기본적인 웹 게시물 관리

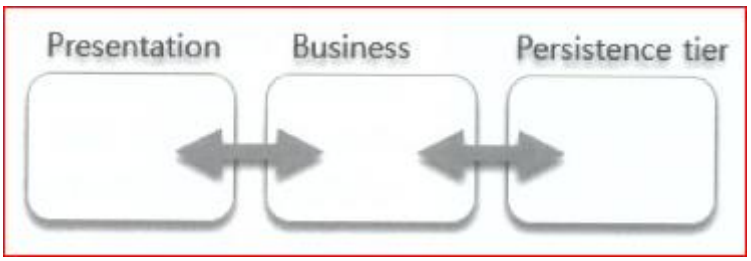
스프링 MVC 와 Mybatis 를 이용한
CRUD(등록, 수정, 삭제, 조회)와
페이징 처리
검색기능
의 게시물 관리를 제작.

중요하게 고려해야 할 부분

스프링 MVC 를 이용하는 웹 프로젝트 전체 구조에 대한 이해.
개발의 각 단계에 필요한 설정 및 테스트 환경
기본적인 등록, 수정, 삭제, 조회, 리스트 구현
목록(리스트) 화면의 페이징(paging) 처리
검색 처리와 페이지 이동

스프링 MVC 프로젝트의 기본 구성

일반적인 웹 프로젝트 구성 : 3-tier(단계) 방식

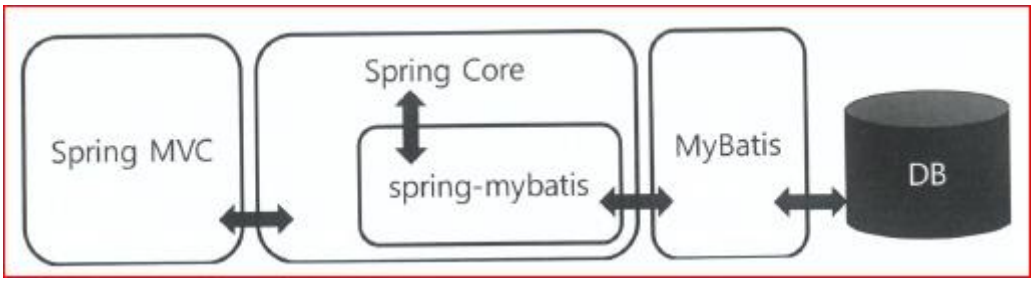


Presentation(화면 계층) : 화면에 보여주는 기술을 사용하는 영역
Servelt/JSP 나 스프링 MVC 가 담당하는 영역.
프로젝트의 성격에 맞추어 앱으로 제작하거나,
CS(Client-Server)로 구성되는 경우도 있다.
스프링 MVC 와 JSP 를 이요한 화면 구성이 이에 속한다.

Business(비즈니스 계층) : 순수한 비즈니스 로직을 담고 있는 영역
이 영역이 중요한 이유
고객이 원하는 요구사항을 반영하는 계층.
이 영역의 설계는 고객의 요구 사항과 정확히 일치해야 한다.
이 영역은 주로 xxxService 와 같은 이름으로 구성하고,
메서드 이름 역시 고객들이 사용하는 용어를 그대로 사용하는 것이 일반적.

Persistence(영속 또는 데이터 계층) : 데이터를 어떤 방식으로 보관하고,
사용하는가에 대한 설계가 들어가는 계층.
일반적인 경우, 데이터베이스를 많이 이용하지만,
경우에 따라서 네트워크 호출이나 원격 호출 등의 기술이 접목될 수도 있다.
이 영역은 Mybatis 와 mybatis-spring 을 이용하여 구성.

스프링 MVC 와 Mybatis 구조



Spring MVC : Presentation Tier 를 구성,
root-context.xml, servlet-context.xml 등의 설정 파일이 해당 영역의 설정을 담당.

Spring Core : POJO (Plain-Old-Java-Object)의 영역.
스프링의 의존성 주입을 이용해서 객체 간의 연관구조를 완성하여 사용.

Mybatis : 현실적으로 mybatis-spring 을 이용하여 구성하는 영역.
SQL 에 대한 처리를 담당하는 구조.

1. 각 영역의 Naming Convention(명명 규칙)

프로젝트를 3-tier 로 구성하는 이유는
유지보수에 대한 필요성 때문.

각 영역은 독립적으로 설계되어
추후 특정 기술이 변하더라도 필요한 부분을 전자제품의 부품처럼
쉽게 교환할 수 있게 하는 방식.

각 영역은 설계 당시부터 영역을 구분하고,
해당 연결 부위는 인터페이스를 이용하여 설계하는 것이 일반적.

1. 네이밍 규칙

xxxController : 스프링 MVC 에서 동작하는 Controoler 클래스를 설계할 때 사용.

xxxService, xxxServiceImpl : 비즈니스 영역을 담당하는 인터페이스는 xxxService 방식.
인터페이스를 구현한 클래스는 xxxServiceImpl 이름을 사용.

xxxDAO, xxxRepository : DAO(Data-Access-Object)나 Repository(저장소) 이름으로
영역을 따로 구성하는 것이 보편적.
별도의 DAO 를 구성하는 대신, Mybatis 의 Mapper 인터페이스를 활용.

VO, DTO : VO 나 DTO 는 일반적으로 유사한 의미로 사용하는 용어.
데이터를 담고 있는 객체를 의미한다는 공통점이 있다.

VO : 주로 Read Only 목적이 강하고, 데이터 자체도 immutable(불변)하게 설계하는 것이 정석.

DTO : 주로 데이터 수집의 용도가 좀더 강하다.
예) 웹 화면에서 로그인하는 정보를 DTO 로 처리하는 방식을 사용.
테이블과 관련된 데이터는 VO 라는 이름을 사용.

2. 패키지의 Naming Convention

패키지의 구성은 프로젝트의 크기나 구성원들의 성향으로 결정.
규모가 적은 프로젝트 :
  Controller 영역을 별도의 패키지로 설계
  Service 영역 등을 하나의 패키지로 설계.

규모가 큰 프로젝트 : 많은 Service 클래스와 Controller 들이 혼재 할 경우,
  비즈니스를 단위 별로 구분하고(즉, 비즈니스 단위 별로 패키지를 작성)
  다시 내부에서 Controller 패키지, Service 패키지 등으로 다시 나누는 방식을 이용.
  담당자가 명확해지고, 독립적인 설정을 가지는 형태로 개발.

작업 패키지 구성

com.이니셜 : 메인 패키지

com.이니셜.config : 프로젝트와 관련된 설정 클래스들

com.이니셜.controller : 스프링 MVC 의 Controller 들

com.이니셜.service : 스프링의 Service 인터페이스와 구현 클래스들

com.이니셜.domain : VO, DTO 클래스들

com.이니셜.persistence : Mybatis Mapper 인터페이스

com.이니셜.exception : 웹 관련 예외처리

com.이니셜.aop : 스프링의 AOP 관련

com.이니셜.security : 스프링의 Security 관련

com.이니셜.util : 각종 유틸리티 클래스 관련

2. 프로젝트를 위한 요구사항

프로젝트를 진행하기 전에
고객의 요구사항을 인식하고, 이를 설계하는 과정이 필요.

요구사항 분석 설계 :
고객이 원하는 내용이 무엇이고,
어느 정도까지 구현할 것인가에 대한 프로젝트의 범위를 정하는 것이 목적.

요구사항 :
실제로 방대해 질 수 있으므로 프로젝트에서는 단계를 정확히 구분.
  경험이 많은 팀 구성 : 초기 버전에 상당히 많은 기능을 포함 시켜서 개발
  반대의 경우 : 최대한 단순하고 눈에 보이는 결과를 만들어 내는 형태로 진행.

온전한 문장으로 정리.
주어는 "고객"이고, 목적어는 "대상(domain)"이 된다.

예) 게시판의 경우, 게시물이 대상이 된다.
  고객은 새로운 게시물을 등록할 수 있어야 한다.
  고객은 특정 게시물을 조회할 수 있어야 한다.
  고객은 작성한 게시물을 삭제할 수 있어야 한다.
  등.

테이블 : tbl_board
VO 클래스 : com.이니셜.domain.BoardVO
게시물과 관련된 로직 : com.이니셜.service.BoardService / com.이니셜.BoardController

요구사항에 따른 화면 설계

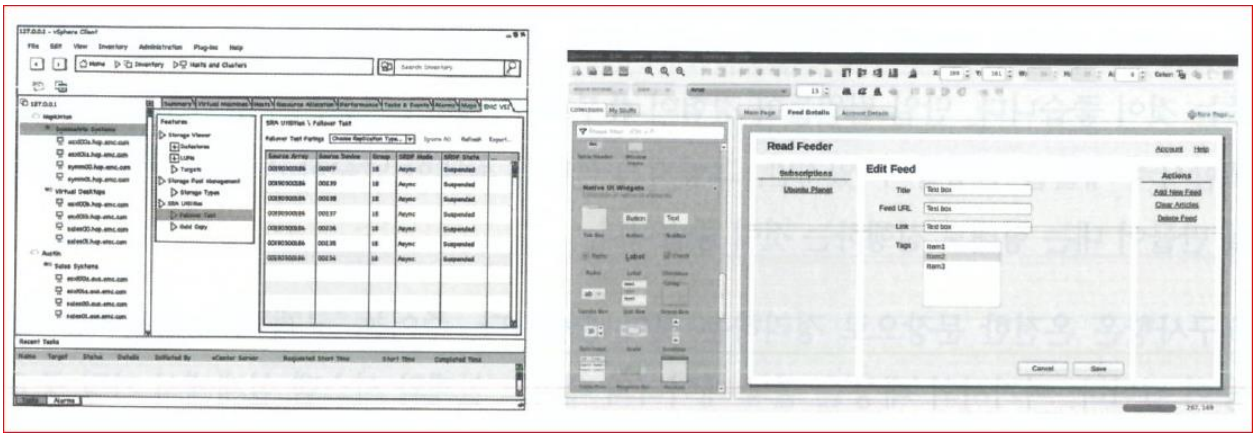
예) 고객은 새로운 게시물을 등록할 수 있어야 한다.
    세부적인 설계 : '어떤 내용들을 입력하게 될 것인가'
    이를 기준으로 테이블이나 클래스의 멤버 변수(인스턴스 변수)들을 설계.

이러한 화면을 설계할 때는 주로 Mock-up(목업)들을 이용하는 경우가 많다.
대표적인 Mock-up 툴 : PowerPoint 나 Balsamiq studio, Pencil Mockup 등.

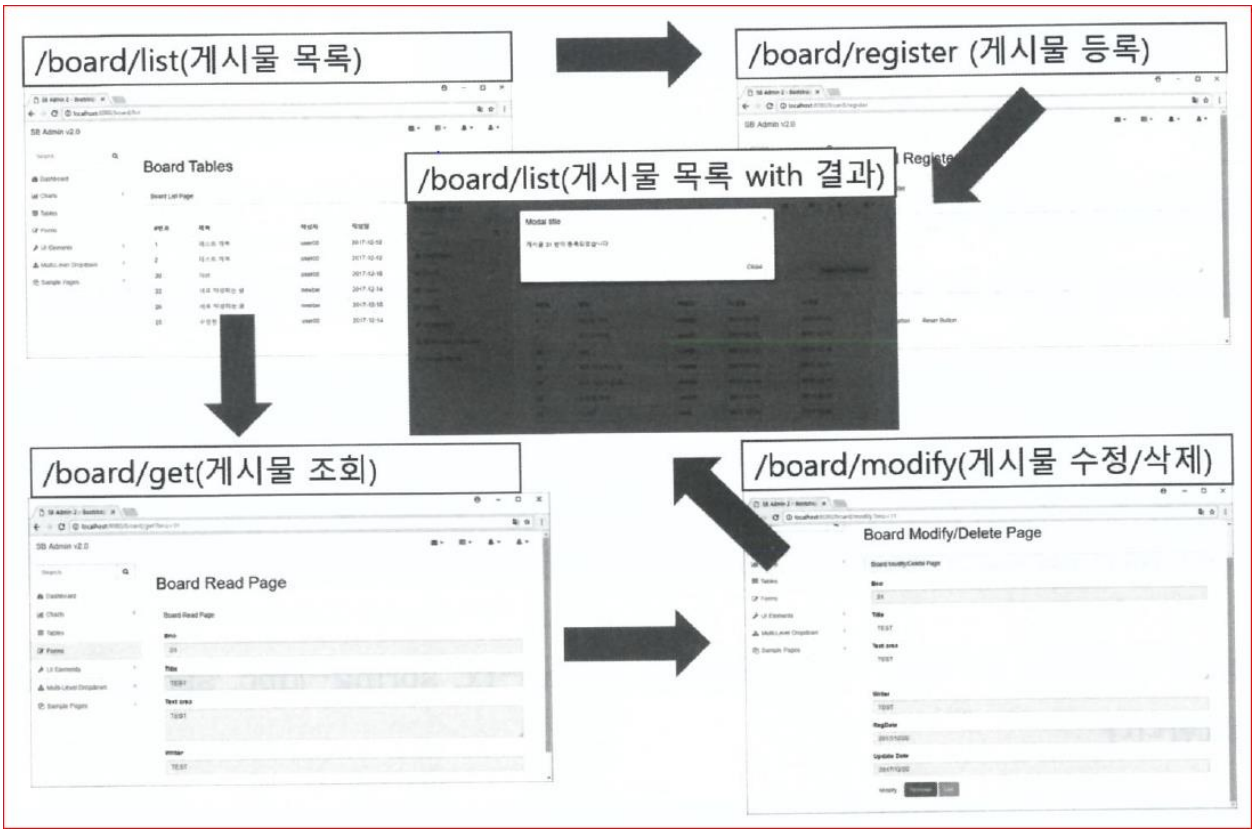
각 화면을 설계하는 단계에서는
  사용자가 입력해야 하는 값과 함께
  전체 페이지의 흐름을 설계.

이 화면의 흐름을 URL 로 구성하게 되는데,
이 경우 GET/POST 방식에 대하여 언급해둔다.

게시물 관리 스토리 보드의 예



게시물 관리의 흐름의 예



3. 게시물 관리 프로젝트 구성

스프링 프로젝트 이름 : springboard
스프링 프로젝트 생성 : Spring Legacy Project

프로젝트 생성 후, 진행 순서 :

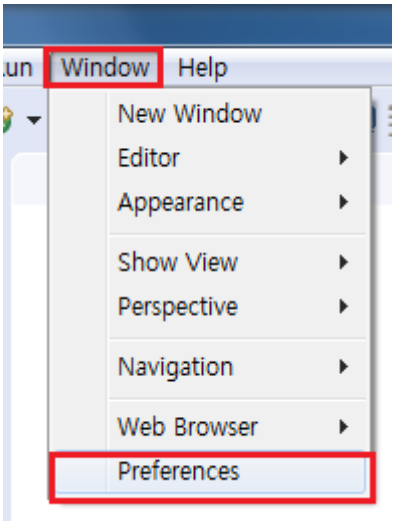
pom.xml 의 수정
데이터베이스 관련 처리
스프링 MVC 처리

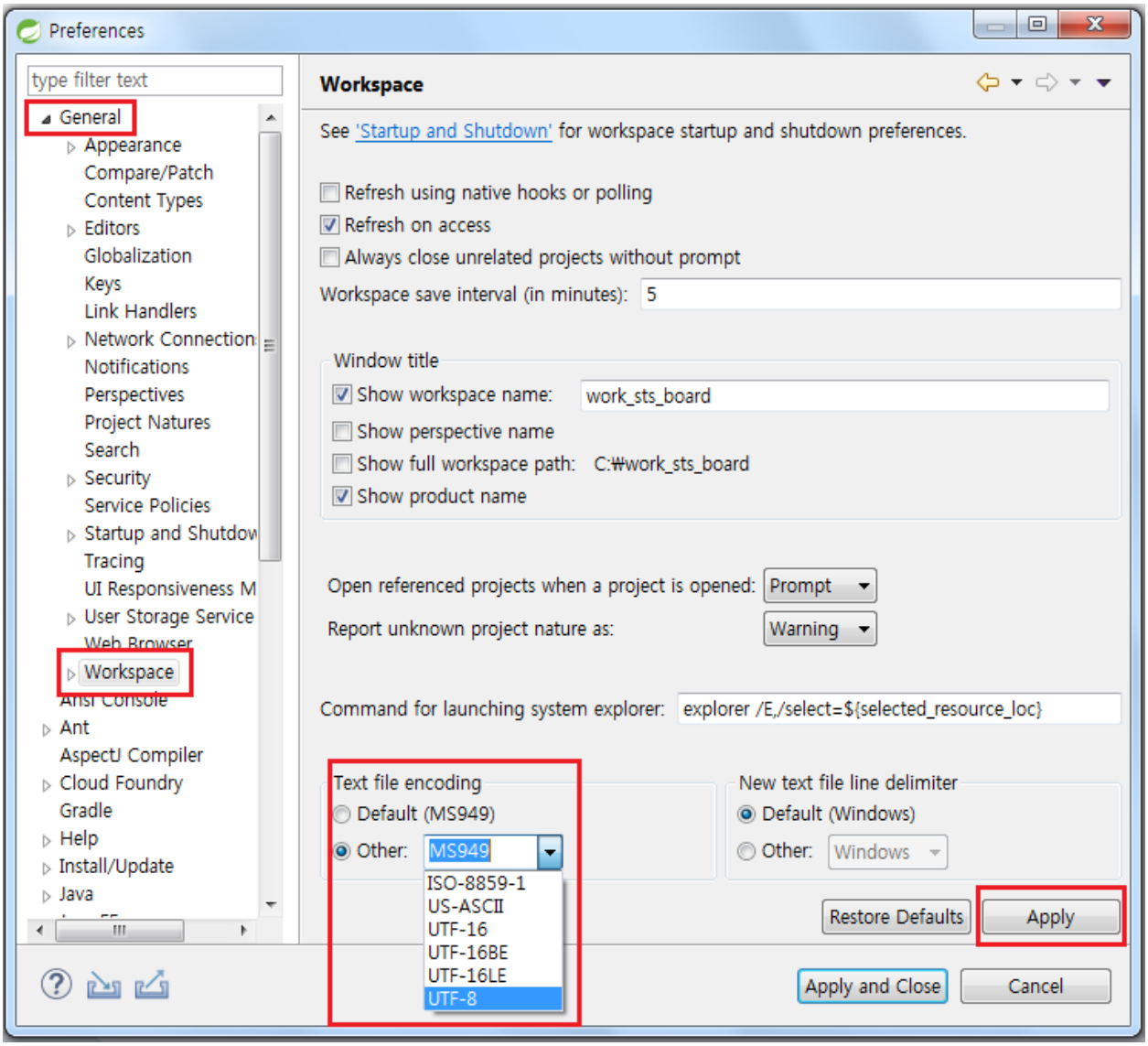
1. workspace 의 UTF-8 설정

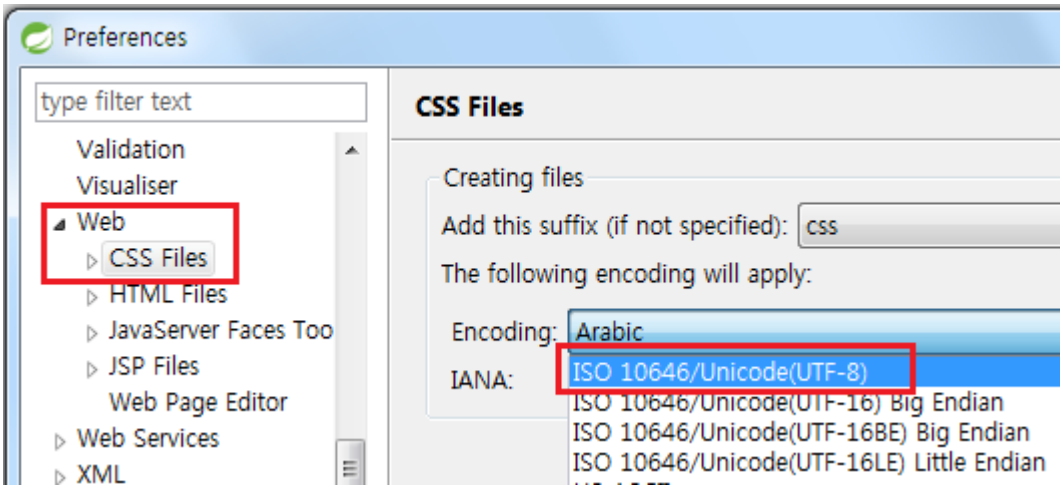
STS 는 운영체제에 따라서 workspace 의 기본 문자열 인코딩 방식을 다르게 지원.
최근 개발 시, UTF-8 인코딩을 이용.

