

# Build & Deploy

## ▶ 아파치 톰캣

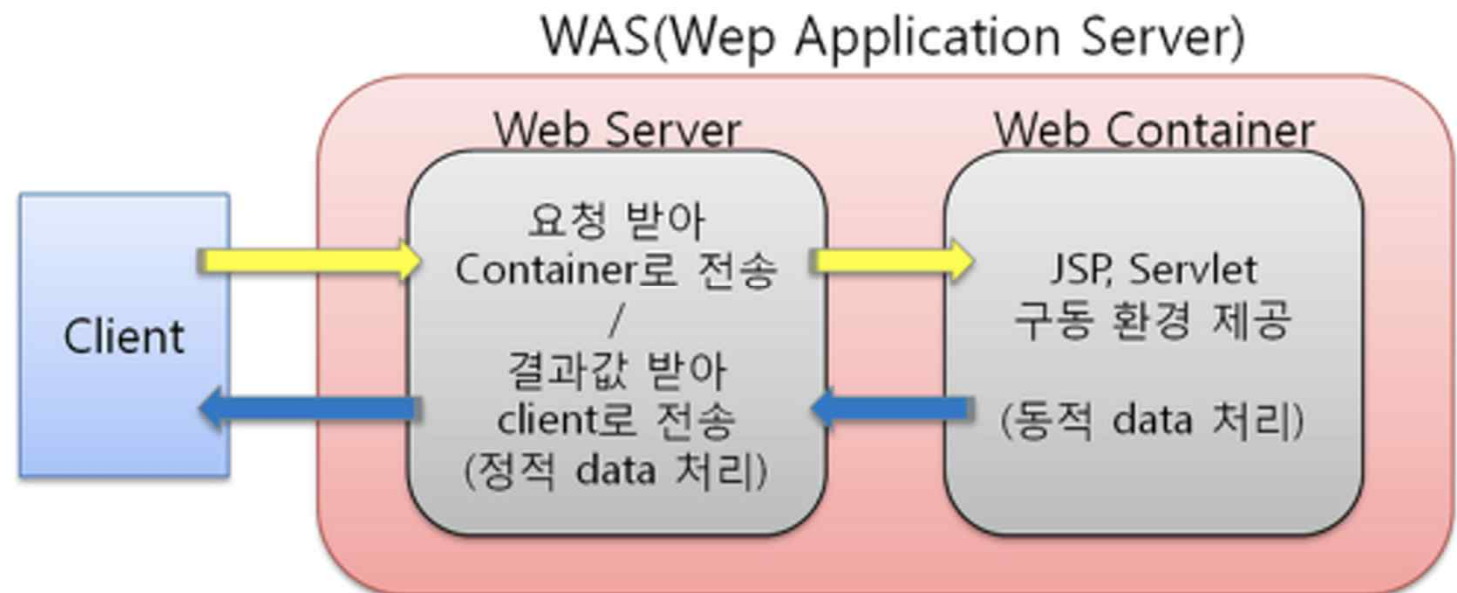
아파치 톰캣은 웹서버와 웹애플리케이션 서버의 통합 프로그램

아파치는 웹 서버로서 정적인 페이지를 처리하는데 이용된다.


톰캣은 Web Application Server로 동적인 페이지를 처리하는데 이용된다.

=> 자바를 실행해준다 생각하자

웹서버와 WAS의 가장 큰 차이점은 Web Container의 유무




# ▶ 아파치 톰캣 설치



## Apache Tomcat®

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### Apache Tomcat

- Home
- Taglibs
- Maven Plugin

### Download

- Which version?
- Tomcat 11 (alpha)
- Tomcat 10
- Tomcat 9
- Tomcat 8
- Tomcat Migration Tool

### Apache Tomcat

The Apache Tomcat® software is an open source implementation of the [Jakarta Servlet](#), [Jakarta Server Pages](#), [Jakarta Expression Language](#), [Jakarta Web Services](#) specifications. These specifications are part of the [Jakarta EE platform](#).

The Jakarta EE platform is the evolution of the Java EE platform. Tomcat 10 and later implement specifications developed as part of Jakarta EE. Tomcat 9 and earlier implement specifications developed as part of the Java EE platform.

The Apache Tomcat software is developed in an open and participatory environment and released under the [Apache License version 2](#). The Apache Tomcat developers from around the world. We invite you to participate in this open development project. To learn more about getting involved, [click here](#).

Apache Tomcat software powers numerous large-scale, mission-critical web applications across a diverse range of industries and organizations. Some of the organizations that use Apache Tomcat include Amazon, Google, IBM, Intel, Microsoft, Oracle, SAP, and VMware.

Apache Tomcat, Tomcat, Apache, the Apache feather, and the Apache Tomcat project logo are trademarks of the Apache Software Foundation.

### Tomcat Connectors 1.2.49 Released












The Apache Tomcat Project is proud to announce the release of version 1.2.49 of Apache Tomcat Connectors. This version fixes a number of bugs found in the previous version. For more information, please see the [Download](#) | [ChangeLog for 1.2.49](#).

### Tomcat 10.1.13 Released

The Apache Tomcat Project is proud to announce the release of version 10.1.13 of Apache Tomcat. This release implements specifications that are part of the Jakarta EE platform.

