Spring MVC beginner tutorial with Spring Tool Suite IDE

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In this tutorial, we will walk you through the steps of creating a hello world Spring MVC application using Spring Tool Suite (an Eclipse-based IDE). You will learn the fundamental concepts of Spring MVC during building the sample application. The tools/technologies used in this tutorial include:

- Spring framework 3.2.2
- Spring Tool Suite IDE 3.2.0 (based on Eclipse Juno 4.2.2).
- vFabric tc Server Developer Edition v2.8 (based on Apache Tomcat and optimized for Spring applications).

Table of content:

1. About Spring Tool Suite IDE

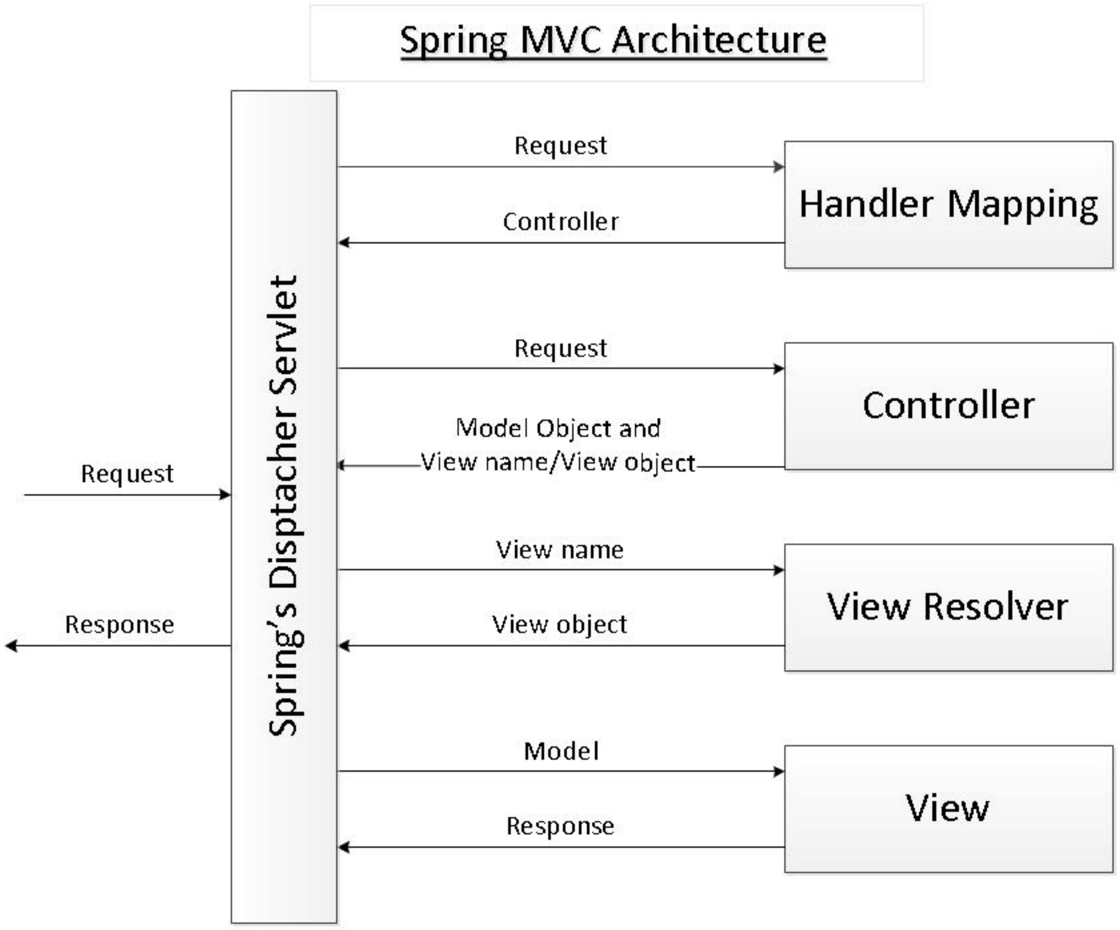
Spring Tool Suite (STS) is an Eclipse-based IDE which is dedicated for developing Spring-based projects. It is actively developed and maintained by the SpringSource community. STS facilitates and simplifies Spring-based applications development by providing robust project templates such as Spring Batch, Spring Integration, Spring Persistence (Hibernate + JPA), Spring MVC, etc. In addition, with Maven integration, STS releases developers from manually managing Spring jar files in their projects. You always get the latest update of Spring artifacts from Maven repository.

You can choose to download and install STS in one of three ways:

- Download and install STS from an installer program.
- Install STS through Eclipse update.
- Download and extract zip archive.

2. A brief overview about Spring MVC

Let’s take a look at how Spring MVC works. The following diagram depicts the architecture of Spring MVC framework:



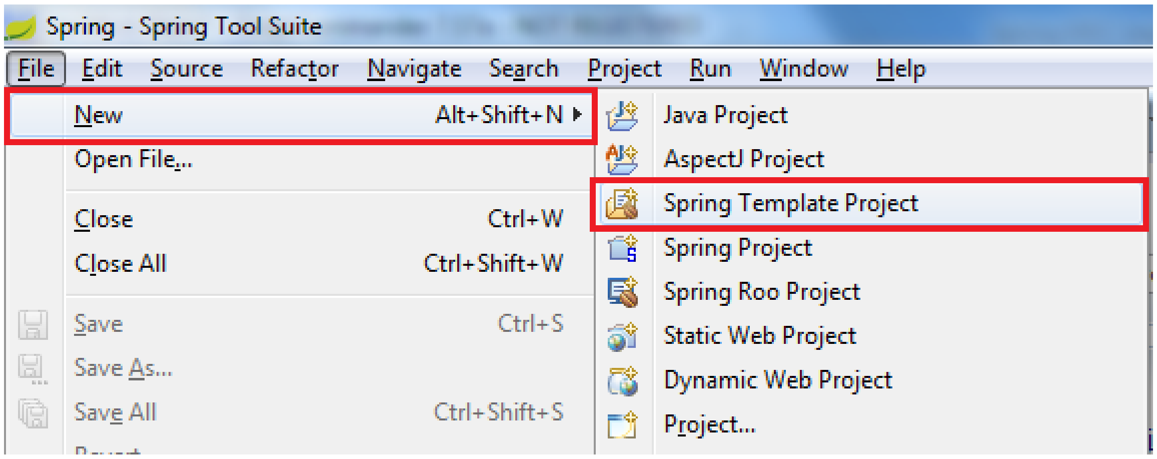
As its name says, the Spring MVC framework is based on the Model - View - Controller (MVC) design pattern which separates the application's logic into the three layers Mode, View and Controller. MVC is implemented in Spring by the following components:

- **Spring's dispatcher servlet**: acts as a front controller between the Spring application and its clients. The dispatcher servlet intercepts all requests coming to the application and consults the Handler Mapping for which controller to be invoked to handle the requests.
- **Handler Mapping**: is responsible to find appropriate controllers that handle specific requests. The mapping between request URLs and controller classes is done via XML configuration or annotations.
- **Controller:** is responsible to process the requests by calling other business/service classes. The output can be attached to model objects which will be sent to the view. To know which view will be rendered, the controller consults the View Resolver.
- **View Resolver:** finds the physical view files from the logical names.
- **View:** physical view files which can be JSP, HTML, XML, Velocity template, etc.

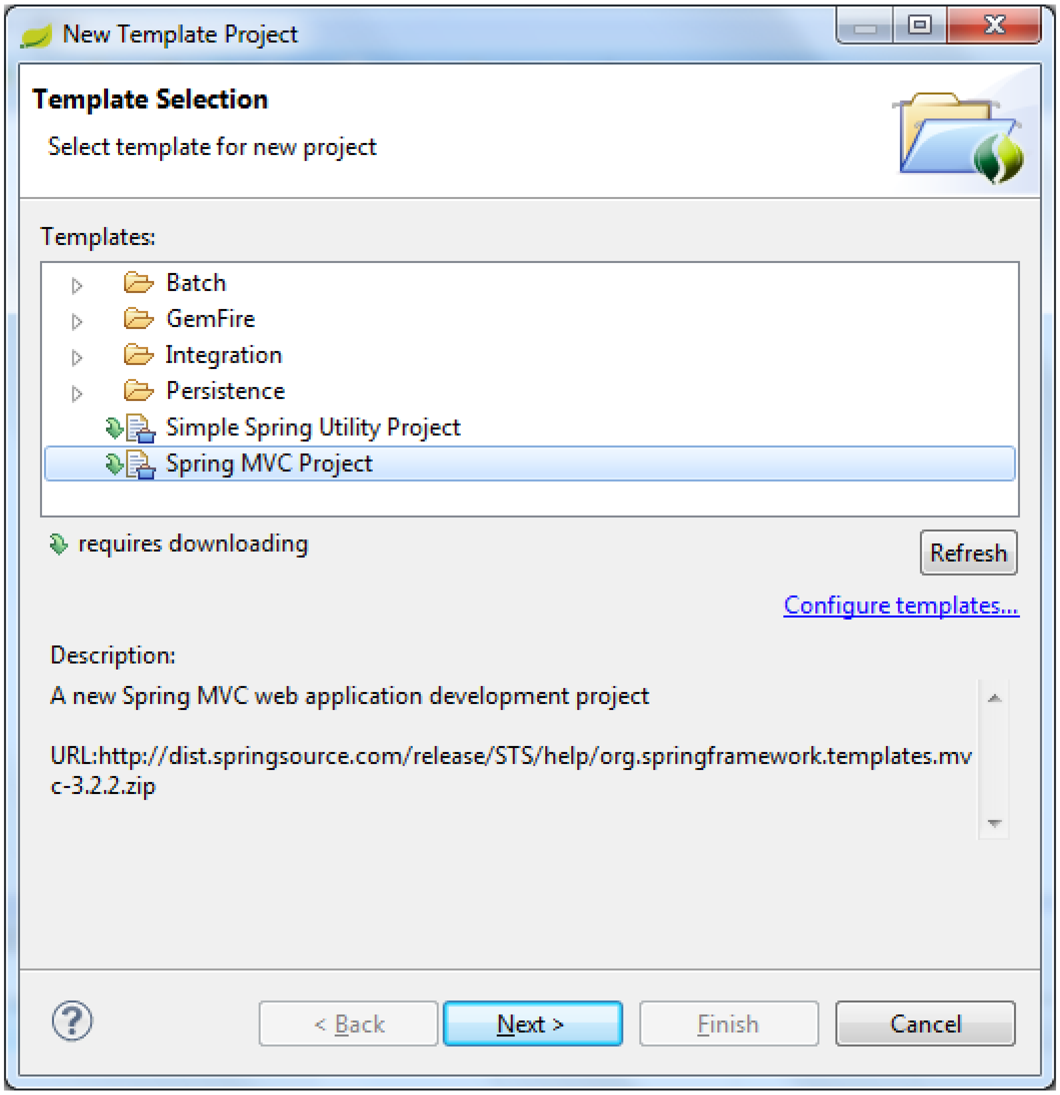
3. Creating a Spring MVC project in Spring Tool Suite IDE

Now let’s play with the Spring Tool Suite IDE to see how it leverages Spring application development.