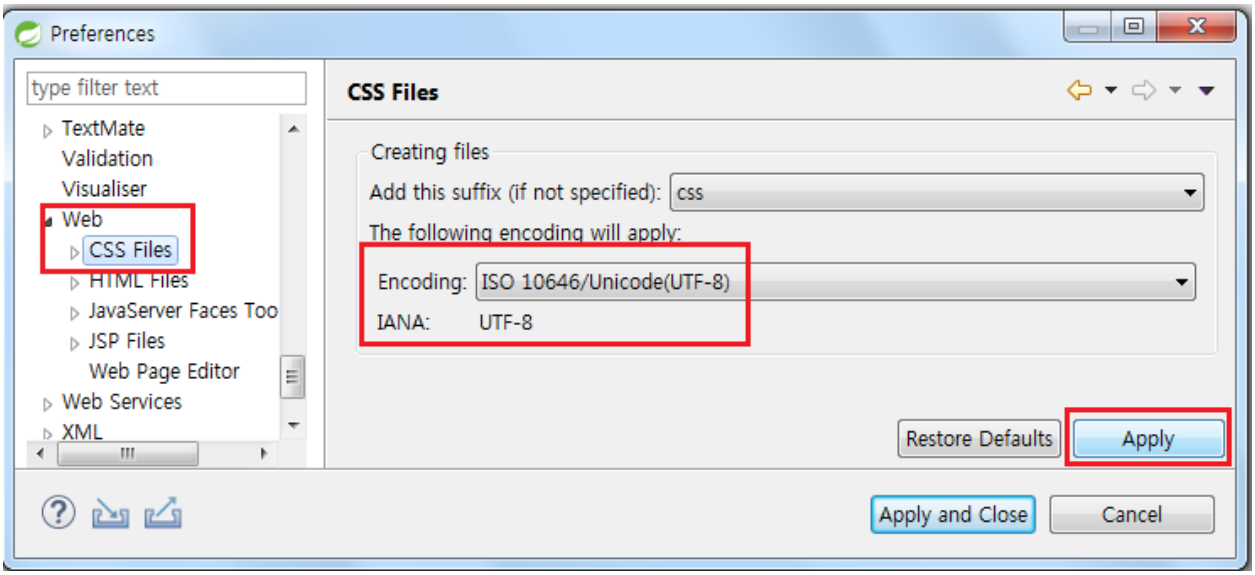
운영체제가 Windows 인 경우,
기본 'MS949' 방식으로 설정되어 있어서 JSP/Java 개발 시,
코드를 작성할 때 어려움을 겪을 수 있다.

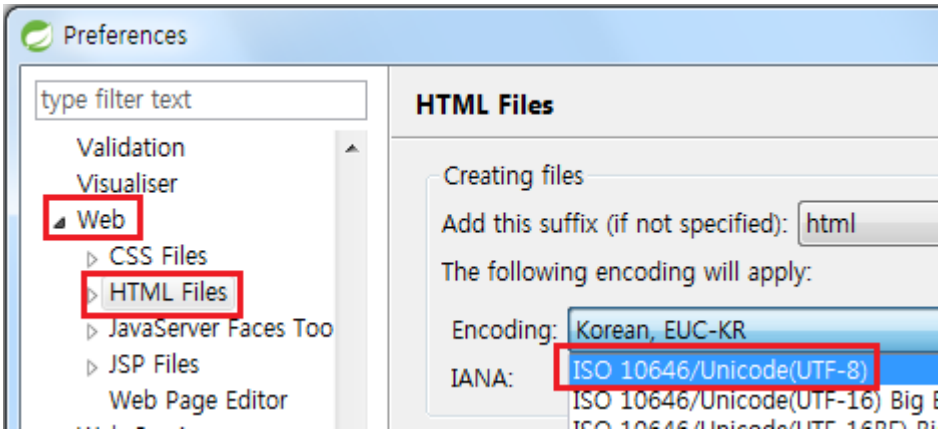
이를 변경하기 위해서는

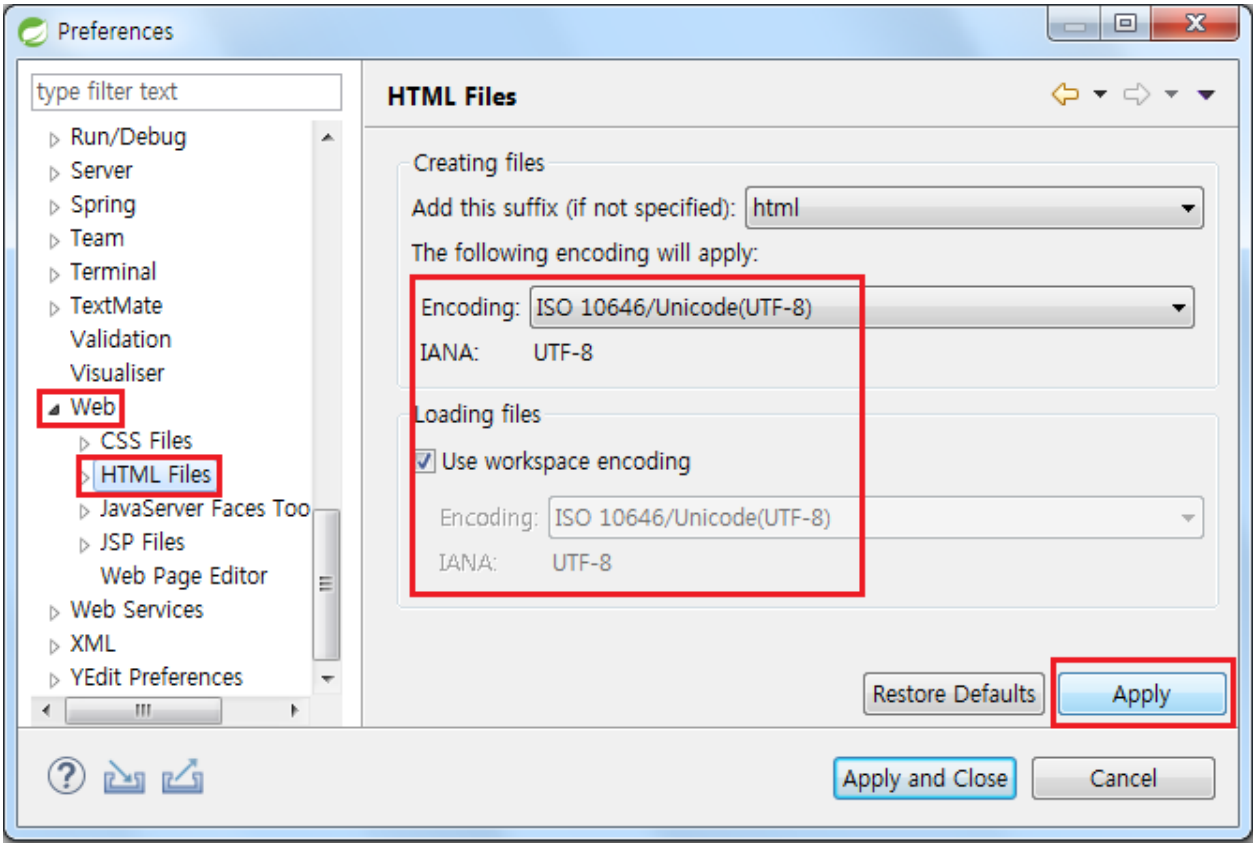


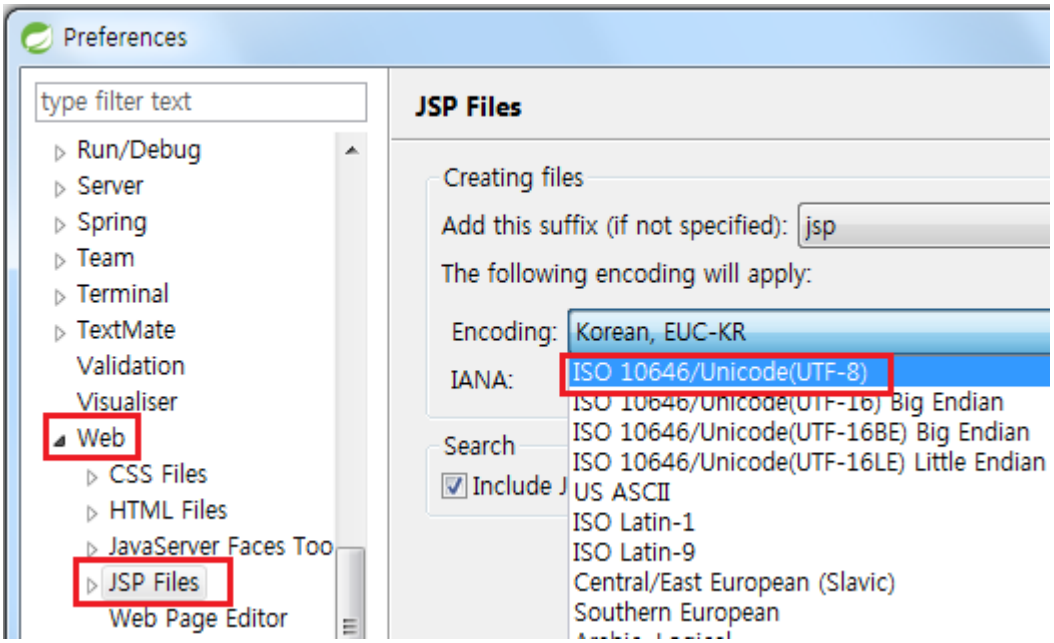

Preferences
type filter text
General
Appearance
Compare/Patch
Content Types
Editors
Globalization
Keys
Link Handlers
Network Connection
Notifications
Perspectives
Project Natures
Search
Security
Service Policies
Startup and Shutdow
Tracing
UI Responsiveness M
User Storage Service
Web Browser
Workspace
Ant
AspectJ Compiler
Cloud Foundry
Gradle
Help
Install/Update
Java
Workspace
See 'Startup and Shutdown' for workspace startup and shutdown preferences.
Refresh using native hooks or polling
Refresh on access
Always close unrelated projects without prompt
Workspace save interval (in minutes): 5
Window title
Show workspace name: work_sts_board
Show perspective name
Show full workspace path: C:₩work_sts_board
Show product name
Open referenced projects when a project is opened: Prompt
Report unknown project nature as: Warning
Command for launching system explorer: explorer /E,/select=${selected_resource_loc}
Text file encoding
Default (MS949)
Other: MS949
ISO-8859-1
US-ASCII
UTF-16
UTF-16BE
UTF-16LE
UTF-8
New text file line delimiter
Default (Windows)
Other: Windows
Restore Defaults
Apply
Apply and Close
Cancel

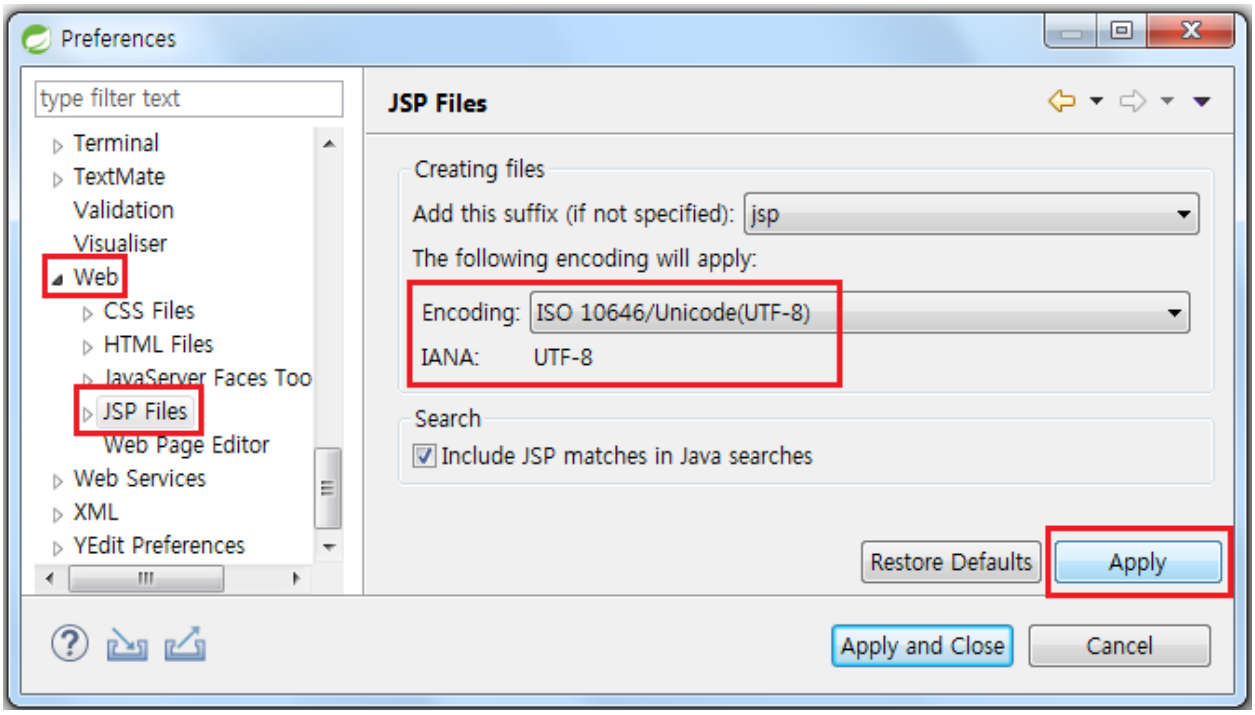

Preferences
type filter text
Validation
Visualiser
Web
CSS Files
HTML Files
JavaServer Faces Too
JSP Files
Web Page Editor
Web Services
XML
CSS Files
Creating files
Add this suffix (if not specified): css
The following encoding will apply:
Encoding: Arabic
IANA:
ISO 10646/Unicode(UTF-8)
ISO 10646/Unicode(UTF-16) Big Endian
ISO 10646/Unicode(UTF-16BE) Big Endian
ISO 10646/Unicode(UTF-16LE) Little Endian

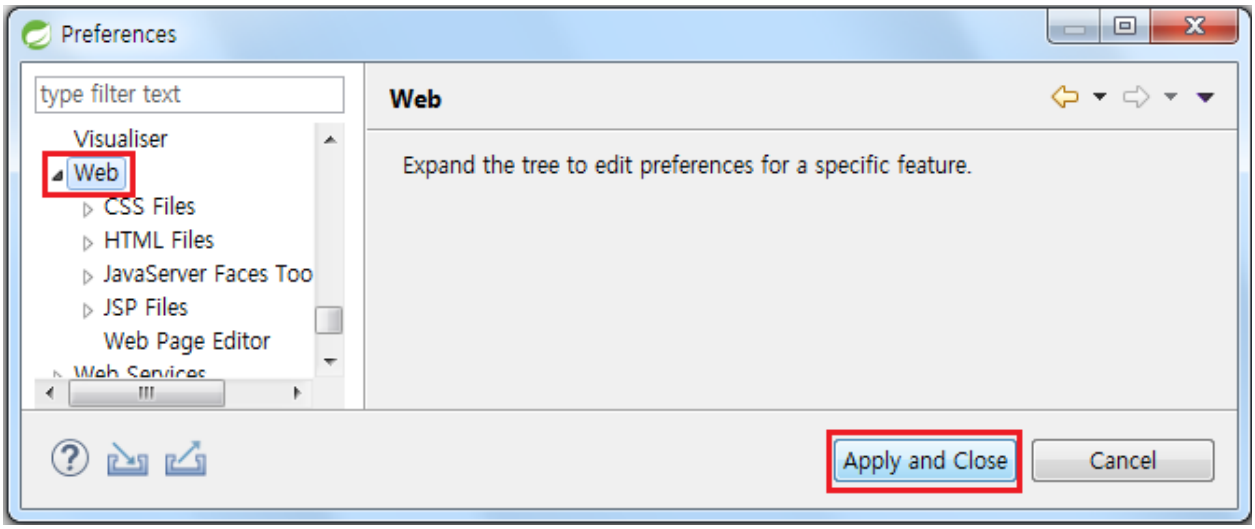

Preferences
type filter text
TextMate
Validation
Visualiser
Web
CSS Files
HTML Files
JavaServer Faces Too
JSP Files
Web Page Editor
Web Services
XML
CSS Files
Creating files
Add this suffix (if not specified): css
The following encoding will apply:
Encoding: ISO 10646/Unicode(UTF-8)
IANA: UTF-8
Restore Defaults
Apply
Apply and Close
Cancel


Preferences
type filter text
Validation
Visualiser
Web
CSS Files
HTML Files
JavaServer Faces Too
JSP Files
Web Page Editor
HTML Files
Creating files
Add this suffix (if not specified): html
The following encoding will apply:
Encoding: Korean, EUC-KR
IANA:
ISO 10646/Unicode(UTF-8)
ISO 10646/Unicode(UTF-16) Big

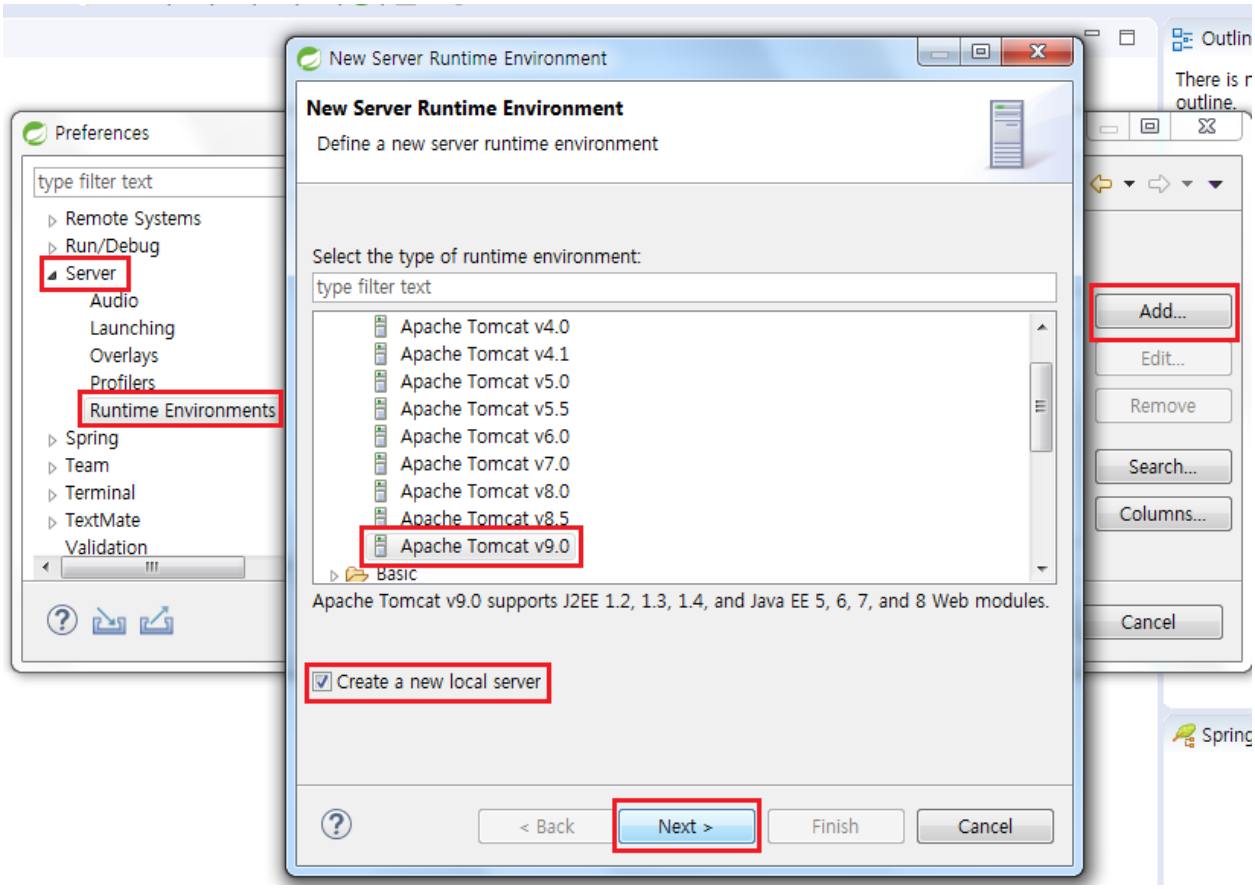

Preferences
type filter text
Run/Debug
Server
Spring
Team
Terminal
TextMate
Validation
Visualiser
Web
CSS Files
HTML Files
JavaServer Faces Too
JSP Files
Web Page Editor
Web Services
XML
YEdit Preferences
HTML Files
Creating files
Add this suffix (if not specified): html
The following encoding will apply:
Encoding: ISO 10646/Unicode(UTF-8)
IANA: UTF-8
Loading files
Use workspace encoding
Encoding: ISO 10646/Unicode(UTF-8)
IANA: UTF-8
Restore Defaults
Apply
Apply and Close
Cancel