# ▶ 환경 설정

apache-tomcat-9.0.73 > conf

 Catalina	9/23/2023 10:12 PM	File folder	
 catalina.policy	2/27/2023 3:33 PM	POLICY File	13 KB
 catalina.properties	2/27/2023 3:33 PM	Properties Source File	8 KB
 context.xml	9/23/2023 10:12 PM	xmlfile	2 KB
 jaspic-providers.xml	2/27/2023 3:33 PM	xmlfile	2 KB
 jaspic-providers.xsd	2/27/2023 3:33 PM	XSD File	3 KB
 logging.properties	2/27/2023 3:33 PM	Properties Source File	5 KB
 server.xml	9/23/2023 11:15 PM	xmlfile	8 KB
 tomcat-users.xml	9/23/2023 10:12 PM	xmlfile	3 KB
 tomcat-users.xsd	2/27/2023 3:33 PM	XSD File	3 KB
 web.xml	9/23/2023 10:12 PM	xmlfile	169 KB

## ▶ Tomcat & Catalina

톰캣은 오픈소스 자바 서블릿 컨테이너이며 Java코드를 실행하는 Java Http 웹서버라고 보면 된다.

Catalina는 톰캣의 여러 부품 중 코어 컴포넌트에 해당된다.

- 톰캣 서블릿의 실질적인 구동 기능을 제공한다고 보면 된다. 즉, 톰캣 서버를 구동시킨다는 말은 카탈리나를 구동시킨다고 생각하면 된다.

## ▶ 환경 설정(server.xml - 1)

Context 설정은 하나의 웹 애플리케이션 자체의 설정, 즉 전역적인 Context 설정이다. 여기에 정의된 설정은 해당 톰캣에서 구동되는 모든 애플리케이션에 적용된다.(권장되지 않음)

톰캣의 메인 설정 파일이 server.xml이며, 서버로의 연결을 위한 각종 port 등을 설정한다.

톰캣에 request가 들어오게 되면 거기에 맞는 context를 찾고, context는 자신이 설정되어 있는 애플리케이션의 web.xml을 기반으로 전달받은 요청을 서블릿에게 전달하여 처리되도록 한다

서버에서 읽혀지는 순서는 request->Catalina->Context->Servlet->response 또한 아파치 톰캣이 실행될때(서버가 실행될 때) 한번만 실행된다.

## ▶ 환경 설정(server.xml - 2)

톰캣 서버 중지를 위한 접속 포트 번호 설정

```
--><!-- Note: A "Server" is not itself a "Container", so you may not  
      define subcomponents such as "Valves" at this level.  
      Documentation at /docs/config/server.html  
--><Server port="8005" shutdown="SHUTDOWN">  
  <Listener className="org.apache.catalina.startup.VersionLoggerListener"/>
```

HTTP 연결에 사용될 포트 설정

```
-->  
<Connector connectionTimeout="20000" port="8090" protocol="HTTP/1.1" redirectPort="8443"/>
```

WEB서버 연결에 사용될 포트 설정 - AJP

```
<Connector protocol="AJP/1.3"  
  address="::1"  
  port="8009"  
  redirectPort="8443" />  
-->
```

## ▶ 환경 설정(server.xml - 3)

Host 옵션은 가상의 호스트를 정의하는데 항목들의 정의는 아래와 같다

- autoDeploy : 항목이 true일 경우 WAR파일을 appBase 디렉토리에 위치시키면 톰캣 구동시 WAR파일을 자동으로 읽어서 배포(deploy)한다.
- unpackWARs : 항목이 true일 경우 WAR파일의 압축을 풀어서 배치한다.
- appBase : \${catalina-home} 밑의 상대경로를 지정하거나 절대경로를 지정한다.(기본 설정은 톰캣 디렉토리의 아래의 webapps 이며 <context>태그를 통하여 추가 설정 가능

```
<Host appBase="webapps" autoDeploy="true" name="localhost" unpackWARs="true">
```



## ▶ 환경 설정(context.xml)

웹 애플리케이션의 자원들을 명시해주는 설정 파일이다.  
여기에 web.xml 파일의 위치를 작성하여 준다.

```
<!-- Default set of monitored resources. If one of these changes, the -->  
<!-- web application will be reloaded. -->  
<WatchedResource>WEB-INF/web.xml</WatchedResource>  
<WatchedResource>WEB-INF/tomcat-web.xml</WatchedResource>  
<WatchedResource>${catalina.base}/conf/web.xml</WatchedResource>  
  
<!-- Uncomment this to disable session persistence across Tomcat restarts -->
```

