



LAB 8: WEB DATABASE PROGRAMMING I

Using Eclipse IDE for EE Developers + Apache Tomcat 8.0
+ JavaServer Pages (JSP)

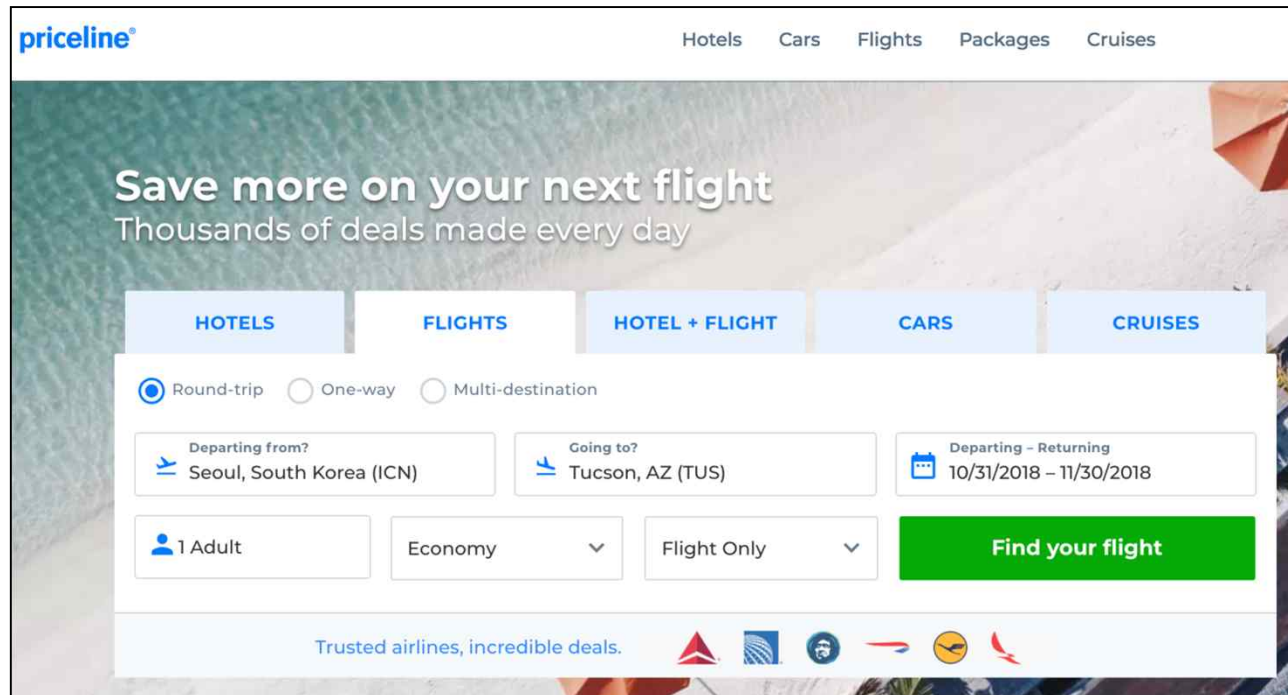
Prof. Young-Kyoon Suh

Web Database Programming

- Many Internet applications provide **Web Interfaces** to access information stored on one or more databases use script languages such as **J**ava**S**erver **P**ages, to discussed today.
- These languages are often used to generate **HTML** documents, which are then displayed by the Web browser for interaction with the user.
- Most Internet applications require **dynamic** Web pages providing interactive features with the user.
 - On the other hand, basic HTML is useful for generating *static* Web pages with fixed text and other objects.

Web Database Programming (Cont'd)

- Consider the case of a Priceline customer.



The screenshot shows the Priceline website's flight search interface. At the top, the Priceline logo is on the left, and navigation links for Hotels, Cars, Flights, Packages, and Cruises are on the right. Below the navigation bar is a large banner with the text "Save more on your next flight" and "Thousands of deals made every day". Underneath the banner is a search form with five tabs: HOTELS, FLIGHTS, HOTEL + FLIGHT, CARS, and CRUISES. The FLIGHTS tab is selected. The form includes radio buttons for Round-trip (selected), One-way, and Multi-destination. Below these are three input fields: "Departing from?" with the value "Seoul, South Korea (ICN)", "Going to?" with the value "Tucson, AZ (TUS)", and "Departing - Returning" with the value "10/31/2018 - 11/30/2018". There are also dropdown menus for "1 Adult", "Economy", and "Flight Only". A green "Find your flight" button is on the right. At the bottom of the form, it says "Trusted airlines, incredible deals." followed by logos for Delta, American, United, Southwest, and JetBlue.

- Will send the customer's information to the application program.
- Then the program formulates and submits a query to the Priceline database server to retrieve that information.
- The database information is sent back to the Web page for display.
 - This page is called **dynamic Web page**, in which part of information is extracted from the DB.

Web Database Programming (Cont'd)

- Consider the case of a Priceline customer. (Cont'd)

- The database information is sent back to the Web page for display.
 - This page is called **dynamic Web page**, in which part of information is extracted from the DB.

The screenshot displays the Priceline website's flight search interface. At the top, navigation links for Hotels, Cars, Flights, Packages, and Cruises are visible. The search type is set to 'Round Trip' with origin 'Seoul, KS (ICN)' and destination 'Tucson, AZ (TUS)'. The travel dates are 'Wed, Oct 31 - Fri, Nov 30' for '1 Adult'. On the left, filters for 'Stops' (nonstop, up to 1 stop, up to 2 stops), 'Time' (Takeoff, Landing), 'Duration' (Max Flight Duration), and 'Airlines' (United Airlines) are shown. A promotional banner offers a \$240 savings on hotel and flight deals. The main results section, titled 'Select Departure', shows two flight options. The first option is a roundtrip from ICN to TUS via SFO, operated by United Express/SkyWest, with a price of \$1,149.93. The second option is a roundtrip from ICN to TUS via SFO, operated by United, with a price of \$1,212.43. Both options include a 'No risk! Book now and cancel online for free within 24 hours.' guarantee.

priceline® Hotels Cars Flights Packages Cruises

☒ Round Trip ☐ One Way ☐ Multi City

Seoul, KS (ICN) Tucson, AZ (TUS) Wed, Oct 31 - Fri, Nov 30 1 Adult

More Options

Stops All None

☒ nonstop
☒ up to 1 stop \$1,150
☒ up to 2 stops \$1,217

Time

Takeoff Landing

Takeoff from ICN
8:55a - 11:20p

Duration

Max Flight Duration
45h 37m

Airlines All None

☒ United Airlines \$1,213

Save an average of \$240 on your trip!
Book a Hotel + Flight together for extra savings. **Hotel + Flight Deals**

Best Price. GUARANTEED. Tired of Searching? Book now! We'll refund the difference if you find a lower price.

Select Departure

Prices are per person and inclusive of taxes and fees with the exception of baggage fees.

FLIGHT SALE: Save \$7.50! Member Deal Sign In

Flight 1: 8:40p ICN → 9:16p TUS (SFO 4h 5m) 1 Stop 16h 36m **\$1,149.93** Roundtrip **Select**

Operated by United Express/SkyWest

Flight 2: 5:00p ICN → 9:16p TUS (SFO 7h 35m) 1 Stop 20h 16m **\$1,212.43** Roundtrip **Select**

Operated by United Express/SkyWest

No risk! Book now and cancel online for free within 24 hours.

Web Database Programming (Cont'd)

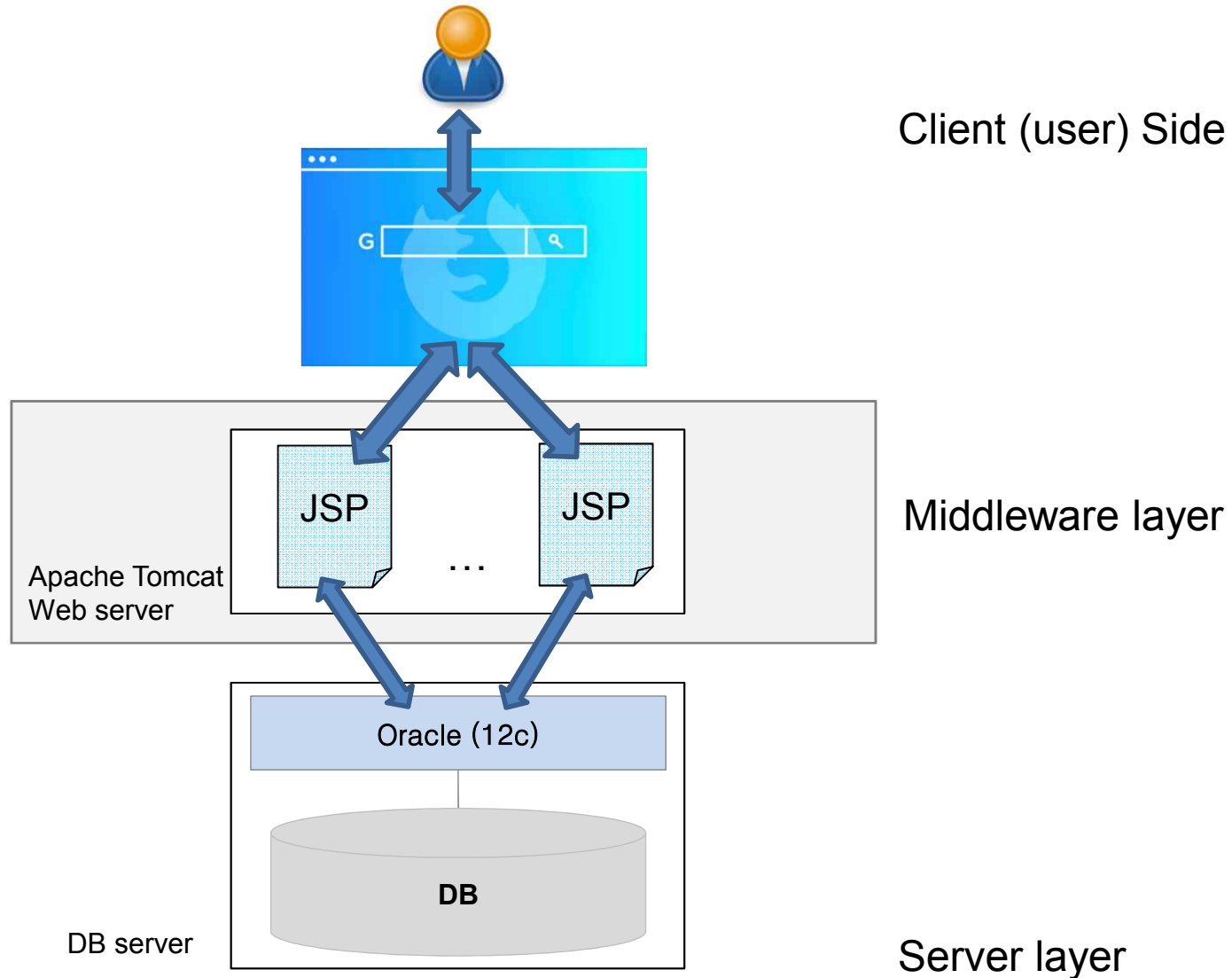
- There are various techniques for programming dynamic features into Web pages.
- **JavaServer Pages (JSP)**
 - One of the most classic, popular script languages for Web database programming
 - Allows scripting at the server to produce dynamic Web pages to be sent at the client (in a manner somewhat similar to PHP).
 - Associated with Java language, and its scripting can be combined with Java code.
 - Uses JDBC to connect to a database server.
- How to deploy and run a web application using JSP?

Apache Tomcat®

- from <https://tomcat.apache.org/>

- An open source implementation of the Java Servlet, JavaServer Pages (JSP), Java Expression Language and Java WebSocket technologies.
- Apache Tomcat software powers numerous large-scale, mission-critical **web applications** across a diverse range of industries and organizations.
- In this lab, we'll learn to how to deploy into the Tomcat and run a simple web application, written in JSP.
 - Next week, we'll connect to the Oracle database via JSP pages.

Example of Database Access via Web



APACHE TOMCAT 8 설치 및 실행

(On Windows 10)

- TA (김성현) 제공
- 참고자료

- Apache Tomcat 8 다운 로드 :

<http://minstar0410.tistory.com/6>

Step 1 : Apache Tomcat8 설치

- <https://tomcat.apache.org/download-80.cgi>

The screenshot shows the Apache Tomcat 8.0.53 download page. On the left is a sidebar with navigation links. The main content area includes a warning about verifying file integrity, a 'Mirrors' section with a dropdown menu, a '8.5.34' section, a 'Binary Distributions' section with a list of download links, and a 'Source Code Distributions' section. An arrow points from the text '64-bit Windows zip 설치' to the '64-bit Windows zip (pgp, sha512)' link in the 'Binary Distributions' list.

Documentation

- Tomcat 9.0
- Tomcat 8.5
- Tomcat 8.0
- Tomcat 7.0
- Tomcat Connectors
- Tomcat Native
- Wiki
- Migration Guide
- Presentations

Problems?

- Security Reports
- Find help
- FAQ
- Mailing Lists
- Bug Database
- IRC

Get Involved

- Overview
- Source code
- Buildbot
- Tools

Media

- Twitter
- YouTube
- Blog

Misc

- Who We Are
- Swag
- Heritage
- Apache Home
- Resources
- Contact
- Legal
- Support Apache
- Sponsorship
- Thanks
- License

You **must** [verify](#) the integrity of the downloaded files. We provide OpenPGP signatures for every release file. This signature should be matched against the [KEYS](#) file which contains the OpenPGP keys of Tomcat's Release Managers. We also provide [SHA-512](#) checksums for every release file. After you download the file, you should calculate a checksum for your download, and make sure it is the same as ours.

Mirrors

You are currently using <http://mirror.apache-kr.org/>. If you encounter a problem with this mirror, please select another mirror. If all mirrors are failing, there are *backup* mirrors (at the end of the mirrors list) that should be available.

Other mirrors:

8.5.34

Please see the [README](#) file for packaging information. It explains what every distribution contains.

Binary Distributions

- Core:
 - [zip \(pgp, sha512\)](#)
 - [tar.gz \(pgp, sha512\)](#)
 - [32-bit Windows zip \(pgp, sha512\)](#)
 - [64-bit Windows zip \(pgp, sha512\)](#)
 - [32-bit/64-bit Windows Service Installer \(pgp, sha512\)](#)
- Full documentation:
 - [tar.gz \(pgp, sha512\)](#)
- Deployer:
 - [zip \(pgp, sha512\)](#)
 - [tar.gz \(pgp, sha512\)](#)
- Extras:
 - [JMX Remote jar \(pgp, sha512\)](#)
 - [Web services jar \(pgp, sha512\)](#)
- Embedded:
 - [tar.gz \(pgp, sha512\)](#)
 - [zip \(pgp, sha512\)](#)

Source Code Distributions

- [tar.gz \(pgp, sha512\)](#)
- [zip \(pgp, sha512\)](#)

8.0.53

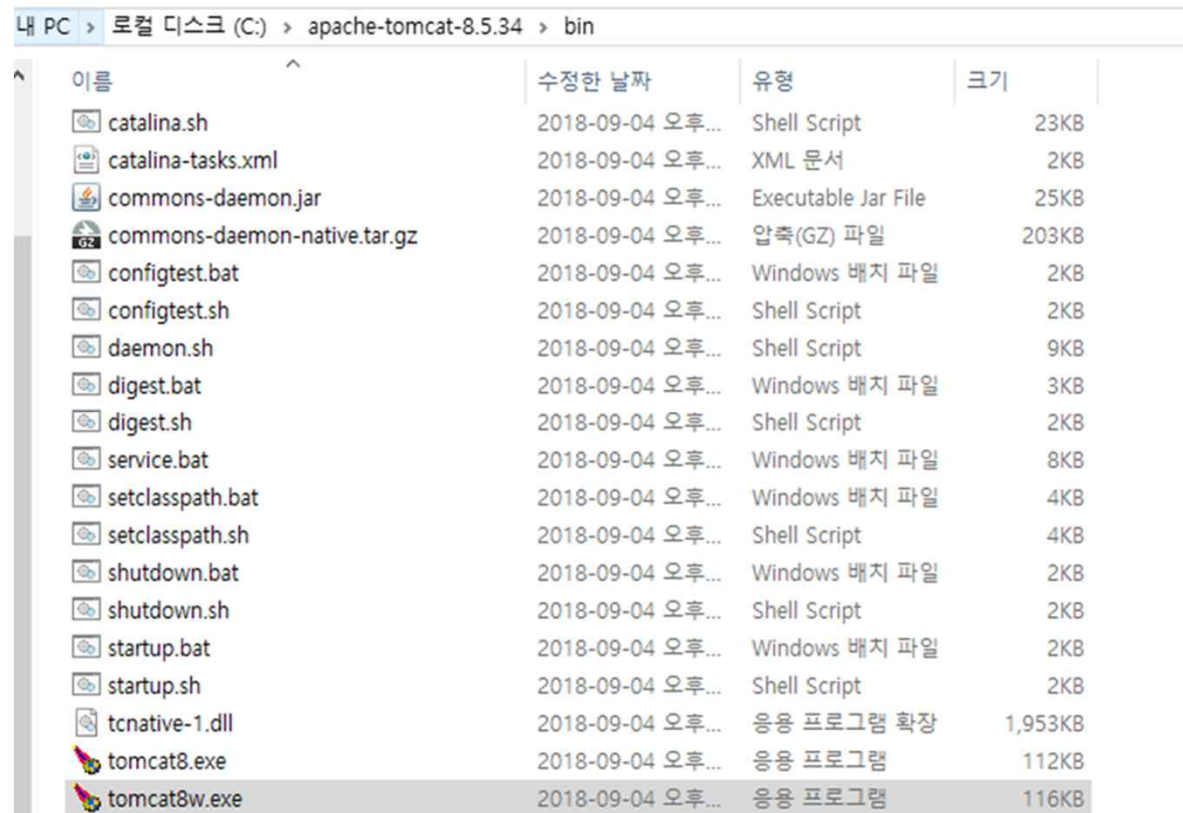
Step 2 : C 드라이브에 압축 해제

내 PC > 로컬 디스크 (C:)

