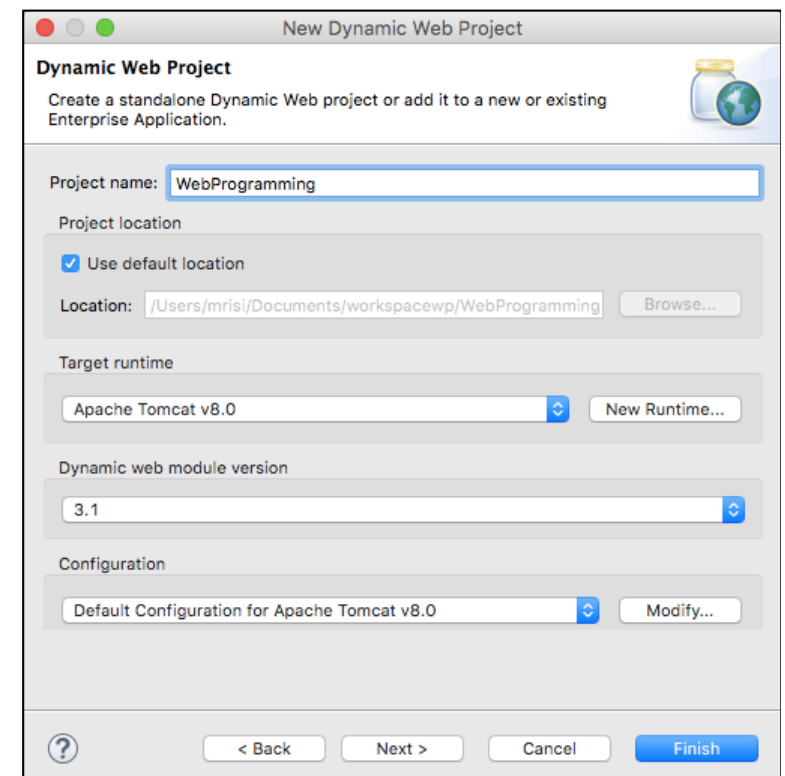
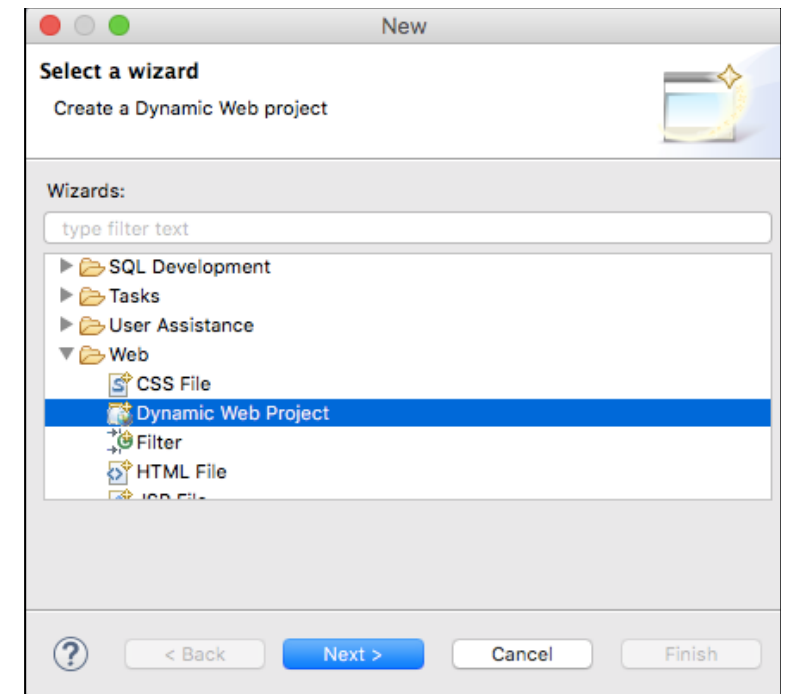
# Example