## ▶ 환경 설정(web.xml)

conf/web.xml : 톰캣 내 모든 webApp의 공통 설정

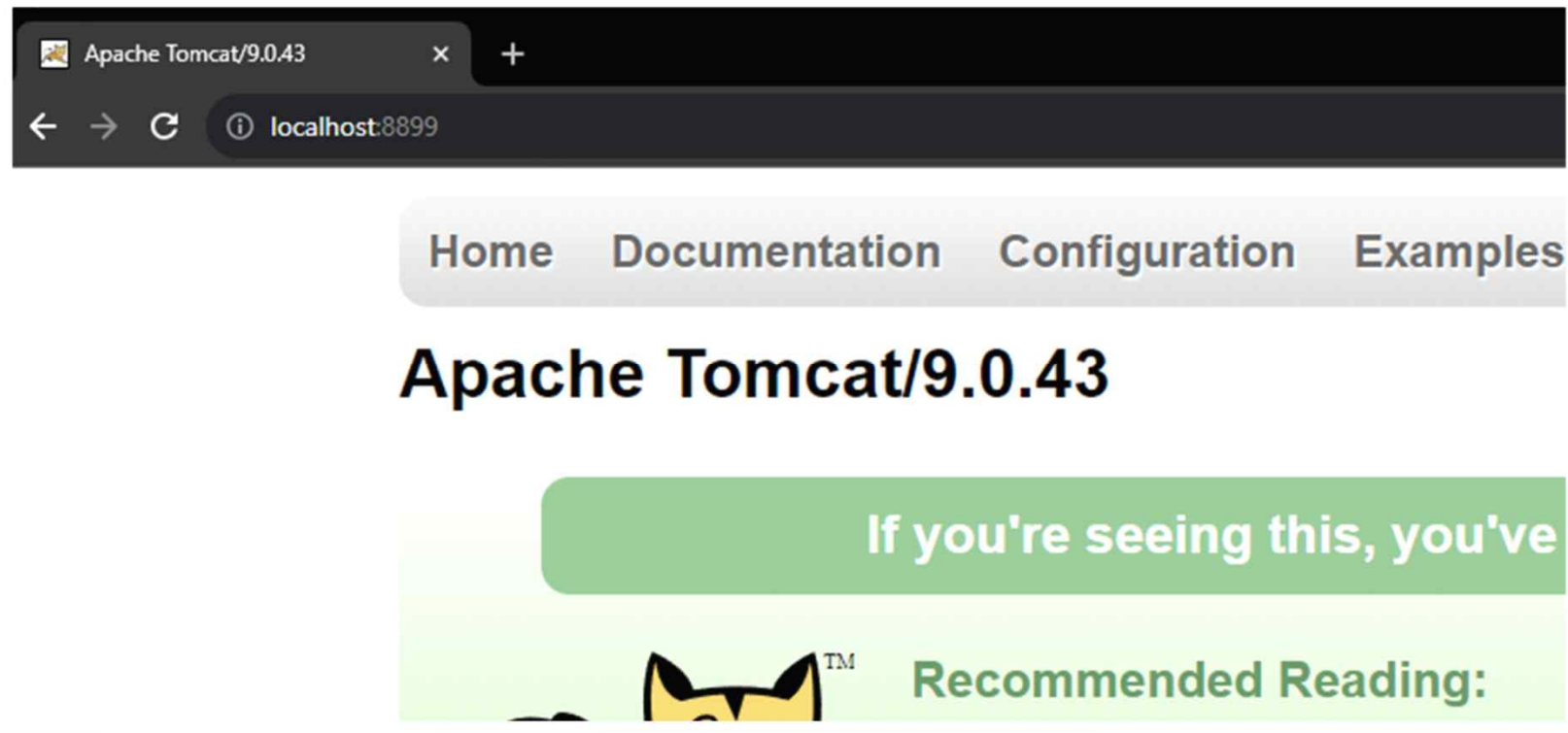
webApp/WEB-INF/web.xml : 각 프로젝트별 webApp의 개별 설정

```
<!-- The mapping for the default servlet -->
<servlet-mapping>
  <servlet-name>default</servlet-name>
  <url-pattern>/</url-pattern>
</servlet-mapping>

<!-- The mappings for the JSP servlet -->
<servlet-mapping>
  <servlet-name>jsp</servlet-name>
  <url-pattern>*.jsp</url-pattern>
  <url-pattern>*.jspx</url-pattern>
</servlet-mapping>
```

# ▶ 서버 실행 및 테스트

```
C:\>cd apache-tomcat-9.0.43
C:\apache-tomcat-9.0.43>cd bin
C:\apache-tomcat-9.0.43\bin>startup.bat
Using CATALINA_BASE:   "C:\apache-tomcat-9.0.43"
Using CATALINA_HOME:   "C:\apache-tomcat-9.0.43"
Using CATALINA_TMPDIR: "C:\apache-tomcat-9.0.43\temp"
Using JRE_HOME:        "C:\Program Files\Eclipse Foundation\jdk-11.0.12.7-hotspot"
Using CLASSPATH:       "C:\apache-tomcat-9.0.43\bin\bootstrap.jar;C:\apache-tomcat-9.0.43\bin\tomcat-juli.jar"
Using CATALINA_OPTS:   ""
C:\apache-tomcat-9.0.43\bin>_
```



# ▶ 아파치 톰캣 설치 - 관리자 화면

← → ↻ ⓘ localhost:8899/manager/html

Sign in

http://localhost:8899

Username

Password

Sign in

Cancel

# ▶ 아파치 톰캣 설치 - 관리자 설정

Local Disk (C:) > apache-tomcat-9.0.43 > conf

Name	Date modified	Type	Size
Catalina	9/5/2023 9:04 PM	File folder	
catalina.policy	1/28/2021 8:28 PM	POLICY File	13 KB
catalina.properties	1/28/2021 8:28 PM	PROPERTIES File	8 KB
context.xml	9/5/2023 9:04 PM	XML Document	2 KB
jaspic-providers.xml	1/28/2021 8:28 PM	XML Document	2 KB
jaspic-providers.xsd	1/28/2021 8:28 PM	XML Schema File	3 KB
logging.properties	1/28/2021 8:28 PM	PROPERTIES File	5 KB
server.xml	10/3/2023 5:11 PM	XML Document	8 KB
tomcat-users.xml	9/5/2023 9:04 PM	XML Document	3 KB
tomcat-users.xsd	1/28/2021 8:28 PM	XML Schema File	3 KB
web.xml	9/5/2023 9:04 PM	XML Document	169 KB

```
-->  
<role rolename="manager-script" />  
<role rolename="manager-gui" />  
<role rolename="manager-jmx" />  
<role rolename="manager-status" />  
<user username="admin" password="nimda1234" roles="manager-gui,manger-script,manger-status, mangager-jmx" />  
</tomcat-users>
```