이름	수정한 날짜	유형	크기
bc8f992f5df34654945e6e32a5aa400c	2018-10-15 오후...	파일 폴더	
HP_Color_LaserJet_Enterprise_M553	2018-08-14 오후...	파일 폴더	
Intel	2018-01-07 오후...	파일 폴더	
PerfLogs	2018-04-12 오전...	파일 폴더	
Program Files	2018-10-01 오후...	파일 폴더	
Program Files (x86)	2018-10-01 오후...	파일 폴더	
Python27	2018-09-19 오후...	파일 폴더	
Rscript	2018-08-28 오후...	파일 폴더	
Temp	2018-09-10 오후...	파일 폴더	
Windows	2018-10-19 오전...	파일 폴더	
사용자	2018-05-08 오후...	파일 폴더	
Install.log	2018-03-30 오후...	텍스트 문서	1KB
apache-tomcat-8.5.34	2018-10-22 오후...	파일 폴더	

Step 3 : tomcat8w.exe 실행

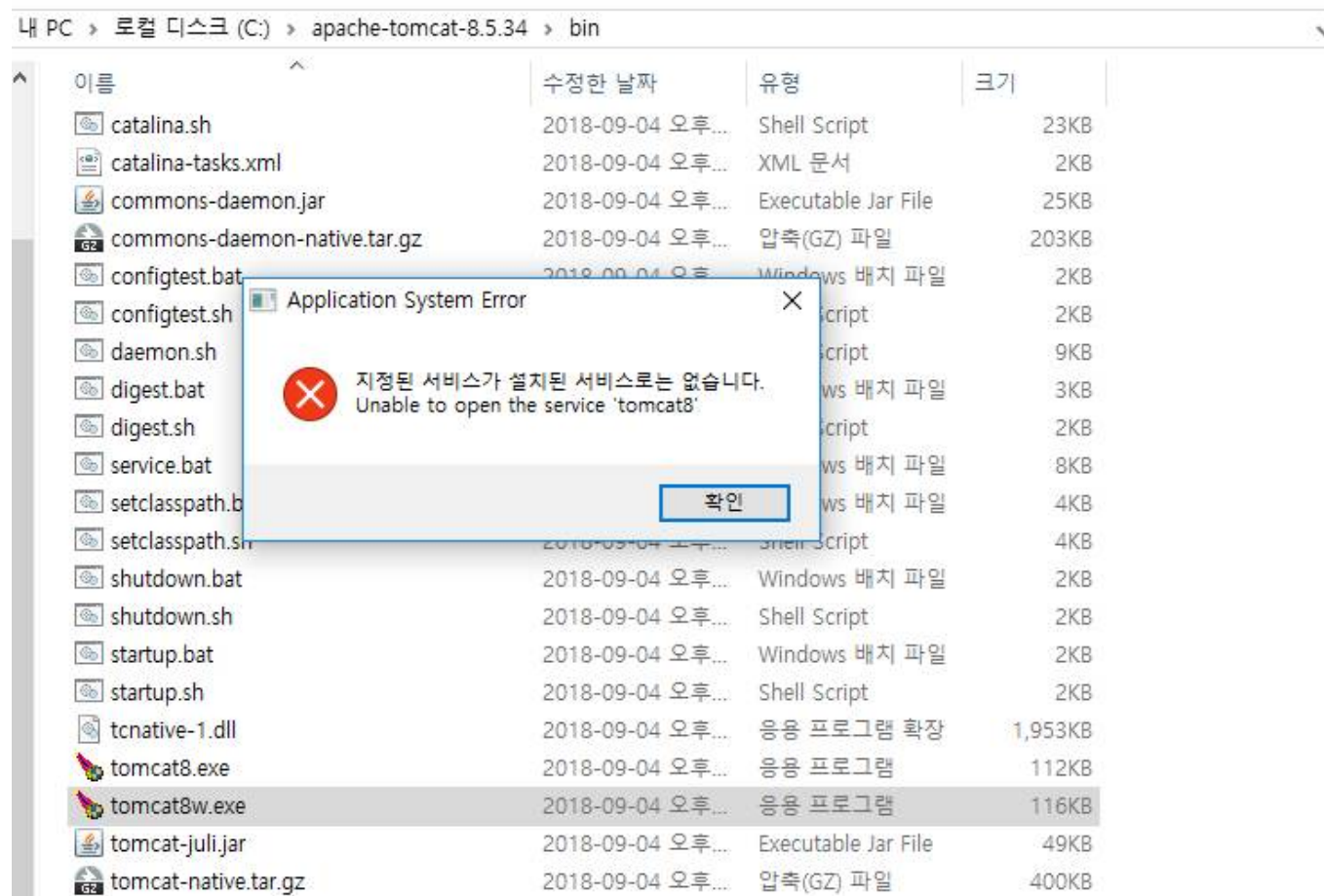
- C:\apache-tomcat-8.5.34\bin\Tomcat8w.exe를
관리자 권한으로 실행(파일을 오른쪽 클릭 후, 관리자
권한으로 실행을 선택)



이름	수정한 날짜	유형	크기
catalina.sh	2018-09-04 오후...	Shell Script	23KB
catalina-tasks.xml	2018-09-04 오후...	XML 문서	2KB
commons-daemon.jar	2018-09-04 오후...	Executable Jar File	25KB
commons-daemon-native.tar.gz	2018-09-04 오후...	압축(GZ) 파일	203KB
configtest.bat	2018-09-04 오후...	Windows 배치 파일	2KB
configtest.sh	2018-09-04 오후...	Shell Script	2KB
daemon.sh	2018-09-04 오후...	Shell Script	9KB
digest.bat	2018-09-04 오후...	Windows 배치 파일	3KB
digest.sh	2018-09-04 오후...	Shell Script	2KB
service.bat	2018-09-04 오후...	Windows 배치 파일	8KB
setclasspath.bat	2018-09-04 오후...	Windows 배치 파일	4KB
setclasspath.sh	2018-09-04 오후...	Shell Script	4KB
shutdown.bat	2018-09-04 오후...	Windows 배치 파일	2KB
shutdown.sh	2018-09-04 오후...	Shell Script	2KB
startup.bat	2018-09-04 오후...	Windows 배치 파일	2KB
startup.sh	2018-09-04 오후...	Shell Script	2KB
tcnative-1.dll	2018-09-04 오후...	응용 프로그램 확장	1,953KB
tomcat8.exe	2018-09-04 오후...	응용 프로그램	112KB
tomcat8w.exe	2018-09-04 오후...	응용 프로그램	116KB

Step 4 : 에러 발생 확인

- Tomcat8 설치가 되지 않아 에러가 발생



Step 5: 명령 프롬프트 창 열기

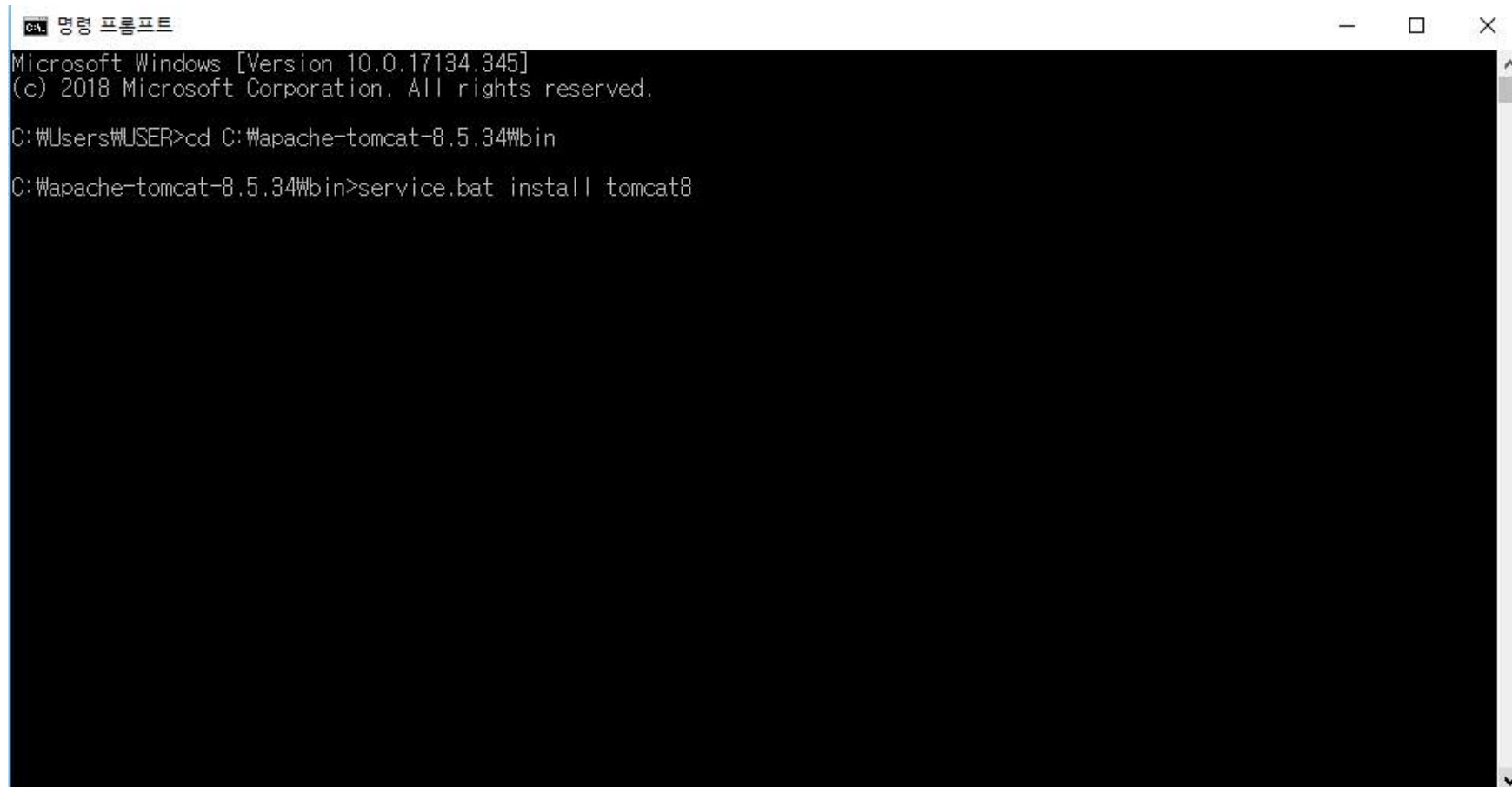
- 명령 프롬프트 창 켜기
- `cd C:\apache-tomcat-8.5.34\bin`



```
Microsoft Windows [Version 10.0.17134.345]  
(c) 2018 Microsoft Corporation. All rights reserved.  
  
C:\Users\USER>cd C:\apache-tomcat-8.5.34\bin  
  
C:\apache-tomcat-8.5.34\bin>
```

Step 6: install 명령어 입력

- service.bat install tomcat8 입력



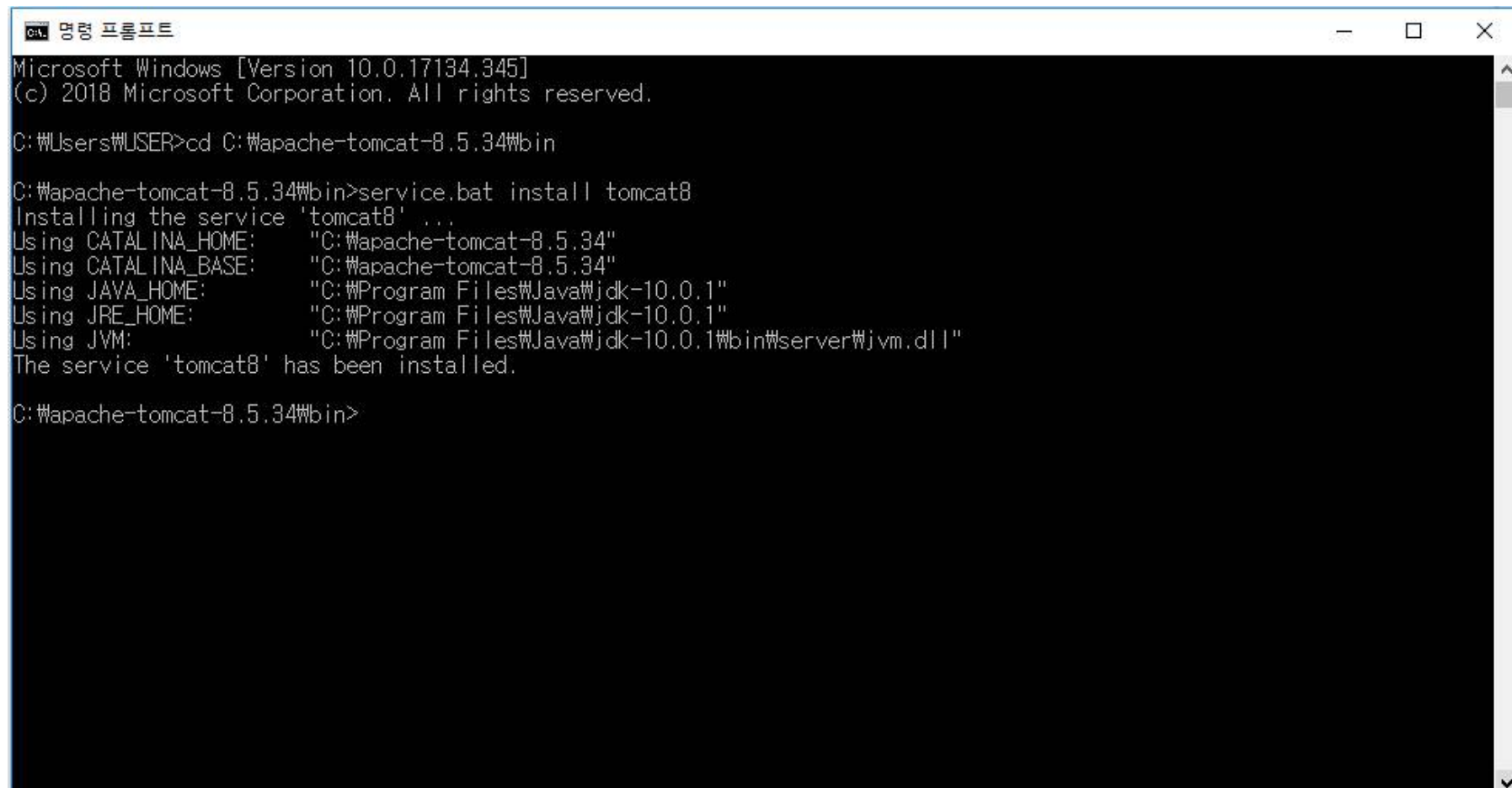
A screenshot of a Windows Command Prompt window. The title bar at the top reads '명령 프롬프트' (Command Prompt). The window content shows the following text: 'Microsoft Windows [Version 10.0.17134.345]' and '(c) 2018 Microsoft Corporation. All rights reserved.' followed by a prompt 'C:\Users\USER>'. The user has entered 'cd C:\apache-tomcat-8.5.34\bin' and the prompt has moved to 'C:\apache-tomcat-8.5.34\bin>'. The user has then entered 'service.bat install tomcat8' and the prompt is now at the end of that line.

```
Microsoft Windows [Version 10.0.17134.345]
(c) 2018 Microsoft Corporation. All rights reserved.

C:\Users\USER>cd C:\apache-tomcat-8.5.34\bin
C:\apache-tomcat-8.5.34\bin>service.bat install tomcat8
```

