



개발환경구축

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학습 개요

• 배경

- 개발자는 필요에 따라 개발 및 테스트를 위한 개발 환경을 구축할 수 있어야 한다.
- 자바 기반 개발에서는 다양한 라이브러리나 프레임워크들을 활용하기 때문에 개발 목적에 맞는 개발 환경 구축이 필요하다.

• 목표

- 개발 목적에 맞는 개발 환경 구축 능력을 배양한다.

- 자바 관련 다양한 개발 환경
 - JDK(Java Development Kit) LTS
 - **AdoptOpenJDK**, Amazon Corretto
 - OpenJDK, Azul Systems Zulu Enterprise, Redhat OpenJDK
 - IDE
 - **IntelliJ IDEA Ultimate**
 - Eclipse
 - Java Web Application Server
 - **Tomcat** or Jetty ...
 - DBMS
 - **Oracle 11g XE**, MySQL, MariaDB ...

단계별 설치

- **JDK(Java Development Kit) 설치**
 - Eclipse Temurin 17 (<https://adoptium.net/>)
- **IDE(Integrated Development Environment) 설치**
 - IntelliJ IDEA 2022.2.1 (
 - Eclipse IDE 2022-09 (<https://www.eclipse.org/downloads/>)
- **WAS(Web Application Server) 설치**
 - Apache Tomcat
 - Tomcat Server - Local

Download Eclipse Technology that is right for you

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Get **Eclipse IDE 2022-09**

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OpenJDK Runtimes



The Eclipse Temurin™ project provides high-quality, TCK certified OpenJDK runtimes and associated technology for use across the Java™ ecosystem.

[Download Now](#)

[Learn More](#)