## ▶ 아파치 톰캣 설치 - 관리자 설정(remote)

```
C: > apache-tomcat-9.0.43 > conf > Catalina > localhost > * manager.xml
```

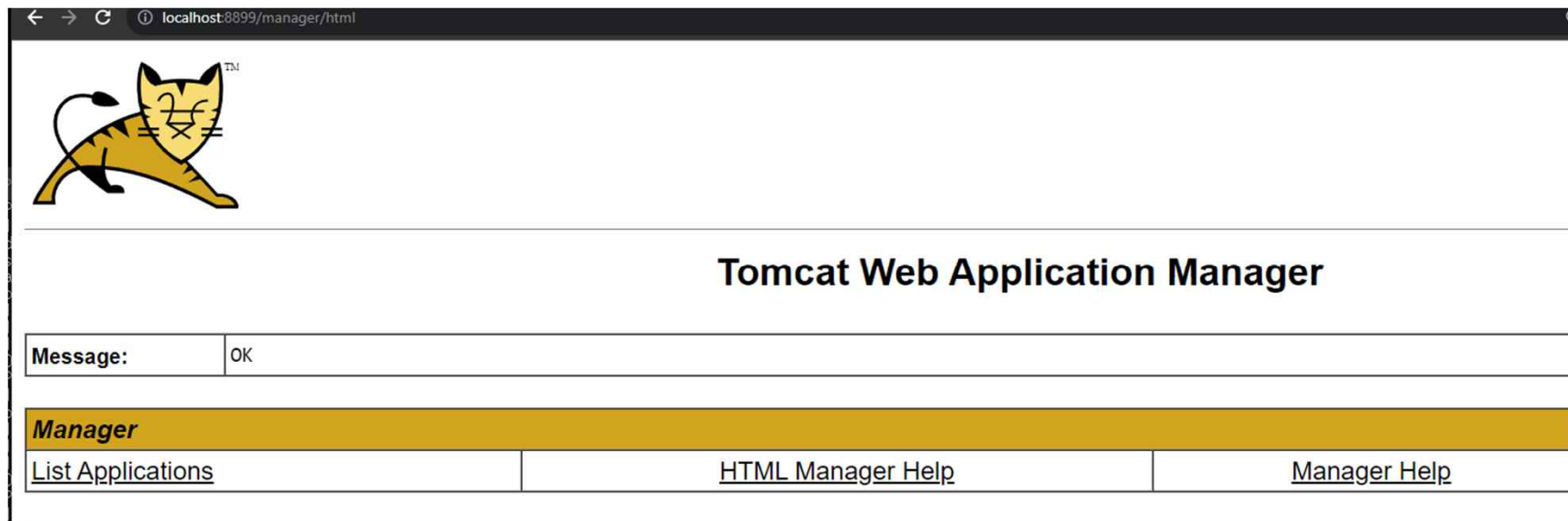
```
1 <Context privileged="true" antiResourceLocking="false" docBase="${catalina.home}/webapps/manager">
2   <Valve className="org.apache.catalina.valves.RemoteAddValve" allow="^.*$" />
3 </Context>
```

# ▶ 아파치 톰캣 설치 - 재시동

```

Using CATALINA_OPTS: ""
C:\wapache-tomcat-9.0.43\bin>shutdown
Using CATALINA_BASE: "C:\wapache-tomcat-9.0.43"
Using CATALINA_HOME: "C:\wapache-tomcat-9.0.43"
Using CATALINA_TMPDIR: "C:\wapache-tomcat-9.0.43\temp"
Using JRE_HOME: "C:\Program Files\Eclipse Foundation\jdk-11.0.12.7-hotspot"
Using CLASSPATH: "C:\wapache-tomcat-9.0.43\bin\bootstrap.jar;C:\wapache-tomcat-9.0.43\bin\tomcat-juli.jar"
Using CATALINA_OPTS: ""
NOTE: Picked up JDK_JAVA_OPTIONS:  --add-opens=java.base/java.lang=ALL-UNNAMED --add-opens=java.base/java.io=ALL-UNNAMED
--add-opens=java.base/java.util=ALL-UNNAMED --add-opens=java.base/java.util.concurrent=ALL-UNNAMED --add-opens=java.rmi
/sun.rmi.transport=ALL-UNNAMED
C:\wapache-tomcat-9.0.43\bin>

```





# ▶ 빌드 도구 설치(Maven) - 1. 다운로드

← → ↻ maven.apache.org



## Apache Maven Project

<http://maven.apache.org/>

[Apache](#) / [Maven](#) / Welcome to Apache Maven

Welcome

[License](#)

ABOUT MAVEN

[What is Maven?](#)

[Features](#)

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[Release Notes](#)

DOCUMENTATION

[Maven Plugins](#)

[Maven Extensions](#)

## Welcome to Apache Maven

Apache Maven is a software project management and comprehension tool. Based on the concept of a pro

If you think that Maven could help your project, you can find out more information in the "About Maven" se

This site is separated into the following sections, depending on how you'd like to use Maven:

Use

[Download, Install, Configure, Run Maven](#)

Information for those needing to build a project that uses Maven

Extend

[Write Maven Plugins](#)

Information for developers writing Maven plugins.