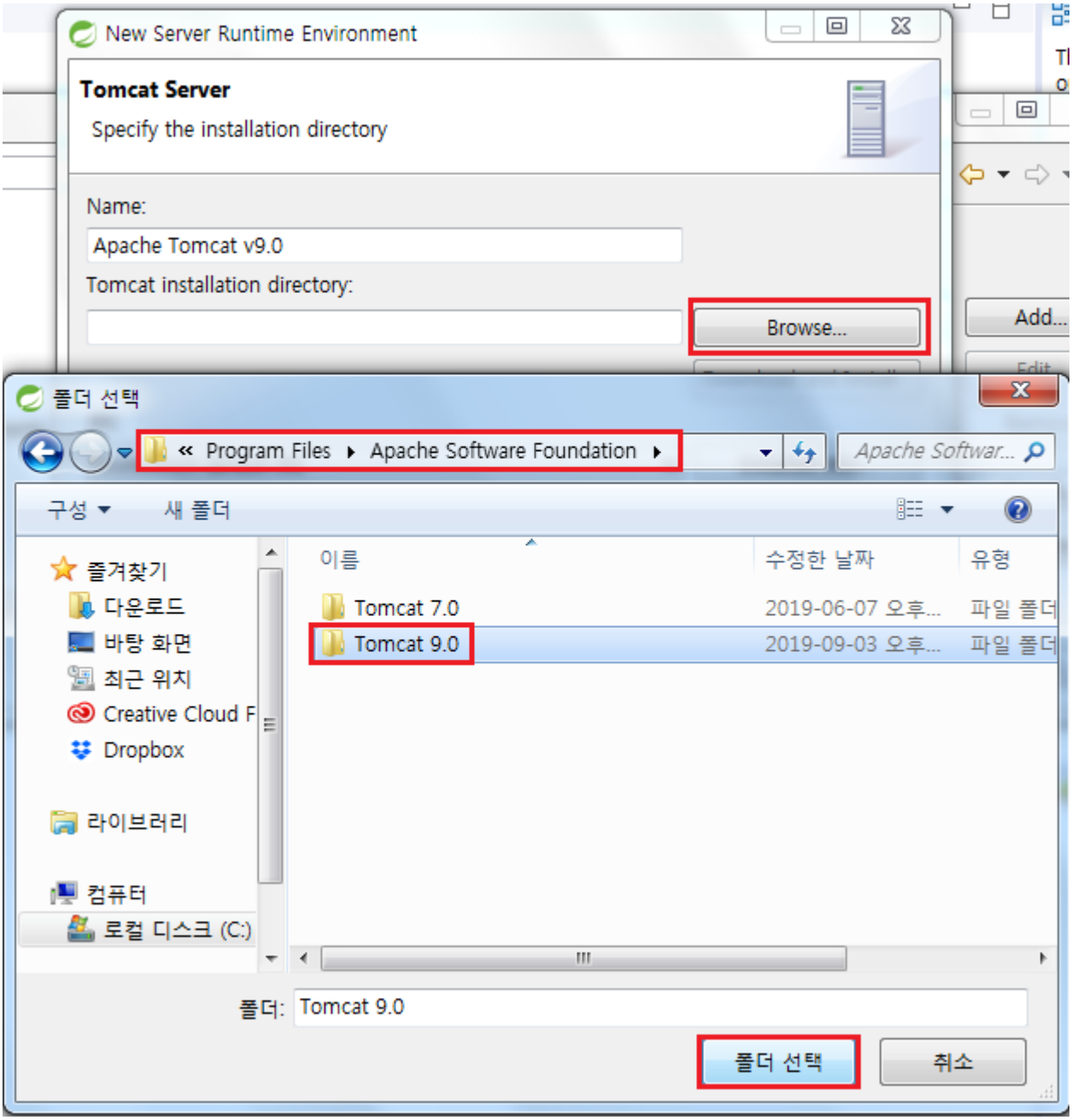

Preferences
type filter text
Run/Debug
Server
Spring
Team
Terminal
TextMate
Validation
Visualiser
Web
CSS Files
HTML Files
JavaServer Faces Too
JSP Files
Web Page Editor
JSP Files
Creating files
Add this suffix (if not specified): jsp
The following encoding will apply:
Encoding: Korean, EUC-KR
IANA:
ISO 10646/Unicode(UTF-8)
ISO 10646/Unicode(UTF-16) Big Endian
ISO 10646/Unicode(UTF-16BE) Big Endian
ISO 10646/Unicode(UTF-16LE) Little Endian
US ASCII
ISO Latin-1
ISO Latin-9
Central/East European (Slavic)
Southern European
Search
Include J

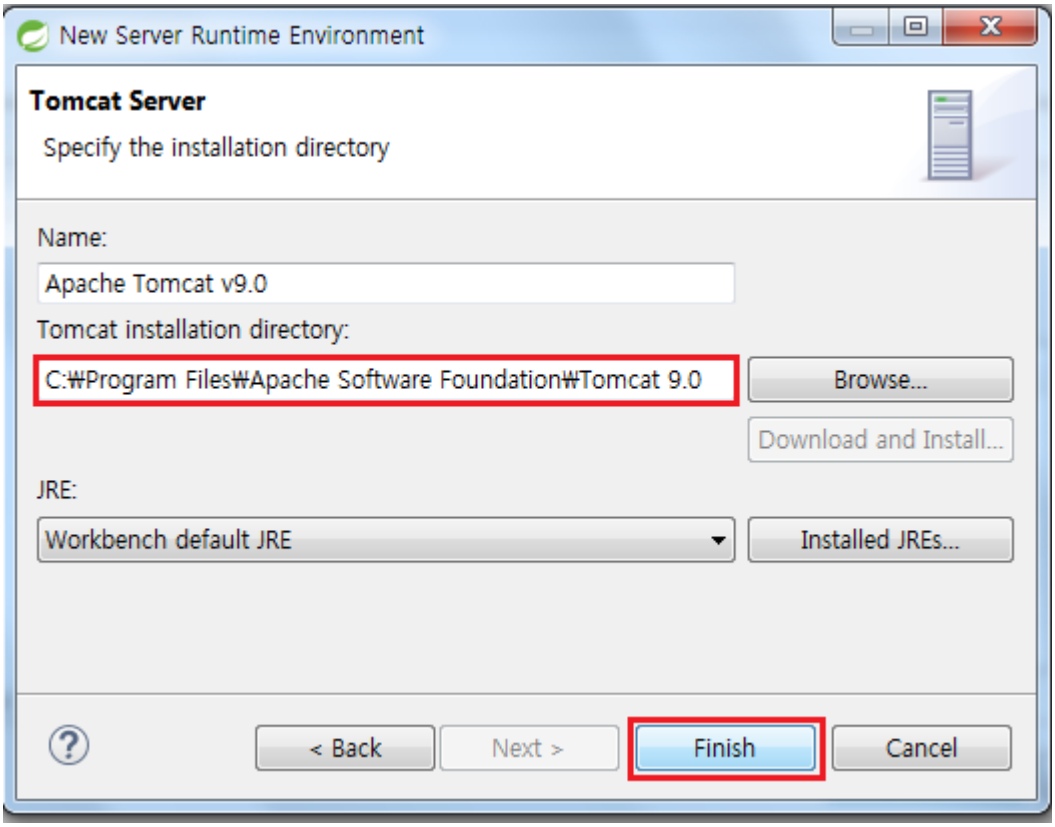

Preferences
type filter text
Terminal
TextMate
Validation
Visualiser
Web
CSS Files
HTML Files
JavaServer Faces Too
JSP Files
Web Page Editor
Web Services
XML
YEdit Preferences
JSP Files
Creating files
Add this suffix (if not specified): jsp
The following encoding will apply:
Encoding: ISO 10646/Unicode(UTF-8)
IANA: UTF-8
Search
Include JSP matches in Java searches
Restore Defaults
Apply
Apply and Close
Cancel

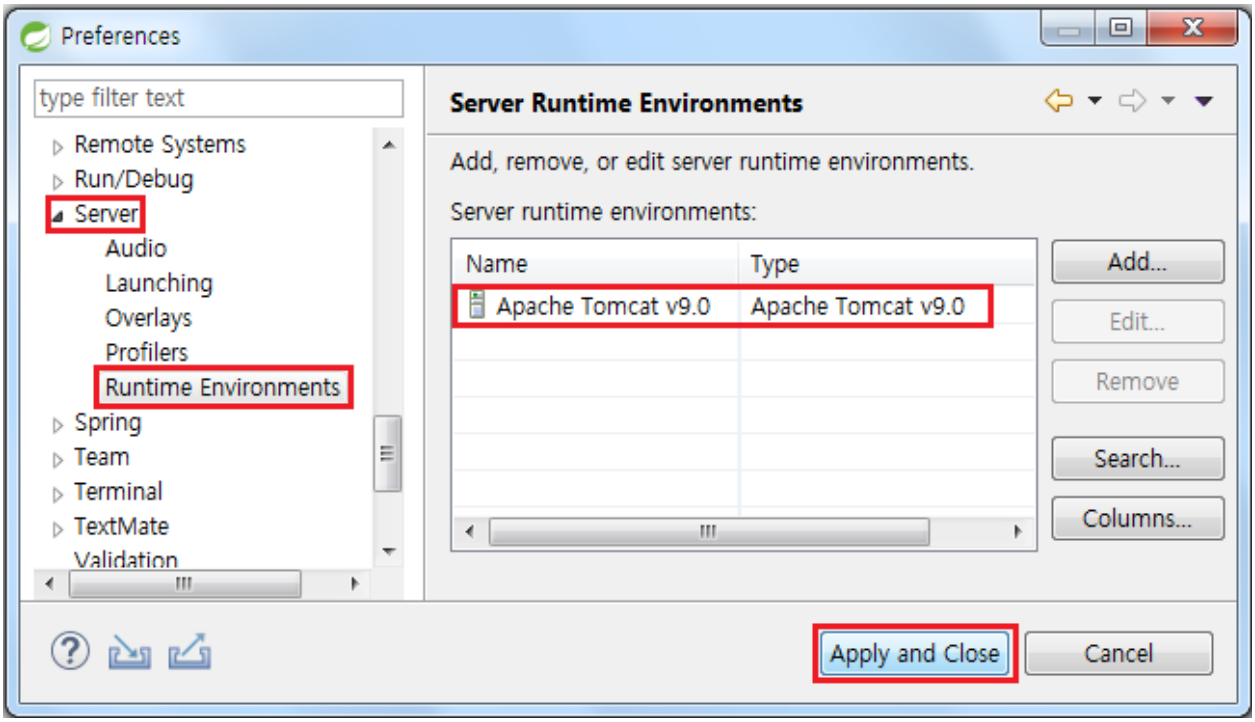

Preferences
type filter text
Visualiser
Web
CSS Files
HTML Files
JavaServer Faces Too
JSP Files
Web Page Editor
Web Services
Web
Expand the tree to edit preferences for a specific feature.
Apply and Close
Cancel

2. Tomcat 9 서버 설정

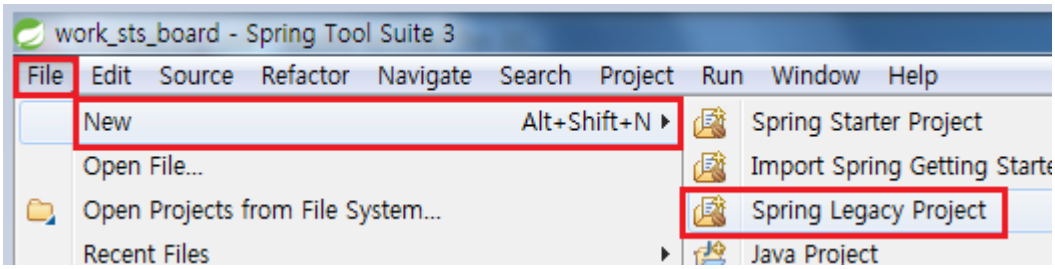


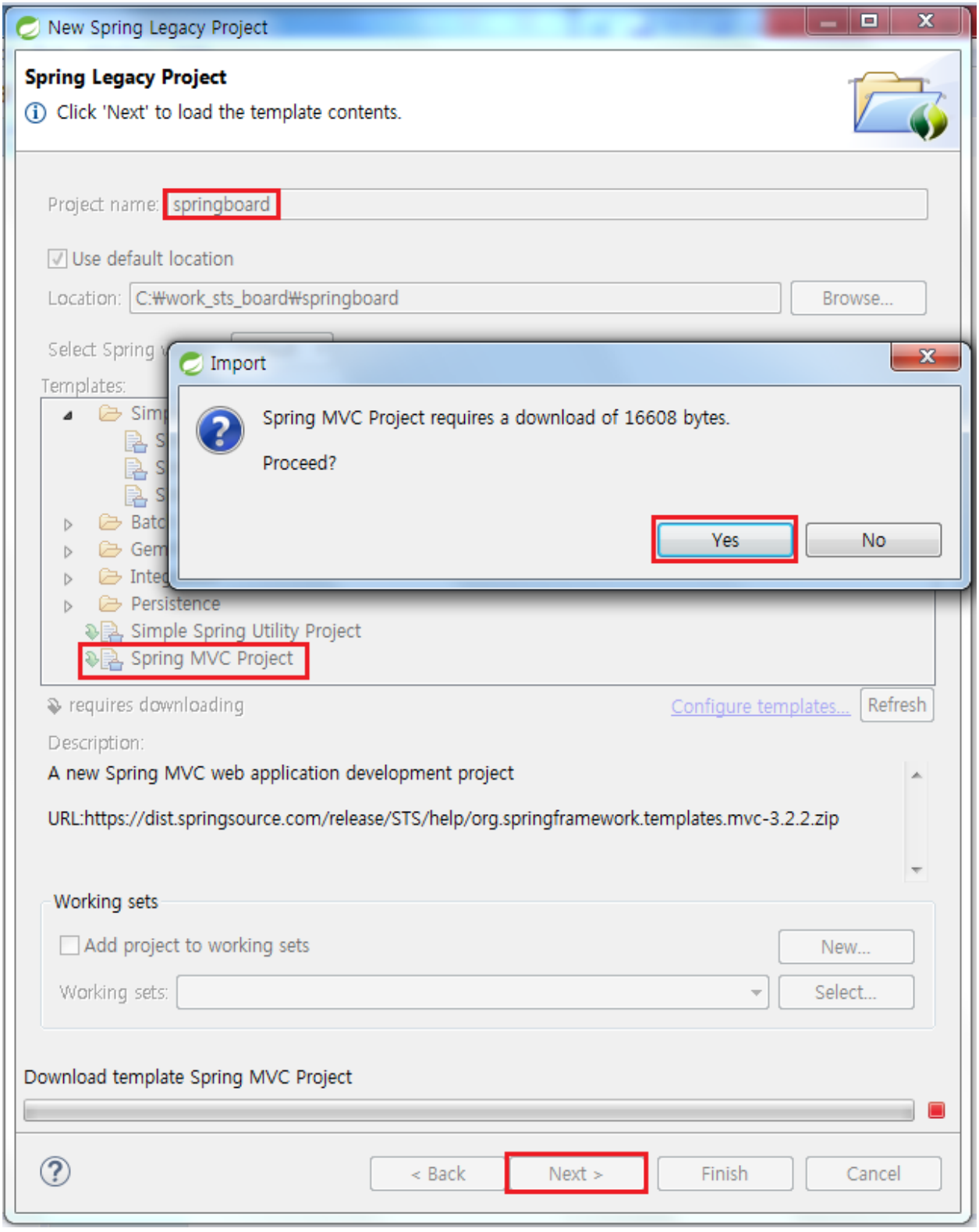

New Server Runtime Environment
Tomcat Server
Specify the installation directory
Name:
Apache Tomcat v9.0
Tomcat installation directory:
Browse...
Add...
폴더 선택
Program Files ▸ Apache Software Foundation ▸
Apache Softwar...
구성
새 폴더
즐겨찾기
다운로드
바탕 화면
최근 위치
Creative Cloud F
Dropbox
라이브러리
컴퓨터
로컬 디스크 (C:)
이름
수정한 날짜
유형
Tomcat 7.0
2019-06-07 오후...
파일 폴더
Tomcat 9.0
2019-09-03 오후...
파일 폴더
폴더: Tomcat 9.0
폴더 선택
취소

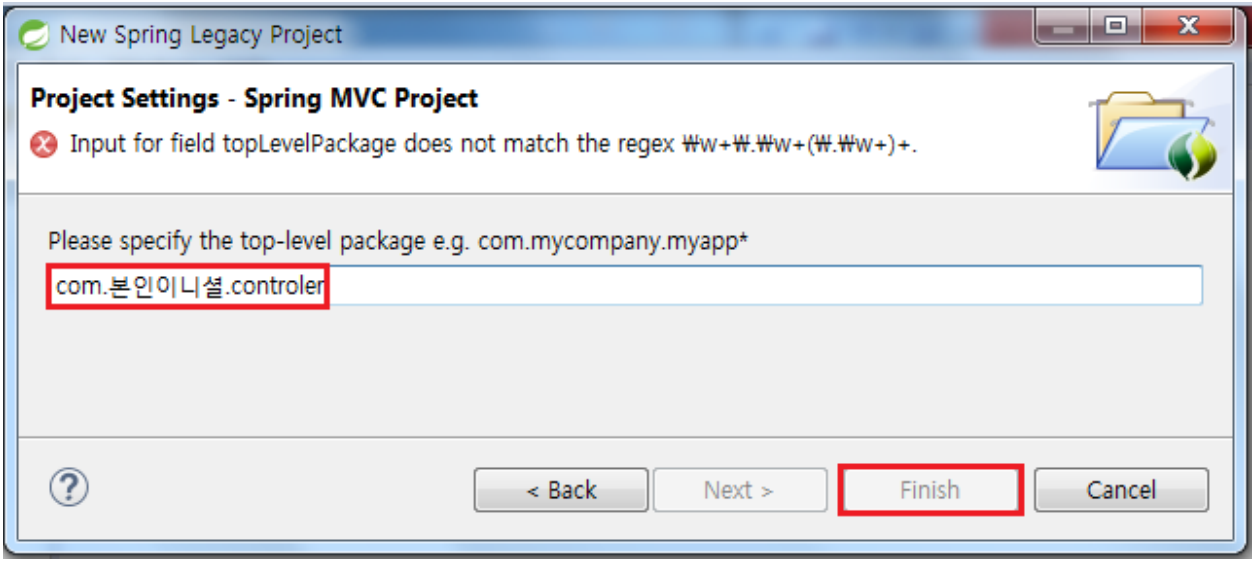

New Server Runtime Environment
Tomcat Server
Specify the installation directory
Name:
Apache Tomcat v9.0
Tomcat installation directory:
C:₩Program Files₩Apache Software Foundation₩Tomcat 9.0
Browse...
Download and Install...
JRE:
Workbench default JRE
Installed JREs...
< Back
Next >
Finish
Cancel