Step 7: 설치 확인

- 아래와 같이 출력되면 성공



```
Ca. 명령 프롬프트
Microsoft Windows [Version 10.0.17134.345]
(c) 2018 Microsoft Corporation. All rights reserved.

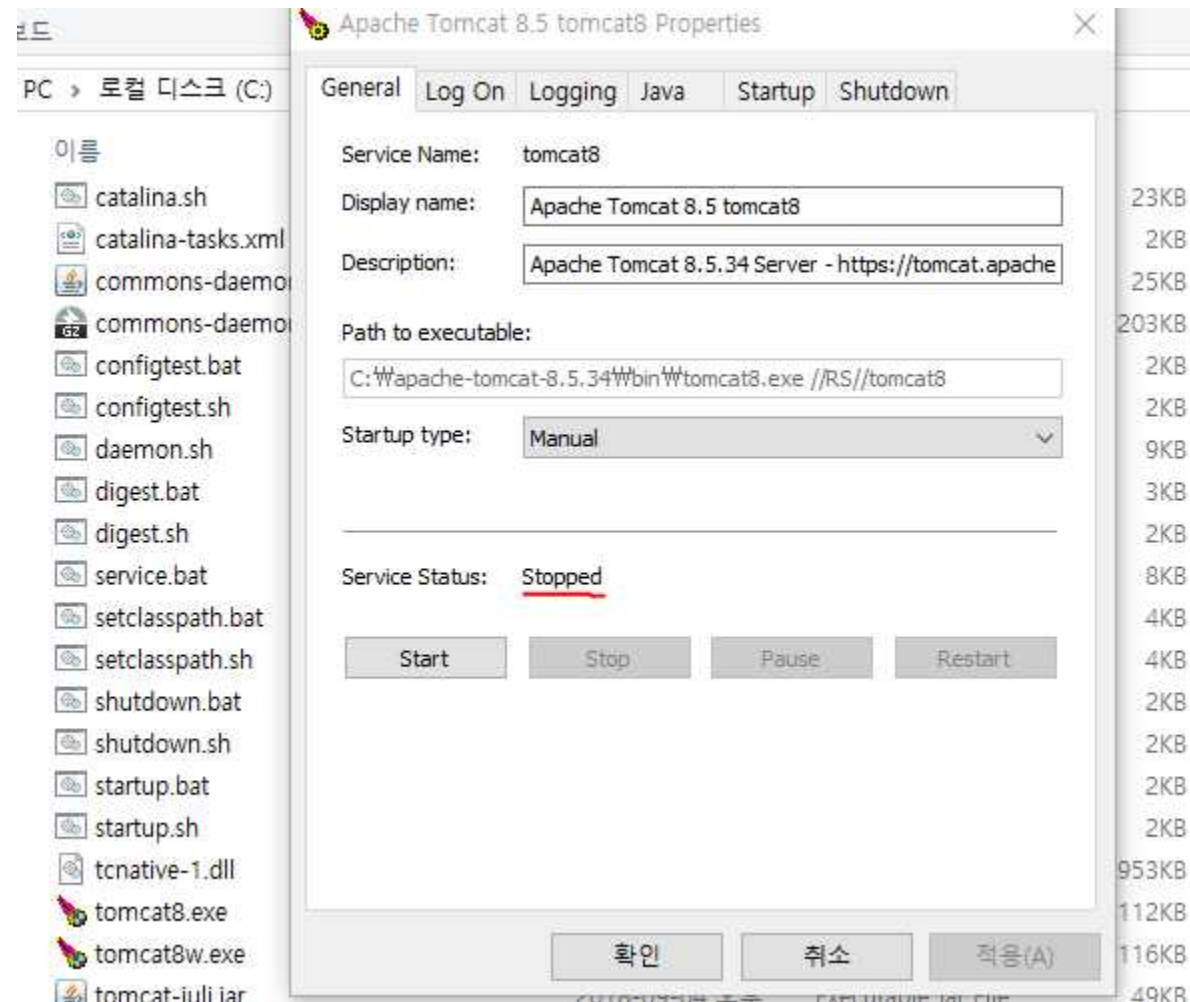
C:\Users\USER>cd C:\wapache-tomcat-8.5.34\bin

C:\wapache-tomcat-8.5.34\bin>service.bat install tomcat8
Installing the service 'tomcat8' ...
Using CATALINA_HOME:      "C:\wapache-tomcat-8.5.34"
Using CATALINA_BASE:      "C:\wapache-tomcat-8.5.34"
Using JAVA_HOME:          "C:\Program Files\Java\jdk-10.0.1"
Using JRE_HOME:           "C:\Program Files\Java\jdk-10.0.1"
Using JVM:                 "C:\Program Files\Java\jdk-10.0.1\bin\server\jvm.dll"
The service 'tomcat8' has been installed.

C:\wapache-tomcat-8.5.34\bin>
```

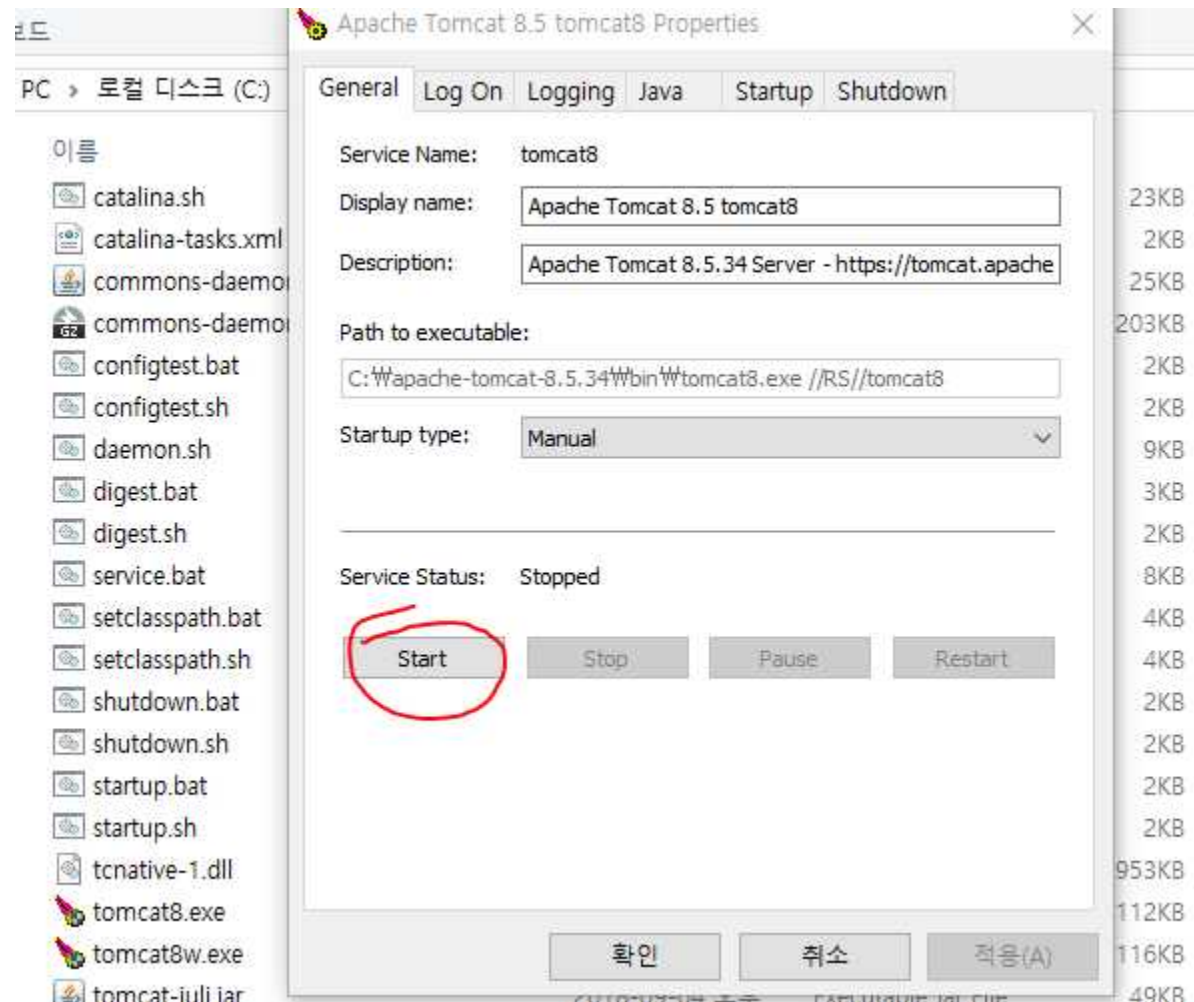

Step 8: tomcat8w.exe 실행

- 아래와 같이 실행되며, Service Status를 보면 Stopped로 되어 있음.



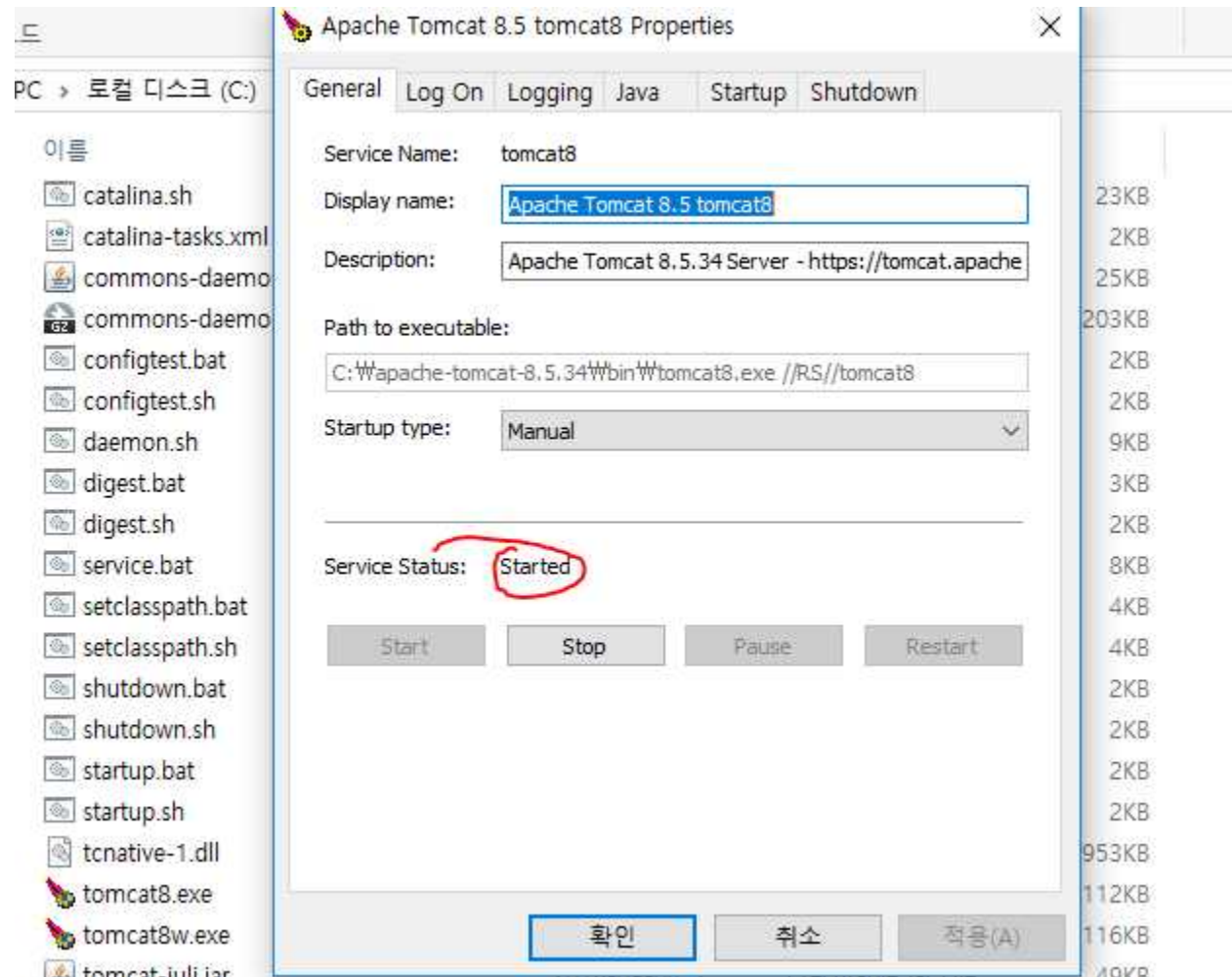
Step 9 : 서버 실행

- Start 버튼을 누름.



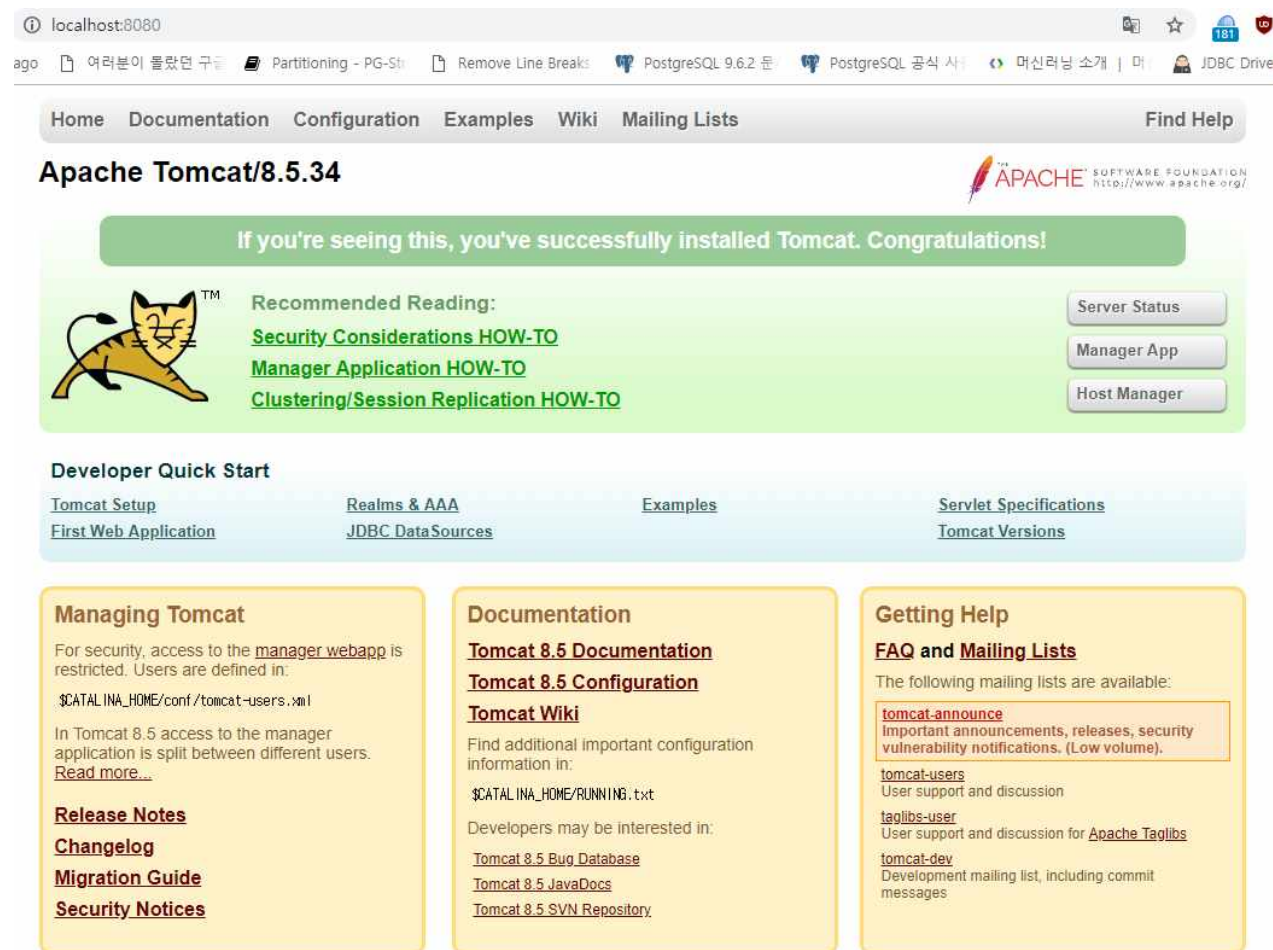
Step 10 : 서버 실행 확인

- 오른쪽과 같이 Started 상태이면 성공!