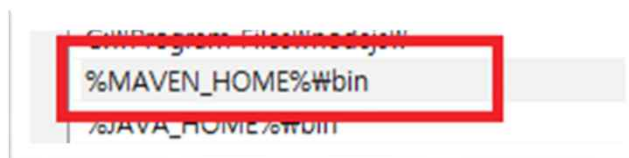
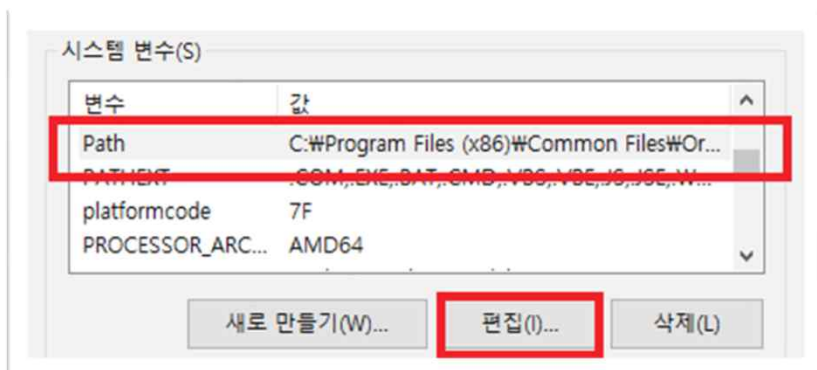
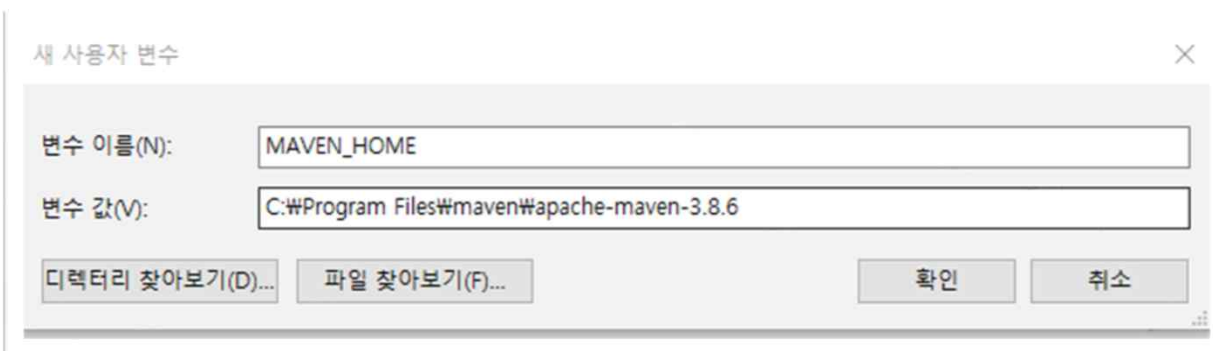
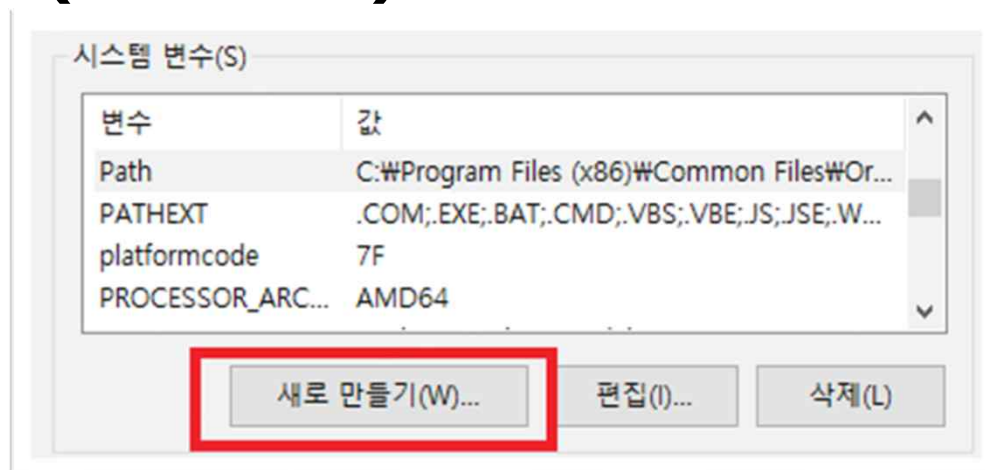
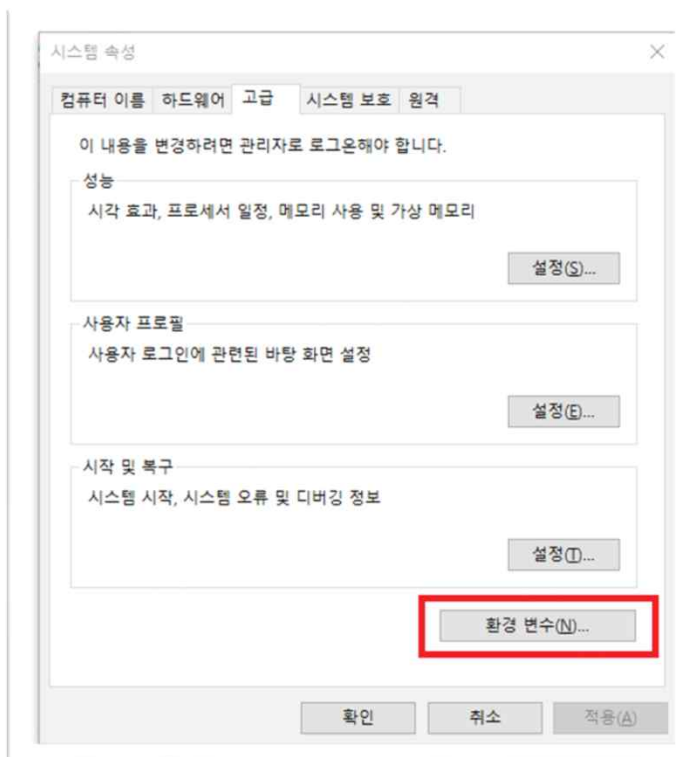
# ▶ 빌드 도구 설치(Maven) - 2. 압축해제

## Files

Maven is distributed in several formats for your convenience. Simply pick a ready-made binary distribution archive and follow the [instructions](#).  
In order to guard against corrupted downloads/installations, it is highly recommended to [verify the signature](#) of the release bundles.