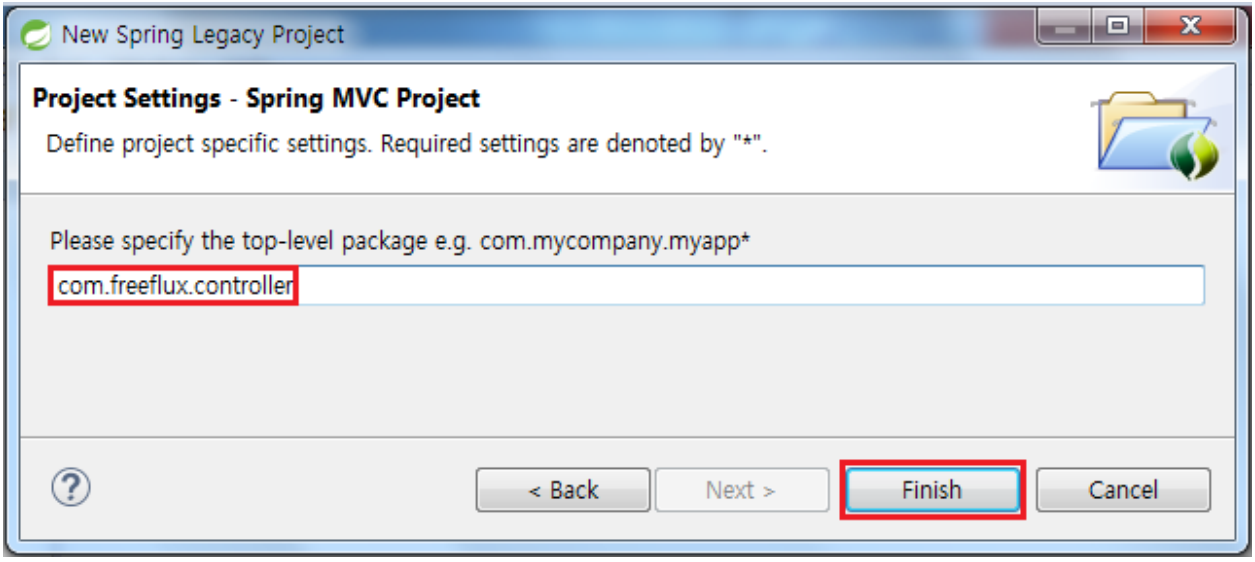

Preferences
type filter text
Remote Systems
Run/Debug
Server
Audio
Launching
Overlays
Profilers
Runtime Environments
Spring
Team
Terminal
TextMate
Validation
Server Runtime Environments
Add, remove, or edit server runtime environments.
Server runtime environments:
Name
Type
Apache Tomcat v9.0
Apache Tomcat v9.0
Add...
Edit...
Remove
Search...
Columns...
Apply and Close
Cancel

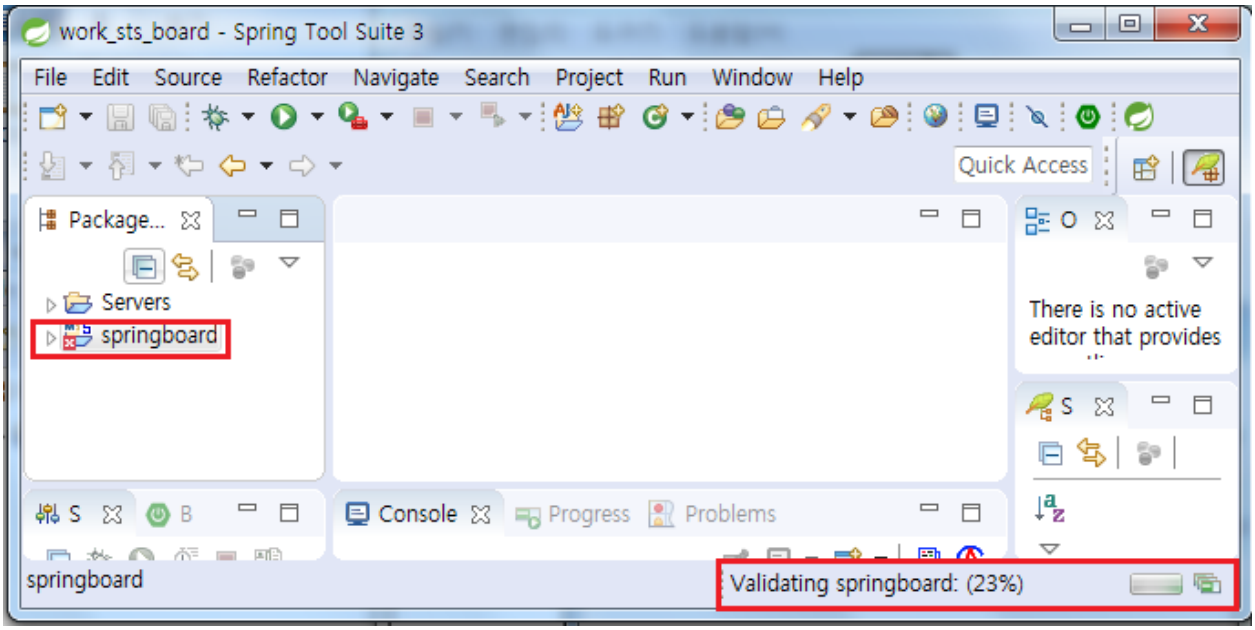
3. 스프링 프로젝트 생성

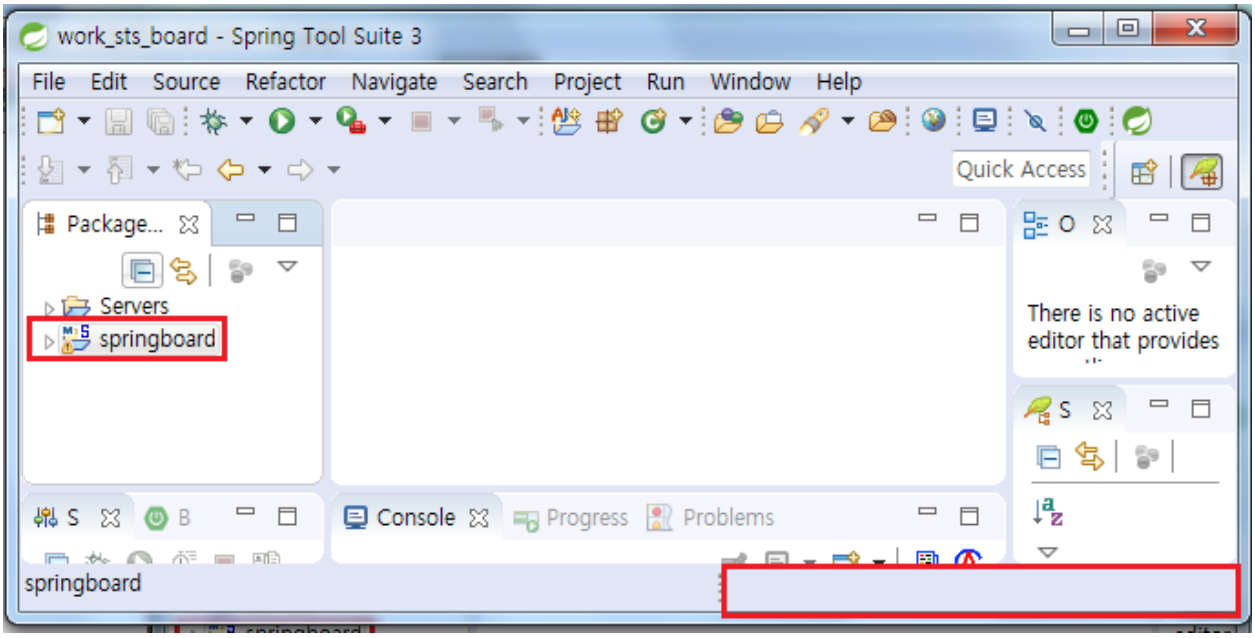

work_sts_board - Spring Tool Suite 3
File
Edit
Source
Refactor
Navigate
Search
Project
Run
Window
Help
New
Alt+Shift+N
Open File...
Open Projects from File System...
Recent Files
Spring Starter Project
Import Spring Getting Starte
Spring Legacy Project
Java Project


New Spring Legacy Project
Spring Legacy Project
Click 'Next' to load the template contents.
Project name:
springboard
Use default location
Location:
C:₩work_sts_board₩springboard
Browse...
Templates:
Persistence
Simple Spring Utility Project
Spring MVC Project
requires downloading
Configure templates...
Refresh
Description:
A new Spring MVC web application development project
URL:https://dist.springsource.com/release/STS/help/org.springframework.templates.mvc-3.2.2.zip
Working sets
Add project to working sets
New...
Working sets:
Select...
Download template Spring MVC Project
< Back
Next >
Finish
Cancel
Import
Spring MVC Project requires a download of 16608 bytes.
Proceed?
Yes
No

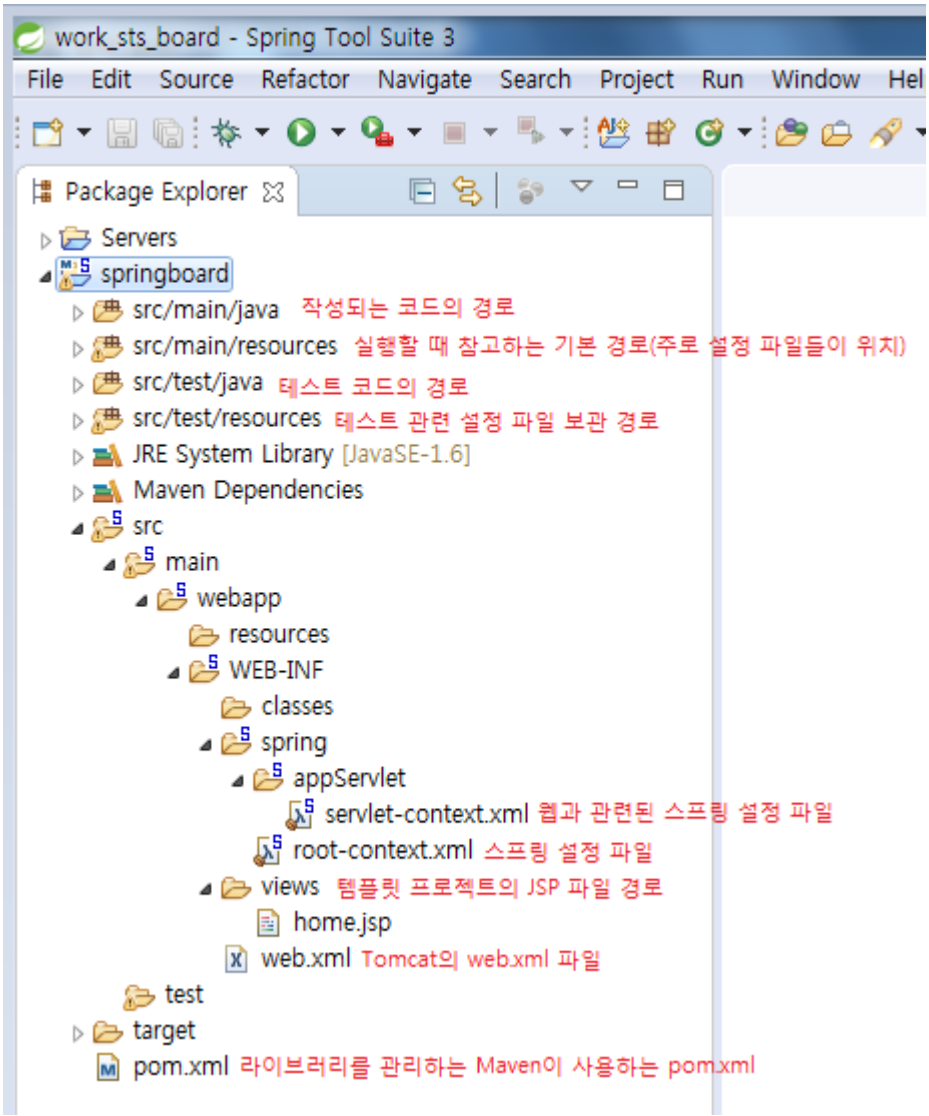

New Spring Legacy Project
Project Settings - Spring MVC Project
Input for field topLevelPackage does not match the regex ₩w+₩.₩w+(₩.₩w+)+.
Please specify the top-level package e.g. com.mycompany.myapp*
com.본인이니셜.controler
< Back
Next >
Finish
Cancel


New Spring Legacy Project
Project Settings - Spring MVC Project
Define project specific settings. Required settings are denoted by "*".
Please specify the top-level package e.g. com.mycompany.myapp*
com.freeflux.controller
< Back
Next >
Finish
Cancel


work_sts_board - Spring Tool Suite 3
File Edit Source Refactor Navigate Search Project Run Window Help
Quick Access
Package...
Servers
springboard
There is no active editor that provides
Console
Progress
Problems
springboard
Validating springboard: (23%)

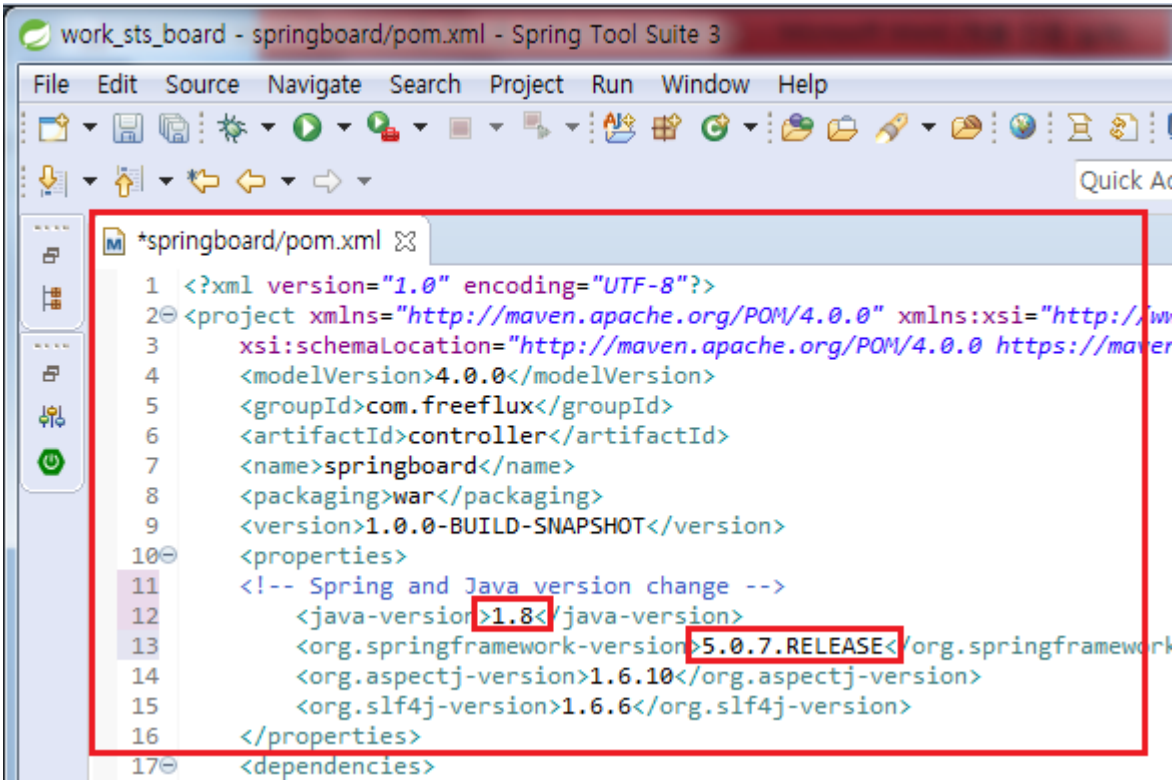

work_sts_board - Spring Tool Suite 3
File Edit Source Refactor Navigate Search Project Run Window Help
Quick Access
Package...
Servers
springboard
There is no active editor that provides
Console
Progress
Problems
springboard

4. 스프링 프로젝트 구조 및 구성 요소들의 특징



5. pom.xml 문서 수정

스프링의 버전(5.0.7.RELEASE)과 Java 버전(1.8)을 수정



스프링 관련 라이브러리 추가

spring-tx : 트랜잭션을 사용하기 위한 라이브러리

spring-jdbc : 데이터베이스와 연동하기 위한 라이브러리

spring-test : 테스트 코드를 단위 테스트하기 위한 라이브러리

```
</properties>
<dependencies>
    <!-- Spring -->
    <dependency>
        <groupId>org.springframework</groupId>
        <artifactId>spring-context</artifactId>
        <version>${org.springframework-version}</version>
        <exclusions>
            <!-- Exclude Commons Logging in favor of SLF4j -->
            <exclusion>
                <groupId>commons-logging</groupId>
                <artifactId>commons-logging</artifactId>
             </exclusion>
        </exclusions>
    </dependency>
    <!-- Spring Transaction -->
        여기에 spring-tx 추가
    <!-- Spring JDBC -->
        여기에 spring-jdbc 추가
    <!-- Spring Test -->
        여기에 spring-test 추가
    <dependency>
        <groupId>org.springframework</groupId>
        <artifactId>spring-webmvc</artifactId>
        <version>${org.springframework-version}</version>
    </dependency>
```

```
  </dependency>

  <!-- Spring Test -->
  <dependency>
      <groupId>org.springframework</groupId>
      <artifactId>spring-test</artifactId>
      <version>${org.springframework-version}</version>
  </dependency>

  <!-- Spring JDBC -->
  <dependency>
      <groupId>org.springframework</groupId>
      <artifactId>spring-jdbc</artifactId>
      <version>${org.springframework-version}</version>
  </dependency>

  <!-- Spring Transaction -->
  <dependency>
      <groupId>org.springframework</groupId>
      <artifactId>spring-tx</artifactId>
      <version>${org.springframework-version}</version>
  </dependency>

  <dependency>
      <groupId>org.springframework</groupId>
      <artifactId>spring-webmvc</artifactId>
      <version>${org.springframework-version}</version>
  </dependency>
```

MyBatis 관련 라이브러리 추가

HikariCP : 대용량 데이터 처리 속도를 빠르게 하기 위한 라이브러리
MyBatis : 데이터베이스 프레임워크
mybatis-spring : MyBatis 를 사용하기 위한 스프링 라이브러리
Log4jdbc : 데이터베이스 실행 시, 단위 테스트를 위한 라이브러리

```
    <dependency>
        <groupId>org.springframework</groupId>
        <artifactId>spring-webmvc</artifactId>
        <version>${org.springframework-version}</version>
    </dependency>

    <!-- HikariCP -->

    <!-- MyBatis  -->

    <!-- mybatis-spring -->

    <!-- Log4jdbc -->

    <!-- AspectJ -->
    <dependency>
        <groupId>org.aspectj</groupId>
        <artifactId>aspectjrt</artifactId>
        <version>${org.aspectj-version}</version>
    </dependency>
```

```
    <!-- HikariCP -->
    <dependency>
        <groupId>com.zaxxer</groupId>
        <artifactId>HikariCP</artifactId>
        <version>2.7.8</version>
    </dependency>

    <!-- MyBatis  -->
    <dependency>
        <groupId>org.mybatis</groupId>
        <artifactId>mybatis</artifactId>
        <version>3.4.6</version>
    </dependency>

    <!-- mybatis-spring -->
    <dependency>
        <groupId>org.mybatis</groupId>
        <artifactId>mybatis-spring</artifactId>
        <version>1.3.2</version>
    </dependency>

    <!-- Log4jdbc -->
    <dependency>
        <groupId>org.bgee.log4jdbc-log4j2</groupId>
        <artifactId>log4jdbc-log4j2-jdbc4</artifactId>
        <version>1.16</version>
    </dependency>

    <!-- AspectJ -->
```

테스트와 Lombok 을 위한 jUnit 버전(4.12) 변경

```
    <!-- Test -->
    <dependency>
        <groupId>junit</groupId>
        <artifactId>junit</artifactId>
        <version>4.12</version>
        <scope>test</scope>
    </dependency>

    <!-- lombok -->
    <dependency>
        <groupId>org.projectlombok</groupId>
        <artifactId>lombok</artifactId>
        <version>1.18.0</version>
        <scope>provided</scope>
    </dependency>

</dependencies>
```