Start STS in your own workspace and make sure the current perspective is Spring (default). From main menu, select **File > New > Spring Template Project**:



In the *New Template Project* dialog, select *Spring MVC Project*:


New Template Project

Template Selection

Select template for new project

Templates:

- Batch
- GemFire
- Integration
- Persistence
- Simple Spring Utility Project
- Spring MVC Project

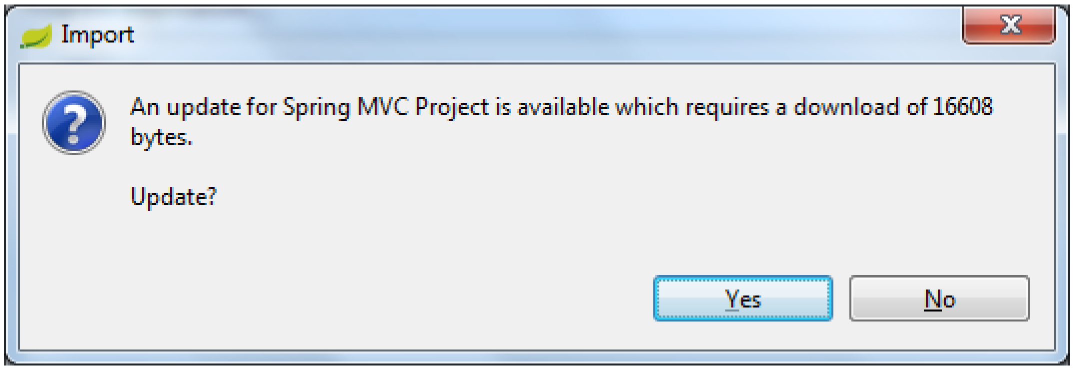
requires downloading

Description:

A new Spring MVC web application development project

URL:http://dist.springsource.com/release/STS/help/org.springframework.templates.mvc-3.2.2.zip

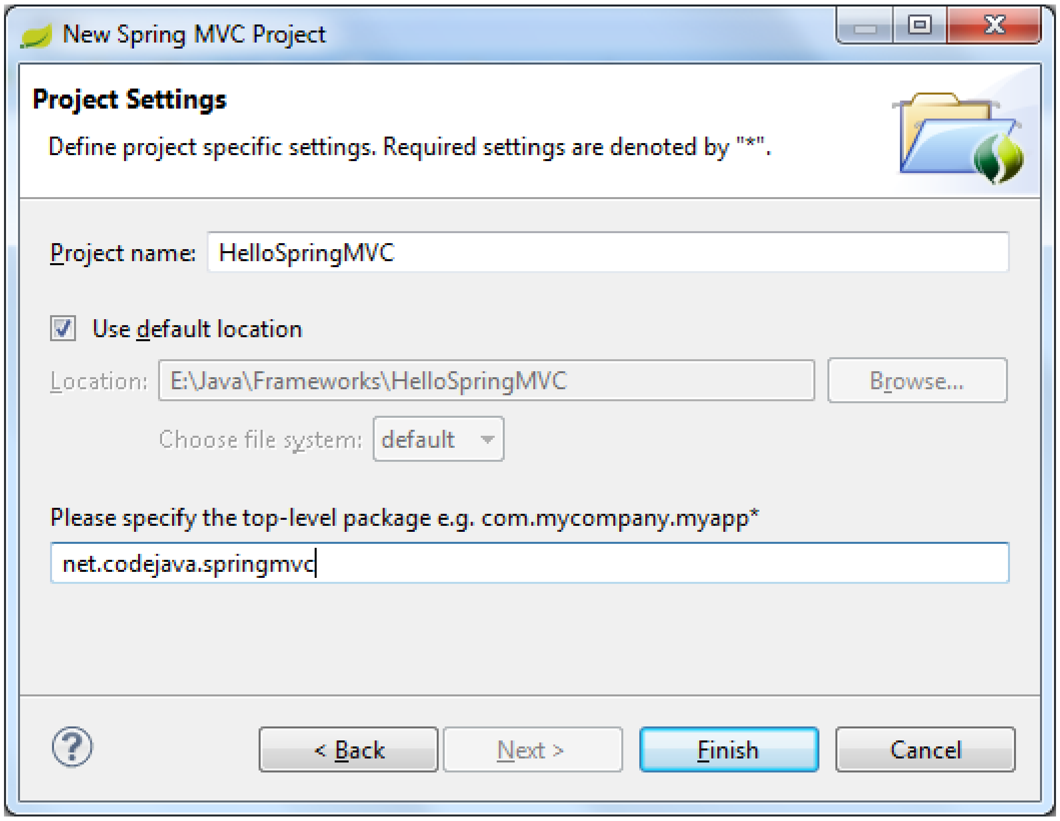
Click **Next**, it requires downloading an update of the template (for the first time you use this template or whenever an update available):


Import

An update for Spring MVC Project is available which requires a download of 16608 bytes.

Update?

Click **Yes** to download the update, it should process quickly and then bring the *New Spring MVC Project*:


New Spring MVC Project

Project Settings

Define project specific settings. Required settings are denoted by "*".

Project name: HelloSpringMVC

[✓] Use default location

Location: E:\Java\Frameworks\HelloSpringMVC

Choose file system: default

Please specify the top-level package e.g. com.mycompany.myapp*

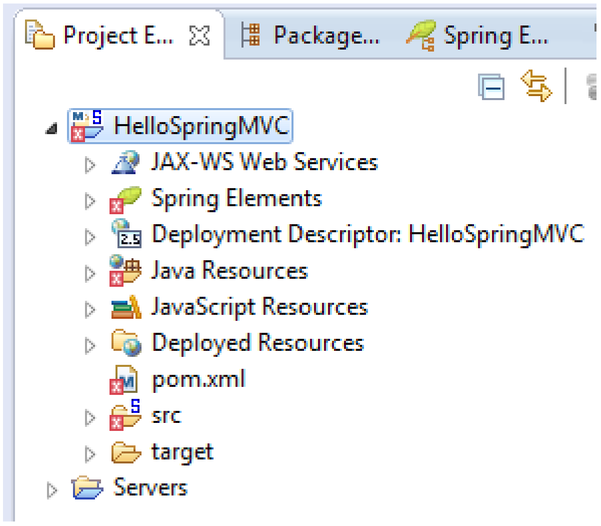
net.codejava.springmvc

In this dialog, enter the following information:

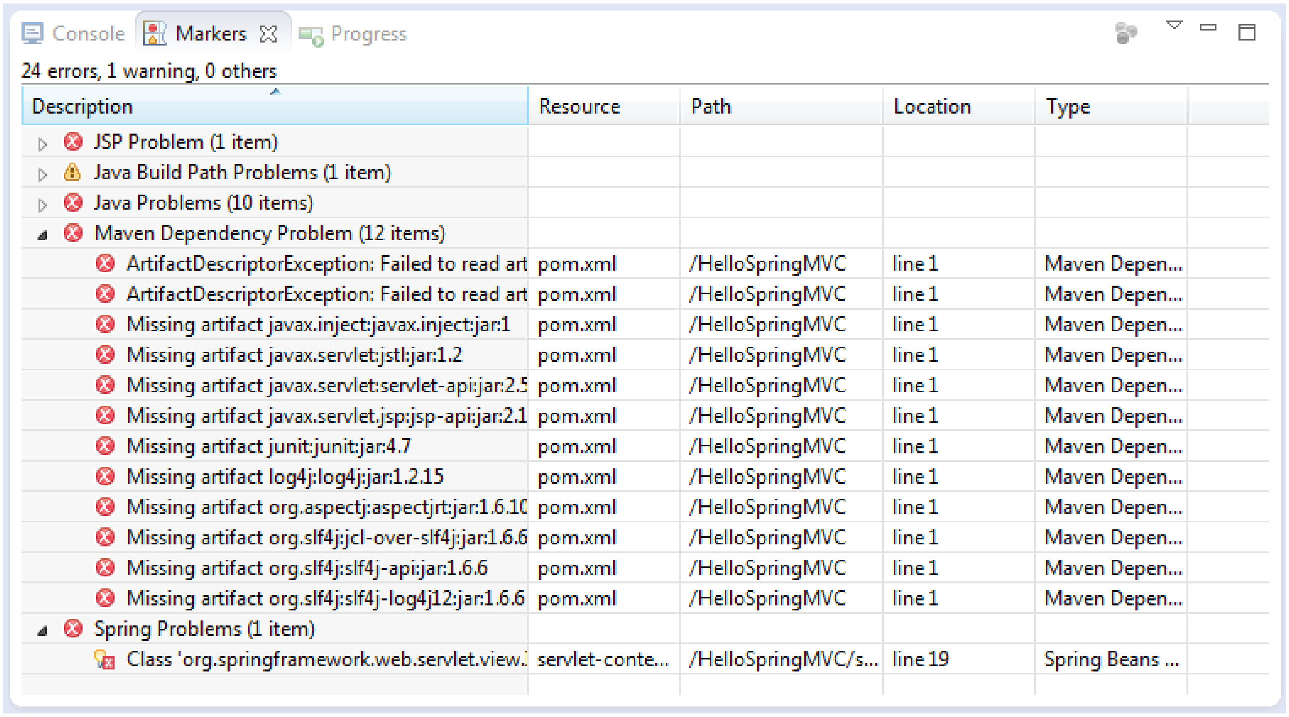
- Project name: *HelloSpringMVC*
- Top-level package: *net.codejava.springmvc*

NOTE: Be careful when selecting the package name, because the last element (*springmvc* in *net.codejava.springmvc*) will be used as `artifactId` in Maven project file (`pom.xml`) and as context path of the application. However we can change this in the `pom.xml` file (which will be discussed later in this tutorial).

Click **Finish**, STS will create a Spring MVC-based project with some defaults for controller, views and configuration. You may get the errors in the *Project Explorer/Package Explorer* like this:



And errors in the *Markers* views like this:

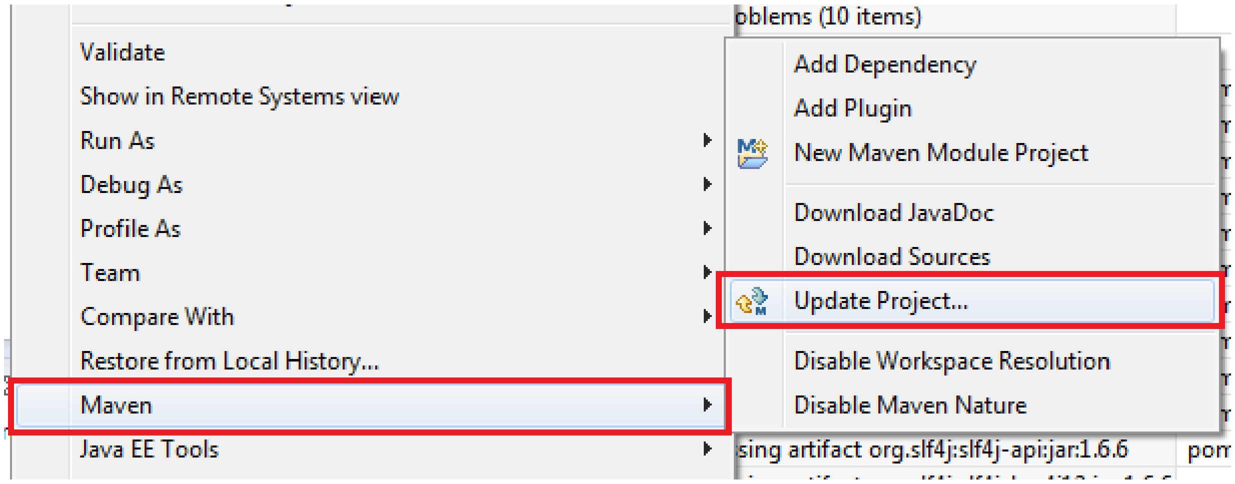


Console | Markers | Progress

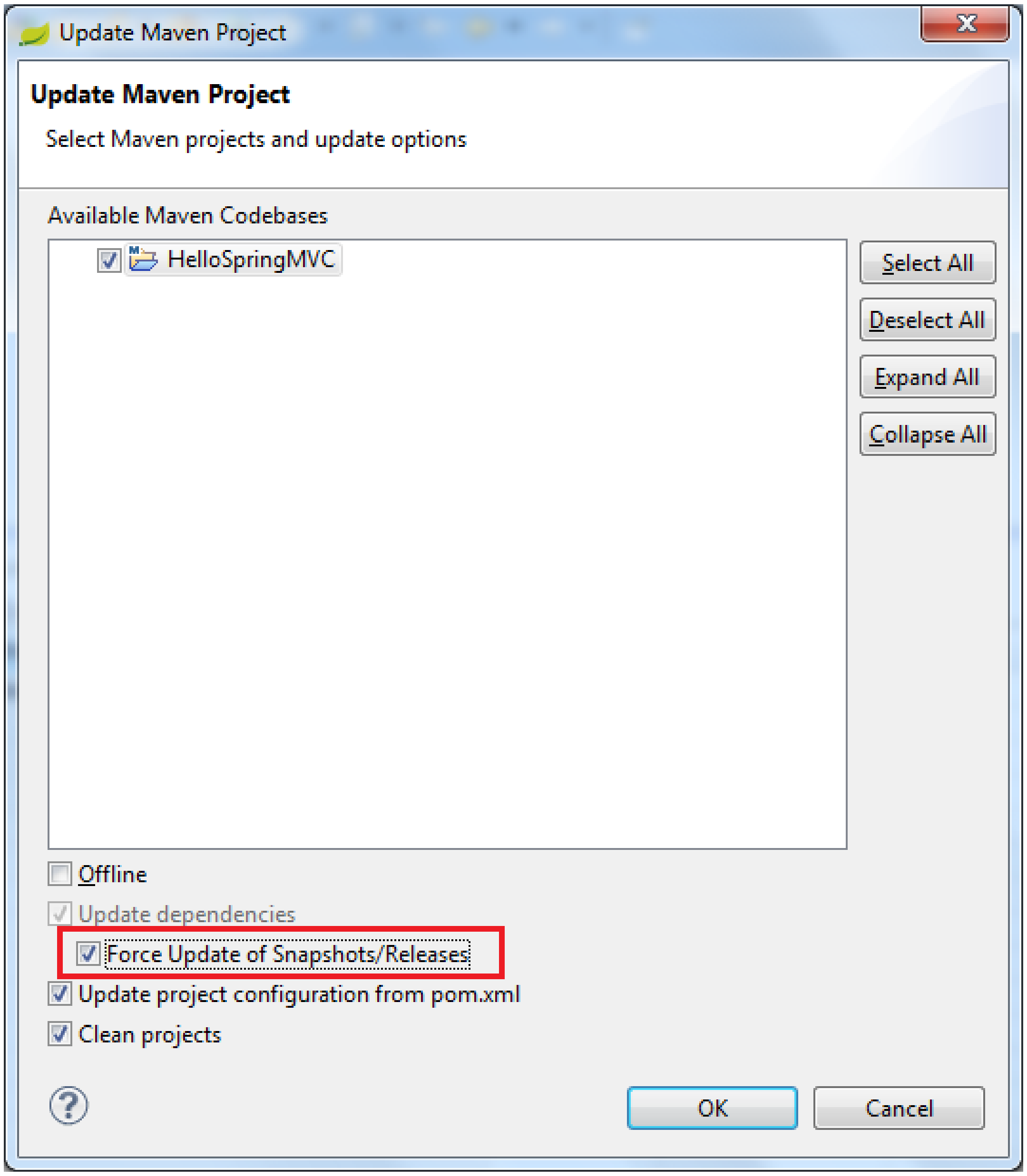
24 errors, 1 warning, 0 others

Description	Resource	Path	Location	Type
JSP Problem (1 item)				
Java Build Path Problems (1 item)				
Java Problems (10 items)				
Maven Dependency Problem (12 items)				
ArtifactDescriptorException: Failed to read art	pom.xml	/HelloSpringMVC	line 1	Maven Depen...
ArtifactDescriptorException: Failed to read art	pom.xml	/HelloSpringMVC	line 1	Maven Depen...
Missing artifact javax.inject:javax.inject:jar:1	pom.xml	/HelloSpringMVC	line 1	Maven Depen...
Missing artifact javax.servlet:jstl:jar:1.2	pom.xml	/HelloSpringMVC	line 1	Maven Depen...
Missing artifact javax.servlet:servlet-api:jar:2.5	pom.xml	/HelloSpringMVC	line 1	Maven Depen...
Missing artifact javax.servlet.jsp:jsp-api:jar:2.1	pom.xml	/HelloSpringMVC	line 1	Maven Depen...
Missing artifact junit:junit:jar:4.7	pom.xml	/HelloSpringMVC	line 1	Maven Depen...
Missing artifact log4j:log4j:jar:1.2.15	pom.xml	/HelloSpringMVC	line 1	Maven Depen...
Missing artifact org.aspectj:aspectjrt:jar:1.6.10	pom.xml	/HelloSpringMVC	line 1	Maven Depen...
Missing artifact org.slf4j:jcl-over-slf4j:jar:1.6.6	pom.xml	/HelloSpringMVC	line 1	Maven Depen...
Missing artifact org.slf4j:slf4j-api:jar:1.6.6	pom.xml	/HelloSpringMVC	line 1	Maven Depen...
Missing artifact org.slf4j:slf4j-log4j12:jar:1.6.6	pom.xml	/HelloSpringMVC	line 1	Maven Depen...
Spring Problems (1 item)				
Class 'org.springframework.web.servlet.view.	servlet-conte...	/HelloSpringMVC/s...	line 19	Spring Beans ...

Don’t worry, that’s because Maven hasn’t update some dependencies yet. We are going to fix these errors right now. Right click on project name in the *Project Explorer* view, select **Maven > Update Project…** from the context menu:



In the *Update Maven Project* dialog, select the checkbox *Force Update of Snapshots/Releases*:


Update Maven Project

Update Maven Project

Select Maven projects and update options

Available Maven Codebases

[✓] HelloSpringMVC

[ ] Offline

[✓] Update dependencies

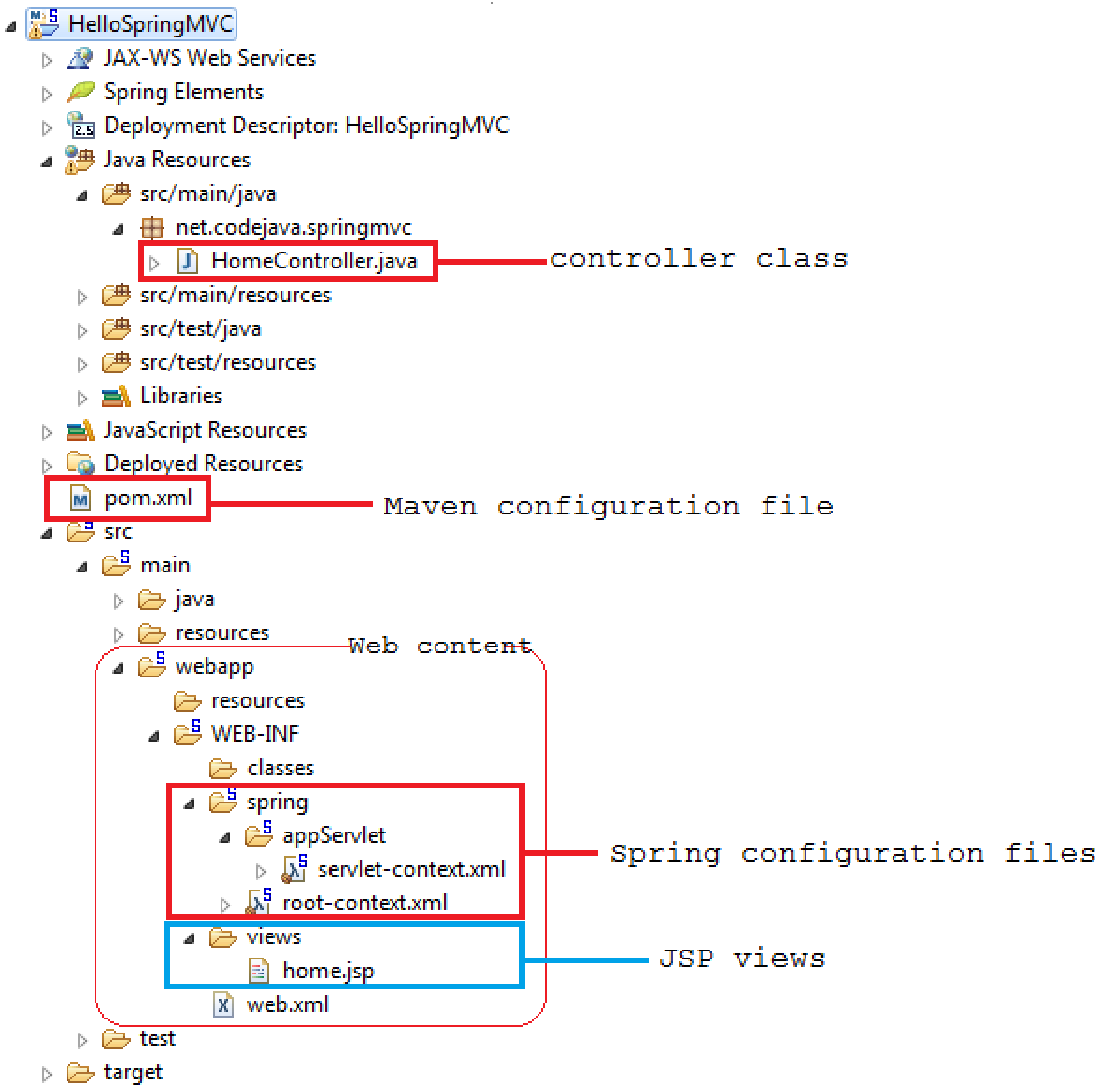
[✓] Force Update of Snapshots/Releases

[✓] Update project configuration from pom.xml

[✓] Clean projects

Click **Finish**, wait a while for Maven downloading the required dependencies then the errors will be gone away.

Now let’s explore what has been created by the Spring MVC Project template. Expand the branches in the *Project Explorer* view, we would see the project is structured like this:

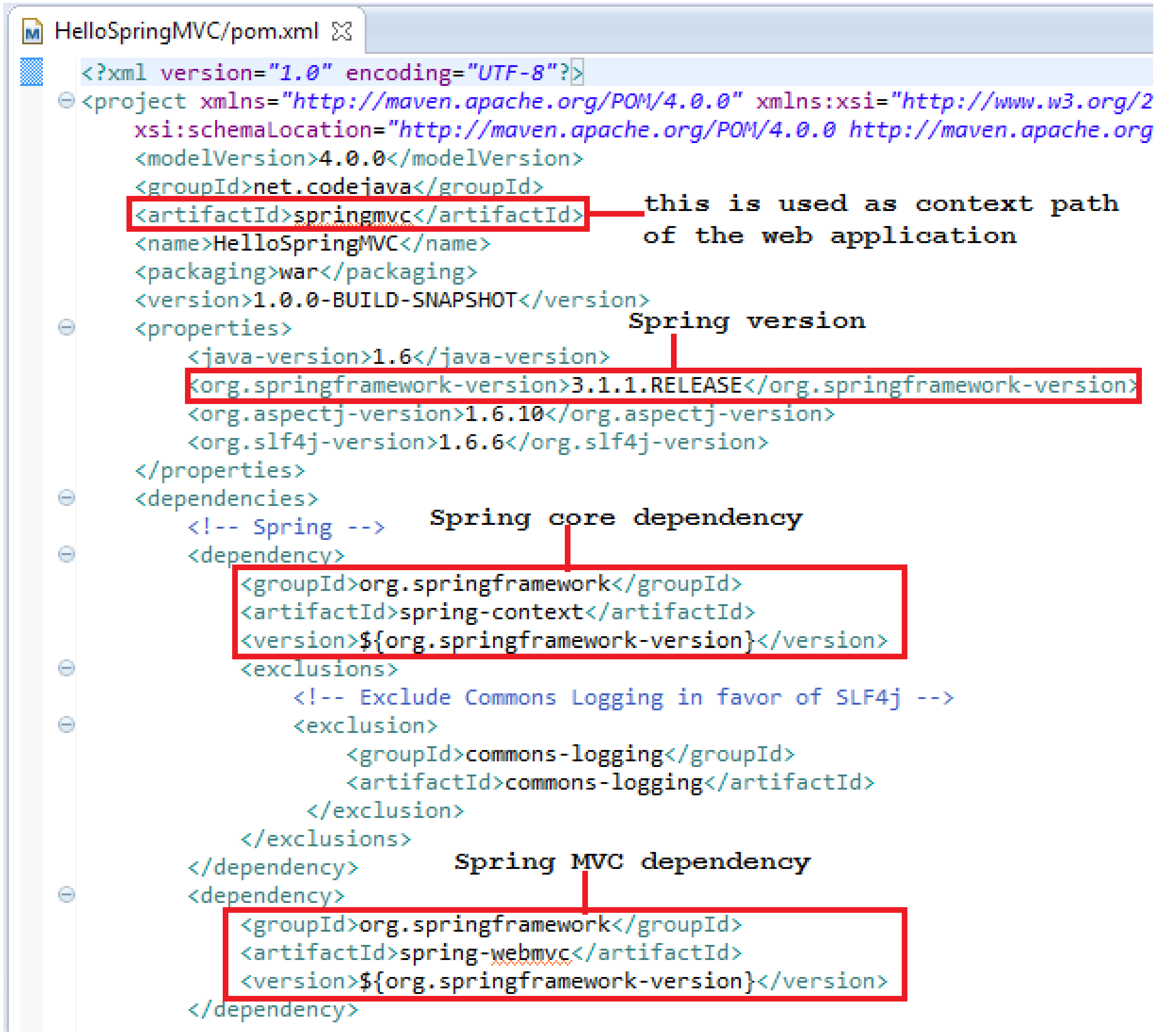


```
HelloSpringMVC
    JAX-WS Web Services
    Spring Elements
    Deployment Descriptor: HelloSpringMVC
    Java Resources
        src/main/java
            net.codejava.springmvc
                HomeController.java
        src/main/resources
        src/test/java
        src/test/resources
        Libraries
    JavaScript Resources
    Deployed Resources
    pom.xml
    src
        main
            java
            resources
            webapp
                resources
                WEB-INF
                    classes
                    spring
                        appServlet
                            servlet-context.xml
                        root-context.xml
                    views
                        home.jsp
                    web.xml
        test
    target
```

As we can see, STS created all the nuts and bolts for a typical Spring MVC application: XML configuration, jar dependencies, an example controller, and an example JSP view. Let's look at these pieces in more details.

3.1. Maven dependencies configuration

Here's a partial content of the `pom.xml` file:



```
<?xml version="1.0" encoding="UTF-8"?>
<project xmlns="http://maven.apache.org/POM/4.0.0" xmlns:xsi="http://www.w3.org/2
    xsi:schemaLocation="http://maven.apache.org/POM/4.0.0 http://maven.apache.org
    <modelVersion>4.0.0</modelVersion>
    <groupId>net.codejava</groupId>
    <artifactId>springmvc</artifactId>
    <name>HelloSpringMVC</name>
    <packaging>war</packaging>
    <version>1.0.0-BUILD-SNAPSHOT</version>
    <properties>
        <java-version>1.6</java-version>
        <org.springframework-version>3.1.1.RELEASE</org.springframework-version>
        <org.aspectj-version>1.6.10</org.aspectj-version>
        <org.slf4j-version>1.6.6</org.slf4j-version>
    </properties>
    <dependencies>
        <!-- Spring -->
        <dependency>
            <groupId>org.springframework</groupId>
            <artifactId>spring-context</artifactId>
            <version>${org.springframework-version}</version>
            <exclusions>
                <!-- Exclude Commons Logging in favor of SLF4j -->
                <exclusion>
                    <groupId>commons-logging</groupId>
                    <artifactId>commons-logging</artifactId>
                 </exclusion>
            </exclusions>
        </dependency>
        <dependency>
            <groupId>org.springframework</groupId>
            <artifactId>spring-webmvc</artifactId>
            <version>${org.springframework-version}</version>
        </dependency>
```

The generated `pom.xml` file includes all necessary dependencies for Spring core and Spring MVC, as well as servlet API, logging, etc. The noteworthy points are marked by red rectangles in the screenshot above.

Value of the `artifactId` element will be used as context path of the web application when deploying the project on a server running within the IDE. That means we will access this application in the following form:

http://localhost:port/springmvc

If we want to change version of Spring framework, just updating value of the `org.springframework-version` element. Because the version `3.1.1.RELEASE` is not the latest, change it to the latest release `3.2.2.RELEASE` (at writing time) as follows:

```
<org.springframework-version>3.2.2.RELEASE</org.springframework-version>
```

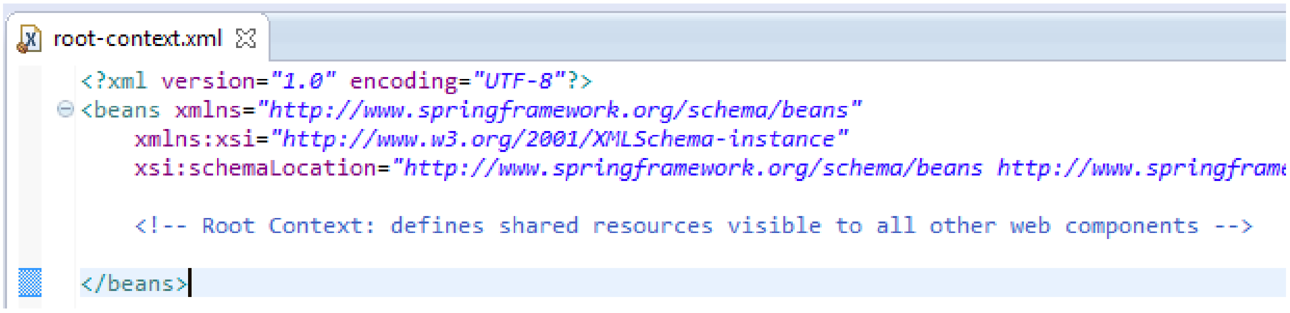
Just by saving the `pom.xml` file, Maven will detect the change and updates all the related dependencies immediately.

This video tutorial: **The Java Spring Tutorial** help you discover how to master the Spring framework instantly.

3.2. Spring MVC configuration

STS created two Spring configuration files: `root-context.xml` and `servlet-context.xml`.

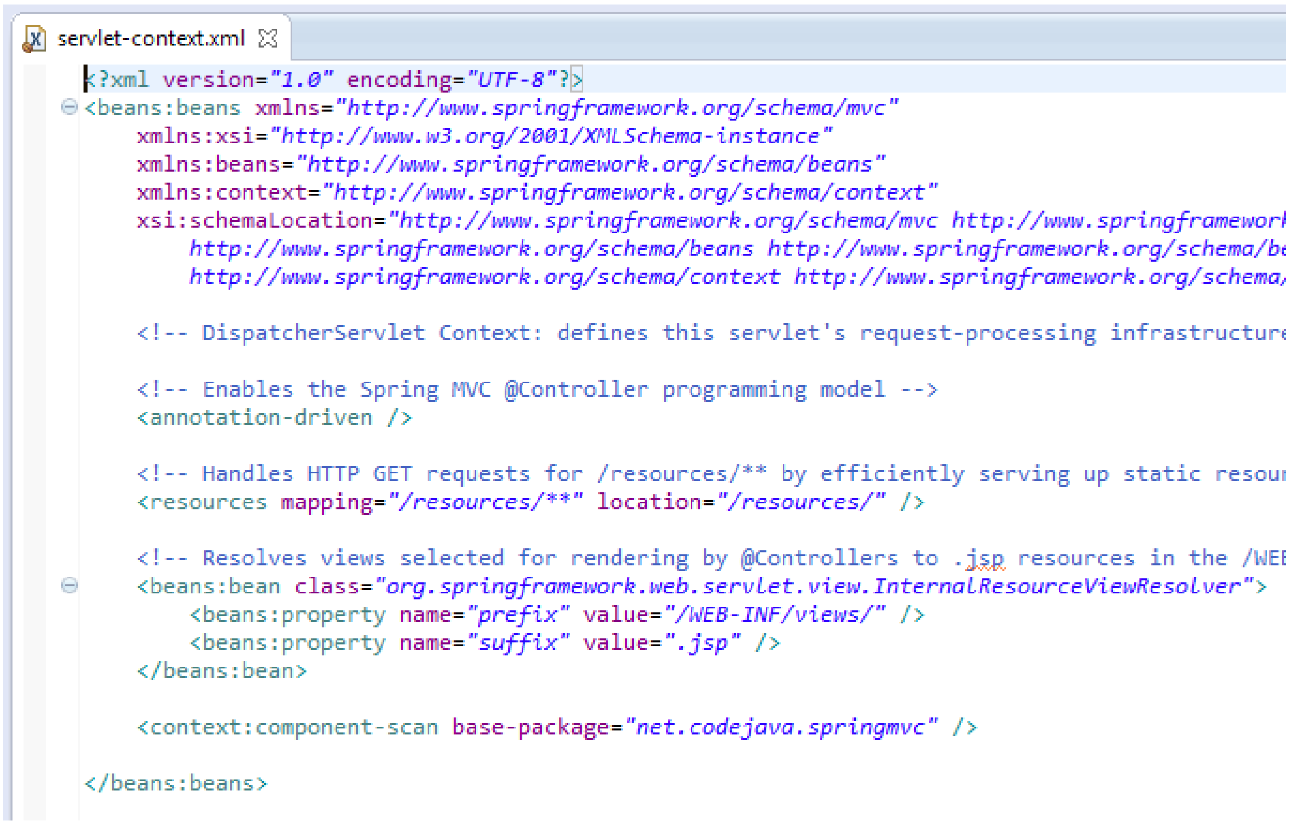
root-context.xml:



```xml
<?xml version="1.0" encoding="UTF-8"?>
<beans xmlns="http://www.springframework.org/schema/beans"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:schemaLocation="http://www.springframework.org/schema/beans http://www.springframe

    <!-- Root Context: defines shared resources visible to all other web components -->

</beans>
```

This specifies configuration for root Spring container which are shared by all servlets and filters. The `root-context.xml` file is loaded by the Spring's `ContextLoaderListener` upon application's startup. This file is empty by default.

servlet-context.xml:



```xml
<?xml version="1.0" encoding="UTF-8"?>
<beans:beans xmlns="http://www.springframework.org/schema/mvc"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xmlns:beans="http://www.springframework.org/schema/beans"
    xmlns:context="http://www.springframework.org/schema/context"
    xsi:schemaLocation="http://www.springframework.org/schema/mvc http://www.springframework
        http://www.springframework.org/schema/beans http://www.springframework.org/schema/be
        http://www.springframework.org/schema/context http://www.springframework.org/schema,

    <!-- DispatcherServlet Context: defines this servlet's request-processing infrastructure

    <!-- Enables the Spring MVC @Controller programming model -->
    <annotation-driven />

    <!-- Handles HTTP GET requests for /resources/** by efficiently serving up static resou
    <resources mapping="/resources/**" location="/resources/" />

    <!-- Resolves views selected for rendering by @Controllers to .jsp resources in the /WEE
    <beans:bean class="org.springframework.web.servlet.view.InternalResourceViewResolver">
        <beans:property name="prefix" value="/WEB-INF/views/" />
        <beans:property name="suffix" value=".jsp" />
    </beans:bean>

    <context:component-scan base-package="net.codejava.springmvc" />

</beans:beans>
```