- 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>
  - In general, **<http://localhost/your-project/your-file.html>**
  - Or <http://localhost:8080/your-project/your-file.html> if you did not change Tomcat port



# 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
  - ...

# Setting the facets

**Project Facets**

Configuration:


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 ▼



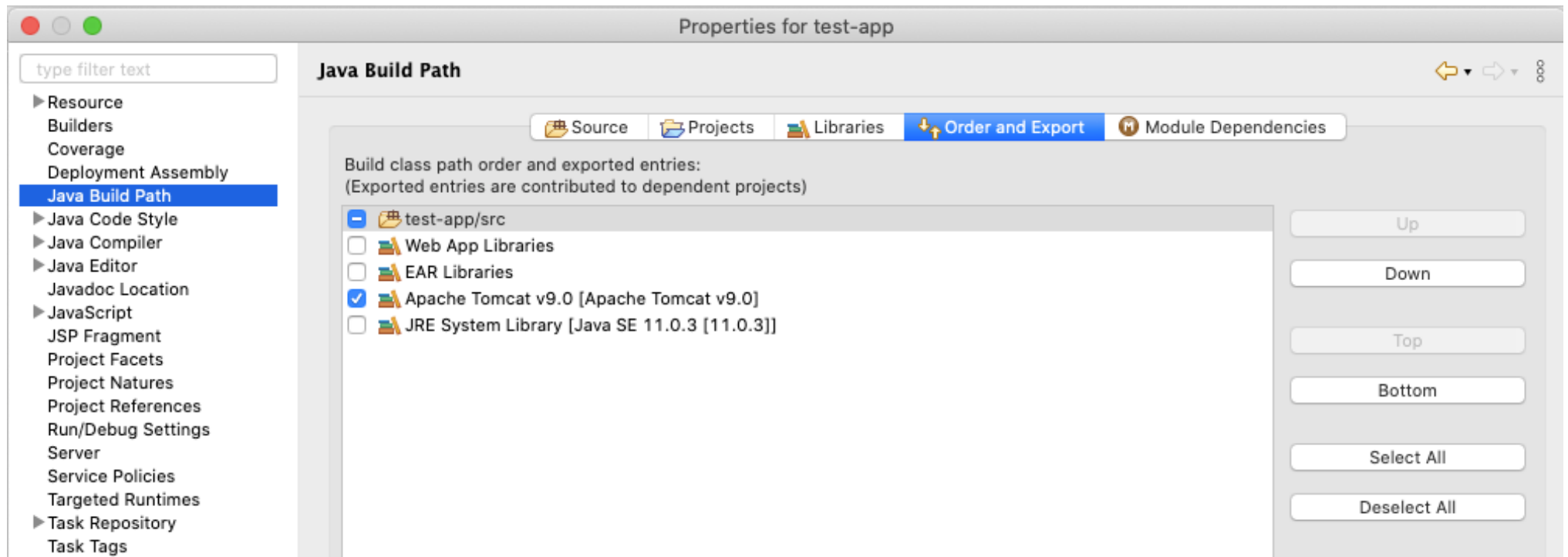
# Setting the targeted runtimes

- Project Facets
- Project Natures
- Project References
- Run/Debug Settings
- Server
- Service Policies
- Targeted Runtimes**
- ▶ Task Repository
  - Task Tags
- ▶ Validation
  - Web Content Settings
  - Web Page Editor
  - Web Project Settings
  - WikiText
- ▶ XDoclet