Servlet 3.1(3.0 이상)을 제대로 사용하기 위한 서블릿 버전(3.1.0) 수정

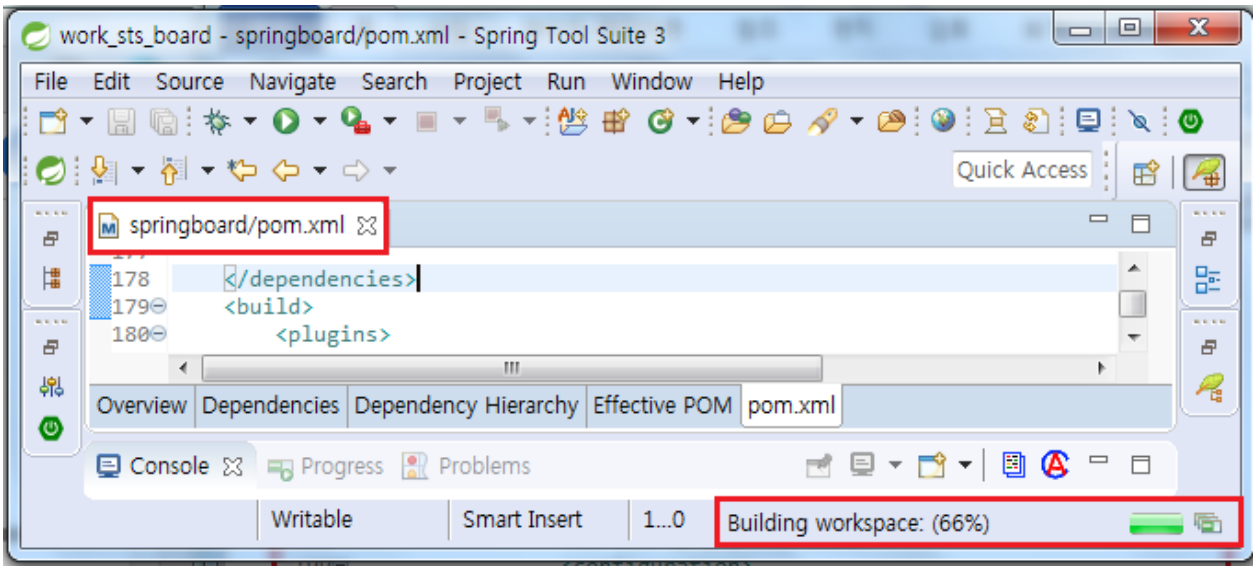
```
<!-- Servlet -->
<dependency>
    <groupId>javax.servlet</groupId>
    <artifactId>javax.servlet-api</artifactId>
    <version>3.1.0</version>
    <scope>provided</scope>
</dependency>
<dependency>
    <groupId>javax.servlet.jsp</groupId>
    <artifactId>jsp-api</artifactId>
    <version>2.1</version>
    <scope>provided</scope>
</dependency>
<dependency>
    <groupId>javax.servlet</groupId>
    <artifactId>jstl</artifactId>
    <version>1.2</version>
</dependency>

<!-- Test -->
```

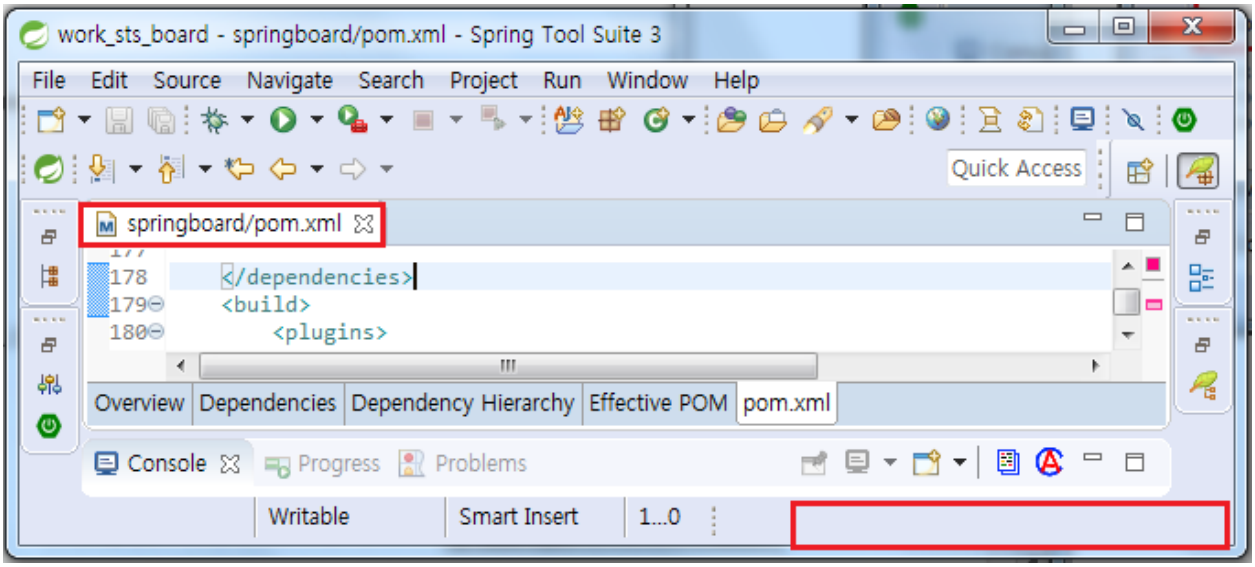
Servlet 3.1 버전과 JDK8 의 기능을 활용하기 위한 Maven 관련 Java 버전(1.8) 수정

*springboard/pom.xml

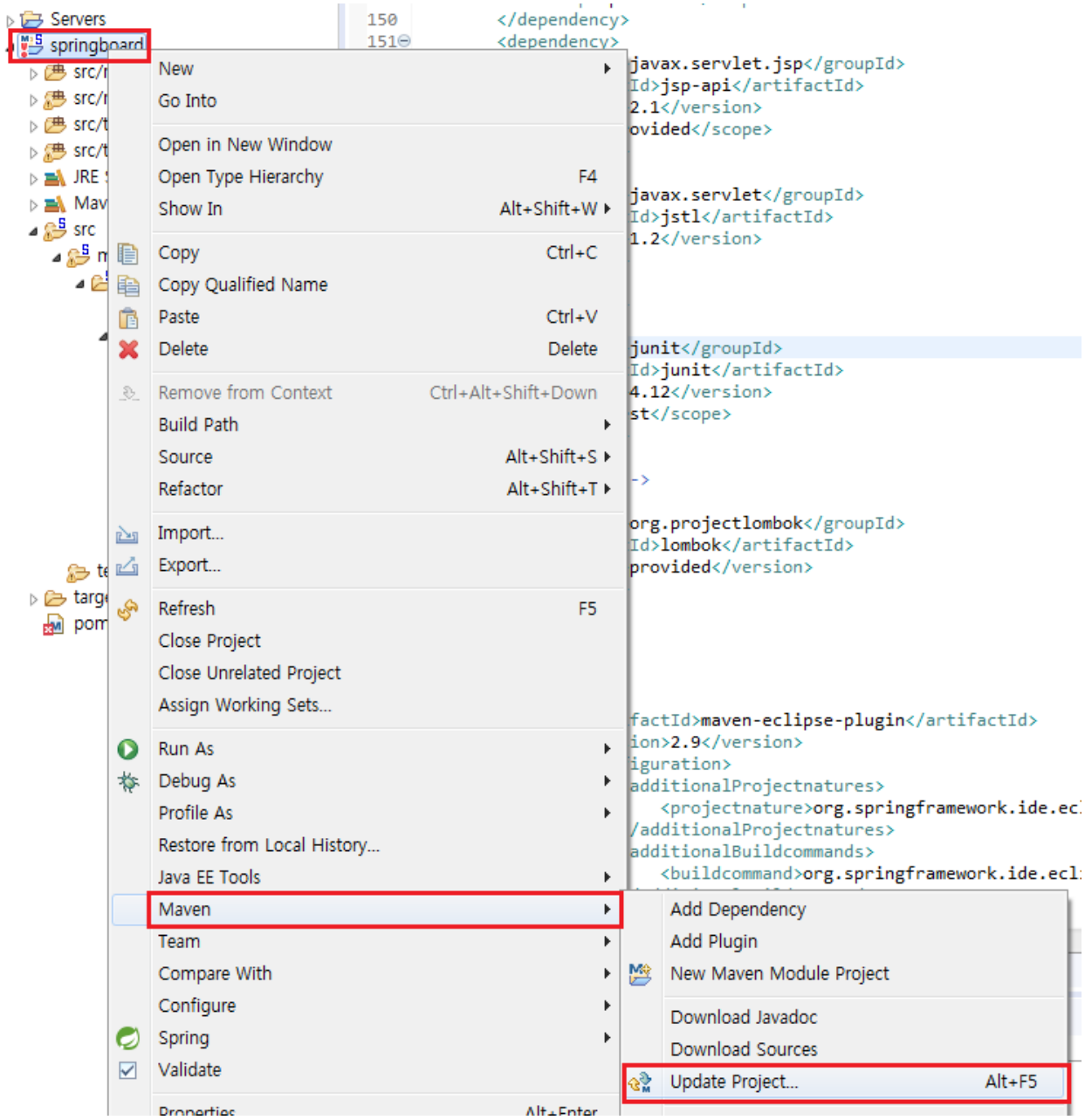
```
178     </dependencies>
179     <build>
180         <plugins>
181             <plugin>
182                 <artifactId>maven-eclipse-plugin</artifactId>
183                 <version>2.9</version>
184                 <configuration>
185                     <additionalProjectnatures>
186                         <projectnature>org.springframework.ide.eclip
187                     </additionalProjectnatures>
188                     <additionalBuildcommands>
189                         <buildcommand>org.springframework.ide.eclips
190                     </additionalBuildcommands>
191                     <downloadSources>true</downloadSources>
192                     <downloadJavadocs>true</downloadJavadocs>
193                 </configuration>
194             </plugin>
195             <plugin>
196                 <groupId>org.apache.maven.plugins</groupId>
197                 <artifactId>maven-compiler-plugin</artifactId>
198                 <version>2.5.1</version>
199                 <configuration>
200                     <source>1.8</source>
201                     <target>1.8</target>
202                     <compilerArgument>-Xlint:all</compilerArgument>
203                     <showWarnings>true</showWarnings>
204                     <showDeprecation>true</showDeprecation>
205                 </configuration>
206             </plugin>
```

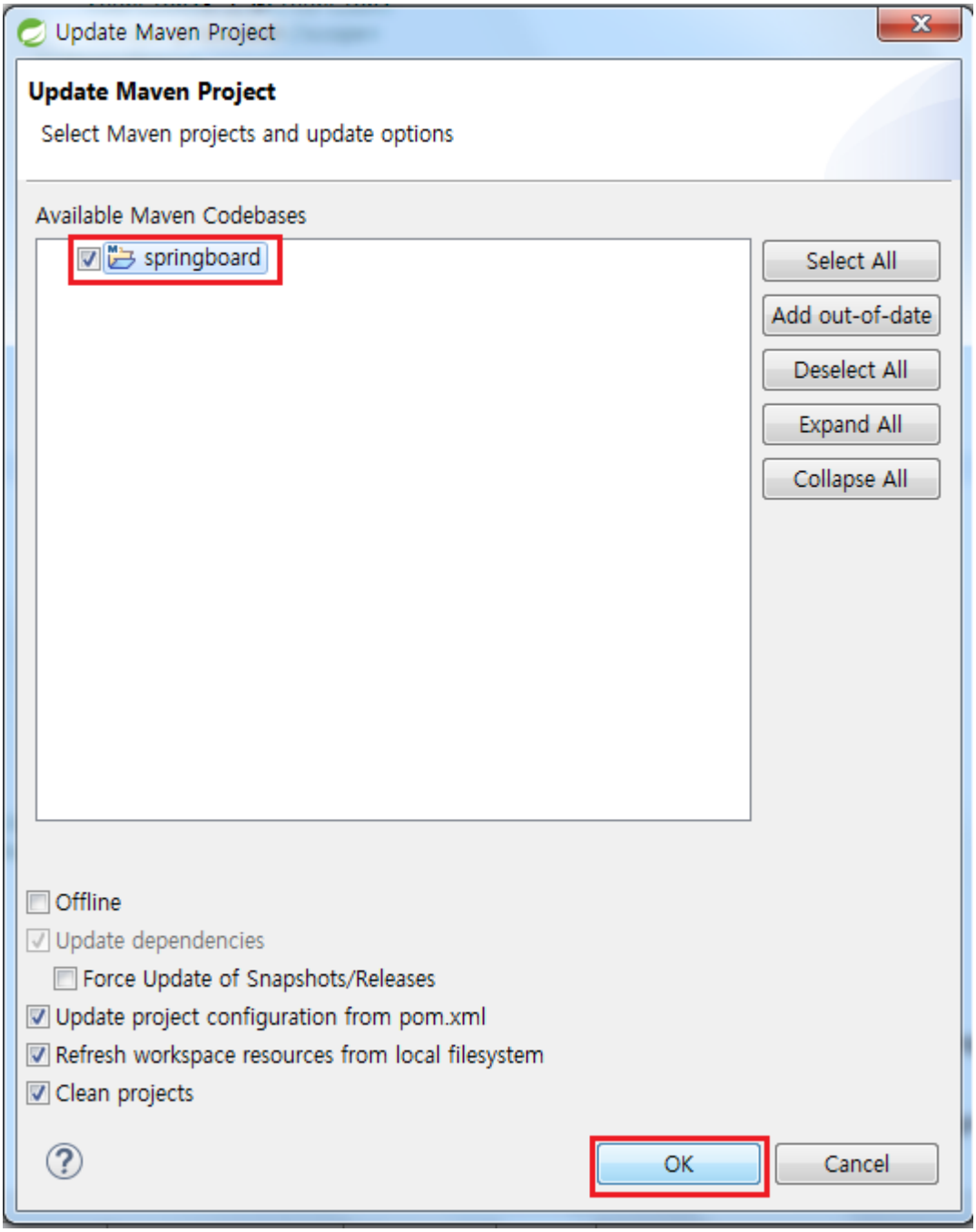
pom.xml 문서 저장

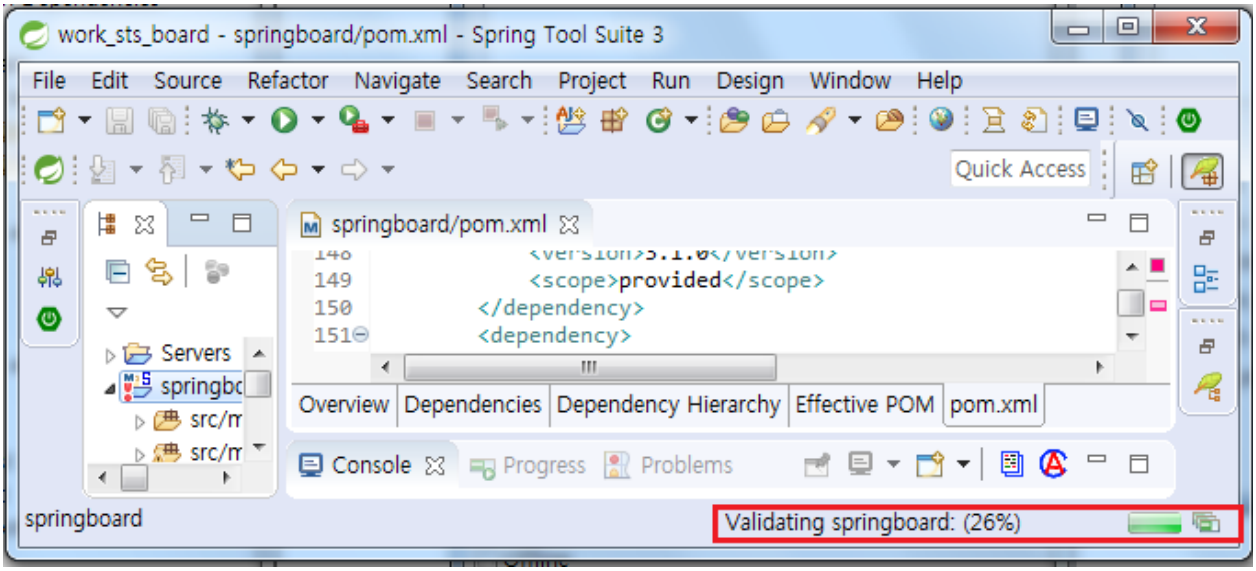



work_sts_board - springboard/pom.xml - Spring Tool Suite 3
File Edit Source Navigate Search Project Run Window Help
Quick Access
springboard/pom.xml
178 </dependencies>
179 <build>
180 <plugins>
Overview Dependencies Dependency Hierarchy Effective POM pom.xml
Console Progress Problems
Writable Smart Insert 1...0