Java 설치

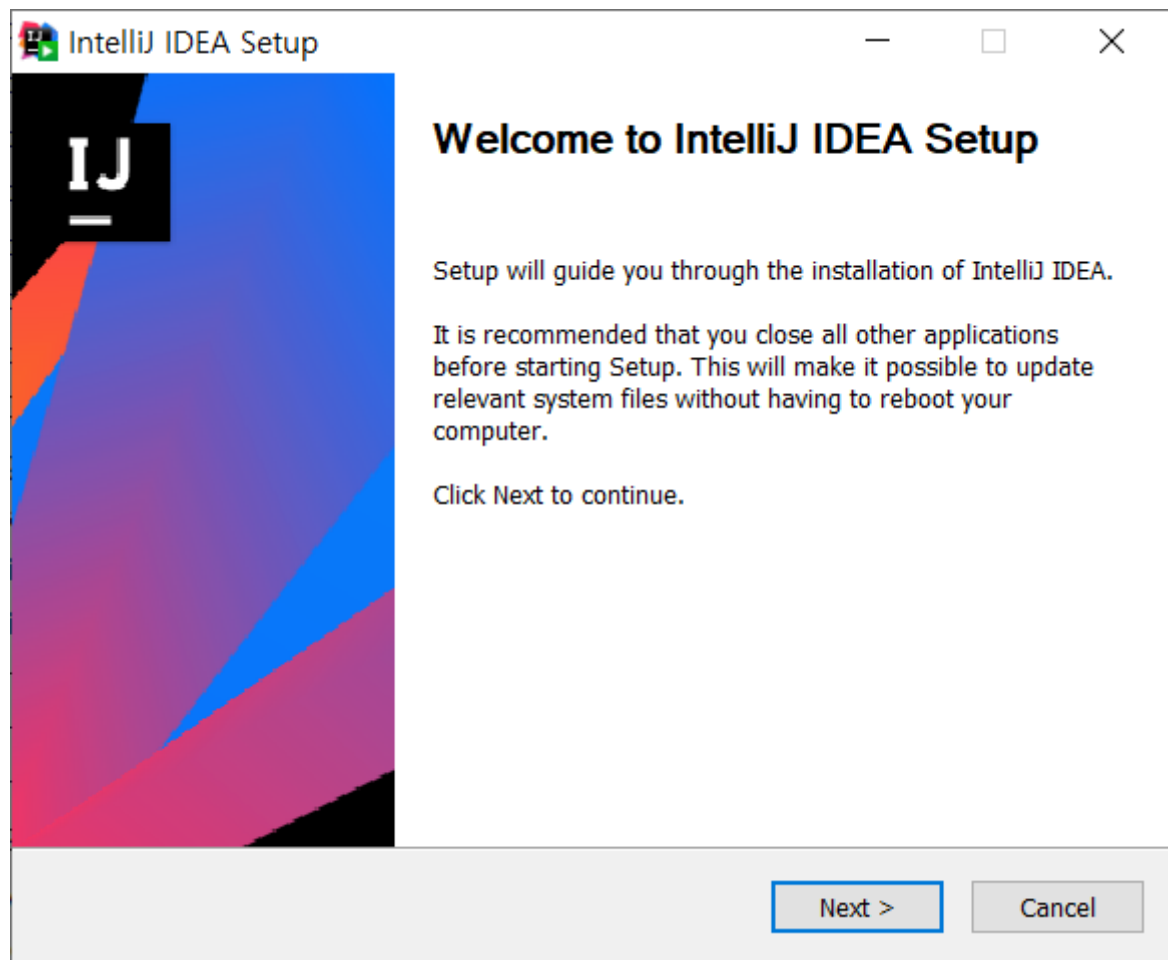
• 단계별 작업

- JDK 11 or JDK 17 선택 후 다운로드
 - <https://adoptium.net/>
- 환영 화면
- 설치경로 선택
- 설치옵션 선택 (전체 선택함)
- 시작 메뉴 폴더 선택
- 설치 완료 확인