This file is loaded by the Spring's `DispatcherServlet` which receives all requests coming into the application and dispatches processing for controllers, based on the configuration specified in this `servlet-context.xml` file. Let's look at some default configurations:

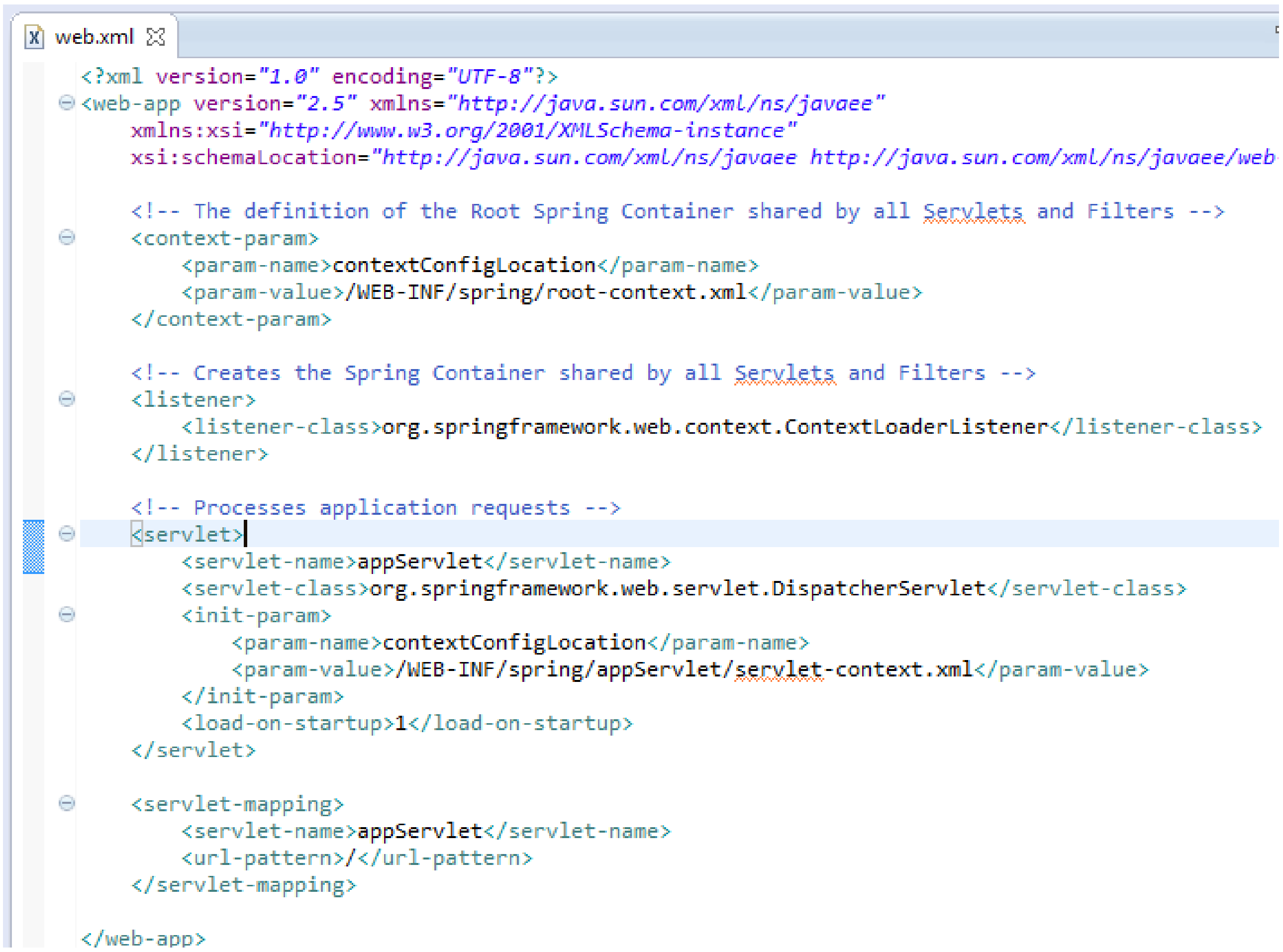
- **`<annotation-driven />`**: tells the framework to use annotations-based approach to scan files in the specified packages. Thus we can use the `@Controller` annotation for the controller class, instead of declaring XML elements.
- **`<resources mapping=…/>`**: maps static resources directly with HTTP GET requests. For example images, javascript, CSS,.. resources do not have to go through controllers.
- Bean **`InternalResourceViewResolver`**: this bean declaration tells the framework how to find physical JSP files according to logical view names returned by the controllers, by attaching the prefix and the suffix to a view name. For example, if a controller's method returns "home" as logical view name, then the framework will find a physical file "home.jsp" under the `/WEB-INF/views` directory.
- **`<context:component-scan …/>`**: tell the framework which packages to be scanned when using annotation-based strategy. Here the framework will scan all classes under the package `net.codejava.springmvc`.

When the application grows up, we will put more configurations for business beans, DAOs, transactions, etc.

This book: **Spring in Practice** covers 66 Spring development techniques that help you solve practical issues you will encounter when using Spring framework.

3.3. Web deployment descriptor (web.xml)

Here is content of the generated `web.xml` file:

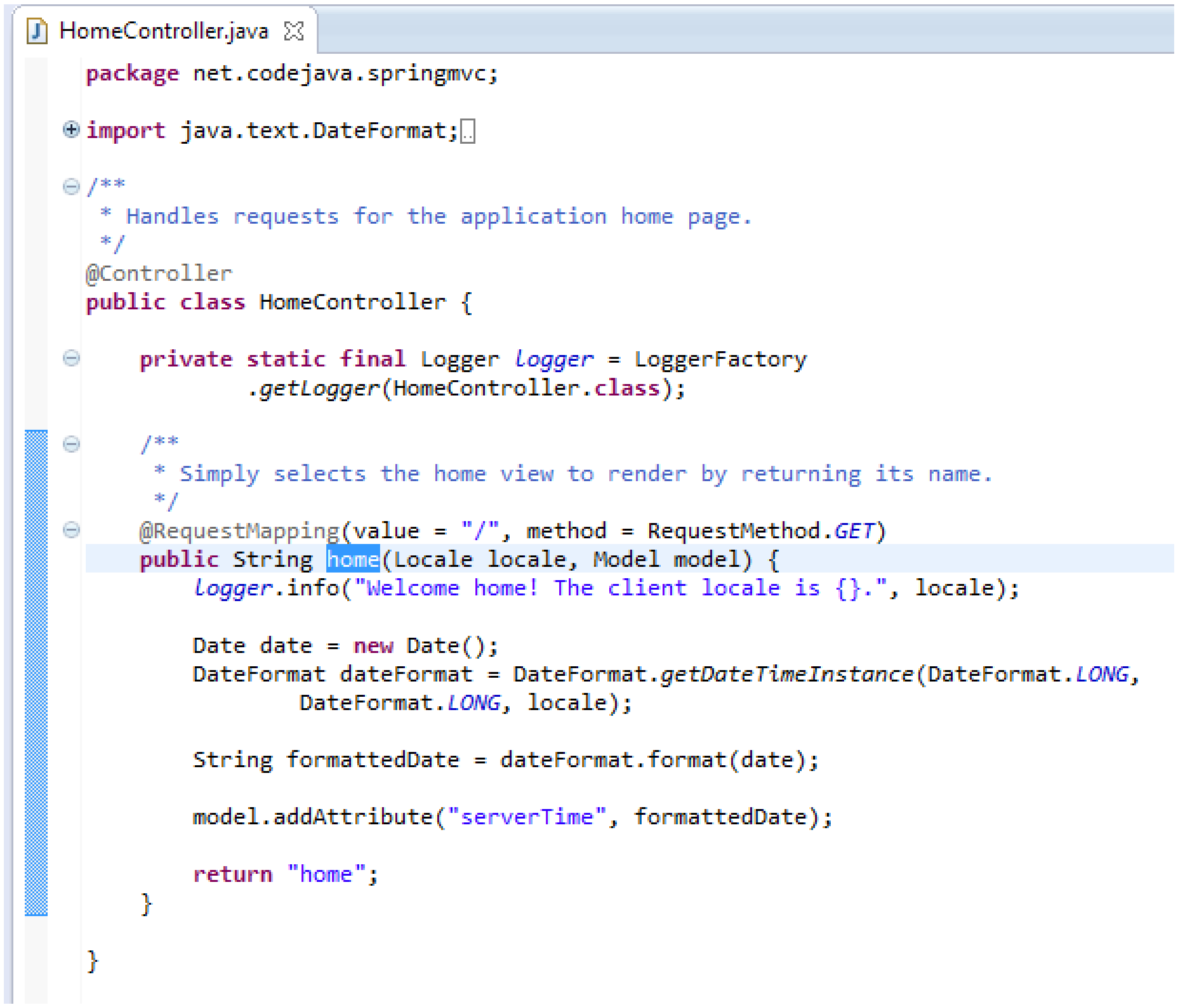


```
<?xml version="1.0" encoding="UTF-8"?>
<web-app version="2.5" xmlns="http://java.sun.com/xml/ns/javaee"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:schemaLocation="http://java.sun.com/xml/ns/javaee http://java.sun.com/xml/ns/javaee/web

    <!-- The definition of the Root Spring Container shared by all Servlets and Filters -->
    <context-param>
        <param-name>contextConfigLocation</param-name>
        <param-value>/WEB-INF/spring/root-context.xml</param-value>
    </context-param>

    <!-- Creates the Spring Container shared by all Servlets and Filters -->
    <listener>
        <listener-class>org.springframework.web.context.ContextLoaderListener</listener-class>
    </listener>

    <!-- Processes application requests -->
    <servlet>
        <servlet-name>appServlet</servlet-name>
        <servlet-class>org.springframework.web.servlet.DispatcherServlet</servlet-class>
        <init-param>
            <param-name>contextConfigLocation</param-name>
            <param-value>/WEB-INF/spring/appServlet/servlet-context.xml</param-value>
        </init-param>
        <load-on-startup>1</load-on-startup>
    </servlet>

    <servlet-mapping>
        <servlet-name>appServlet</servlet-name>
        <url-pattern>/</url-pattern>
    </servlet-mapping>

</web-app>
```

This is the typical configuration for a Spring MVC-based application with declaration for Spring's `ContextLoaderListener` and `DispatcherServlet` along with the Spring configuration files `root-context.xml` and `servlet-context.xml`. Finally, it specifies the URL mapping for Spring's `DispatcherServlet` to handle all requests.

3.4. The example controller: HomeController.java

Following is the generated code of the controller class:



```java
package net.codejava.springmvc;

import java.text.DateFormat;

/**
 * Handles requests for the application home page.
 */
@Controller
public class HomeController {

    private static final Logger logger = LoggerFactory
            .getLogger(HomeController.class);

    /**
     * Simply selects the home view to render by returning its name.
     */
    @RequestMapping(value = "/", method = RequestMethod.GET)
    public String home(Locale locale, Model model) {
        logger.info("Welcome home! The client locale is {}.", locale);

        Date date = new Date();
        DateFormat dateFormat = DateFormat.getDateTimeInstance(DateFormat.LONG,
                DateFormat.LONG, locale);

        String formattedDate = dateFormat.format(date);

        model.addAttribute("serverTime", formattedDate);

        return "home";
    }

}
```

As we can see, the `@Controller` annotation is used to specify this class is a Spring controller, and the `@RequestMapping` annotation specifies that the `home()` method will handle a GET request with the URL / (default page of the application). In one controller class we can write many methods to handle different URLs.