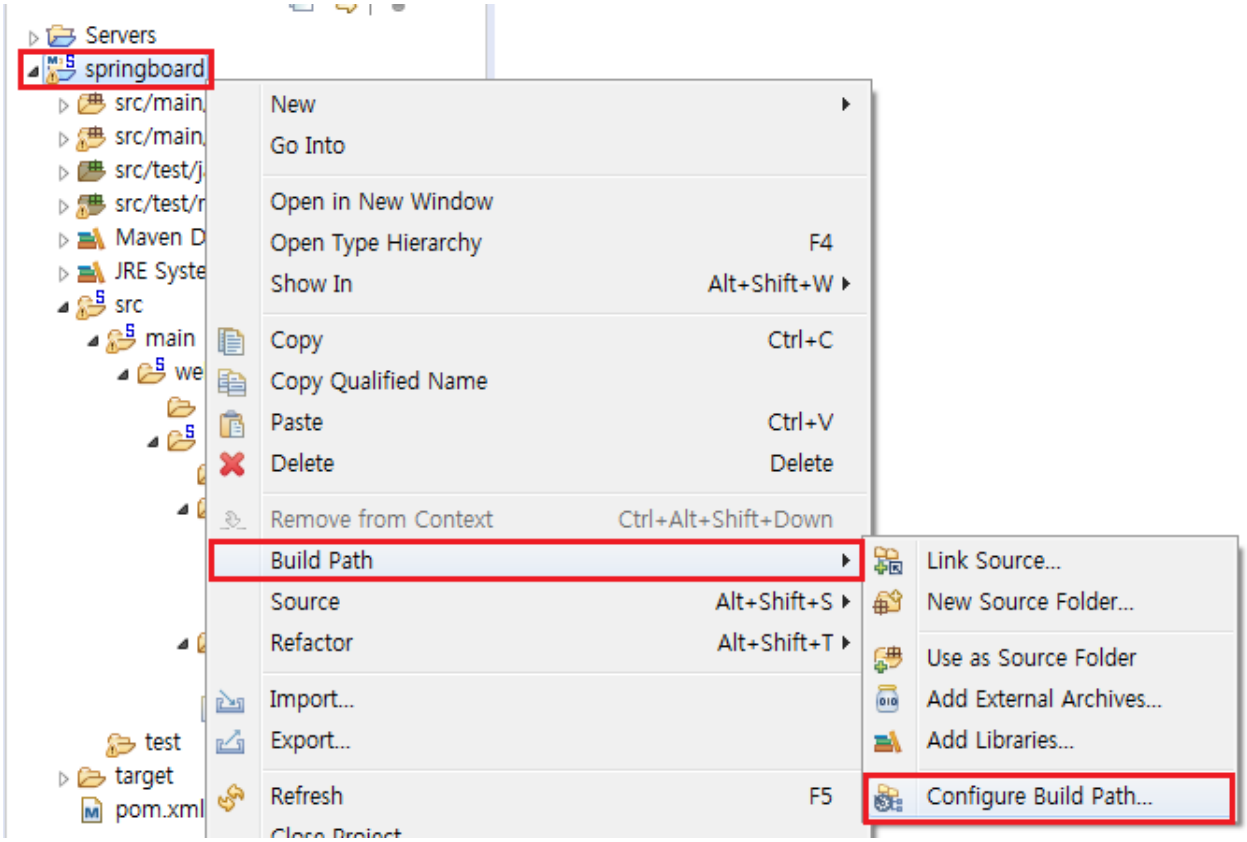
6. Maven 업데이트

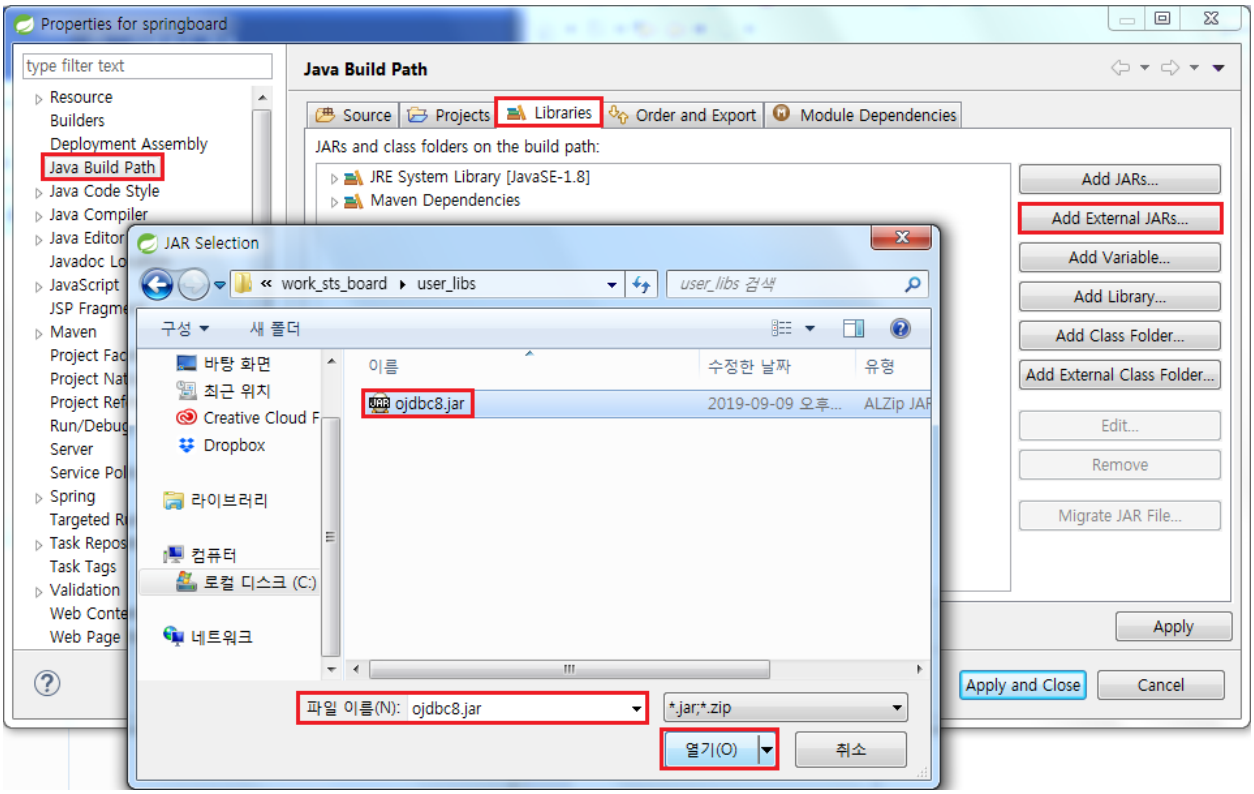

Servers
springboard
src/m
src/m
src/t
src/t
JRE
Mav
src
m
te
targ
pom
150 </dependency>
151 <dependency>
javax.servlet.jsp</groupId>
Id>jsp-api</artifactId>
2.1</version>
ovided</scope>
javax.servlet</groupId>
Id>jstl</artifactId>
1.2</version>
junit</groupId>
Id>junit</artifactId>
4.12</version>
st</scope>
->
org.projectlombok</groupId>
Id>lombok</artifactId>
provided</version>
factId>maven-eclipse-plugin</artifactId>
ion>2.9</version>
iguration>
additionalProjectnatures>
<projectnature>org.springframework.ide.ec
/additionalProjectnatures>
additionalBuildcommands>
<buildcommand>org.springframework.ide.ecl
New
Go Into
Open in New Window
Open Type Hierarchy F4
Show In Alt+Shift+W
Copy Ctrl+C
Copy Qualified Name
Paste Ctrl+V
Delete Delete
Remove from Context Ctrl+Alt+Shift+Down
Build Path
Source Alt+Shift+S
Refactor Alt+Shift+T
Import...
Export...
Refresh F5
Close Project
Close Unrelated Project
Assign Working Sets...
Run As
Debug As
Profile As
Restore from Local History...
Java EE Tools
Maven
Team
Compare With
Configure
Spring
Validate
Properties Alt+Enter
Add Dependency
Add Plugin
New Maven Module Project
Download Javadoc
Download Sources
Update Project... Alt+F5

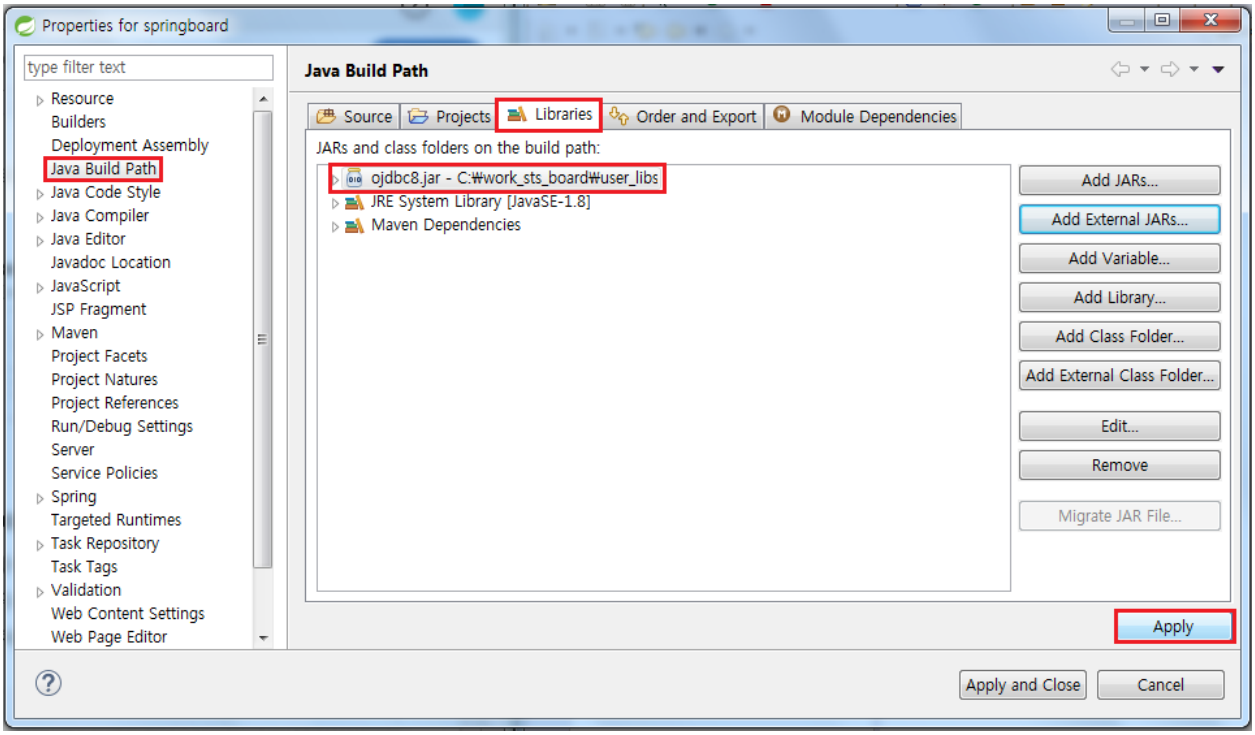

Update Maven Project
Update Maven Project
Select Maven projects and update options
Available Maven Codebases
springboard
Select All
Add out-of-date
Deselect All
Expand All
Collapse All
Offline
Update dependencies
Force Update of Snapshots/Releases
Update project configuration from pom.xml
Refresh workspace resources from local filesystem
Clean projects
OK
Cancel

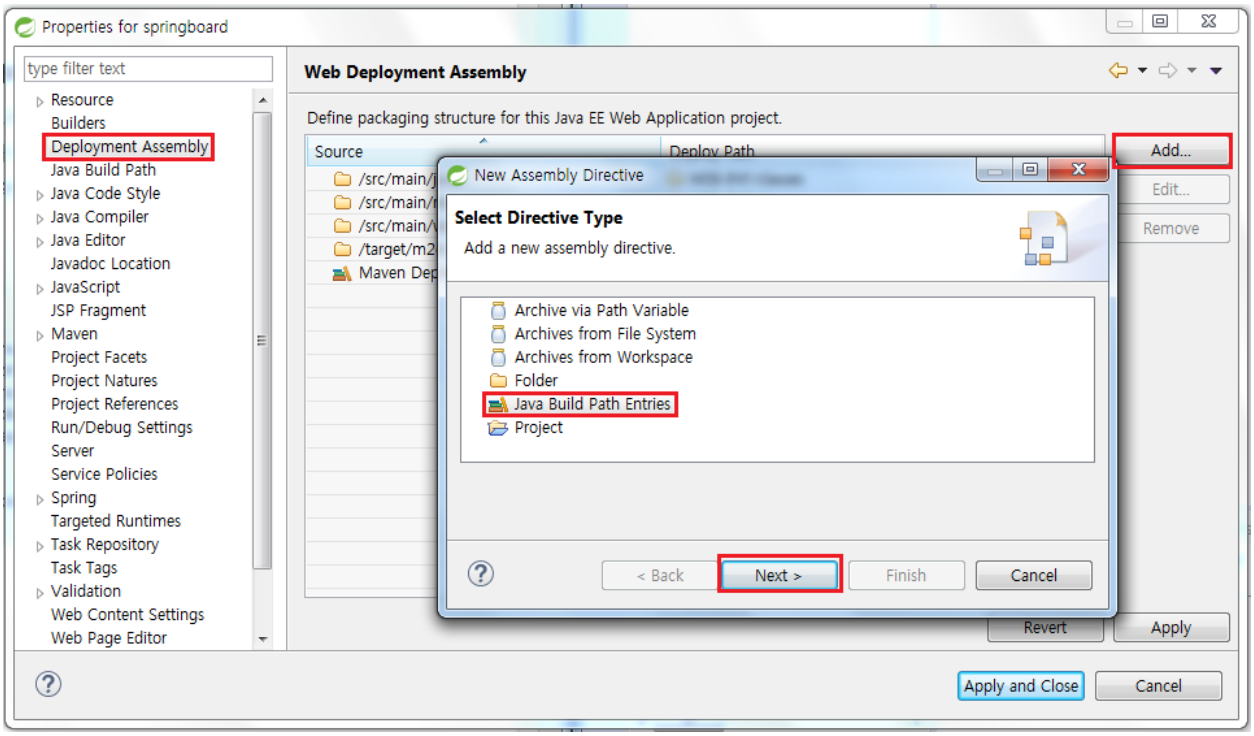

work_sts_board - springboard/pom.xml - Spring Tool Suite 3
File Edit Source Refactor Navigate Search Project Run Design Window Help
Quick Access
springboard/pom.xml
149 <scope>provided</scope>
150 </dependency>
151 <dependency>
Overview Dependencies Dependency Hierarchy Effective POM pom.xml
Console Progress Problems
Servers
springboard
Validating springboard: (26%)

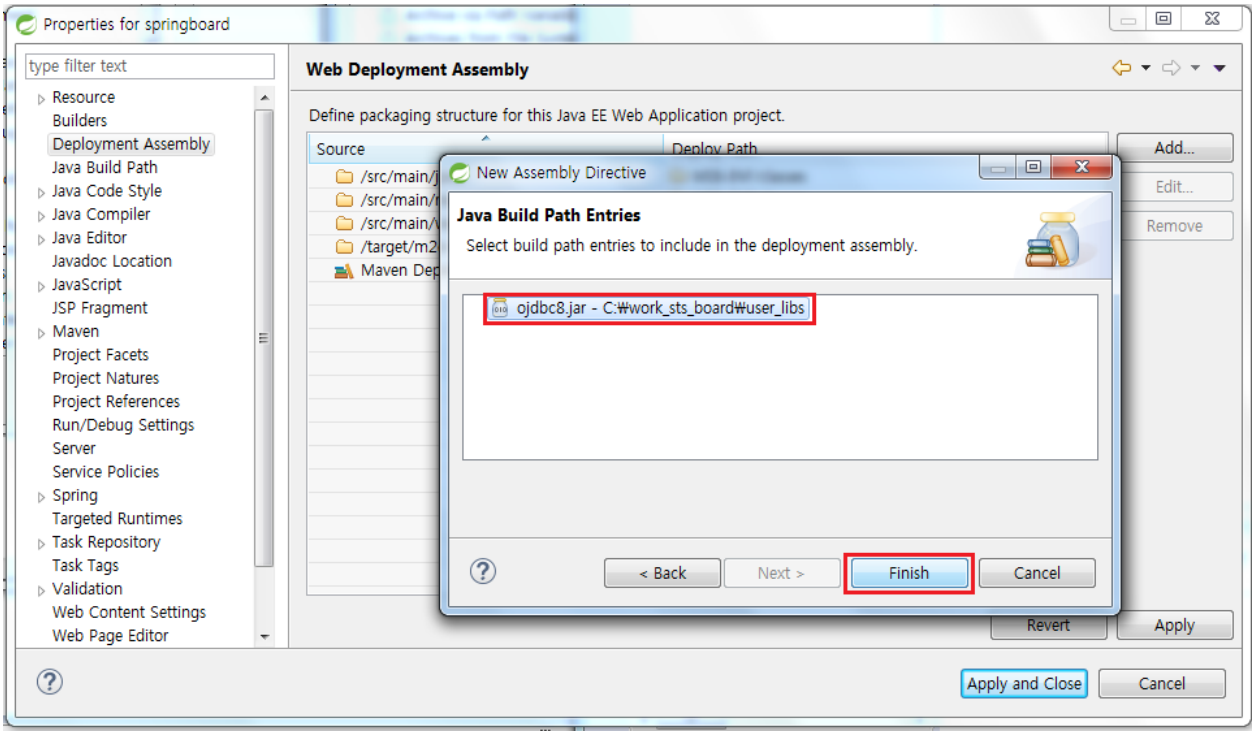
7. Oracle JDBC Driver 추가

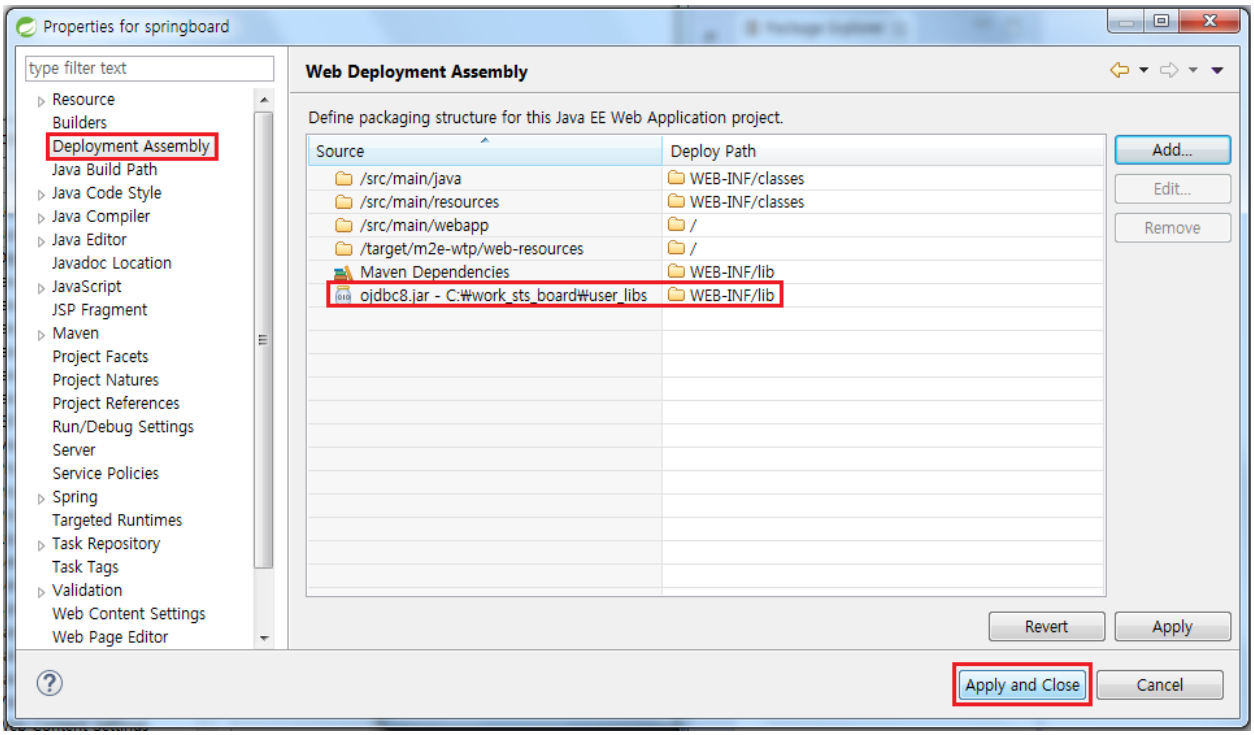





Properties for springboard
type filter text
Resource
Builders
Deployment Assembly
Java Build Path
Java Code Style
Java Compiler
Java Editor
Javadoc Location
JavaScript
JSP Fragment
Maven
Project Facets
Project Natures
Project References
Run/Debug Settings
Server
Service Policies
Spring
Targeted Runtimes
Task Repository
Task Tags
Validation
Web Content Settings
Web Page Editor
Java Build Path
Source
Projects
Libraries
Order and Export
Module Dependencies
JARs and class folders on the build path:
ojdbc8.jar - C:₩work_sts_board₩user_libs
JRE System Library [JavaSE-1.8]
Maven Dependencies
Add JARs...
Add External JARs...
Add Variable...
Add Library...
Add Class Folder...
Add External Class Folder...
Edit...
Remove
Migrate JAR File...
Apply
Apply and Close
Cancel


Properties for springboard
type filter text
Resource
Builders
Deployment Assembly
Java Build Path
Java Code Style
Java Compiler
Java Editor
Javadoc Location
JavaScript
JSP Fragment
Maven
Project Facets
Project Natures
Project References
Run/Debug Settings
Server
Service Policies
Spring
Targeted Runtimes
Task Repository
Task Tags
Validation
Web Content Settings
Web Page Editor
Web Deployment Assembly
Define packaging structure for this Java EE Web Application project.
Source
Deploy Path
Add...
Edit...
Remove
Revert
Apply
Apply and Close
Cancel
New Assembly Directive
Select Directive Type
Add a new assembly directive.
Archive via Path Variable
Archives from File System
Archives from Workspace
Folder
Java Build Path Entries
Project
< Back
Next >
Finish
Cancel


Properties for springboard
type filter text
Resource
Builders
Deployment Assembly
Java Build Path
Java Code Style
Java Compiler
Java Editor
Javadoc Location
JavaScript
JSP Fragment
Maven
Project Facets
Project Natures
Project References
Run/Debug Settings
Server
Service Policies
Spring
Targeted Runtimes
Task Repository
Task Tags
Validation
Web Content Settings
Web Page Editor
Web Deployment Assembly
Define packaging structure for this Java EE Web Application project.
Source
Deploy Path
Add...
Edit...
Remove
Revert
Apply
Apply and Close
Cancel
New Assembly Directive
Java Build Path Entries
Select build path entries to include in the deployment assembly.
ojdbc8.jar - C:₩work_sts_board₩user_libs
< Back
Next >
Finish
Cancel


Properties for springboard
type filter text
Resource
Builders
Deployment Assembly
Java Build Path
Java Code Style
Java Compiler
Java Editor
Javadoc Location
JavaScript
JSP Fragment
Maven
Project Facets
Project Natures
Project References
Run/Debug Settings
Server
Service Policies
Spring
Targeted Runtimes
Task Repository
Task Tags
Validation
Web Content Settings
Web Page Editor
Web Deployment Assembly
Define packaging structure for this Java EE Web Application project.
Source
Deploy Path
/src/main/java
WEB-INF/classes
/src/main/resources
WEB-INF/classes
/src/main/webapp
/
/target/m2e-wtp/web-resources
/
Maven Dependencies
WEB-INF/lib
ojdbc8.jar - C:₩work_sts_board₩user_libs
WEB-INF/lib
Add...
Edit...
Remove
Revert
Apply
Apply and Close
Cancel

4. 테이블 생성과 Dummy 데이터 생성

SQL Developer 를 이용하여 본인의 계정으로 접속하여 테이블을 생성.

게시물은 각 게시문마다 고유의 번호가 필요.
오라클의 경우, 시퀀스(sequence)를 이용하여 처리.

시퀀스(sequence)를 생성할 때에는
다른 오브젝트들(테이블 등)과 구별하기 위해서
'seq_' 와 같이 시작하는 것이 일반적.

테이블을 생성 할 때에는
'tbl_'로 시작하거나, 't_' 와 같이 구분이 가능한 단어를 앞에 붙여준다.

tbl_board 테이블 구성 요소

bno : 고유의 번호
title : 제목
content : 내용
writer : 작성자

테이블을 설계할 때에는
가능하면 레코드의 생성 시간과 최종 수정 시간을 같이 기록하는 것이 일반적.

regdate : 생성 시간
updatedate : 최종 수정 시간

레코드가 생성된 시간을 자동으로 기록될 수 있도록 기본 값을 sysdate 로 설정.