Step 11: 서버 실행 확인

- <http://localhost:8080> 로 접속하였을 때 아래와 같이 접속 되면 성공




localhost:8080

Home Documentation Configuration Examples Wiki Mailing Lists Find Help

Apache Tomcat/8.5.34

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

Developer Quick Start

- [Tomcat Setup](#)
- [First Web Application](#)
- [Realms & AAA](#)
- [JDBC DataSources](#)
- [Examples](#)
- [Servlet Specifications](#)
- [Tomcat Versions](#)

Managing Tomcat

For security, access to the [manager webapp](#) is restricted. Users are defined in:

```
$CATALINA_HOME/conf/tomcat-users.xml
```

In Tomcat 8.5 access to the manager application is split between different users. [Read more...](#)

[Release Notes](#)
[Changelog](#)
[Migration Guide](#)
[Security Notices](#)

Documentation

[Tomcat 8.5 Documentation](#)
[Tomcat 8.5 Configuration](#)
[Tomcat Wiki](#)

Find additional important configuration information in:

```
$CATALINA_HOME/RUNNING.txt
```

Developers may be interested in:

- [Tomcat 8.5 Bug Database](#)
- [Tomcat 8.5 JavaDocs](#)
- [Tomcat 8.5 SVN Repository](#)

Getting Help

[FAQ and Mailing Lists](#)

The following mailing lists are available:

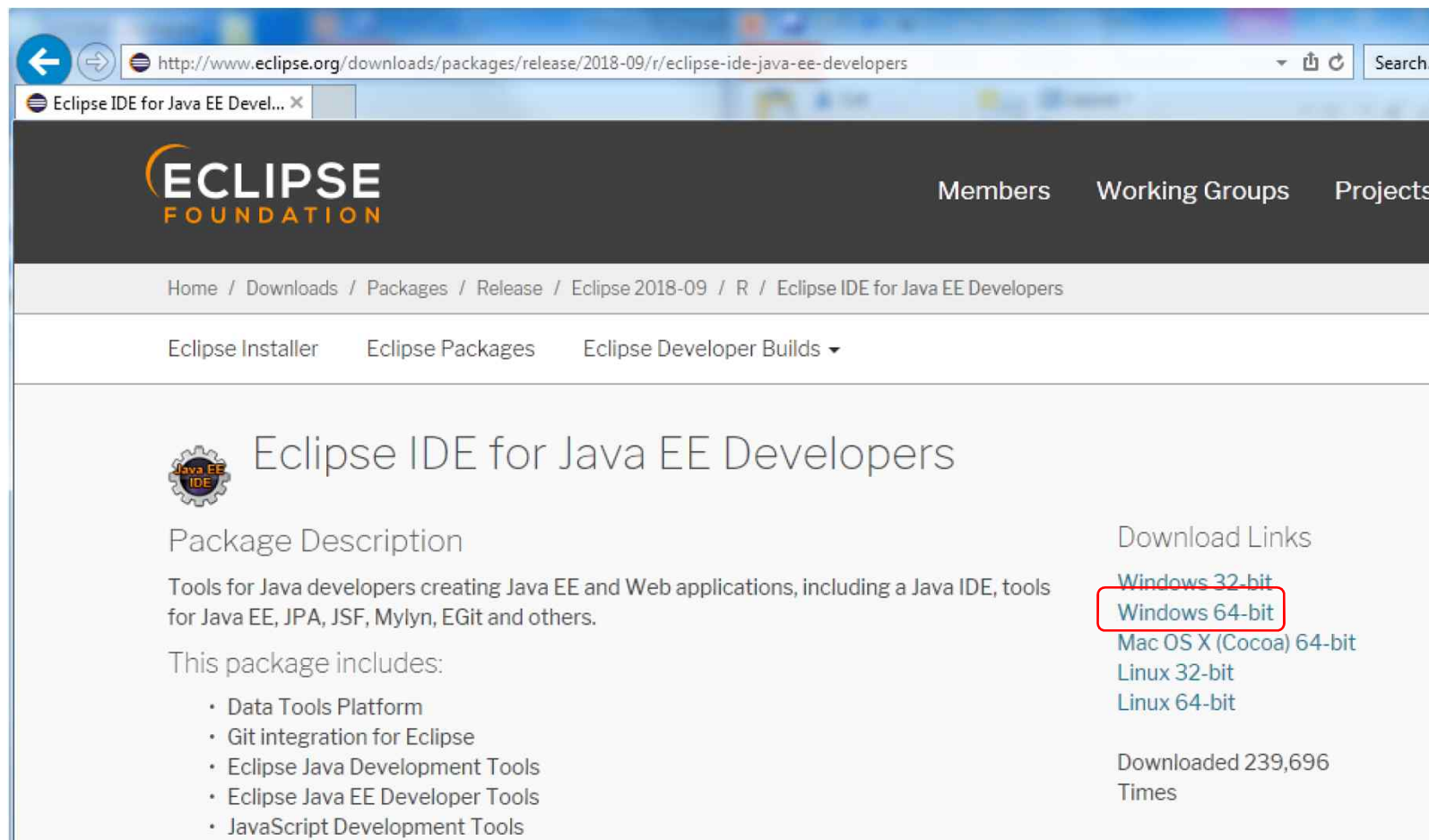
- [tomcat-announce](#)
Important announcements, releases, security vulnerability notifications, (Low volume).
- [tomcat-users](#)
User support and discussion
- [taglibs-user](#)
User support and discussion for [Apache Taglibs](#)
- [tomcat-dev](#)
Development mailing list, including commit messages

APACHE TOMCAT 8 예제

- TA 제공
- Eclipse IDE for Java EE Developers 설치 할 것.
- 참고자료
 - Eclipse, tomcat 연동 : <http://codedragon.tistory.com/3848>
 - Eclipse tomcat 예제 : <http://www.masque.kr/free/227248>

Step 0-1: Eclipse IDE for EE 다운로드

- <http://www.eclipse.org/downloads/packages/release/2018-09/r/eclipse-ide-java-ee-developers>



The screenshot shows the Eclipse IDE for Java EE Developers download page. The browser address bar displays the URL: <http://www.eclipse.org/downloads/packages/release/2018-09/r/eclipse-ide-java-ee-developers>. The page features the Eclipse Foundation logo and navigation links for Members, Working Groups, and Projects. A breadcrumb trail indicates the path: Home / Downloads / Packages / Release / Eclipse 2018-09 / R / Eclipse IDE for Java EE Developers. Below this, there are links for Eclipse Installer, Eclipse Packages, and Eclipse Developer Builds. The main content area is titled "Eclipse IDE for Java EE Developers" and includes a "Package Description" section. This section states that the tools are for Java developers creating Java EE and Web applications, including a Java IDE, tools for Java EE, JPA, JSF, Mylyn, EGit, and others. It also lists the contents of the package: Data Tools Platform, Git integration for Eclipse, Eclipse Java Development Tools, Eclipse Java EE Developer Tools, and JavaScript Development Tools. To the right, the "Download Links" section lists various operating system and architecture combinations: Windows 32-bit, Windows 64-bit (highlighted with a red box), Mac OS X (Cocoa) 64-bit, Linux 32-bit, and Linux 64-bit. At the bottom right, it shows that the package has been downloaded 239,696 times.

Home / Downloads / Packages / Release / Eclipse 2018-09 / R / Eclipse IDE for Java EE Developers

Eclipse Installer Eclipse Packages Eclipse Developer Builds ▾

Eclipse IDE for Java EE Developers

Package Description

Tools for Java developers creating Java EE and Web applications, including a Java IDE, tools for Java EE, JPA, JSF, Mylyn, EGit and others.

This package includes:

- Data Tools Platform
- Git integration for Eclipse
- Eclipse Java Development Tools
- Eclipse Java EE Developer Tools
- JavaScript Development Tools

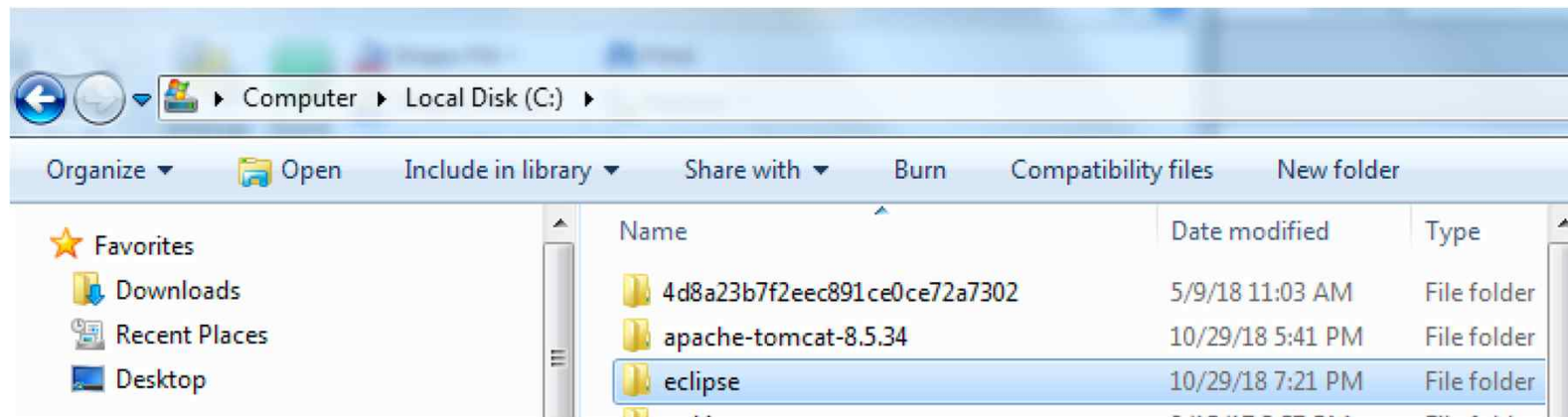
Download Links

- Windows 32-bit
- Windows 64-bit**
- Mac OS X (Cocoa) 64-bit
- Linux 32-bit
- Linux 64-bit