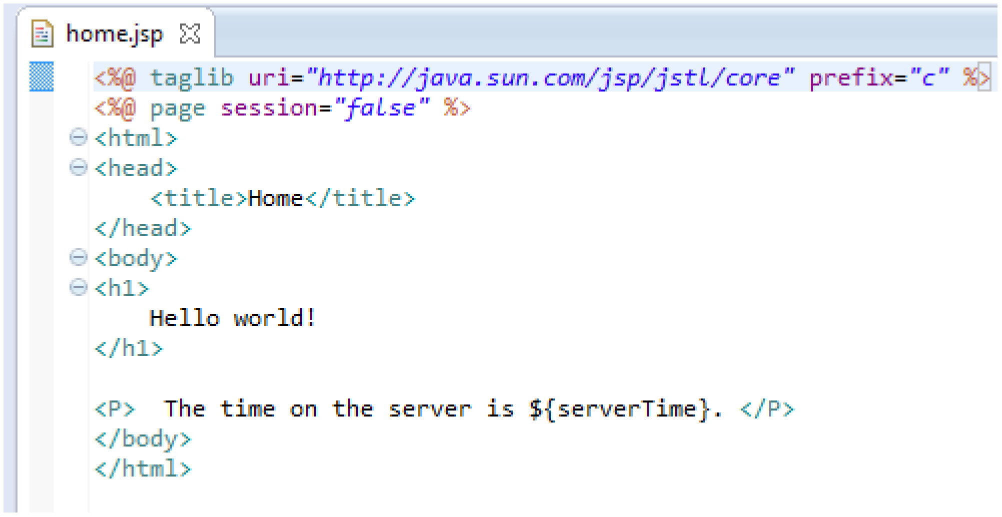
Inside the `home()` method, it creates a String object to hold the current date based on the current locale, and adds this object to the model with the name “serverTime”:

```
model.addAttribute("serverTime", formattedDate);
```

And finally the method returns a view named “home”, which will be resolved by the view resolver specified in the `servlet-context.xml` file, to find the actual view file.

3.5. The example JSP view: home.jsp

The `home.jsp` file is generated under `/WEB-INF/views` directory with the following content:



```
<%@ taglib uri="http://java.sun.com/jsp/jstl/core" prefix="c" %>
<%@ page session="false" %>
<html>
<head>
    <title>Home</title>
</head>
<body>
<h1>
    Hello world!
</h1>

<P>  The time on the server is ${serverTime}. </P>
</body>
</html>
```

This code is very simple, it just prints out value of the variable "serverTime" which is passed by the controller, using an EL expression:

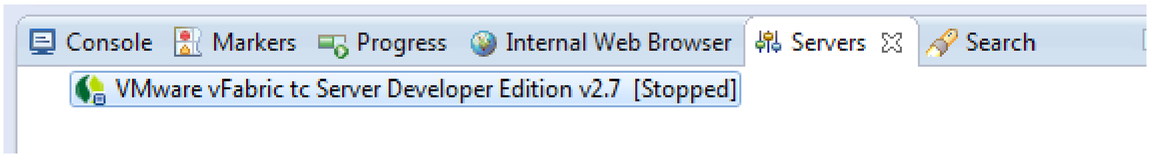
```
The time on the server is ${serverTime}.
```

So far we have gone through all the stuffs generated by the Spring MVC Project template. Notice we haven't written any line of code yet, but the application is ready to be deployed and tested now. Let's go!

This book **Pro Spring 3** helps you learn Spring basics and core, remoting, Hibernate, and EJB, transactions, the web and presentations tiers, deployment, and much more.

4. Deploying and running the application

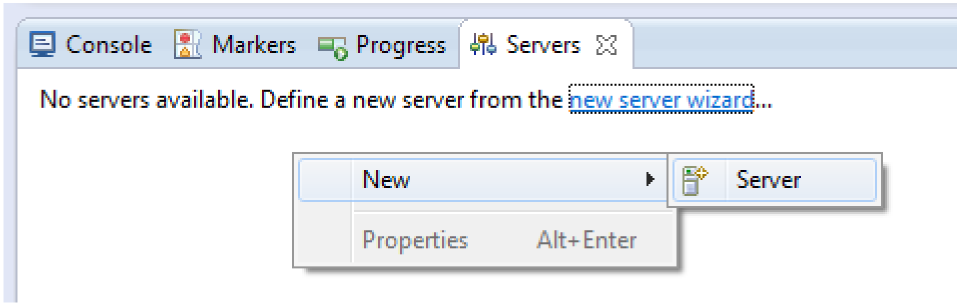
In Spring Tool Suite IDE, switch to the *Servers* view. Probably you should see the *VMWare vFabric tc Server* like this:



VMware vFabric tc Server Developer Edition v2.7 [Stopped]

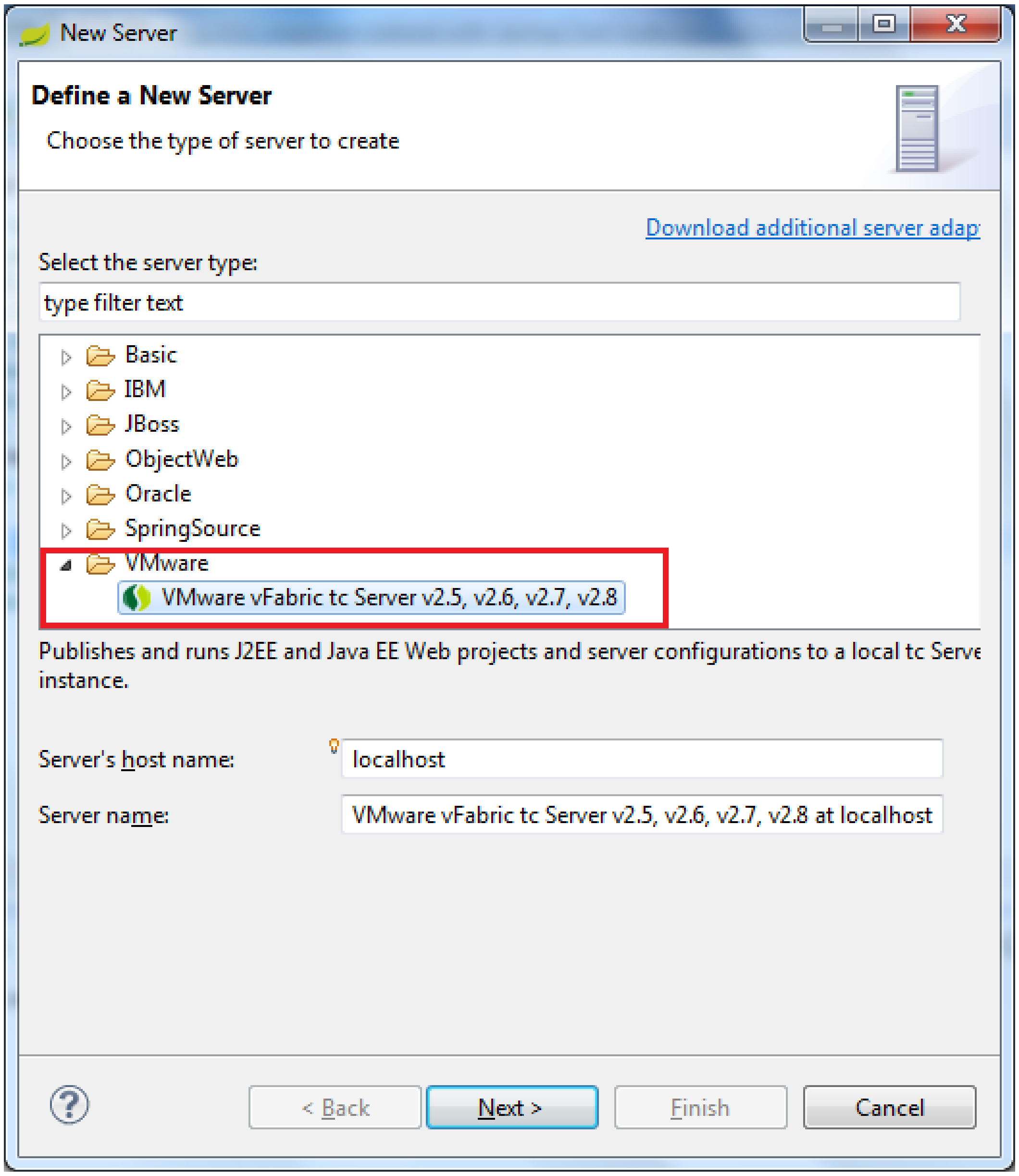
If you don't see any server, follow these steps to add one:

- Right click inside the *Servers* view then select **New > Server** from the context menu (Or click on the link ***new server wizard***, if this link available):



No servers available. Define a new server from the new server wizard...

- In the *New Server* dialog, select **VMware > VMware vFabric tc Server…**as follows:



Define a New Server

Choose the type of server to create

Download additional server adap

Select the server type:

type filter text

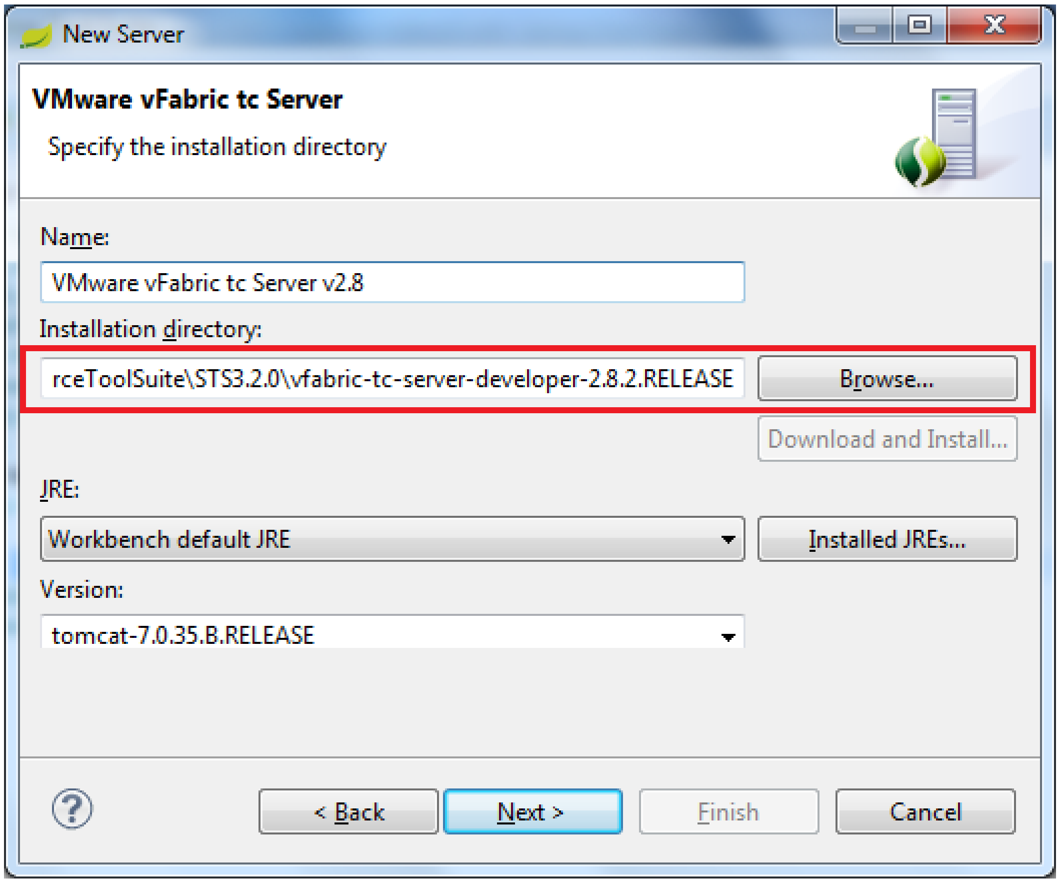
- Basic
- IBM
- JBoss
- ObjectWeb
- Oracle
- SpringSource
- VMware
  - VMware vFabric tc Server v2.5, v2.6, v2.7, v2.8

Publishes and runs J2EE and Java EE Web projects and server configurations to a local tc Serve instance.