	Link
Binary tar.gz archive	<a href="#">apache-maven-3.9.4-bin.tar.gz</a>
Binary zip archive	<a href="#">apache-maven-3.9.4-bin.zip</a>
Source tar.gz archive	<a href="#">apache-maven-3.9.4-src.tar.gz</a>
Source zip archive	<a href="#">apache-maven-3.9.4-src.zip</a>

# ▶ 빌드 도구 설치(Maven) - 3. 경로설정



```
C:\Users\USER>mvn -version
Apache Maven 3.8.6 (84538c9988a25
Maven home: C:\Program Files\mave
```

# ▶ 메이븐 프로젝트 생성하기

```

#Codes#Maven>mvn archetype:generate
[INFO] Scanning for projects...
[INFO]
[INFO] -----< org.apache.maven:standalone-pom >-----
[INFO] Building Maven Stub Project (No POM) 1
[INFO] -----[ pom ]-----
[INFO]
[INFO] >>> archetype:3.2.1:generate (default-cli) > generate-sources @ standalone-pom >>>
[INFO]
[INFO] <<< archetype:3.2.1:generate (default-cli) < generate-sources @ standalone-pom <<<
[INFO]
[INFO] --- archetype:3.2.1:generate (default-cli) @ standalone-pom ---
[INFO] Generating project in Interactive mode
[INFO] No archetype defined. Using maven-archetype-quickstart (org.apache.maven.archetypes:maven-archetype-quickstart:1.0)
Choose archetype:

```

```

319: remote -> ws.osiris:osiris-archetype (Maven Archetype for Osiris)
320: remote -> xyz.luan.generator:xyz-gae-generator (-)
321: remote -> xyz.luan.generator:xyz-generator (-)
322: remote -> za.co.absa.hyperdrive:component-archetype (-)
323: remote -> za.co.absa.hyperdrive:component-archetype_2.11 (-)
324: remote -> za.co.absa.hyperdrive:component-archetype_2.12 (-)
Choose a number or apply filter (format: [groupId:]artifactId, case sensitive contains): 2081:
Choose org.apache.maven.archetypes:maven-archetype-quickstart version:

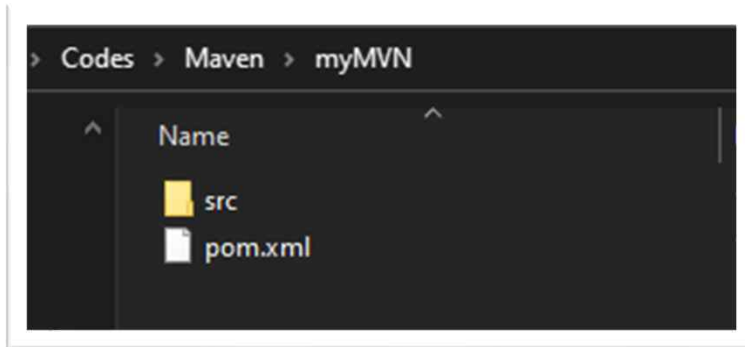
```

```

Downloaded from central: https://repo.maven.apache.org/maven2/org/apache
Define value for property 'groupId': com.MVNTTest
Define value for property 'artifactId': myMVN
Define value for property 'version' 1.0-SNAPSHOT: : 1.0
Define value for property 'package' com.MVNTTest: : com.MVNTTest.pjt
Confirm properties configuration:

```

## ▶ 메이븐 프로젝트 생성 결과



pom.xml 파일과 소스 디렉토리등이 생성된다.

## ▶ settings.xml 파일

```
:₩>cd %maven_home%

:₩Program Files₩apache-maven-3.9.4>cd conf

:₩Program Files₩apache-maven-3.9.4₩conf>dir
Volume in drive C has no label.
Volume Serial Number is 76D2-4431

Directory of C:₩Program Files₩apache-maven-3.9.4₩conf

0/03/2023  06:28 PM    <DIR>          .
0/03/2023  06:28 PM    <DIR>          ..
0/03/2023  06:28 PM    <DIR>          logging
7/26/2023  09:37 AM             10,528 settings.xml
7/26/2023  09:37 AM             3,645 toolchains.xml
               2 File(s)             14,173 bytes
               3 Dir(s)  955,986,997,248 bytes free
```

전역 settings.xml의 기본 위치이다.

사용자별 settings.xml의 위치는 %homepath%₩.m2₩settings.xml 이지만,  
존재하지 않을 수 있다. 사용자 settings.xml파일을 따로 정의하고 싶다면 복  
사해서 사용한다.