PK(Primary Key)를 지정할 때에는 'pk_' 시작하는 이름을 붙여주는 것이 일반적.
반드시 의미를 구분할 수 있도록 생성해준다.

```
CREATE SEQUENCE seq_board;

CREATE TABLE tbl_board (
    bno NUMBER(10,2),
    title VARCHAR2(200) NOT NULL,
    content VARCHAR2(2000) NOT NULL,
    writer VARCHAR2(50) NOT NULL,
    regdate DATE DEFAULT sysdate,
    updatedate DATE DEFAULT sysdate
);

ALTER TABLE tbl_board
    ADD CONSTRAINT pk_board
    PRIMARY KEY (bno);

COMMIT;
```

Dummy 데이터의 추가

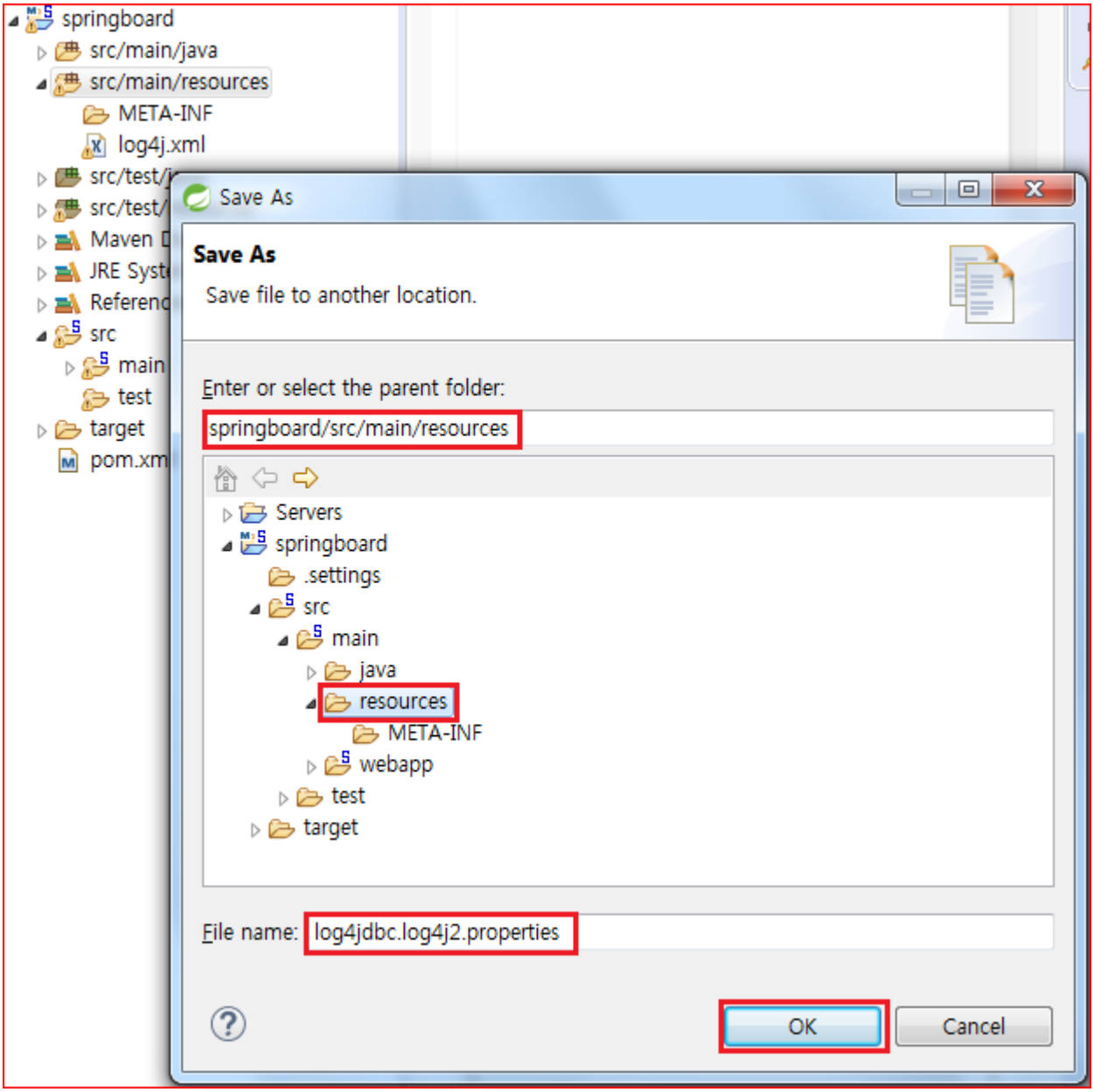
테이블을 생성하고 나면, 테스트를 위한 여러 개의 데이터를 추가하게 되는 데, 이런 의미 없는 데이터를 'toy data' 혹은 'dummy data'라고 한다.

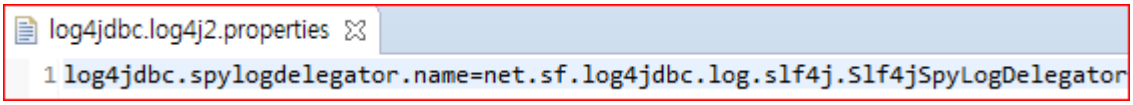
```
INSERT INTO tbl_board (bno, title, content, writer)
VALUES (seq_board.NEXTVAL, '테스트제목', '테스트 내용', 'user00');

INSERT INTO tbl_board (bno, title, content, writer)
VALUES (seq_board.NEXTVAL, '테스트제목1', '테스트 내용1', 'user01');

INSERT INTO tbl_board (bno, title, content, writer)
VALUES (seq_board.NEXTVAL, '테스트제목2', '테스트 내용2', 'user02');

INSERT INTO tbl_board (bno, title, content, writer)
VALUES (seq_board.NEXTVAL, '테스트제목3', '테스트 내용3', 'user03');

INSERT INTO tbl_board (bno, title, content, writer)
VALUES (seq_board.NEXTVAL, '테스트제목4', '테스트 내용4', 'user04');


COMMIT;
```

5. 데이터베이스 관련 설정 및 테스트

root-context.xml

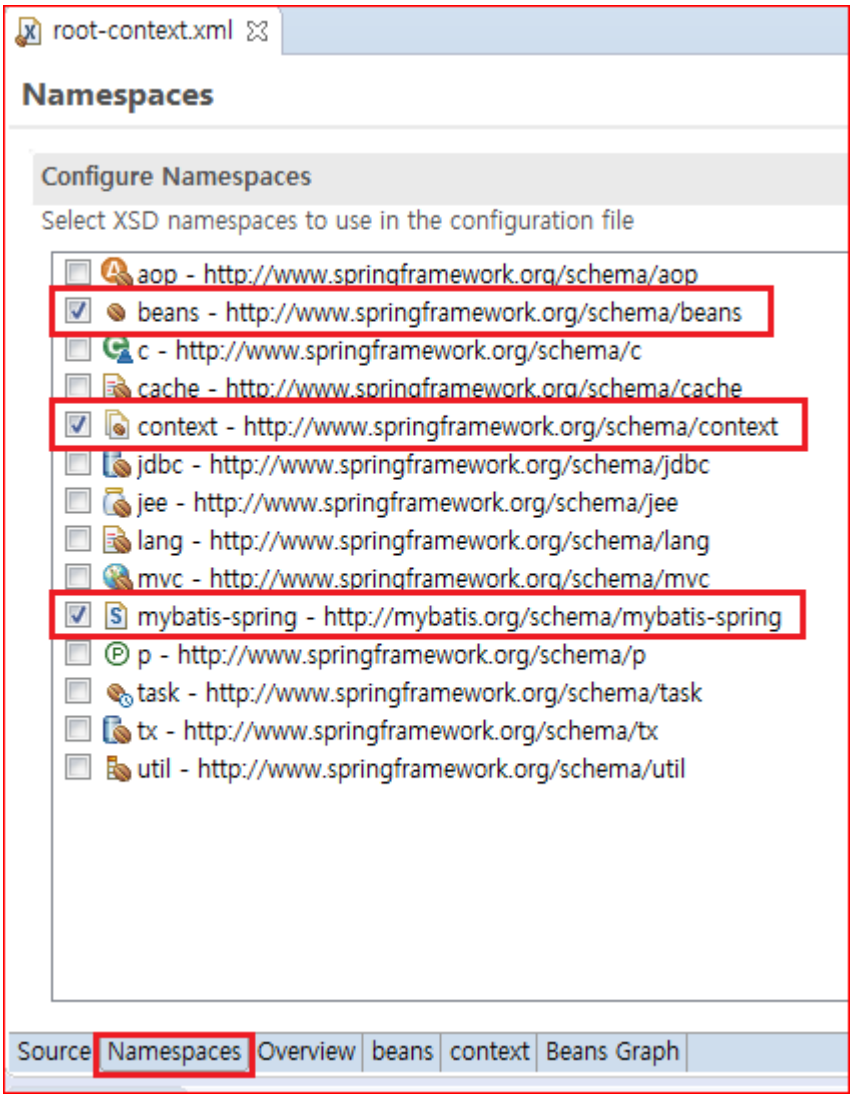
기본으로 Log4jdbc 를 이용하는 방식으로 구성되어 있으므로
log4jdbc.log4j2.properties 파일을 추가.





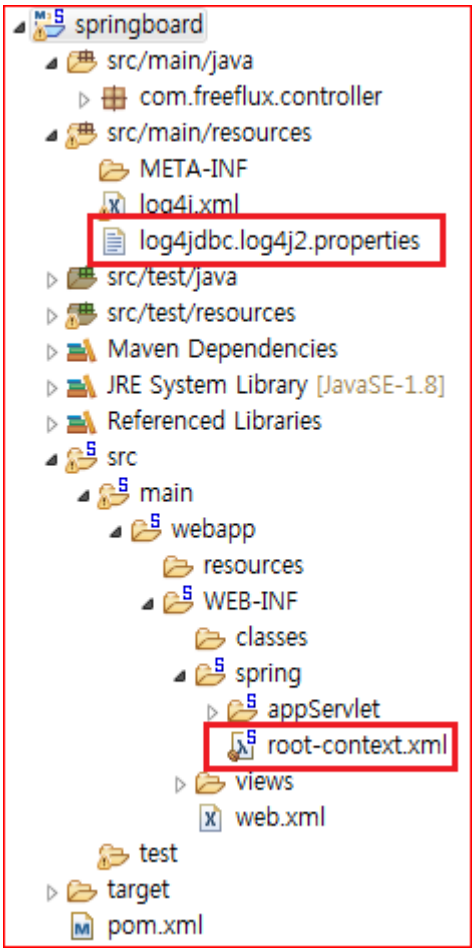
Log4jdbc 를 이용하는 경우 :

root-context.xml 의 JDBC 드라이버와 URL 정보를 수정.




```
<?xml version="1.0" encoding="UTF-8"?>
<beans xmlns="http://www.springframework.org/schema/beans"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xmlns:mybatis-spring="http://mybatis.org/schema/mybatis-spring"
    xmlns:context="http://www.springframework.org/schema/context"
    xsi:schemaLocation="http://mybatis.org/schema/mybatis-spring http://mybatis.org/schema/mybatis-spring-1.2.xsd
        http://www.springframework.org/schema/beans https://www.springframework.org/schema/beans/spring-beans.xsd
        http://www.springframework.org/schema/context http://www.springframework.org/schema/context/spring-context-4.3.xsd">

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

```
    <!-- Root Context: defines shared resources visible to all other web components -->
    <bean id="hikariConfig" class="com.zaxxer.hikari.HikariConfig">
        <!-- Old Driver (jdbc) -->
        <!--
            <property name="driverClassName" value="oracle.jdbc.driver.OracleDriver"></property>
         -->

        <!-- log4jdbc -->
        <property name="driverClassName" value="net.sf.log4jdbc.sql.jdbcapi.DriverSpy"></property>
        <property name="jdbcUrl" value="jdbc:log4jdbc:oracle:thin:@localhost:1521:XE"></property>
        <property name="username" value="ora_book"></property>
        <property name="password" value="1234"></property>
    </bean>

    <!-- HikariCP configuration -->
    <bean id="dataSource" class="com.zaxxer.hikari.HikariDataSource" destroy-method="close">
        <constructor-arg ref="hikariConfig"></constructor-arg>
    </bean>

    <bean id="sqlSessionFactory" class="org.mybatis.spring.SqlSessionFactoryBean">
        <property name="dataSource" ref="dataSource"></property>
    </bean>

    <mybatis-spring:scan base-package="com.freeflux.mapper" />
</beans>
```

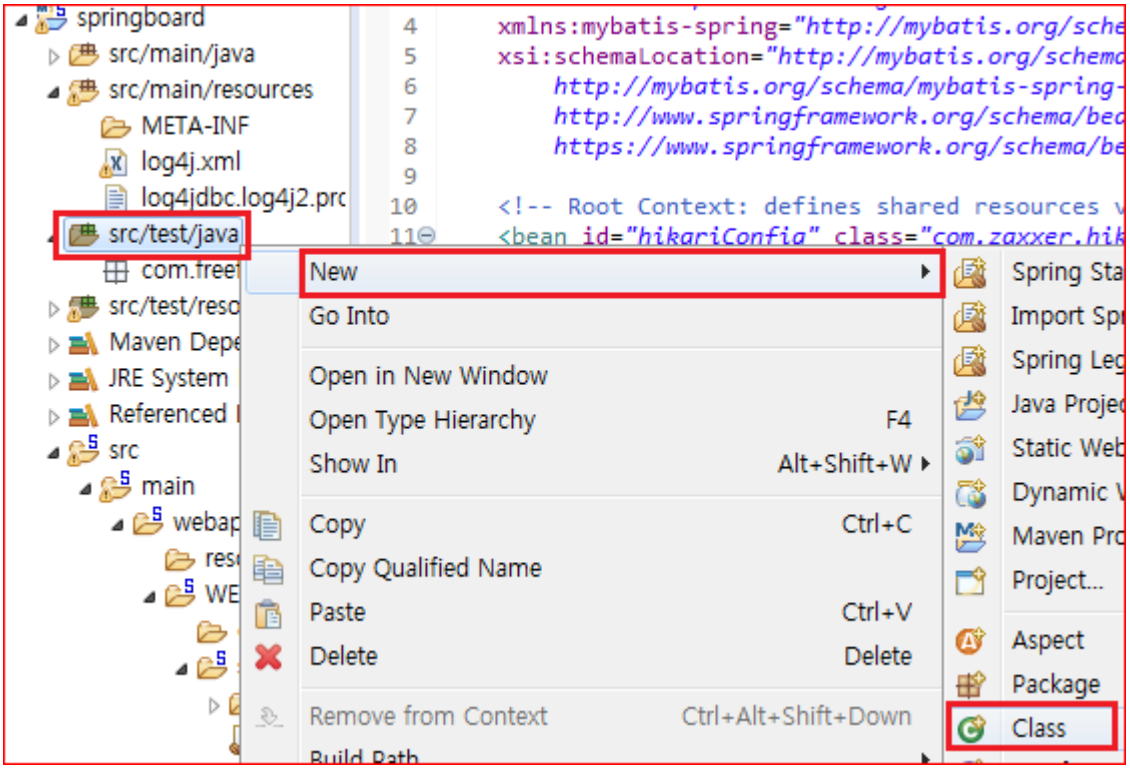


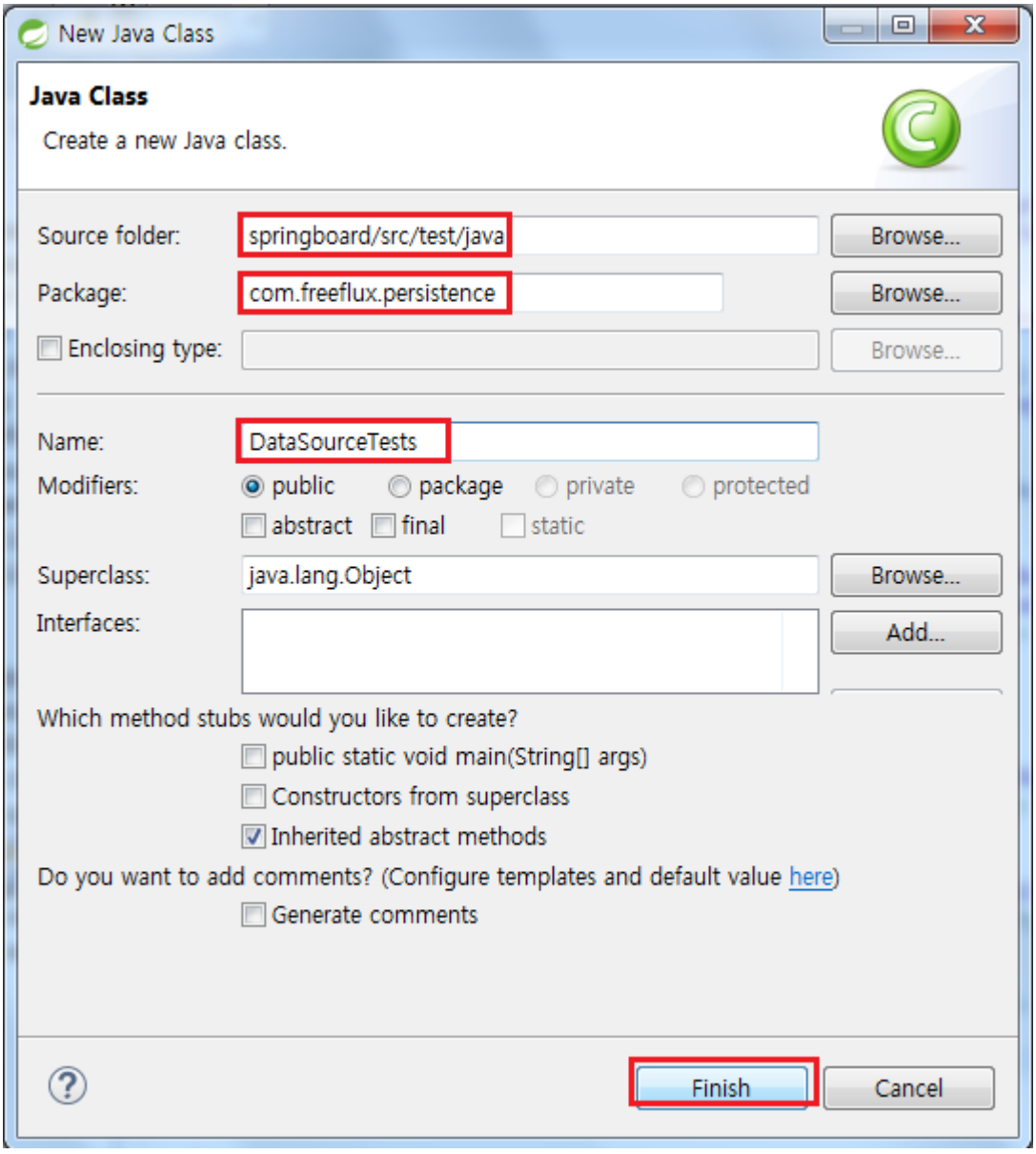
프로젝트가 정상적으로 실행되기 위한 조건 :
DataSource 와 MyBatis 의 연결이 반드시 필요.

DataSourceTests.java
JDBCTests.java

위의 두 클래스는 반드시 웹 개발 이전에 테스트를 통해서 확인한다.

DataSourceTests.java 생성





필요 클래스 import

```
import static org.junit.Assert.fail;

import java.sql.Connection;

import javax.sql.DataSource;

import org.apache.ibatis.session.SqlSession;
import org.apache.ibatis.session.SqlSessionFactory;
import org.junit.Test;
import org.junit.runner.RunWith;
import org.springframework.beans.factory.annotation.Autowired;
import org.springframework.test.context.ContextConfiguration;
import org.springframework.test.context.junit4.SpringJUnit4ClassRunner;

import lombok.Setter;
import lombok.extern.log4j.Log4j;
```

클래스 선언부

```
@RunWith(SpringJUnit4ClassRunner.class)
@ContextConfiguration("file:src/main/webapp/WEB-INF/spring/root-context.xml")
@Log4j
public class DataSourceTests {