Server's host name: localhost

Server name: VMware vFabric tc Server v2.5, v2.6, v2.7, v2.8 at localhost

- Click **Next**, you may have to select installation directory for the server:


New Server

VMware vFabric tc Server

Specify the installation directory

Name: VMware vFabric tc Server v2.8

Installation directory: rceToolSuite\STS3.2.0\vfabric-tc-server-developer-2.8.2.RELEASE

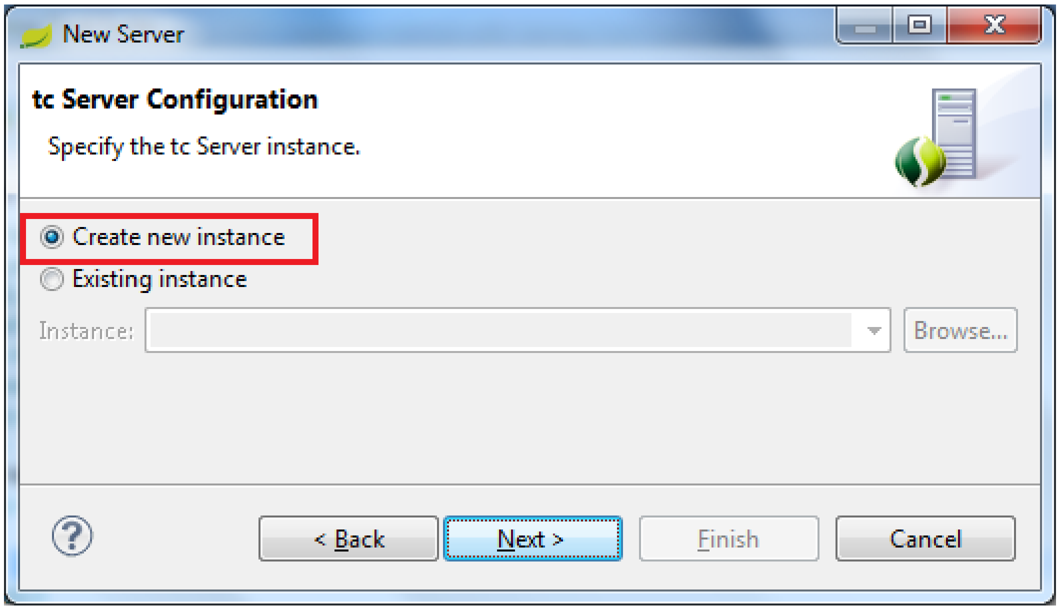
JRE: Workbench default JRE

Version: tomcat-7.0.35.B.RELEASE

For a STS installation, the server usually installed in the following directory:

```
STS_HOME\vfabric-tc-server-developer-VERSION
```

- Click **Next**. In the next screen, keep the option *Create a new instance*selected:


New Server

tc Server Configuration

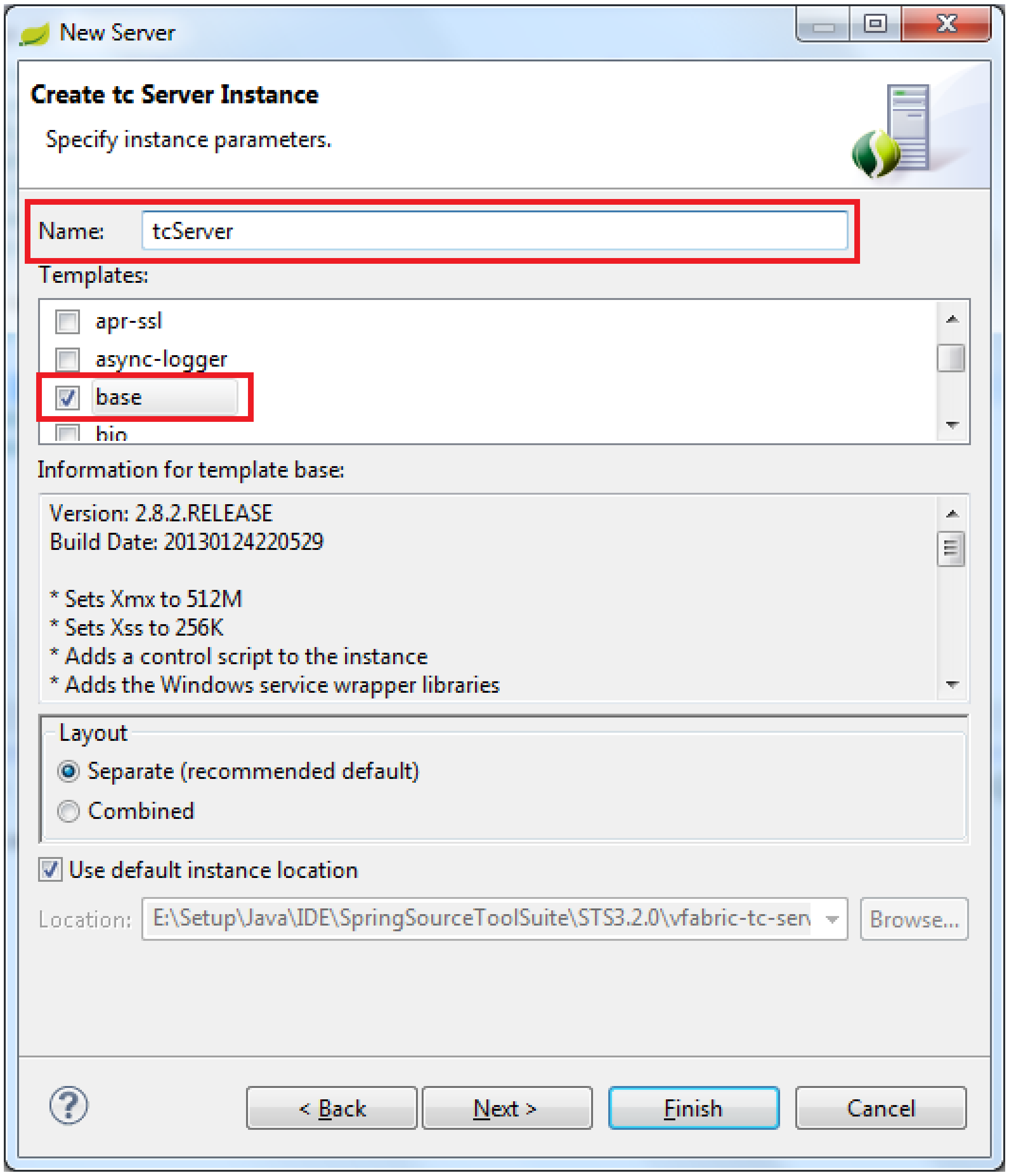
Specify the tc Server instance.

(●) Create new instance

( ) Existing instance

Instance:

- Click **Next**. In the next screen, type *tcServer* as name for the new instance and select **base** as the template:



Create tc Server Instance

Specify instance parameters.

Name: tcServer

Templates:

- [ ] apr-ssl
- [ ] async-logger
- [✓] base
- [ ] bio

Information for template base:

```
Version: 2.8.2.RELEASE
Build Date: 20130124220529

* Sets Xmx to 512M
* Sets Xss to 256K
* Adds a control script to the instance
* Adds the Windows service wrapper libraries
```

Layout

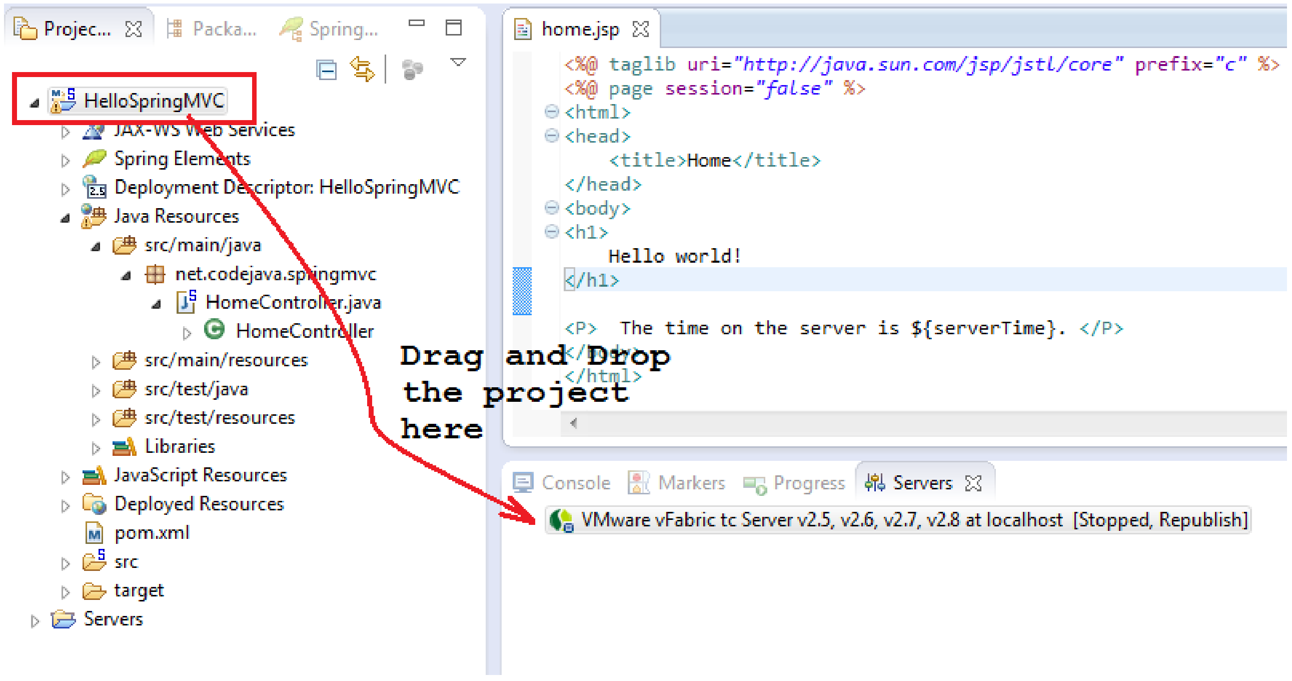
- [✓ Separate (recommended default)]
- Combined

[✓] Use default instance location

Location: E:\Setup\Java\IDE\SpringSourceToolSuite\STS3.2.0\vfabric-tc-serv

- Click **Finish**, to complete the server setup and you should see the server appears in the *Servers* view.