## ▶ Local Repository

Maven이 온라인(원격) repository에서 다운로드 한 artifacts와 로컬에서 생성된 artifacts들을 저장하는 공간

- 기본 위치는 %homepath%/.m2/repository

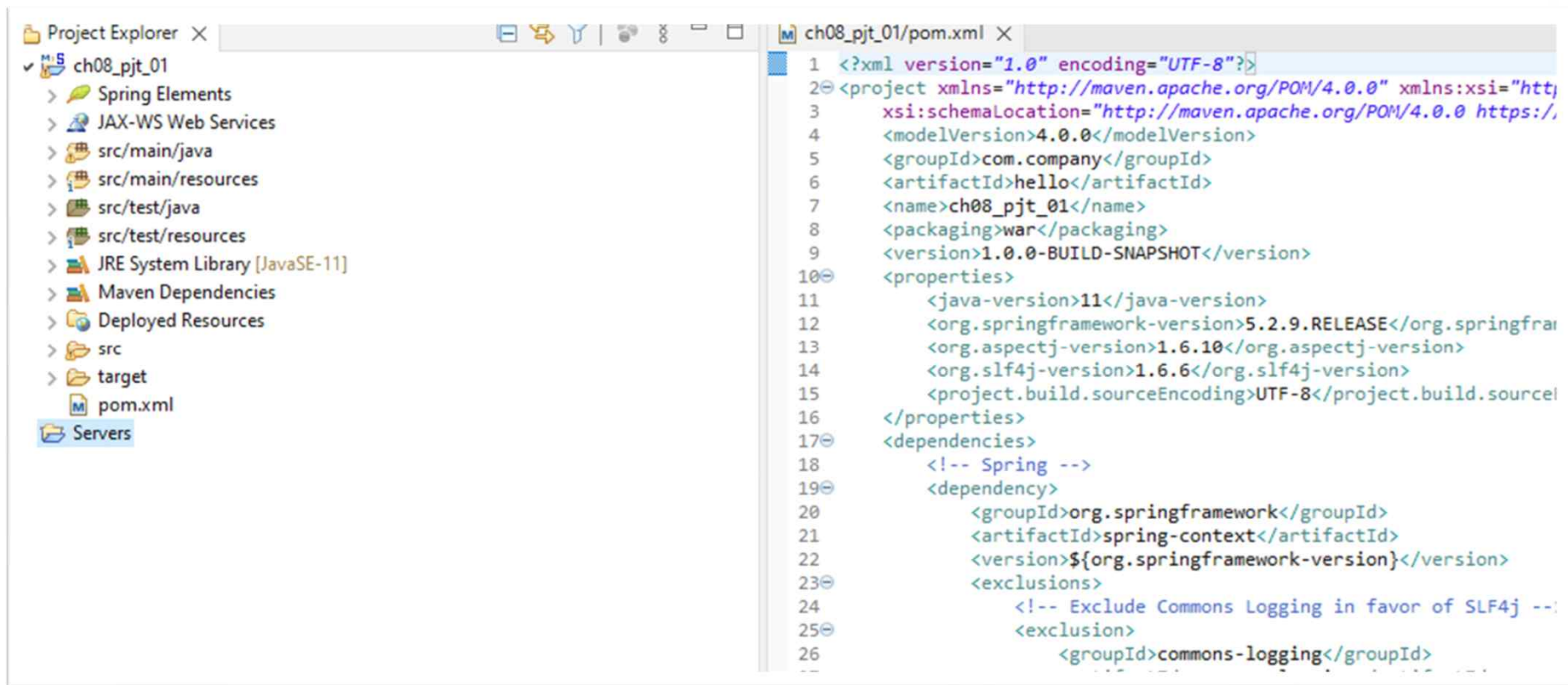
## ▶ Local Repository 위치 변경

settings.xml 파일에 <localRepository> 태그를 사용하여 위치 설정 가능

- 절대경로로 입력한다.

```
<!-- localRepository
| The path to the local repository maven will use to store artifacts.
|
| Default: ${user.home}/.m2/repository
<localRepository>/path/to/local/repo</localRepository>
-->
```

# ▶ 프로젝트 작성



The screenshot displays an IDE interface with two main panels. The left panel, titled 'Project Explorer', shows a project named 'ch08\_pjt\_01'. The project structure includes a 'src' directory with 'main' and 'test' subdirectories, each containing 'java' and 'resources' folders. It also lists 'JRE System Library [JavaSE-11]', 'Maven Dependencies', 'Deployed Resources', and a 'target' directory. The right panel shows the 'pom.xml' file for 'ch08\_pjt\_01'. The XML content is as follows:

```
1 <?xml version="1.0" encoding="UTF-8"?>
2 <project xmlns="http://maven.apache.org/POM/4.0.0" xmlns:xsi="http://maven.apache.org/POM/4.0.0" xsi:schemaLocation="http://maven.apache.org/POM/4.0.0 https://maven.apache.org/maven-v4_0_0.xsd">
3   <modelVersion>4.0.0</modelVersion>
4   <groupId>com.company</groupId>
5   <artifactId>hello</artifactId>
6   <name>ch08_pjt_01</name>
7   <packaging>war</packaging>
8   <version>1.0.0-BUILD-SNAPSHOT</version>
9   <properties>
10     <java.version>11</java.version>
11     <org.springframework.version>5.2.9.RELEASE</org.springframework.version>
12     <org.aspectj.version>1.6.10</org.aspectj.version>
13     <org.slf4j.version>1.6.6</org.slf4j.version>
14     <project.build.sourceEncoding>UTF-8</project.build.sourceEncoding>
15   </properties>
16   <dependencies>
17     <!-- Spring -->
18     <dependency>
19       <groupId>org.springframework</groupId>
20       <artifactId>spring-context</artifactId>
21       <version>${org.springframework.version}</version>
22     </dependency>
23     <!-- Exclude Commons Logging in favor of SLF4j -->
24     <exclusion>
25       <groupId>commons-logging</groupId>
26     </exclusion>
27   </dependencies>
28 </project>
```



## ▶ pom.xml 설정

```
</dependencies>
<build>
  <plugins>
    <plugin>
      <groupId>org.apache.tomcat.maven</groupId>
      <artifactId>tomcat7-maven-plugin</artifactId>
      <version>2.2</version>
      <configuration>
        <url>http://localhost:8090/manager/text</url>
        <server>TomcatServer</server>
        <path>/</path>
        <username>admin</username>
        <password>admin</password>
      </configuration>
    </plugin>
    <plugin>
      <artifactId>maven-eclipse-plugin</artifactId>
      <version>2.9</version>
      <configuration>
        <additionalProjectnatures>
          <projectnature>org.springframework.ide.eclipse.core.springnature</projectnature>
        </additionalProjectnatures>
      </configuration>
    </plugin>
  </plugins>
</build>
```