}
```

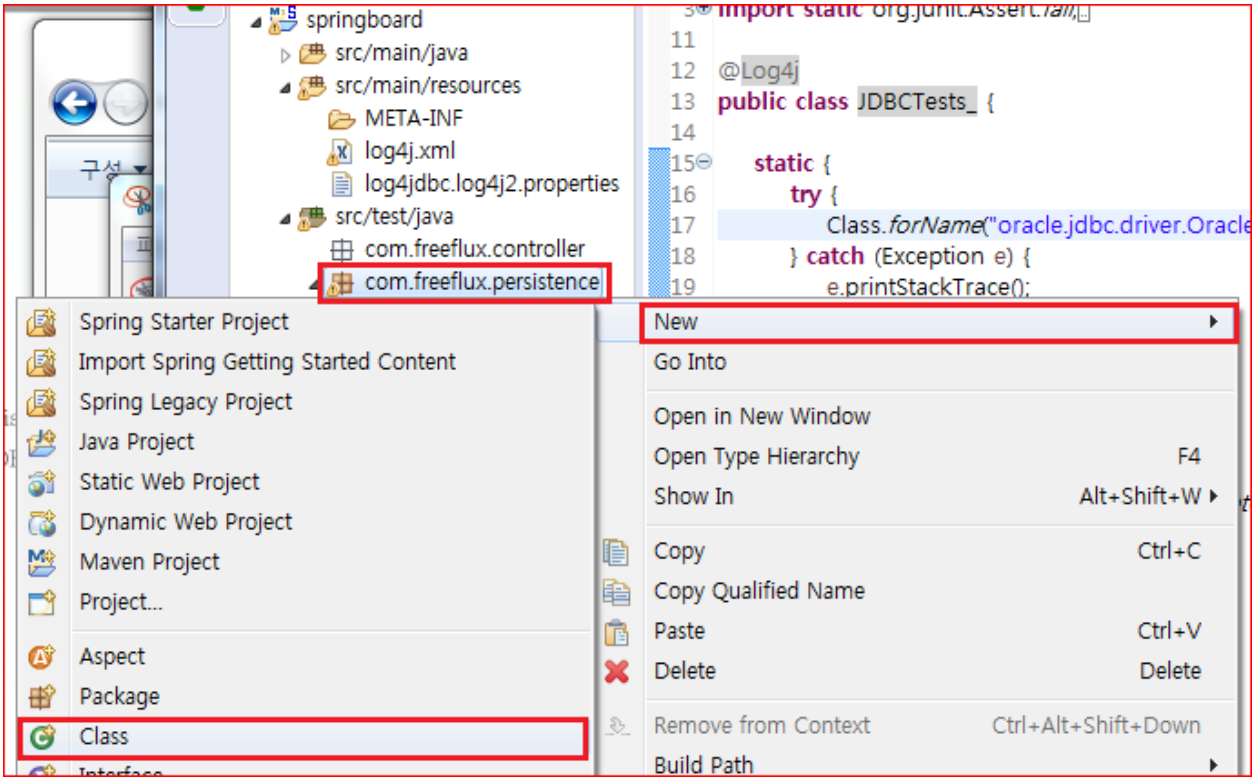
의존성 주입 추가

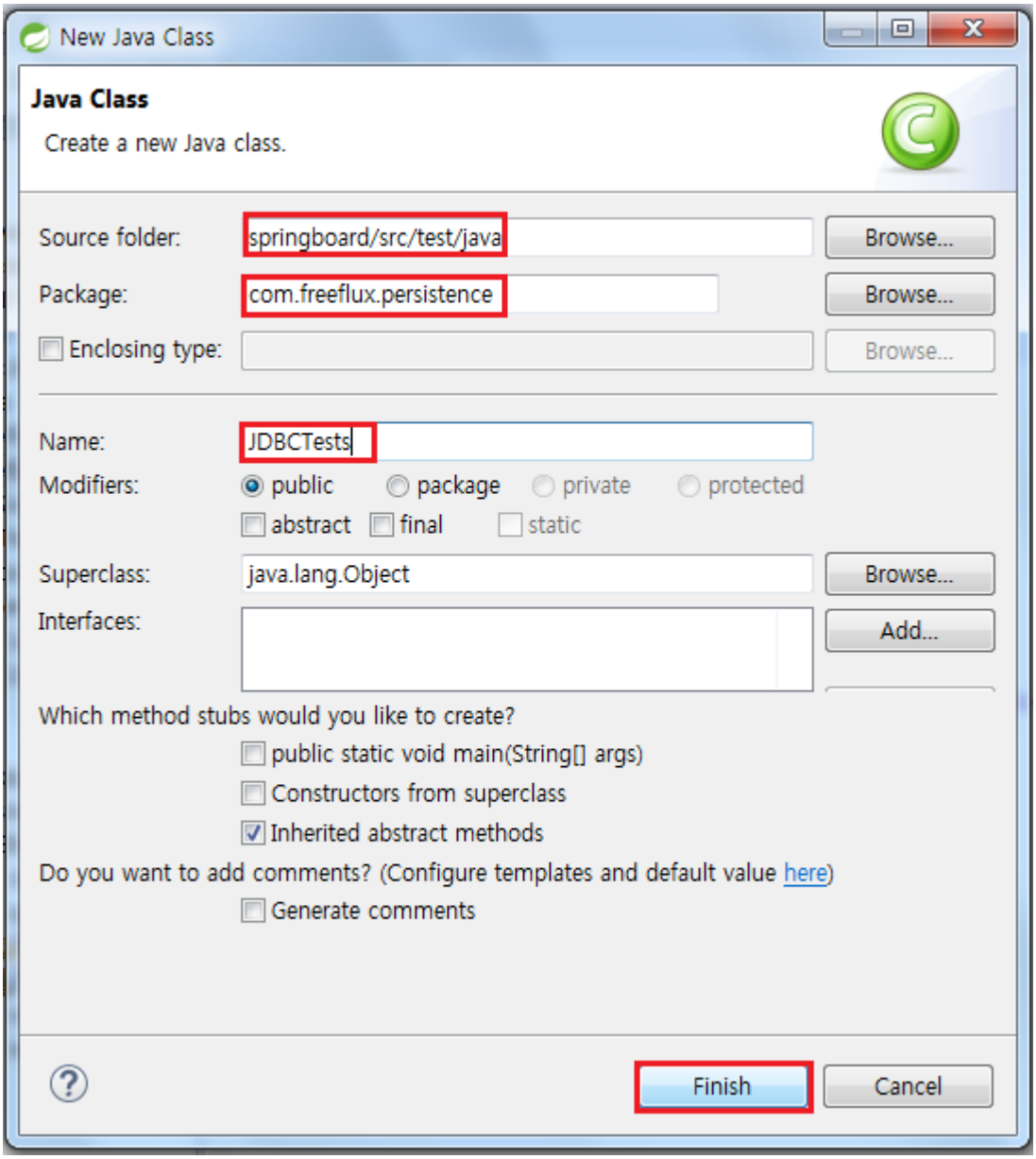
```
@RunWith(SpringJUnit4ClassRunner.class)
@ContextConfiguration("file:src/main/webapp/WEB-INF/spring/root-context.xml")
@Log4j
public class DataSourceTests {

    @Setter(onMethod_ = { @Autowired })
    private DataSource dataSource;

    @Setter(onMethod_ = { @Autowired })
    private SqlSessionFactory sqlSessionFactory;

    @Test
    public void testMyBatis() {

        try (SqlSession session = sqlSessionFactory.openSession();
                Connection con = session.getConnection();) {

            log.info(session);
            log.info(con);

        } catch (Exception e) {
            fail(e.getMessage());
        }

    }
```

테스트 메서드 추가

```
public void testConnection() {

    try (Connection con = dataSource.getConnection()) {

        log.info(con);

    } catch (Exception e) {
        fail(e.getMessage());
    }
```

JDBCTests.java 생성





필요 클래스 import

```
import static org.junit.Assert.fail;

import java.sql.Connection;
import java.sql.DriverManager;

import org.junit.Test;

import lombok.extern.log4j.Log4j;
```

```
@Log4j
public class JDBCTests {


}
```

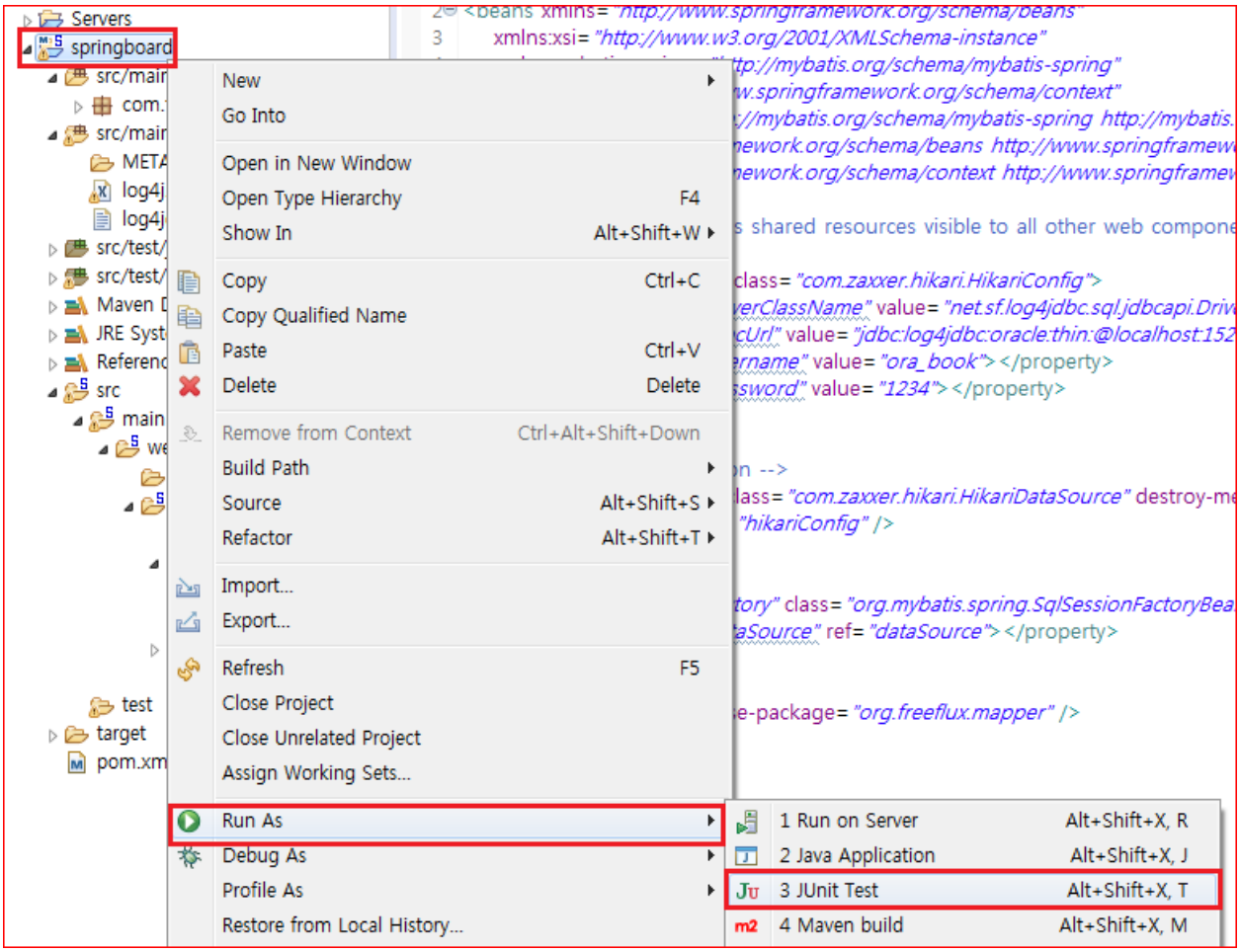
드리이버 로드

```
static {
    try {
        Class.forName("oracle.jdbc.driver.OracleDriver");
    } catch (Exception e) {
        e.printStackTrace();
    }
}
```

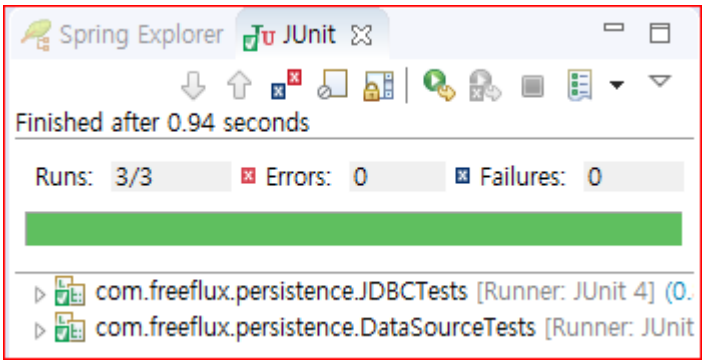
테스트 메서드 추가

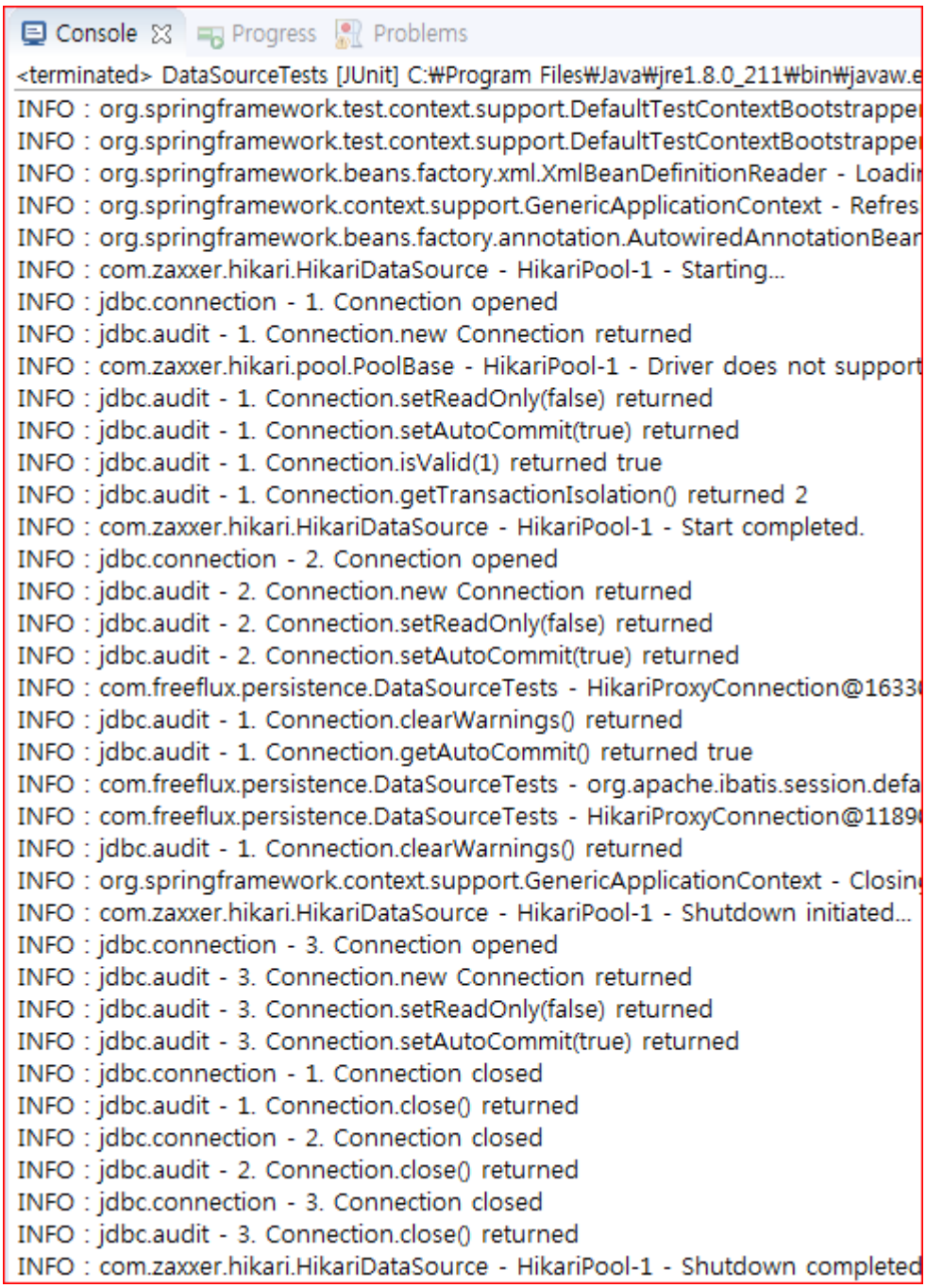
```
@Test
public void testConnection() {

    try (Connection con = DriverManager.getConnection("jdbc:oracle:thin:@localhost:1521:XE",
                                                      "ora_book",
                                                      "1234")) {


        log.info(con);
    } catch (Exception e) {
        fail(e.getMessage());
    }
}
```

실행



결과 화면


Spring Explorer
JUnit
Finished after 0.94 seconds
Runs: 3/3
Errors: 0
Failures: 0
com.freeflux.persistence.JDBCTests [Runner: JUnit 4] (0.
com.freeflux.persistence.DataSourceTests [Runner: JUnit


Console
Progress
Problems
<terminated> DataSourceTests [JUnit] C:₩Program Files₩Java₩jre1.8.0_211₩bin₩javaw.e
INFO : org.springframework.test.context.support.DefaultTestContextBootstrappe
INFO : org.springframework.test.context.support.DefaultTestContextBootstrappe
INFO : org.springframework.beans.factory.xml.XmlBeanDefinitionReader - Loadi
INFO : org.springframework.context.support.GenericApplicationContext - Refres
INFO : org.springframework.beans.factory.annotation.AutowiredAnnotationBear
INFO : com.zaxxer.hikari.HikariDataSource - HikariPool-1 - Starting...
INFO : jdbc.connection - 1. Connection opened
INFO : jdbc.audit - 1. Connection.new Connection returned
INFO : com.zaxxer.hikari.pool.PoolBase - HikariPool-1 - Driver does not support
INFO : jdbc.audit - 1. Connection.setReadOnly(false) returned
INFO : jdbc.audit - 1. Connection.setAutoCommit(true) returned
INFO : jdbc.audit - 1. Connection.isValid(1) returned true
INFO : jdbc.audit - 1. Connection.getTransactionIsolation() returned 2
INFO : com.zaxxer.hikari.HikariDataSource - HikariPool-1 - Start completed.
INFO : jdbc.connection - 2. Connection opened
INFO : jdbc.audit - 2. Connection.new Connection returned
INFO : jdbc.audit - 2. Connection.setReadOnly(false) returned
INFO : jdbc.audit - 2. Connection.setAutoCommit(true) returned
INFO : com.freeflux.persistence.DataSourceTests - HikariProxyConnection@1633
INFO : jdbc.audit - 1. Connection.clearWarnings() returned
INFO : jdbc.audit - 1. Connection.getAutoCommit() returned true
INFO : com.freeflux.persistence.DataSourceTests - org.apache.ibatis.session.defa
INFO : com.freeflux.persistence.DataSourceTests - HikariProxyConnection@1189
INFO : jdbc.audit - 1. Connection.clearWarnings() returned
INFO : org.springframework.context.support.GenericApplicationContext - Closin
INFO : com.zaxxer.hikari.HikariDataSource - HikariPool-1 - Shutdown initiated...
INFO : jdbc.connection - 3. Connection opened
INFO : jdbc.audit - 3. Connection.new Connection returned
INFO : jdbc.audit - 3. Connection.setReadOnly(false) returned
INFO : jdbc.audit - 3. Connection.setAutoCommit(true) returned
INFO : jdbc.connection - 1. Connection closed
INFO : jdbc.audit - 1. Connection.close() returned
INFO : jdbc.connection - 2. Connection closed
INFO : jdbc.audit - 2. Connection.close() returned
INFO : jdbc.connection - 3. Connection closed
INFO : jdbc.audit - 3. Connection.close() returned
INFO : com.zaxxer.hikari.HikariDataSource - HikariPool-1 - Shutdown completed

에러 메시지

아래 처럼 에러 메시지가 나오는 경우는, JDK/JRE 에 오래된 JDBC 드라이버가 있거나,
root-context.xml 문서 내부 설정이 잘못되어 있을 때, 발생한다.

```
ERROR: org.springframework.test.context.TestContextManager - Caught exception while allowing TestExecutionListener [or
java.lang.IllegalStateException: Failed to load ApplicationContext
        at org.springframework.test.context.cache.DefaultCacheAwareContextLoaderDelegate.loadContext(DefaultCacheAwar
```

```
Caused by: org.springframework.beans.factory.BeanCreationException: Error creating bean with name 'dataSource' define
```

```
Caused by: org.springframework.beans.BeanInstantiationException: Failed to instantiate [com.zaxxer.hikari.HikariDataSource]
```

```
Caused by: java.lang.RuntimeException: Driver net.sf.log4jdbc.sql.jdbcapi.DriverSpy claims to not accept jdbcUrl, jdbc:oracle:t
```