## Targeted Runtimes

- ☒  Apache Tomcat v9.0

# 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/test-app/index.html>

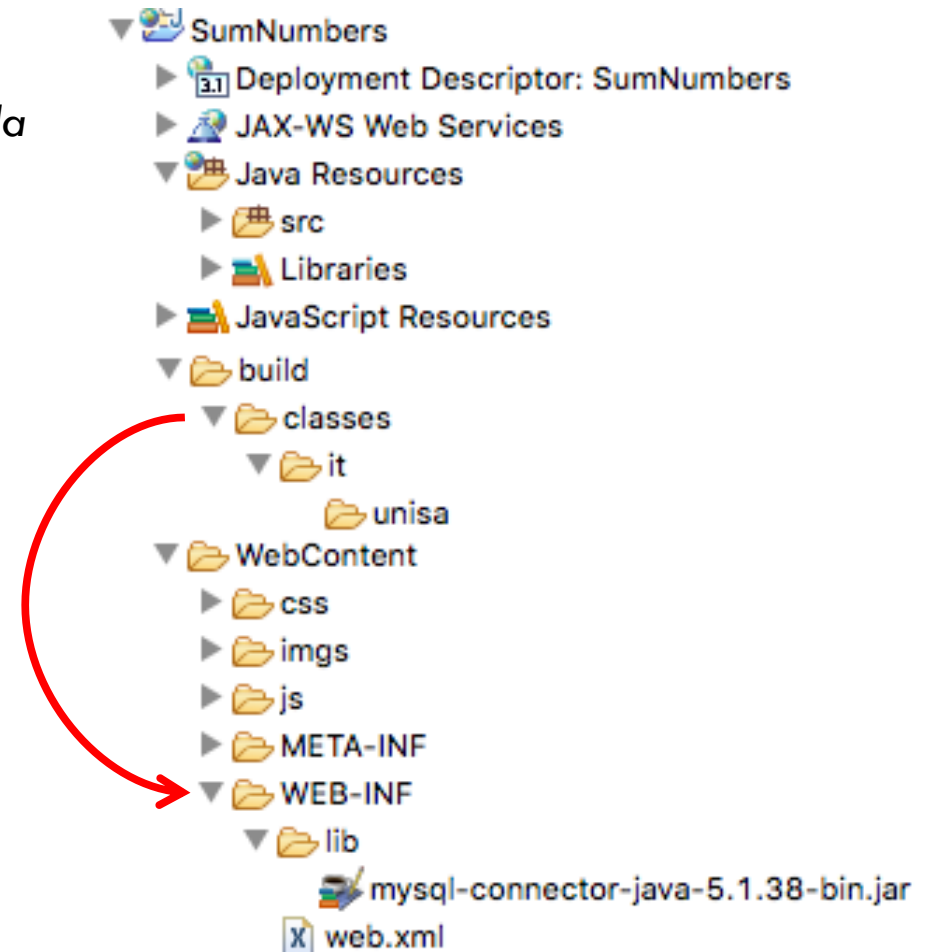
# Deploy the App to Tomcat (manually)