Downloaded 239,696 Times

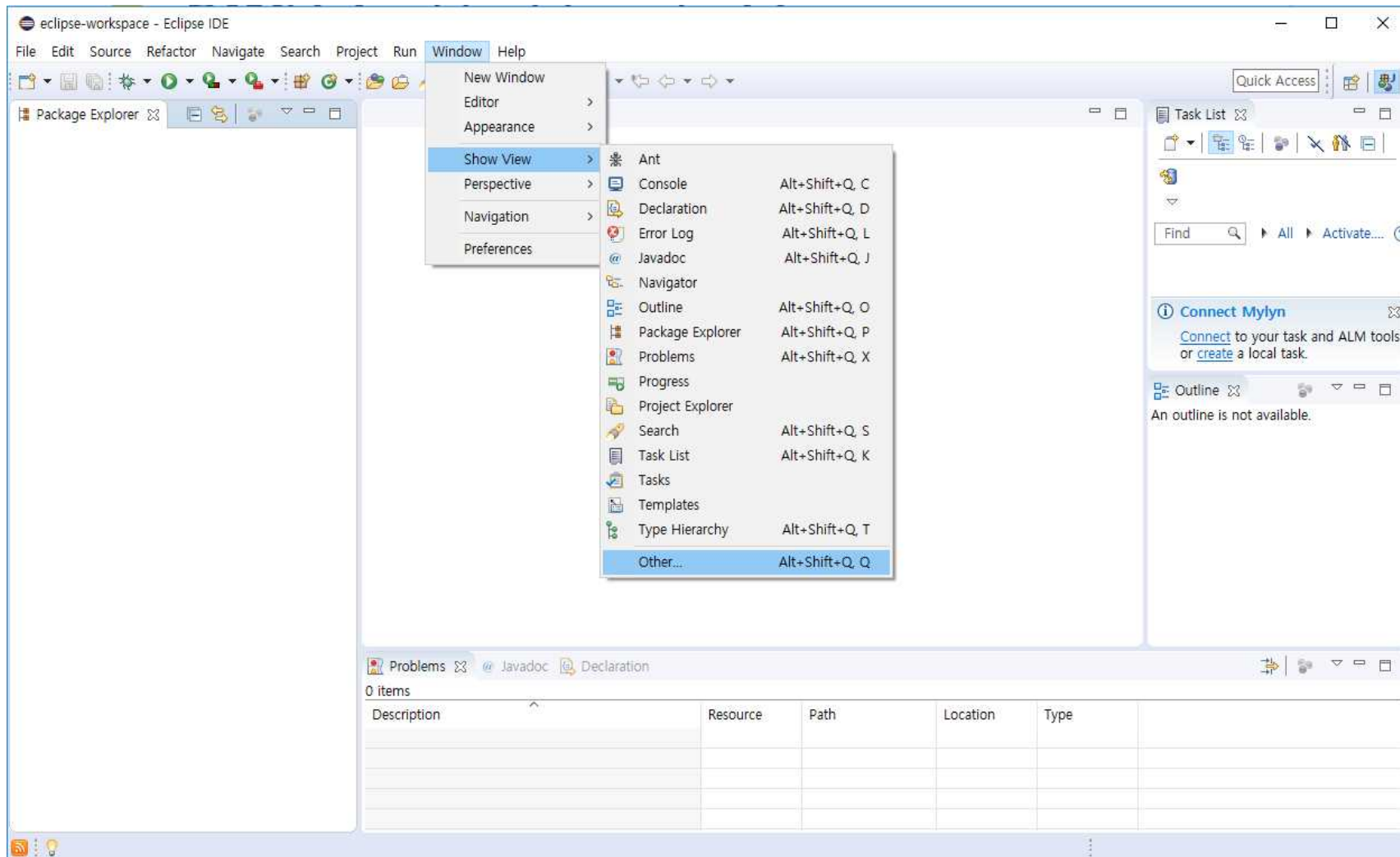
Step 0-2: Eclipse IDE for EE 설치

- C 드라이브에 압축 해제



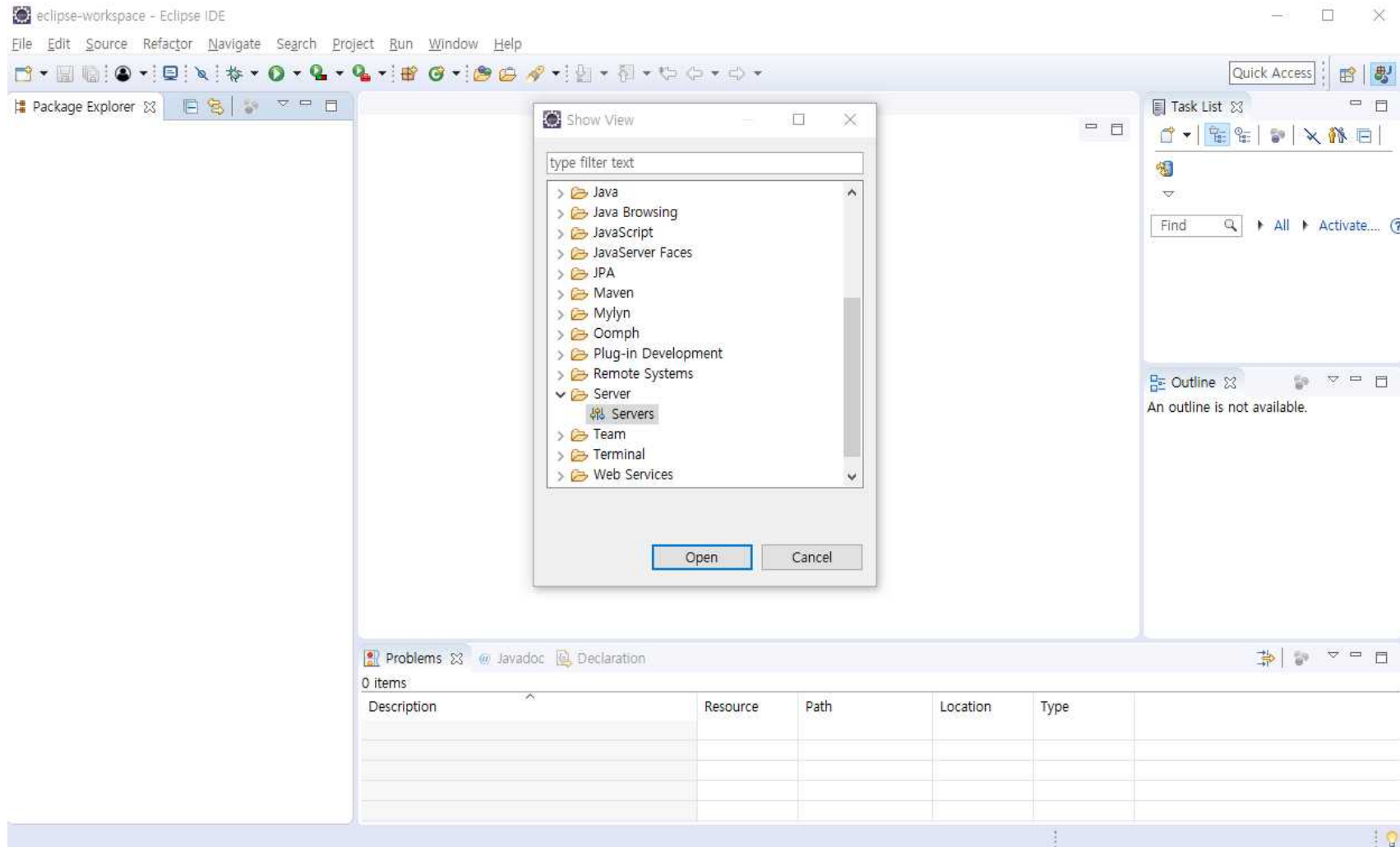
Step 1: 이클립스 실행 및 뷰 전환

- Window -> Show View -> Other



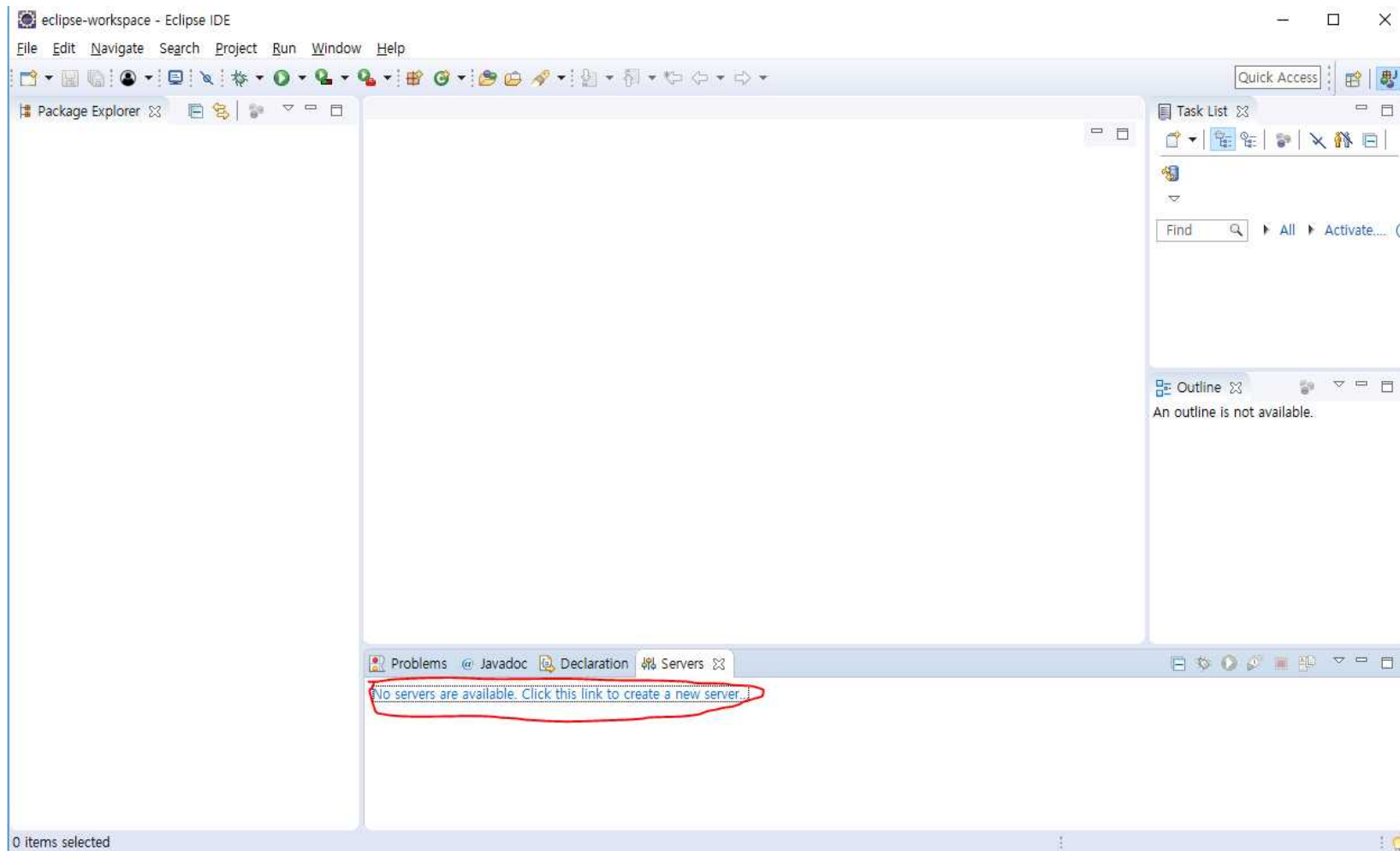
Step 2: tomcat 연동

- Server > Server 클릭 후 Open



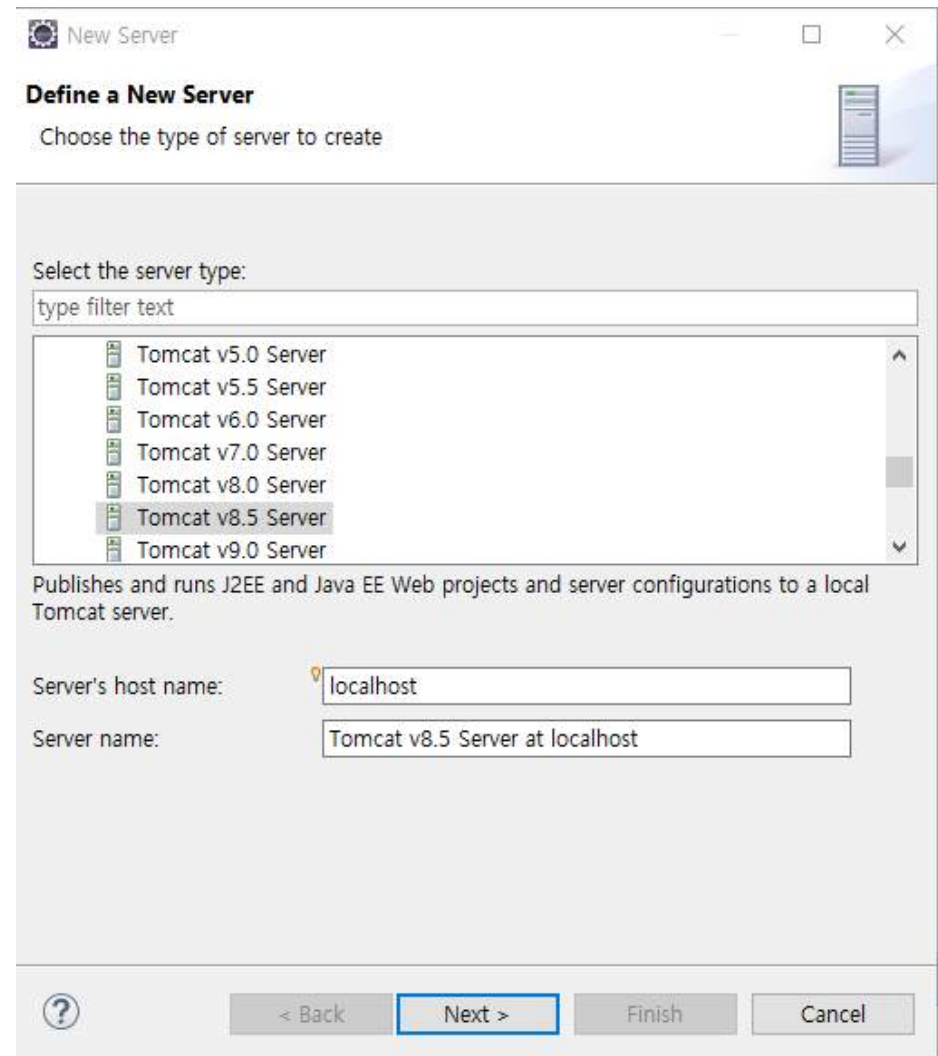
Step 4: tomcat 서버 생성

- 서버 탭의 No servers are available. Click this link to create a new server... 클릭



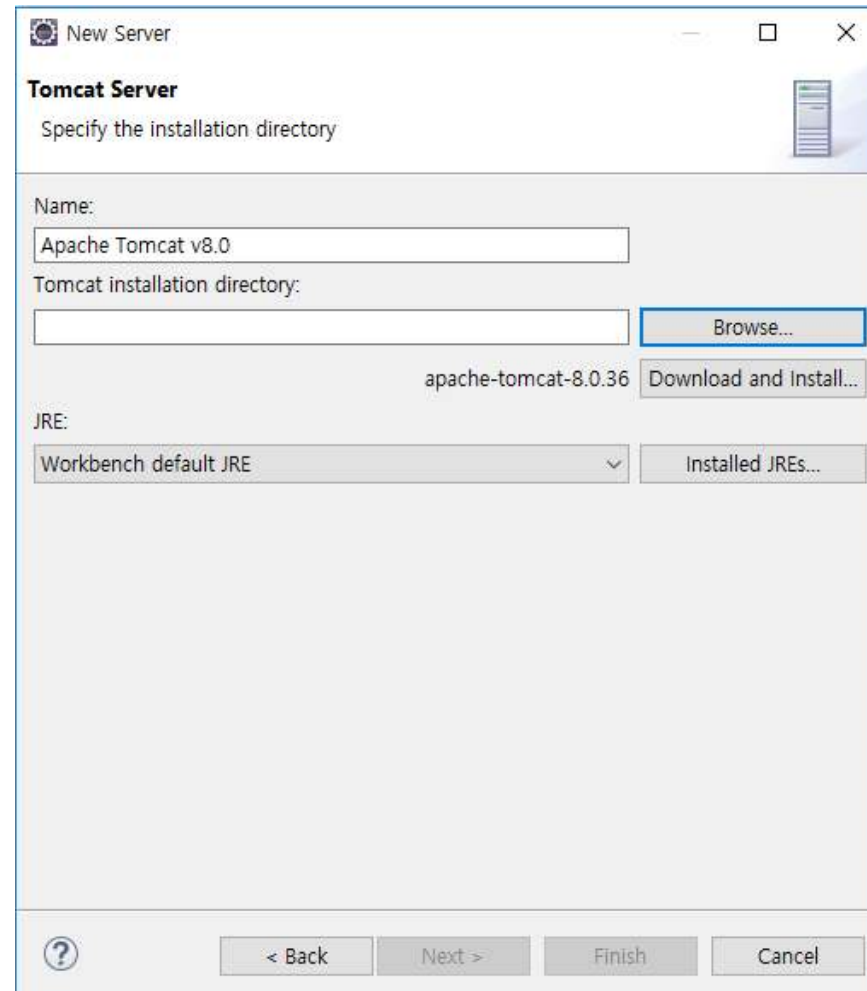
Step 5: tomcat 서버 생성

- Tomcat v8.5 Server
선택 후 Next



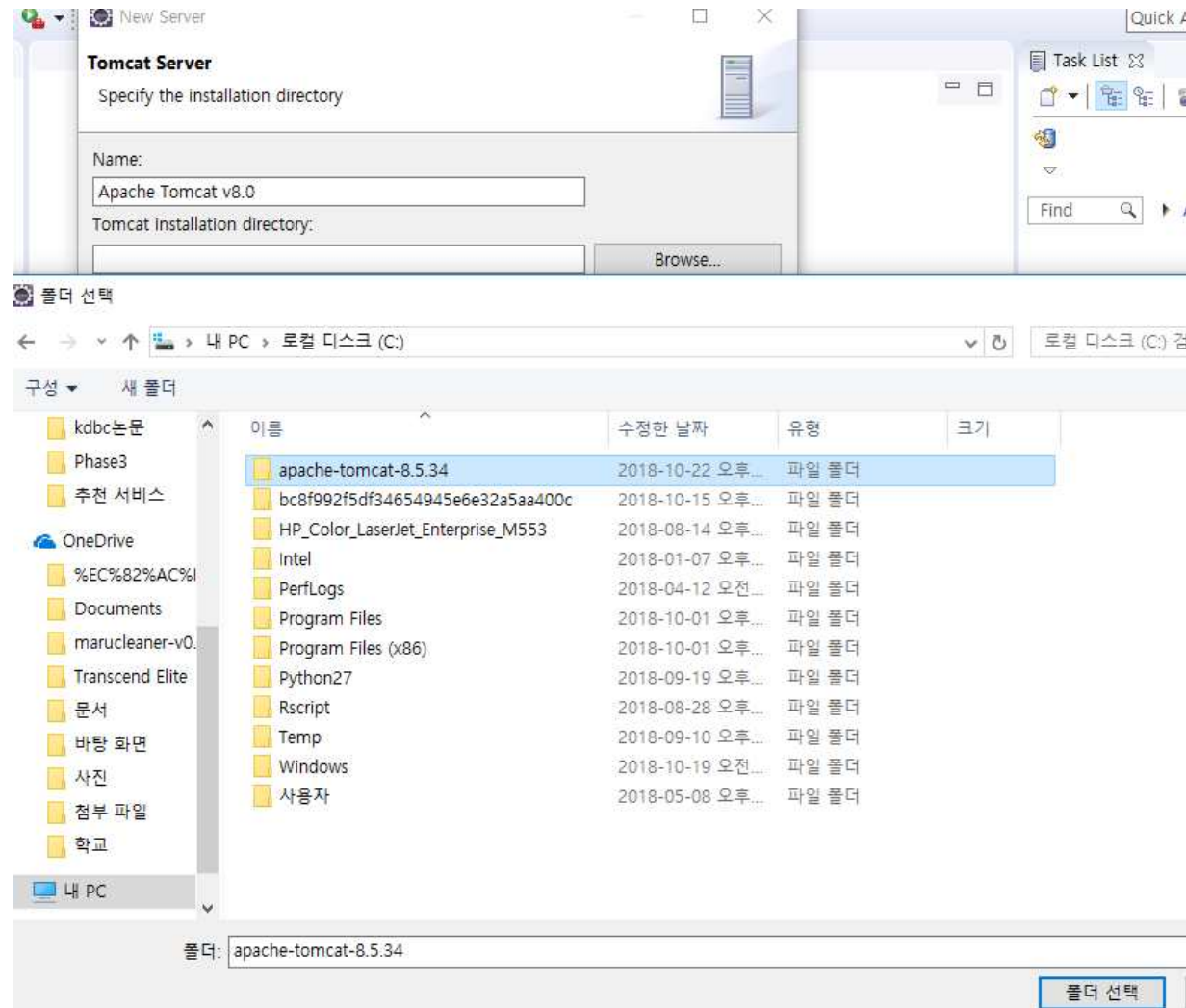
Step 6: tomcat 서버 생성

- Browse 클릭



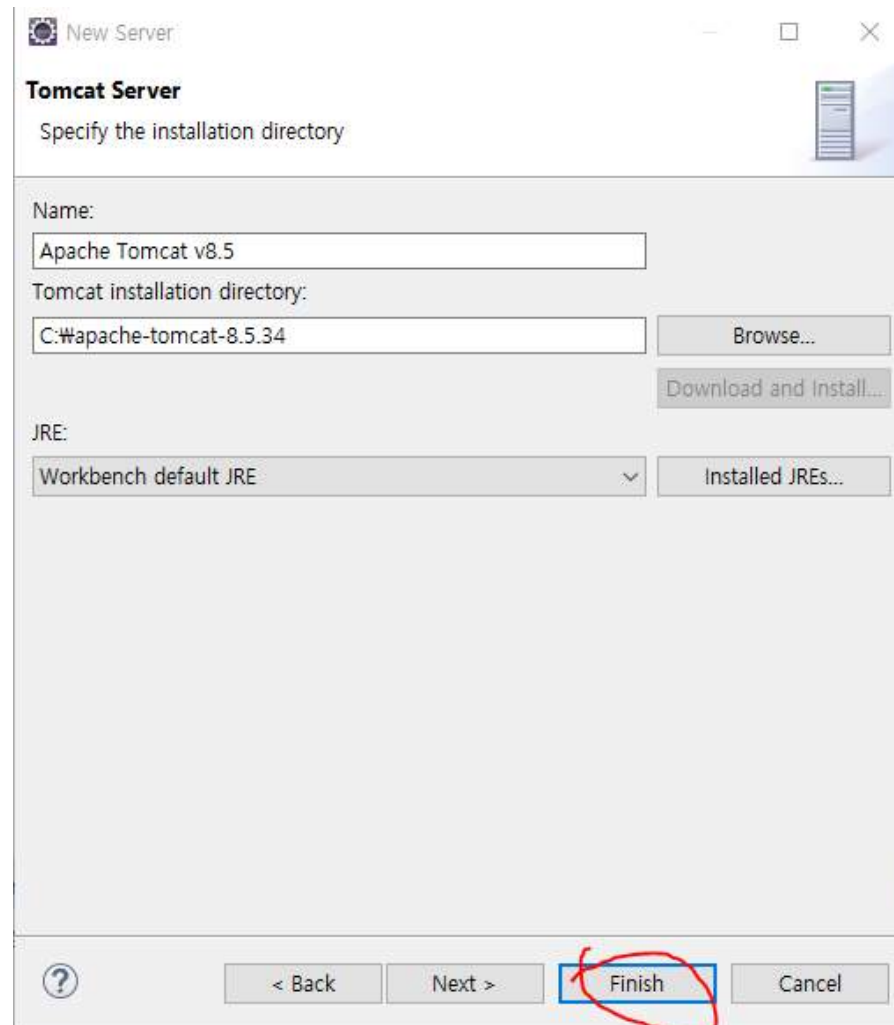
Step 7: tomcat 서버 생성

- Tomcat 폴더 선택
(C드라이브에 설치한)