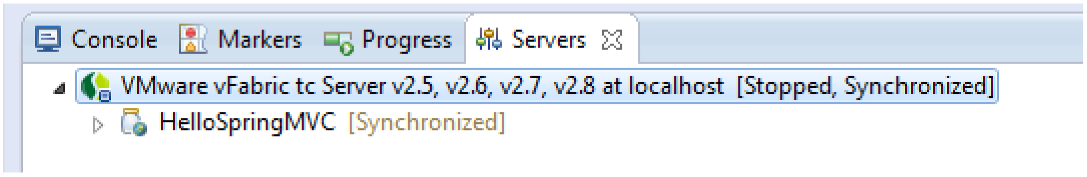
Now deploy our HelloSpringMVC application as simple as drag-n-drop the project to the server:



```
<%@ taglib uri="http://java.sun.com/jsp/jstl/core" prefix="c" %>
<%@ page session="false" %>
<html>
<head>
    <title>Home</title>
</head>
<body>
<h1>
    Hello world!
</h1>

<P>  The time on the server is ${serverTime}. </P>
</body>
</html>
```

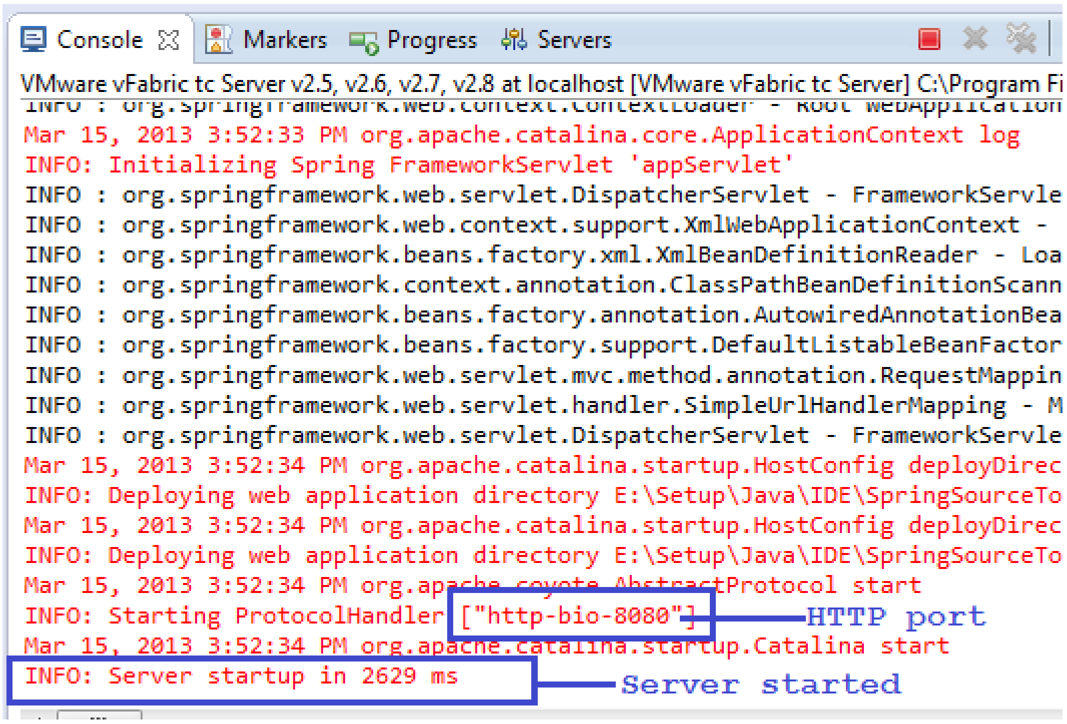
VMware vFabric tc Server v2.5, v2.6, v2.7, v2.8 at localhost [Stopped, Republish]

The application is deployed on the server if we see it beneath the server name like this:



```
VMware vFabric tc Server v2.5, v2.6, v2.7, v2.8 at localhost  [Stopped, Synchronized]
    HelloSpringMVC  [Synchronized]
```

Start the server by right clicking on the server name then select **Start** from the context menu (or click on the start icon). Wait for seconds while the server is starting, you should see some verbose output in the *Console* view:

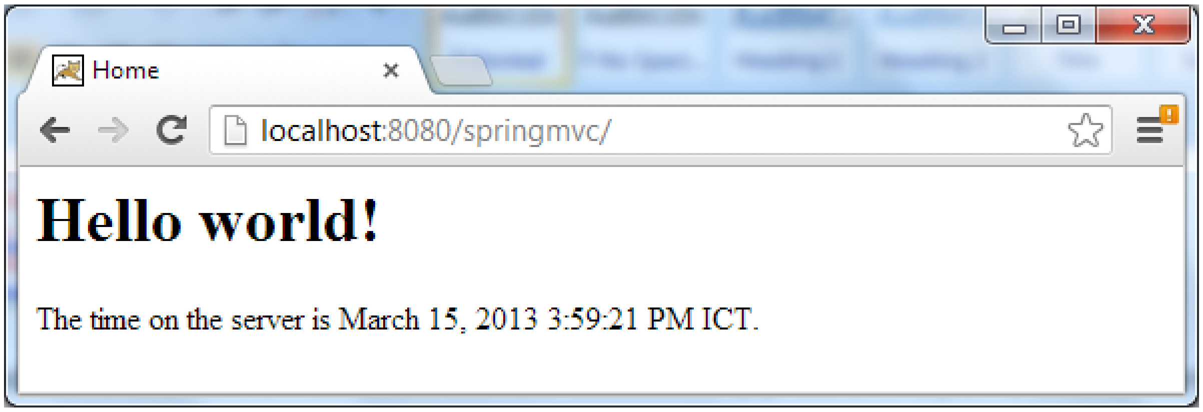


```
VMware vFabric tc Server v2.5, v2.6, v2.7, v2.8 at localhost [VMware vFabric tc Server] C:\Program Fi
INFO : org.springframework.web.context.ContextLoader - Root WebApplication
Mar 15, 2013 3:52:33 PM org.apache.catalina.core.ApplicationContext log
INFO: Initializing Spring FrameworkServlet 'appServlet'
INFO : org.springframework.web.servlet.DispatcherServlet - FrameworkServle
INFO : org.springframework.web.context.support.XmlWebApplicationContext -
INFO : org.springframework.beans.factory.xml.XmlBeanDefinitionReader - Loa
INFO : org.springframework.context.annotation.ClassPathBeanDefinitionScann
INFO : org.springframework.beans.factory.annotation.AutowiredAnnotationBea
INFO : org.springframework.beans.factory.support.DefaultListableBeanFactor
INFO : org.springframework.web.servlet.mvc.method.annotation.RequestMappin
INFO : org.springframework.web.servlet.handler.SimpleUrlHandlerMapping - M
INFO : org.springframework.web.servlet.DispatcherServlet - FrameworkServle
Mar 15, 2013 3:52:34 PM org.apache.catalina.startup.HostConfig deployDirec
INFO: Deploying web application directory E:\Setup\Java\IDE\SpringSourceTo
Mar 15, 2013 3:52:34 PM org.apache.catalina.startup.HostConfig deployDirec
INFO: Deploying web application directory E:\Setup\Java\IDE\SpringSourceTo
Mar 15, 2013 3:52:34 PM org.apache.coyote.AbstractProtocol start
INFO: Starting ProtocolHandler ["http-bio-8080"]
Mar 15, 2013 3:52:34 PM org.apache.catalina.startup.Catalina start
INFO: Server startup in 2629 ms
```

Notice the last line indicates the server has been started without any problem. Open a web browser window and type the following URL into its address bar:

http://localhost:8080/springmvc

If everything is going well (of course), we would see following screen:



Hello world!

The time on the server is March 15, 2013 3:59:21 PM ICT.

Congratulations! We have got our first Spring MVC application running, it prints the current date time on the server. If you refresh the page, you should see the time changes.

This video tutorial: **The Java Spring Tutorial** help you discover how to master the Spring framework instantly.

5. Modifying the project

So far we have tested and seen the generated application running. Now let's add some changes to the project for further understanding Spring MVC.

Add the following method into the `HomeController.java` class:

```java
@RequestMapping(value = "/test", method = RequestMethod.GET)
public String test(Model model) {
    String greetings = "Greetings, Spring MVC!";
    model.addAttribute("message", greetings);

    return "test";
}
```

This method will handle requests having the URL pattern */test* and does the following chore:

- Adds a String object as an attribute into the model with name "message" and value is "Greetings, Spring MVC!".
- Returns a logical view named "test".

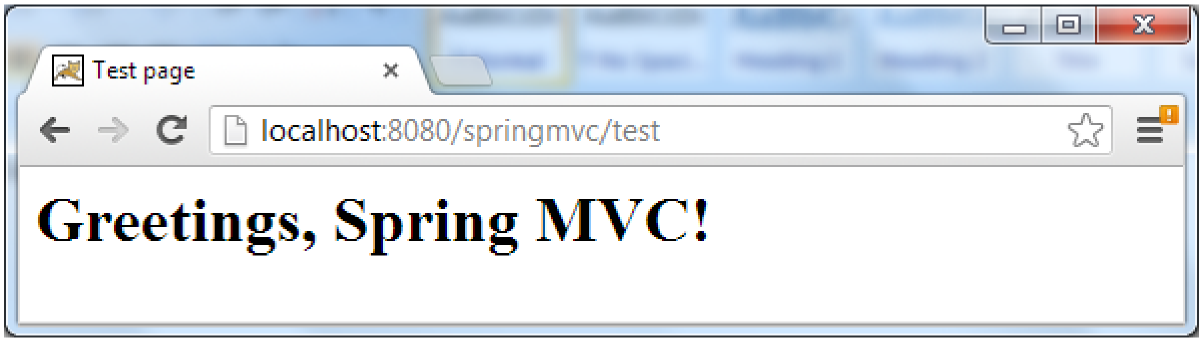
Because the `test()` method returns "test" view name, and following the configuration specified by the view resolver, we have to create a JPS file called `test.jsp` under `/WEB-INF/views` directory, with the following content:

```jsp
<%@ taglib uri="http://java.sun.com/jsp/jstl/core" prefix="c" %>
<%@ page session="false" %>
<html>
<head>
    <title>Test page</title>
</head>
<body>
<h1>
    ${message}
</h1>
</body>
</html>
```

This page is deadly simple, as it prints out value of the variable "message" which will be passed by the controller. Now get back to the browser window, change the URL to:

http://localhost:8080/springmvc/test

Hit **Enter**, we should be welcomed by the following screen:

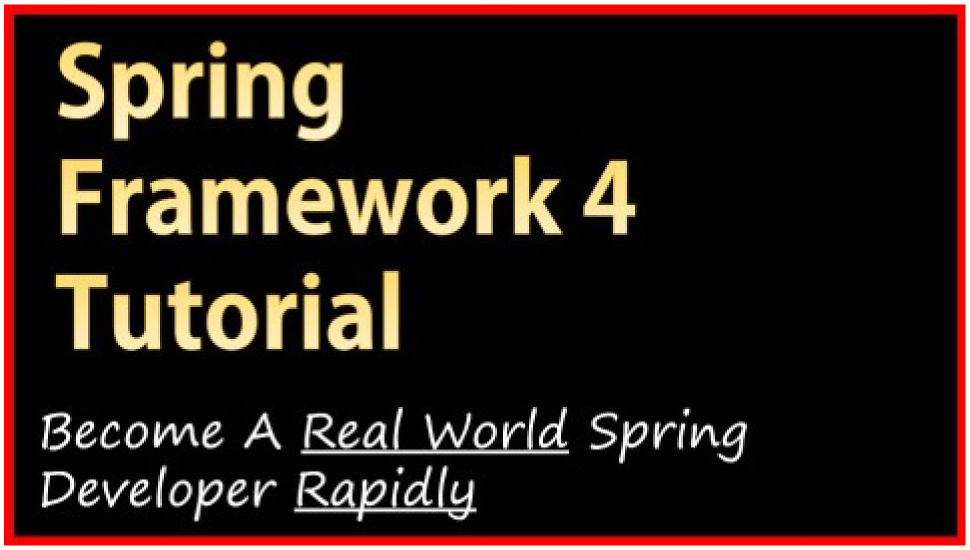


Greetings, Spring MVC!

Hurrah! We have finished walking through a quite long journey with Spring Tool Suite IDE and our first Spring MVC application. We hope this tutorial would be useful for those who want to be leveraged by Spring Tool Suite in Spring applications development. It's time to break!

You may be also interested in:

- Understanding the core of Spring framework
- Understanding Spring MVC
- 14 Tips for Writing Spring MVC Controller



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