- 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 > WAR file

- 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, role1"/>
```

```
  <user username="role1" password="tomcat" roles="role1"/>
```

```
</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

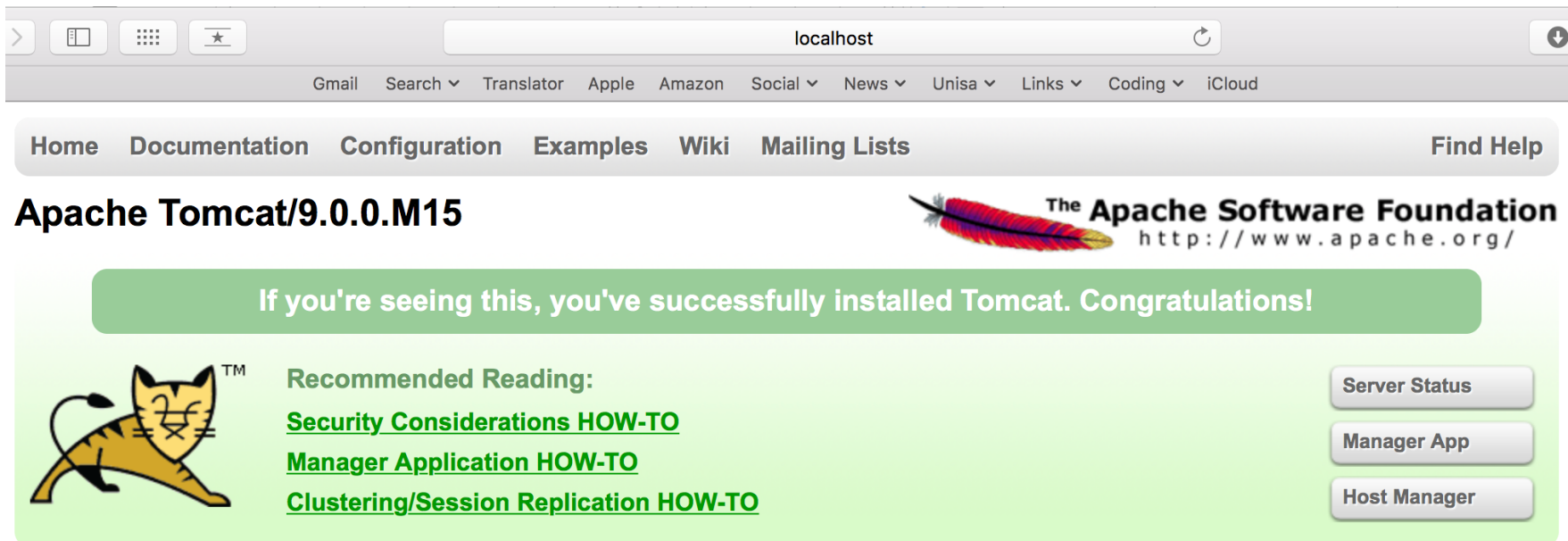
Using CLASSPATH: /usr/local/tomcat/bin/bootstrap.jar:/usr/local/tomcat/bin/tomcat-juli.jar

Tomcat started.



# Test installation

- 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



The screenshot shows a web browser window with the address bar set to 'localhost'. The browser's address bar and tabs are visible at the top. Below the browser window, the Apache Tomcat/9.0.0.M15 default page is displayed. The page has a light green background and a navigation bar at the top with links: Home, Documentation, Configuration, Examples, Wiki, Mailing Lists, and Find Help. The main content area features a large green banner with the text 'If you're seeing this, you've successfully installed Tomcat. Congratulations!'. Below the banner, on the left, is the Tomcat logo (a stylized orange cat). To the right of the logo, under the heading 'Recommended Reading:', are three links: 'Security Considerations HOW-TO', 'Manager Application HOW-TO', and 'Clustering/Session Replication HOW-TO'. On the far right, there are three buttons: 'Server Status', 'Manager App', and 'Host Manager'.

localhost


Gmail Search ▼ Translator Apple Amazon Social ▼ News ▼ Unisa ▼ Links ▼ Coding ▼ iCloud

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	<a href="#">Start</a> <a href="#">Stop</a> <a href="#">Reload</a> <a href="#">Undeploy</a> <a href="#">Expire sessions</a> with idle <input type="text" value="30"/> minutes
/docs	None specified	Tomcat Documentation	true	0	<a href="#">Start</a> <a href="#">Stop</a> <a href="#">Reload</a> <a href="#">Undeploy</a> <a href="#">Expire sessions</a> with idle <input type="text" value="30"/> minutes
/examples	None specified	Servlet and JSP Examples	true	0	<a href="#">Start</a> <a href="#">Stop</a> <a href="#">Reload</a> <a href="#">Undeploy</a> <a href="#">Expire sessions</a> with idle <input type="text" value="30"/> minutes
/host-manager	None specified	Tomcat Host Manager Application	true	1	<a href="#">Start</a> <a href="#">Stop</a> <a href="#">Reload</a> <a href="#">Undeploy</a> <a href="#">Expire sessions</a> with idle <input type="text" value="30"/> minutes
/manager	None specified	Tomcat Manager Application	true	1	<a href="#">Start</a> <a href="#">Stop</a> <a href="#">Reload</a> <a href="#">Undeploy</a> <a href="#">Expire sessions</a> with idle <input type="text" value="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**

# 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/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*