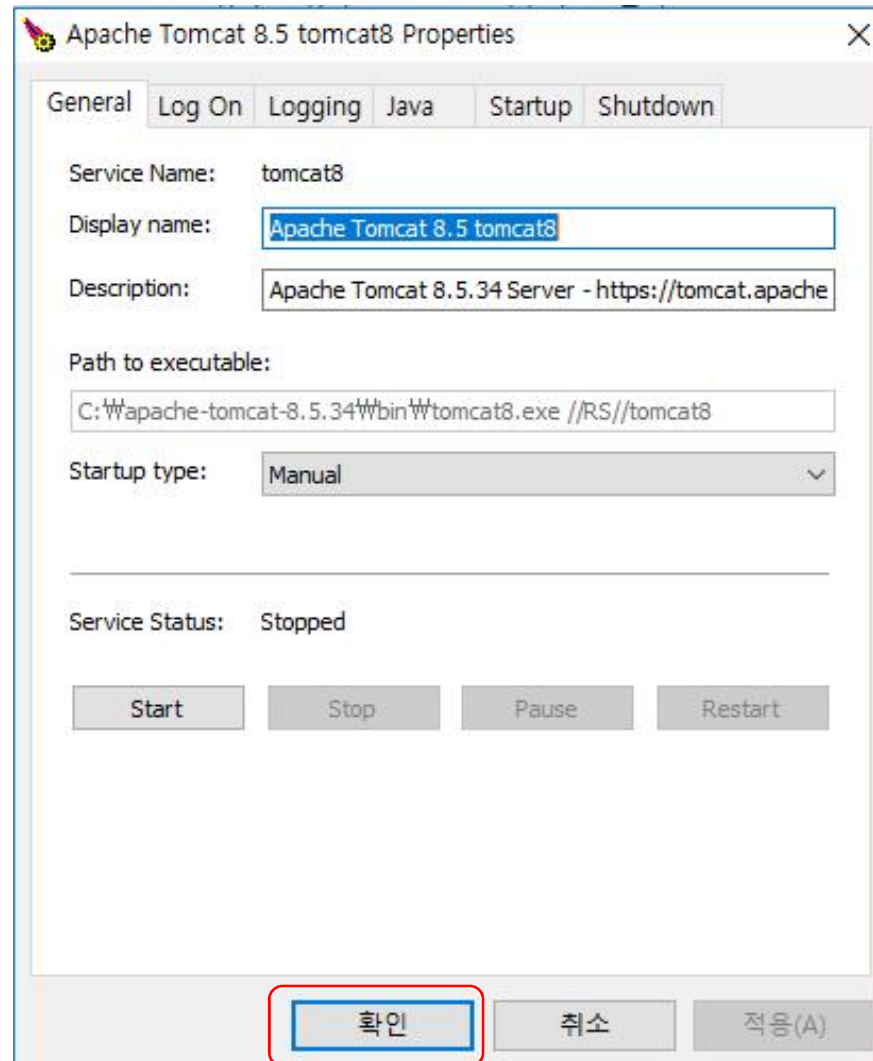
Step 8: tomcat 서버 생성

- Finish를
클릭하여 서버
생성 완료



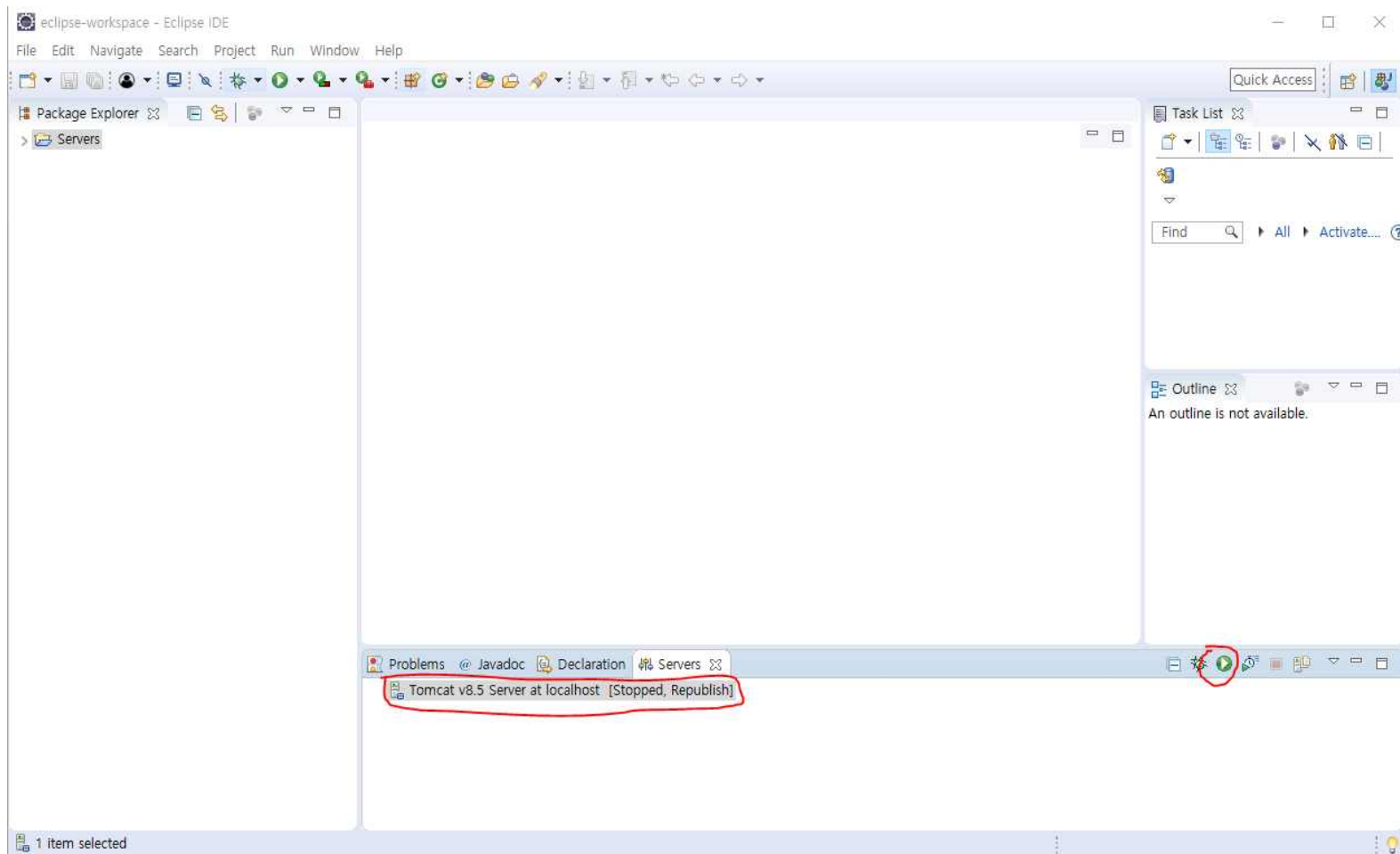
Step 9: tomcat 서버 실행 중지

- 이전 설치 과정에서 Tomcat 서버를 실행한 상태라면 서버를 정지시키는 과정이 필요
 - tomcat8w.exe 실행 후, stop 클릭



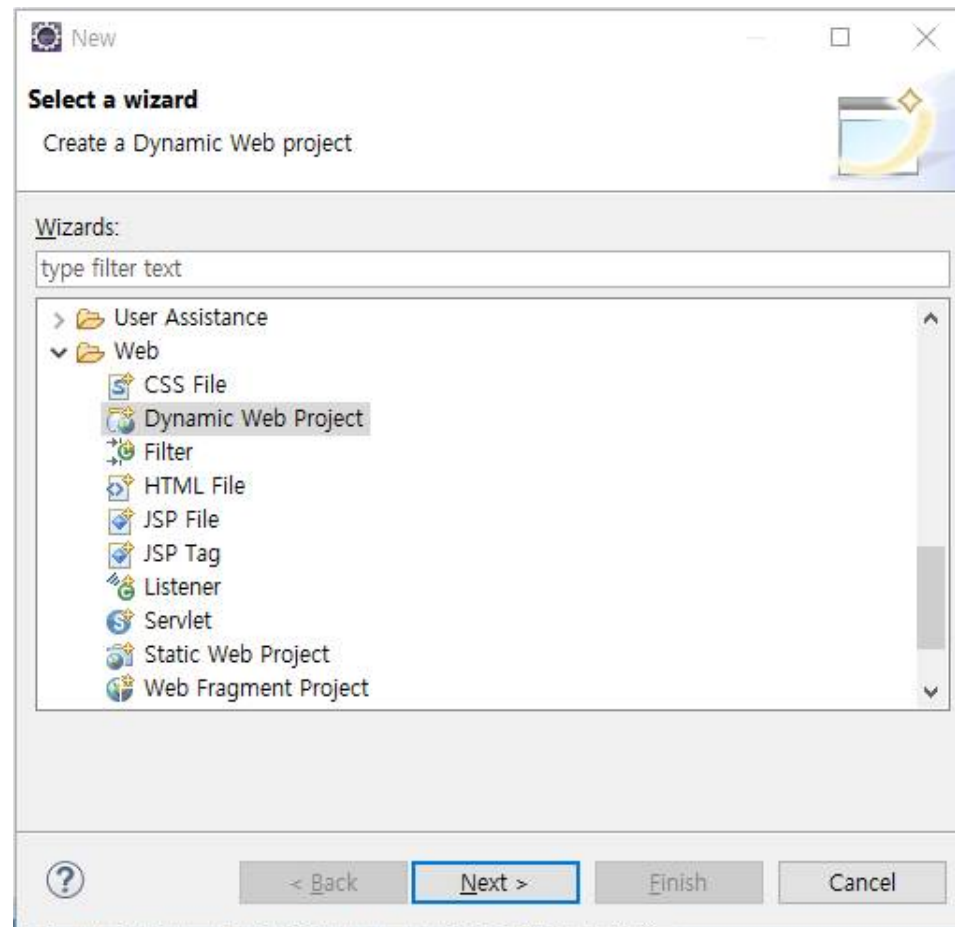
Step 10: 이클립스 내에 tomcat 서버 실행

- 서버탭의 Tomcat v8.5 Server at localhost [Stopped, Republish] 를 선택하고 오른쪽의 초록색 실행을 누름



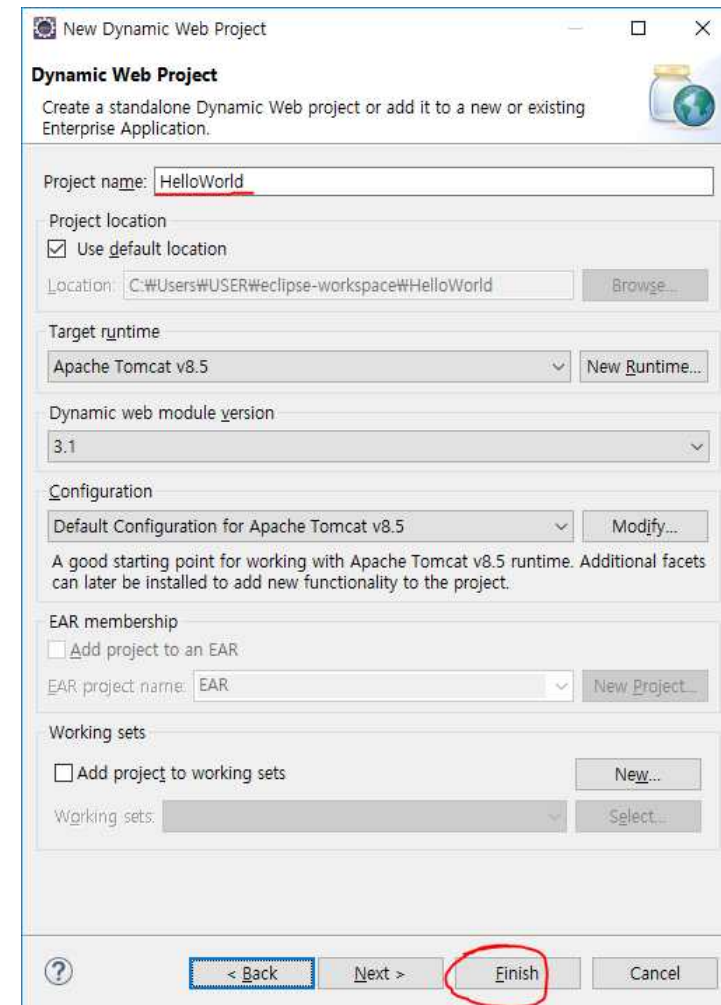
Step 11: 프로젝트 생성

- File > New > Other
- Web > Dynamic Web Project 선택



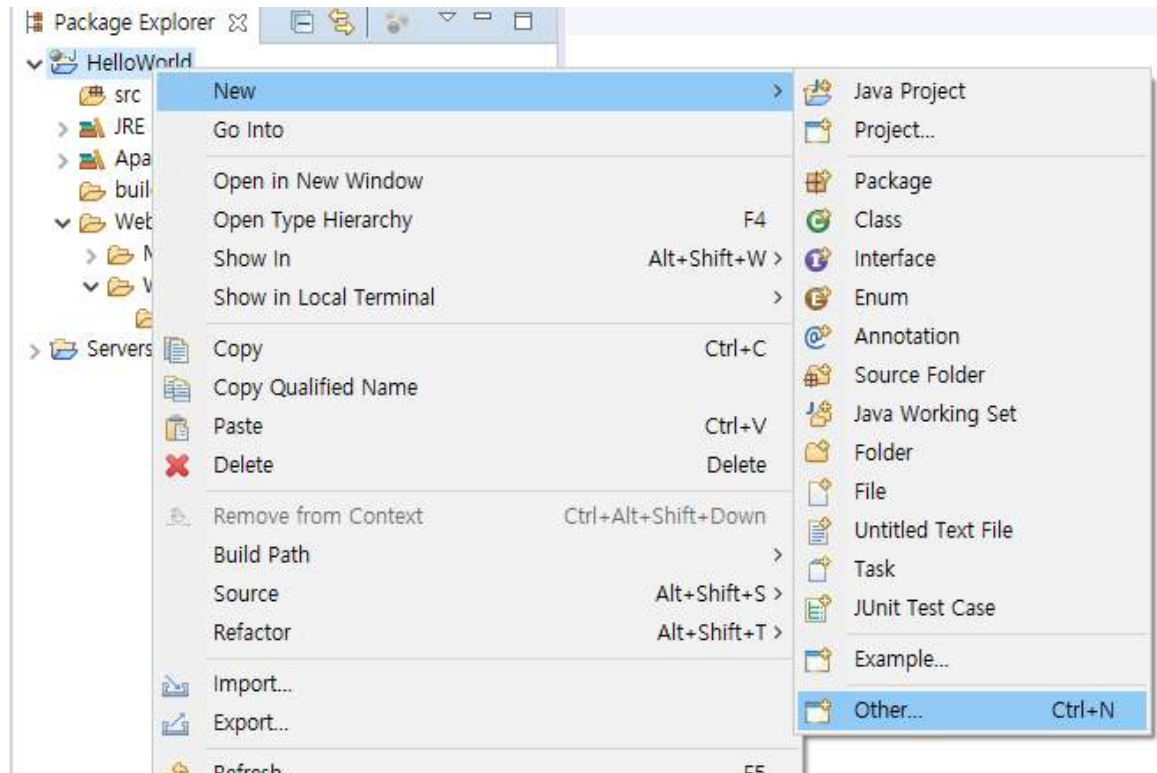
Step 11: 프로젝트 생성 (Cont'd)

- 프로젝트 명 입력 후 Finish
- 혹시 Yes, No 창 뜨면 No 선택



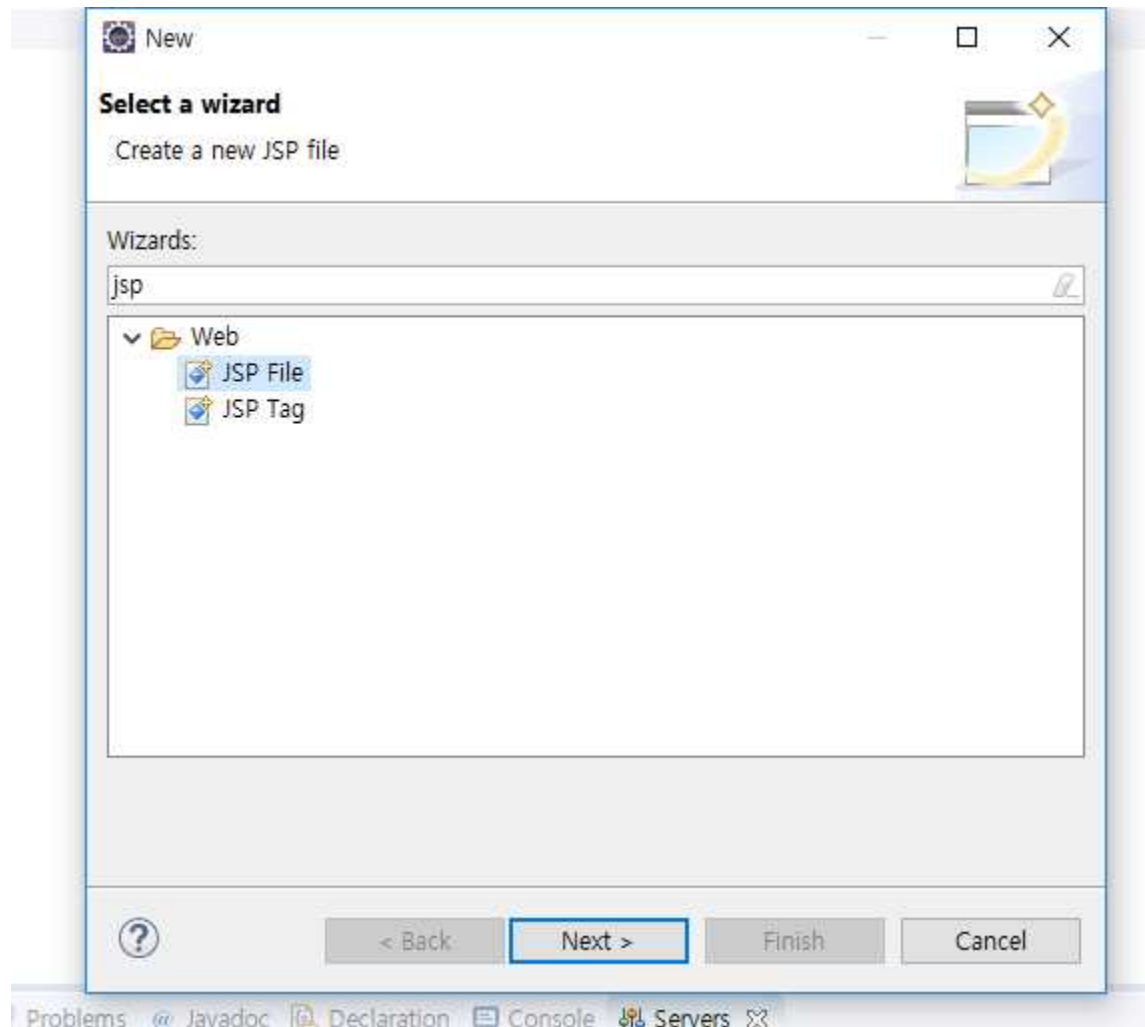
Step 12: JSP 파일 생성 (Cont'd)