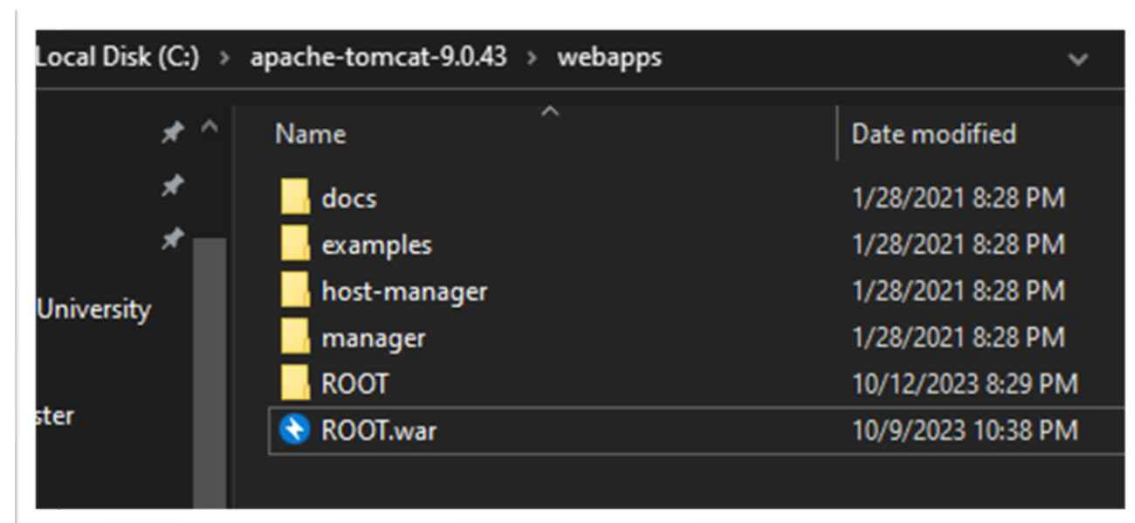
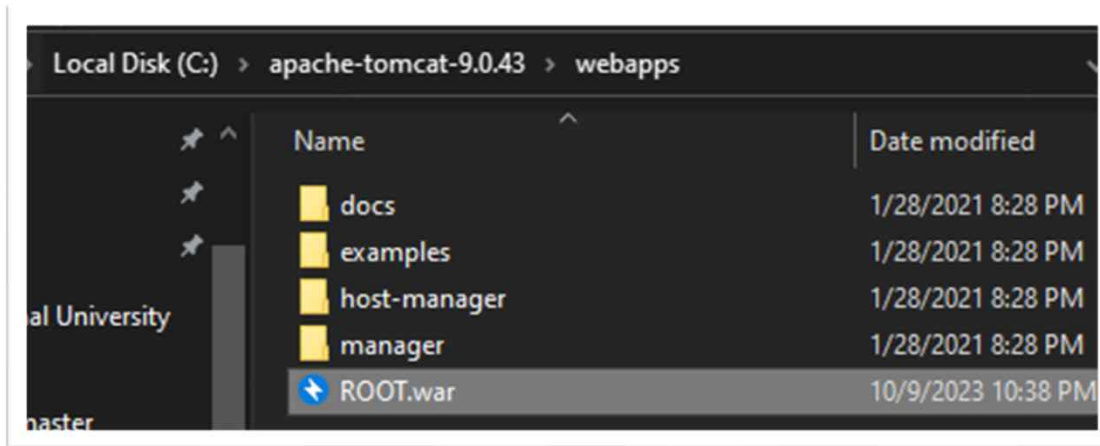


## ▶ 빌드 및 배포

```
5.0M (5) 80,834,841,844 bytes free
D:\Codes\springMVC_STSW\projects\ch08_pjt_01>mvn tomcat7:redeploy
[INFO] Scanning for projects...
[INFO]
[INFO] -----< com.company:hello >-----
[INFO] Building ch08_pjt_01 1.0.0-BUILD-SNAPSHOT
[INFO] from pom.xml
[INFO] -----[ war ]-----
```

```
[INFO] Packaging webapp
[INFO] Assembling webapp [hello] in [D:\Codes\springMVC_STSW\projects\ch08_pjt_01\target\hello-1.0.0-BUILD-SNAPSHOT]
[INFO] Processing war project
[INFO] Copying webapp resources [D:\Codes\springMVC_STSW\projects\ch08_pjt_01\src\main\webapp]
[INFO] Building war: D:\Codes\springMVC_STSW\projects\ch08_pjt_01\target\hello-1.0.0-BUILD-SNAPSHOT.war
[INFO]
[INFO] <<< tomcat7:2.2:redeploy (default-cli) < package @ hello <<<
[INFO]
[INFO] --- tomcat7:2.2:redeploy (default-cli) @ hello ---
[INFO] Deploying war to http://localhost:8090/
Uploading: http://localhost:8090/manager/text/deploy?path=%2F&update=true
Uploaded: http://localhost:8090/manager/text/deploy?path=%2F&update=true (6473 KB at 5879.0 KB/sec)
[INFO] tomcatManager status code:200, ReasonPhrase:
[INFO] OK - Deployed application at context path [/]
[INFO]
[INFO] BUILD SUCCESS
[INFO]
[INFO] Total time: 5.326 s
[INFO] Finished at: 2023-10-09T22:38:46+09:00
[INFO]
```

# ▶ war파일로 배포하기 - 루트(/)에 배포



# ▶ war파일로 배포하기 - Context에 배포

```
<Context path="[경로]" docBase="[war파일의 이름]" reloadable="false" > </Context>
```

```
<Host appBase="webapps" autoDeploy="true" name="localhost" unpackWARs="true">

  <!-- SingleSignOn valve, share authentication between web applications
      Documentation at: /docs/config/valve.html -->
  <!--
  <Valve className="org.apache.catalina.authenticator.SingleSignOn" />
  -->

  <!-- Access log processes all example.
      Documentation at: /docs/config/valve.html
      Note: The pattern used is equivalent to using pattern="common" -->
  <Valve className="org.apache.catalina.valves.AccessLogValve" directory="logs"
    <Context path="/hello" docBase="example" reloadable="false" />
  </Host>
```

(C:) > apache-tomcat-9.0.43 > webapps

Name
docs
examples
hello
host-manager
manager
example.war

← → ↻ ⓘ localhost:8090/hello/

# Hello world!

The time on the server is October 12, 2023 at 8:35:01 PM KST.