- 프로젝트 오른쪽
클릭 > New > Other



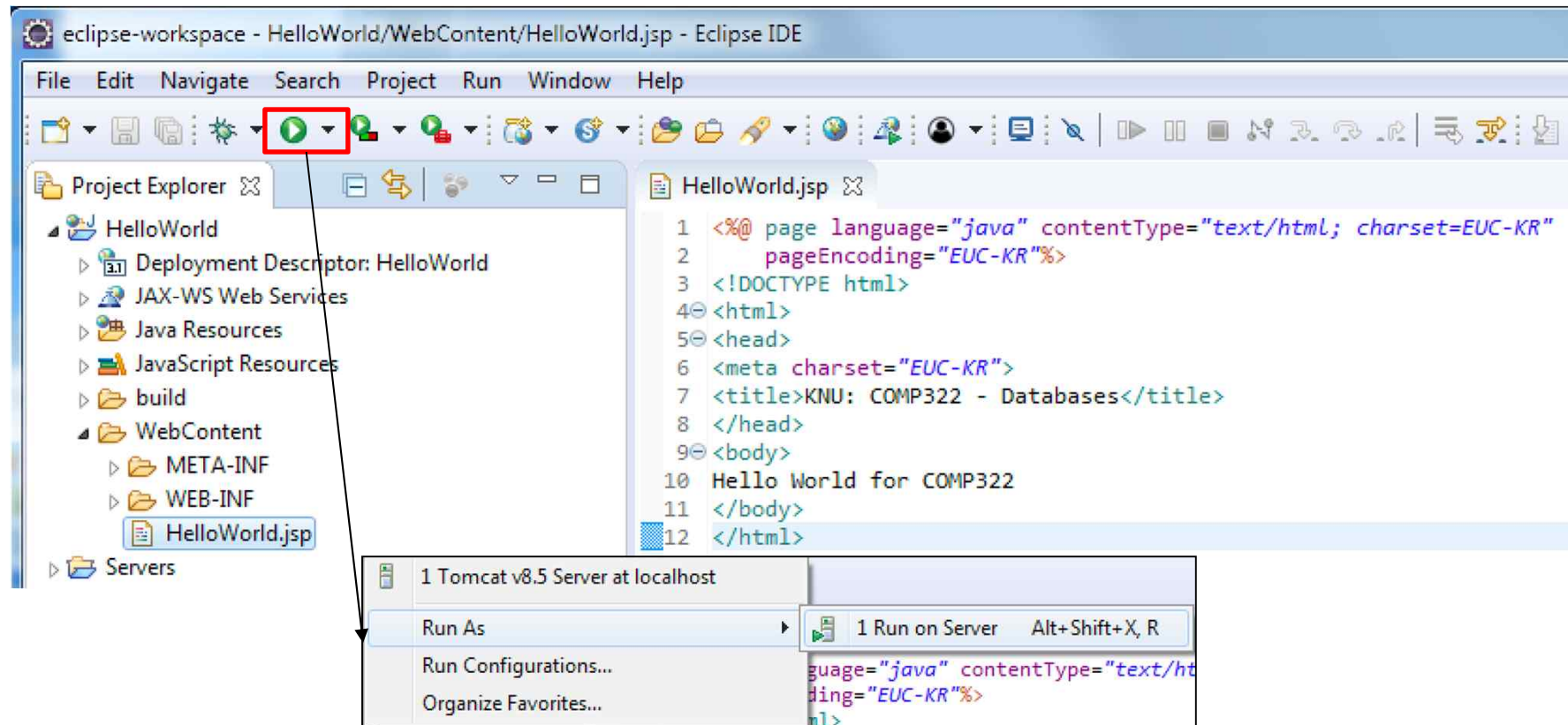
Step 12: JSP 파일 생성 (Cont'd)

- JSP 파일 선택 후,
Next



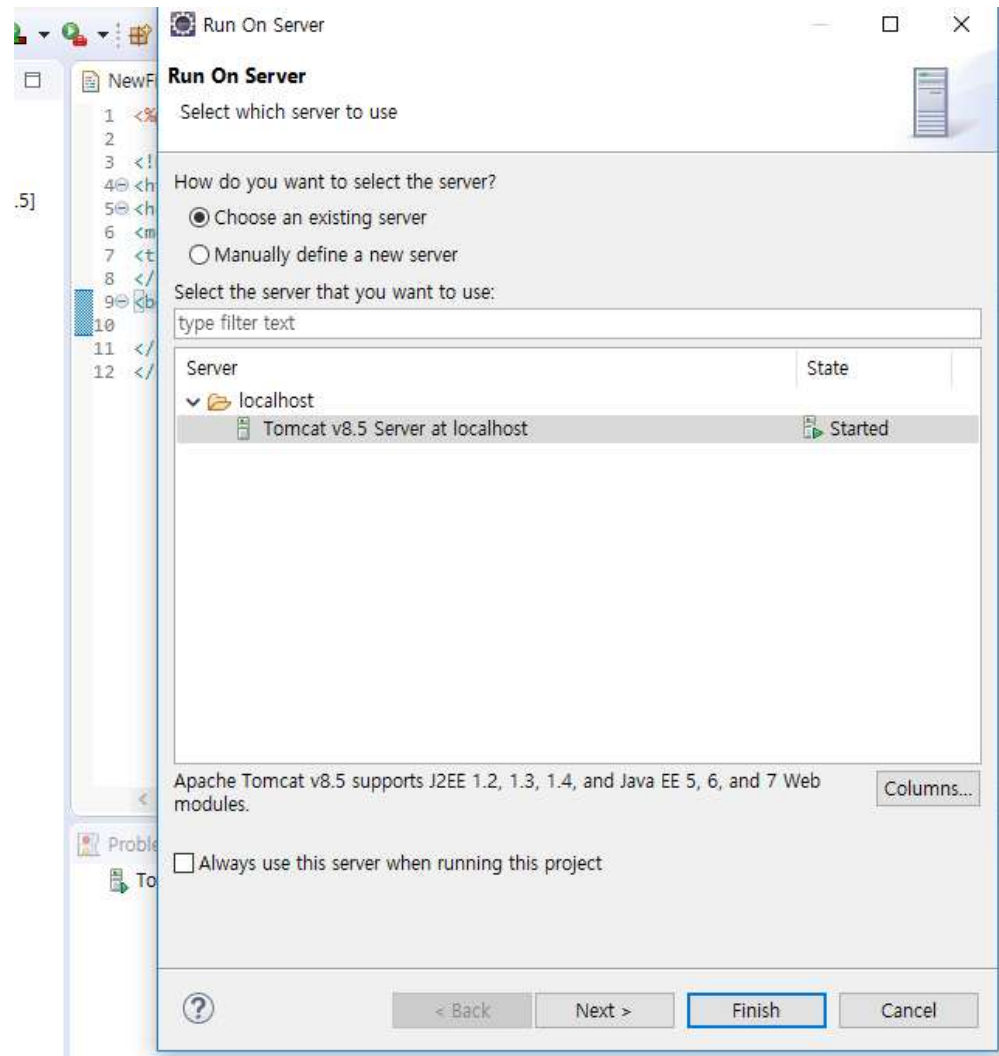
Step 13: 예제 실행

- Hello World 입력 후 실행 클릭



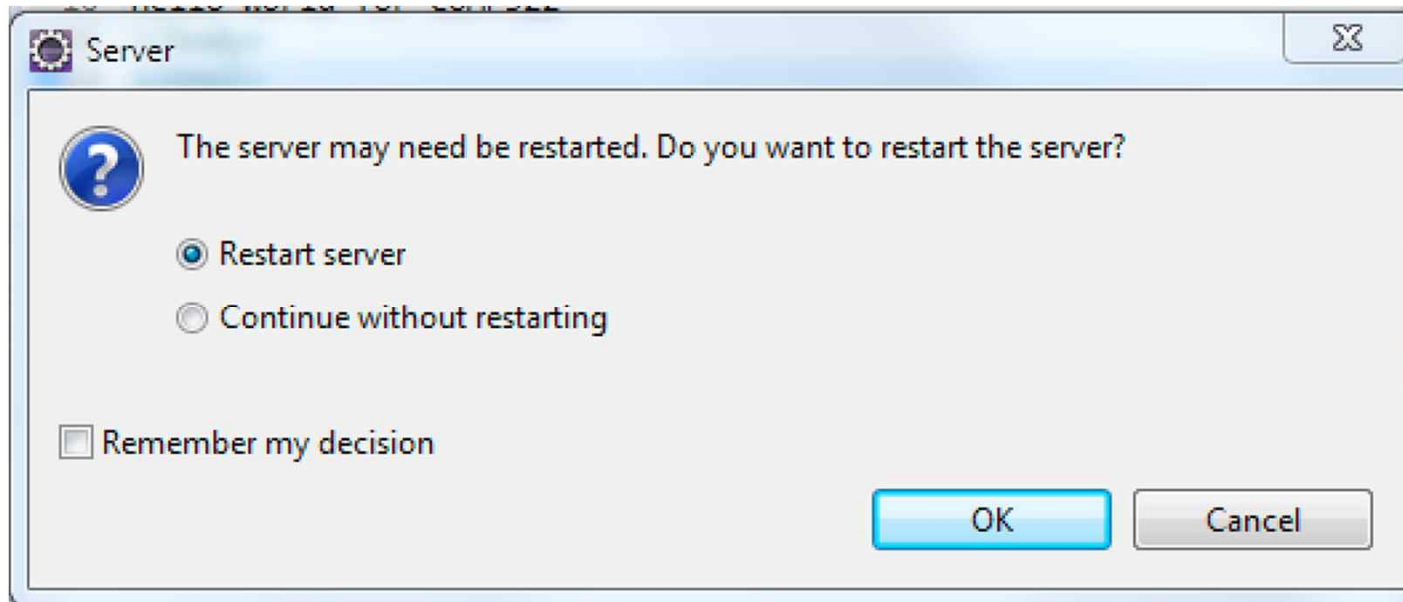
Step 13: 예제 실행 (Cont'd)

- Finish 선택



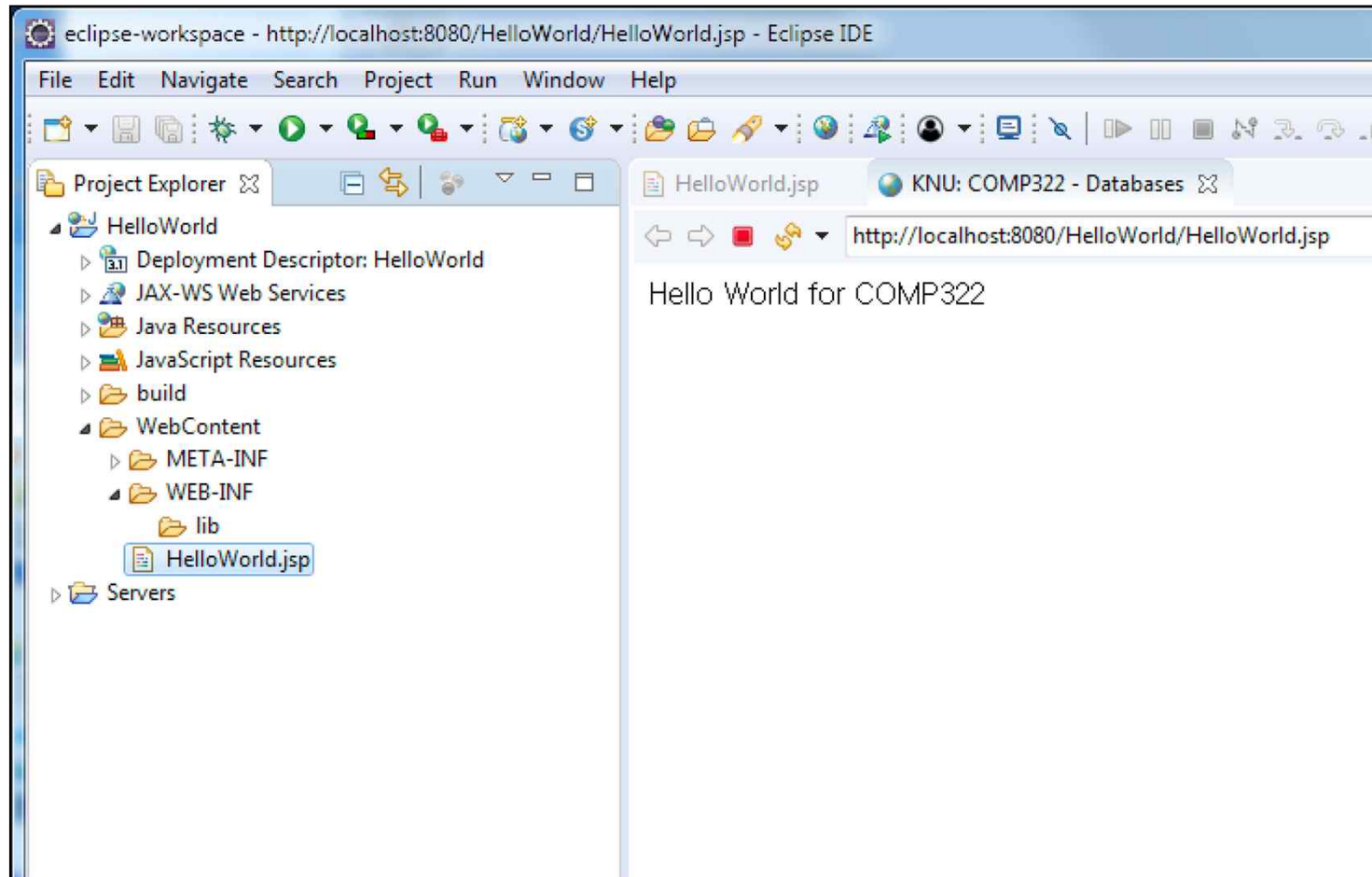
Step 13: 예제 실행 (Cont'd)

- Server Restart를 물어보면 Restart를 선택



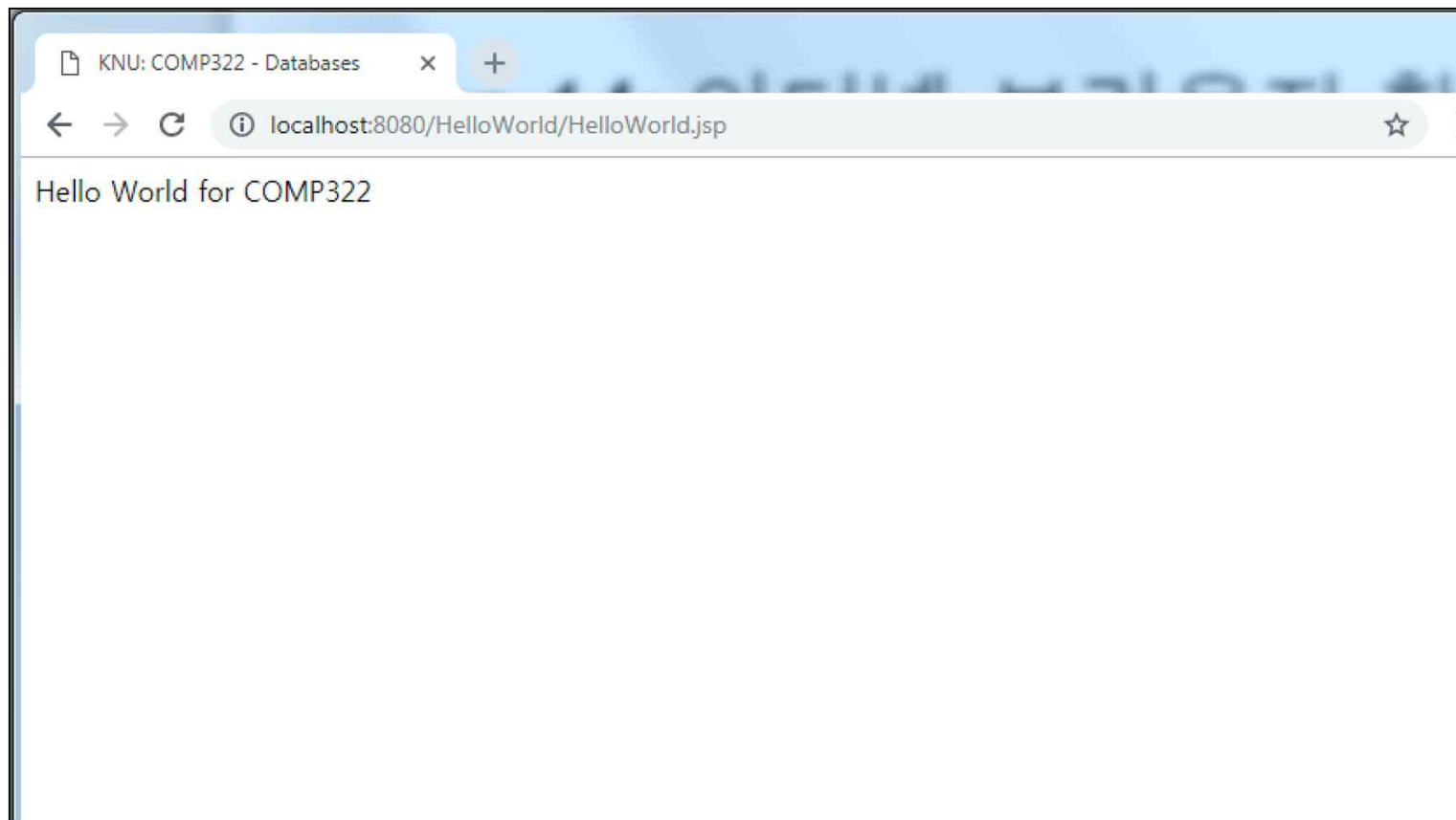
Step 13: 예제 실행 (Cont'd)

- 다음과 같은 창이 보이면 성공

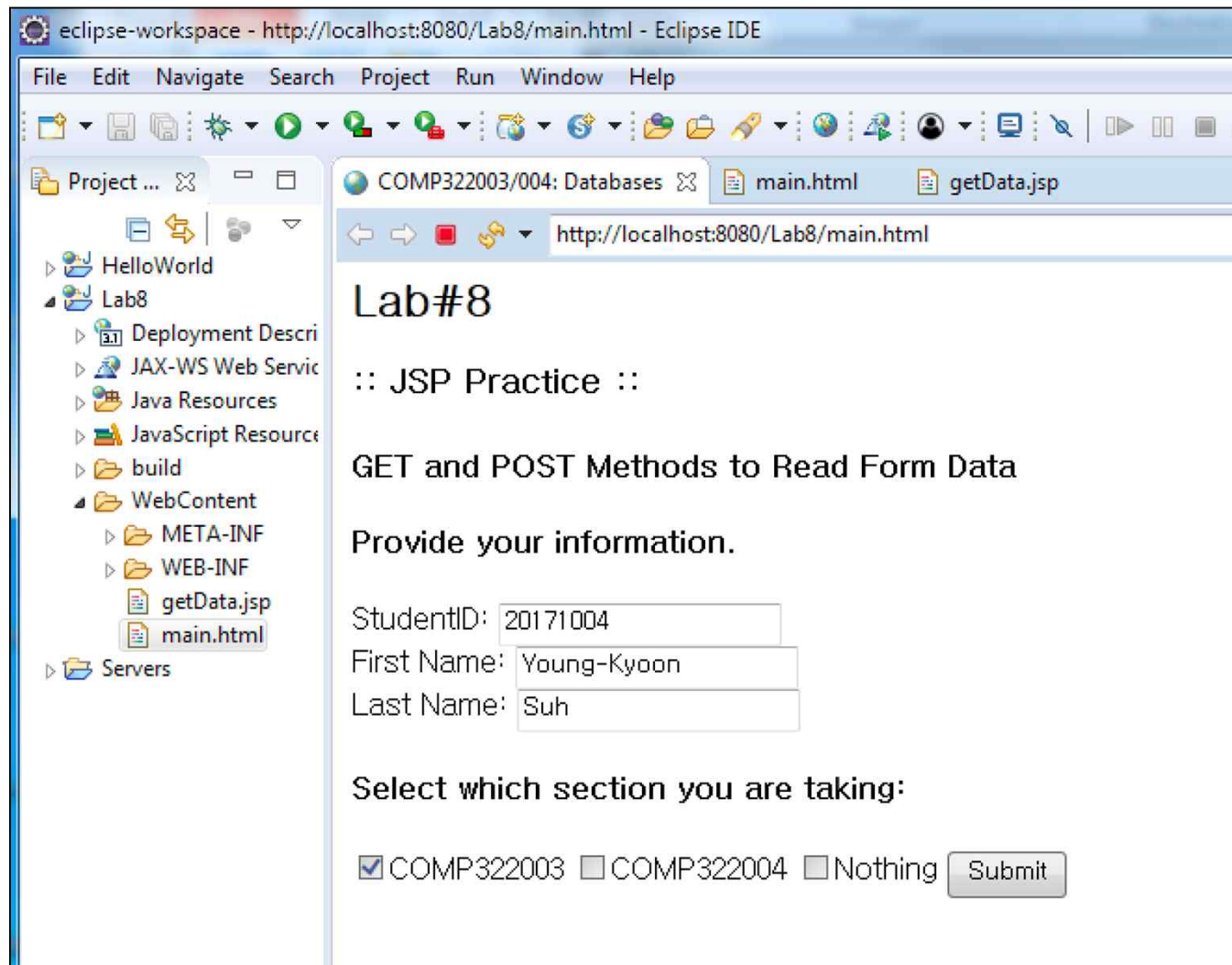


Step 14: 인터넷 브라우저 확인

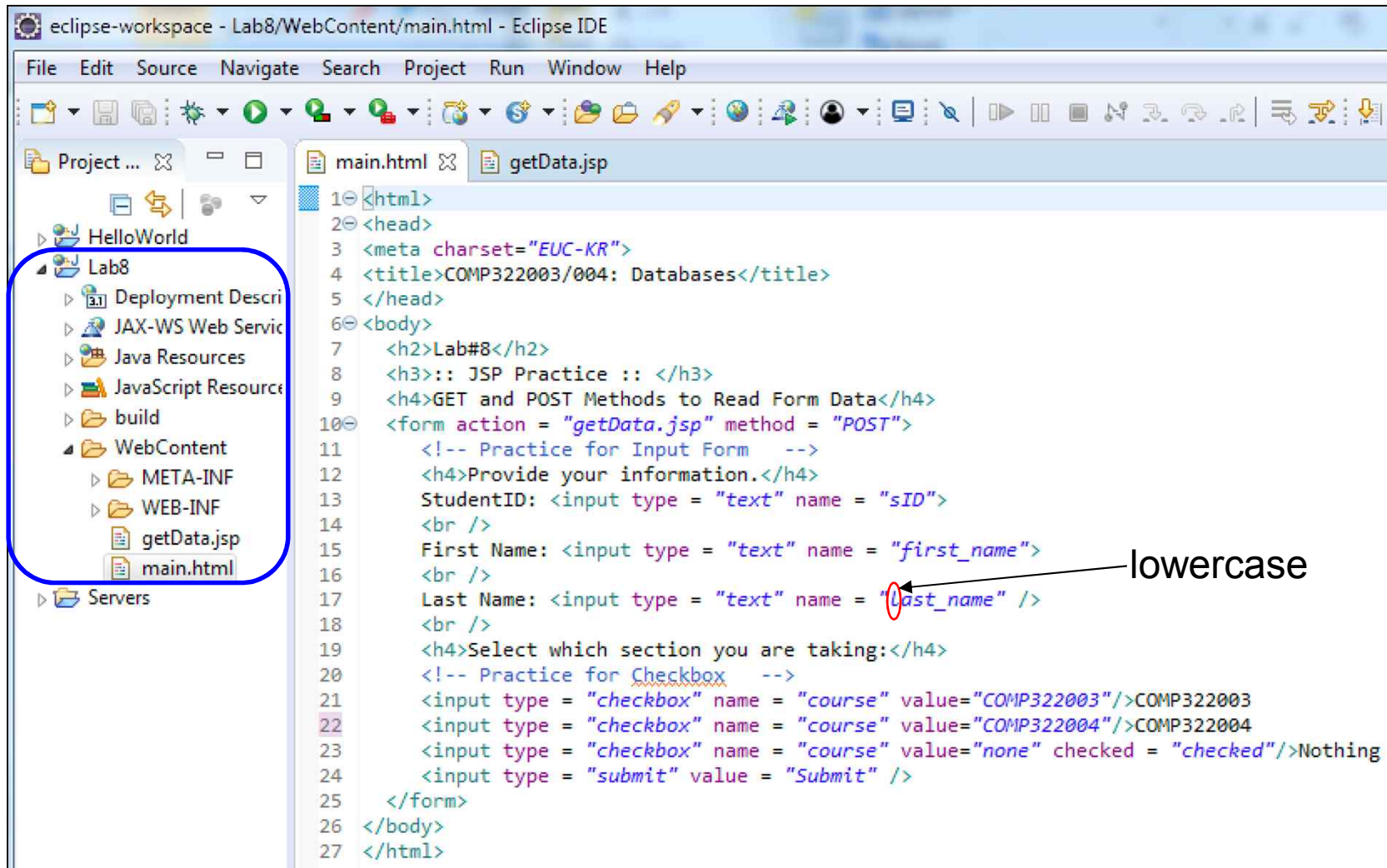
- 이클립스에서 보이는 창의 주소를 복사하여 브라우저에 입력하면 똑같은 창을 확인할 수 있음



Lab #8: “학번/이름 수업번호” 받아오기



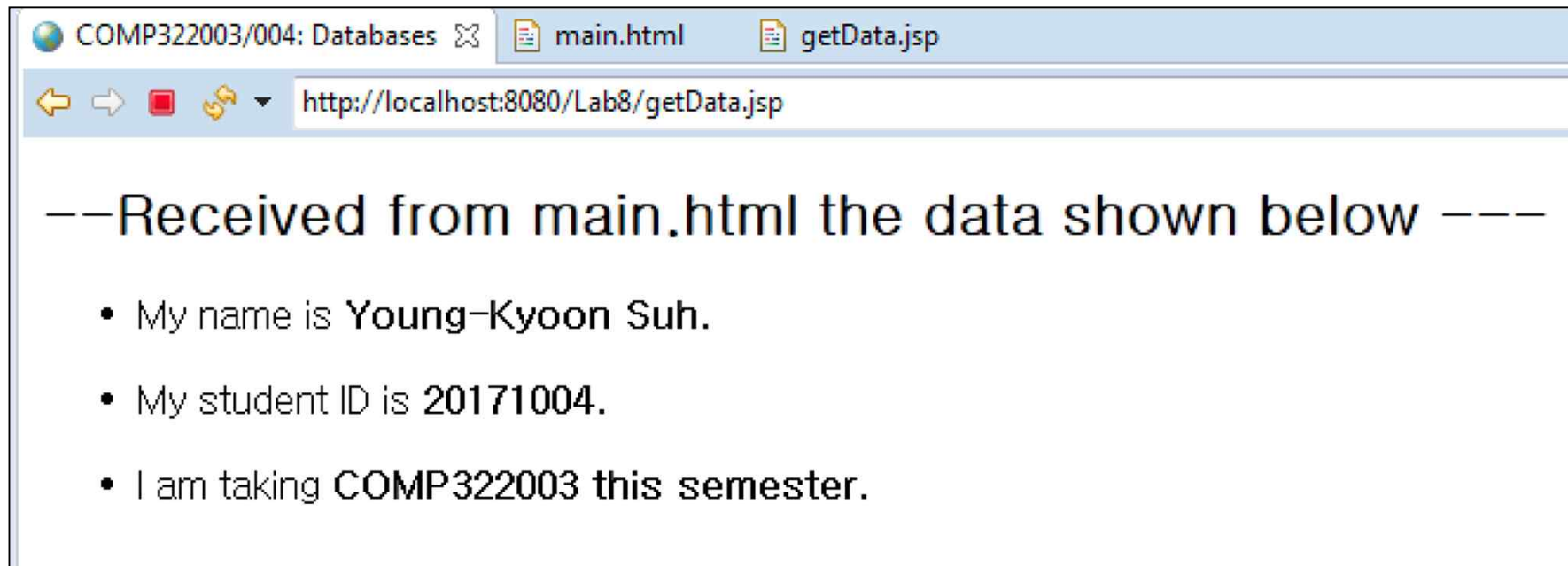
Lab8 / WebContent / main.html



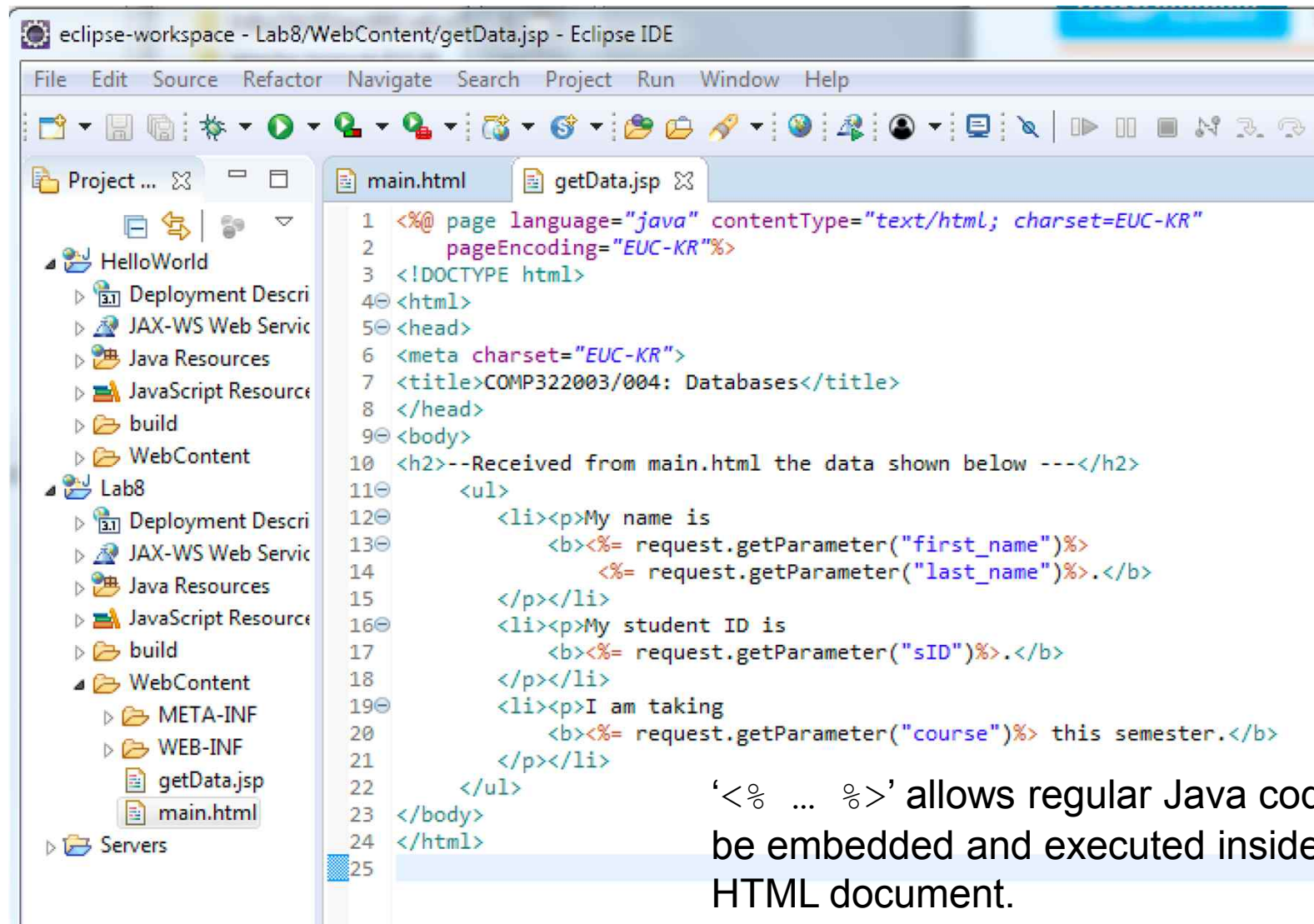
The screenshot shows the Eclipse IDE interface. The Project Explorer on the left displays the project structure, with the 'WebContent' folder and its sub-files 'main.html' and 'getData.jsp' highlighted by a blue circle. The main editor window shows the content of 'main.html', which is an HTML form for a JSP practice. The form includes text input fields for StudentID, First Name, and Last Name, and a section with checkboxes for selecting a course section. An arrow points from the word 'lowercase' to the 'last_name' attribute in the Last Name input field, indicating a correction from 'Last' to 'last'.

```
1 <html>
2 <head>
3   <meta charset="EUC-KR">
4   <title>COMP322003/004: Databases</title>
5 </head>
6 <body>
7   <h2>Lab#8</h2>
8   <h3>:: JSP Practice :: </h3>
9   <h4>GET and POST Methods to Read Form Data</h4>
10  <form action = "getData.jsp" method = "POST">
11    <!-- Practice for Input Form -->
12    <h4>Provide your information.</h4>
13    StudentID: <input type = "text" name = "sID">
14    <br />
15    First Name: <input type = "text" name = "first_name">
16    <br />
17    Last Name: <input type = "text" name = "last_name" />
18    <br />
19    <h4>Select which section you are taking:</h4>
20    <!-- Practice for Checkbox -->
21    <input type = "checkbox" name = "course" value="COMP322003"/>COMP322003
22    <input type = "checkbox" name = "course" value="COMP322004"/>COMP322004
23    <input type = "checkbox" name = "course" value="none" checked = "checked"/>Nothing
24    <input type = "submit" value = "Submit" />
25  </form>
26 </body>
27 </html>
```

Lab #8: “학번/이름 수업번호” 받아오기



Lab8 / WebContent / getData.jsp



```
1 <%@ page language="java" contentType="text/html; charset=EUC-KR"
2   pageEncoding="EUC-KR"%>
3 <!DOCTYPE html>
4 <html>
5 <head>
6   <meta charset="EUC-KR">
7   <title>COMP322003/004: Databases</title>
8 </head>
9 <body>
10 <h2>--Received from main.html the data shown below ---</h2>
11   <ul>
12     <li><p>My name is
13       <b><%= request.getParameter("first_name")%>
14         <%= request.getParameter("last_name")%>.</b>
15     </p></li>
16     <li><p>My student ID is
17       <b><%= request.getParameter("sID")%>.</b>
18     </p></li>
19     <li><p>I am taking
20       <b><%= request.getParameter("course")%> this semester.</b>
21     </p></li>
22   </ul>
23 </body>
24 </html>
25
```

‘<% ... %>’ allows regular Java code be embedded and executed inside HTML document.

Lab #8: “학번/이름 수업번호” 받아오기

[Submission]

- Deadline: **midnight** (11/01/2018)
- Name your files like:
 - ‘lab8-Your_Student_ID.html’ and
 - ‘lab8-Your_Student_ID.jsp’
- Get a screenshot from your Web app and save them each as
 - ‘lab8-Your_Student_ID_main.jpg’ and
 - ‘lab8-Your_Student_ID_result.jpg’
- Zip the four files.
- Upload the zip file into LMS.