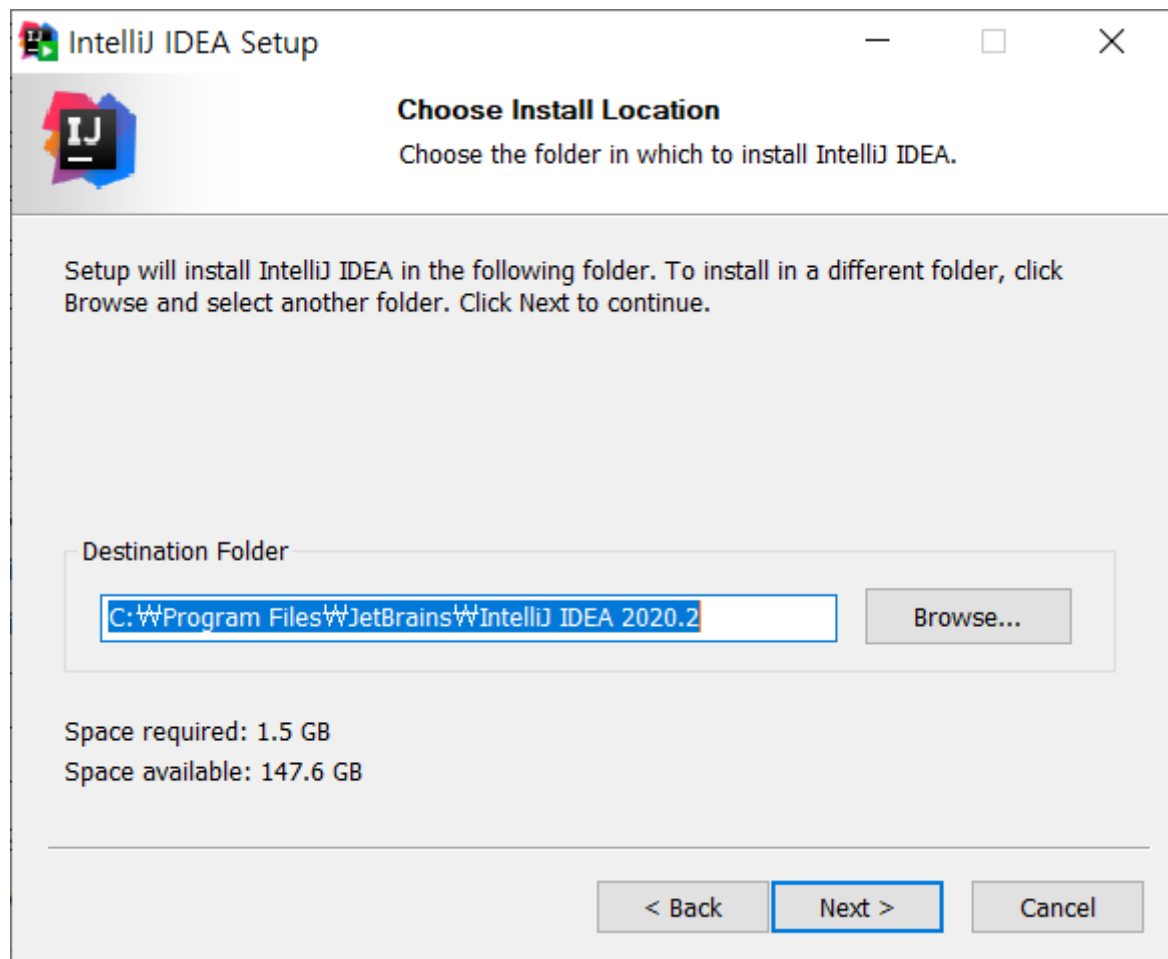
IntelliJ IDEA Ultimate 설치

- 단계별 작업
 - 환영 화면
 - 설치경로 선택
 - 설치옵션 선택 (전체 선택함)
 - 시작 메뉴 폴더 선택
 - 설치 완료 확인

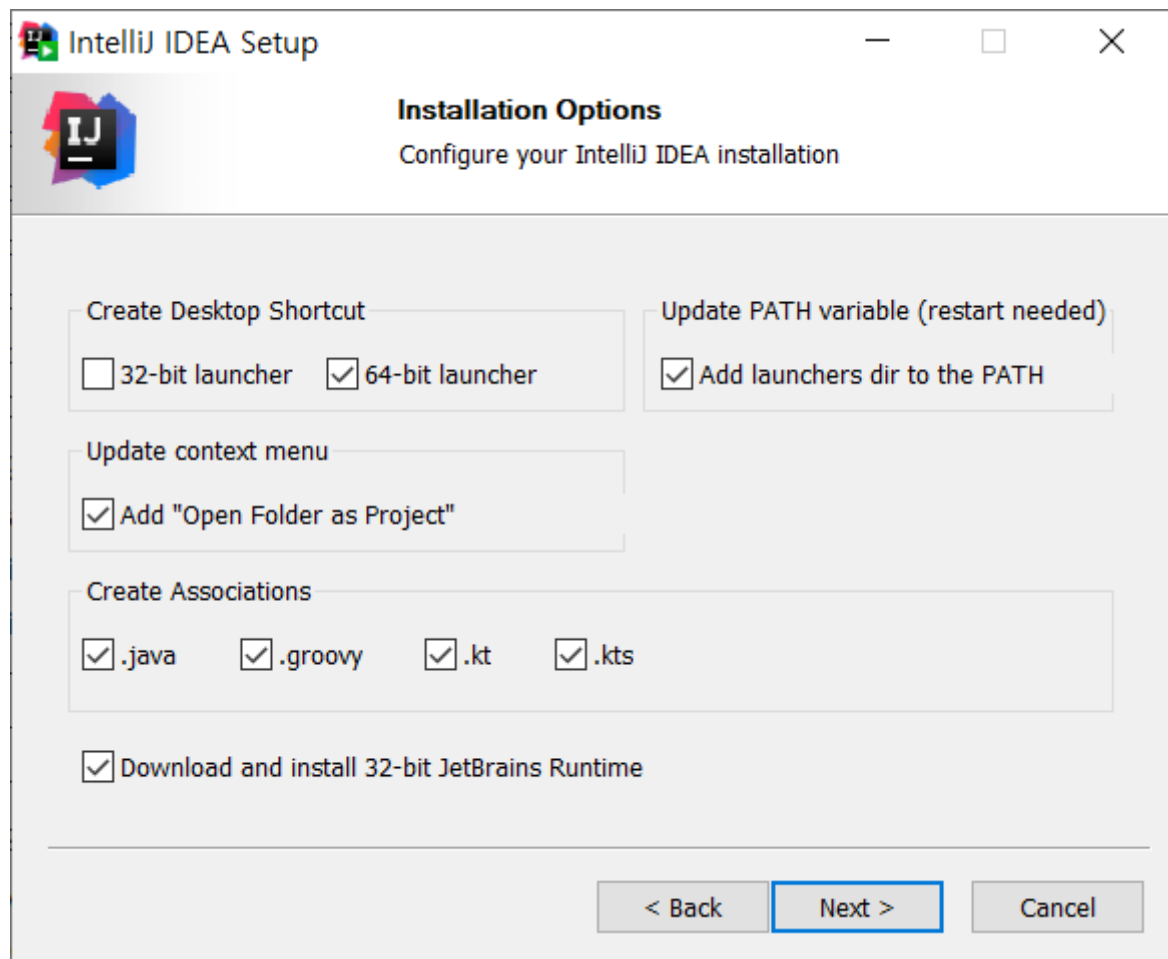
IntelliJ IDEA Ultimate 설치



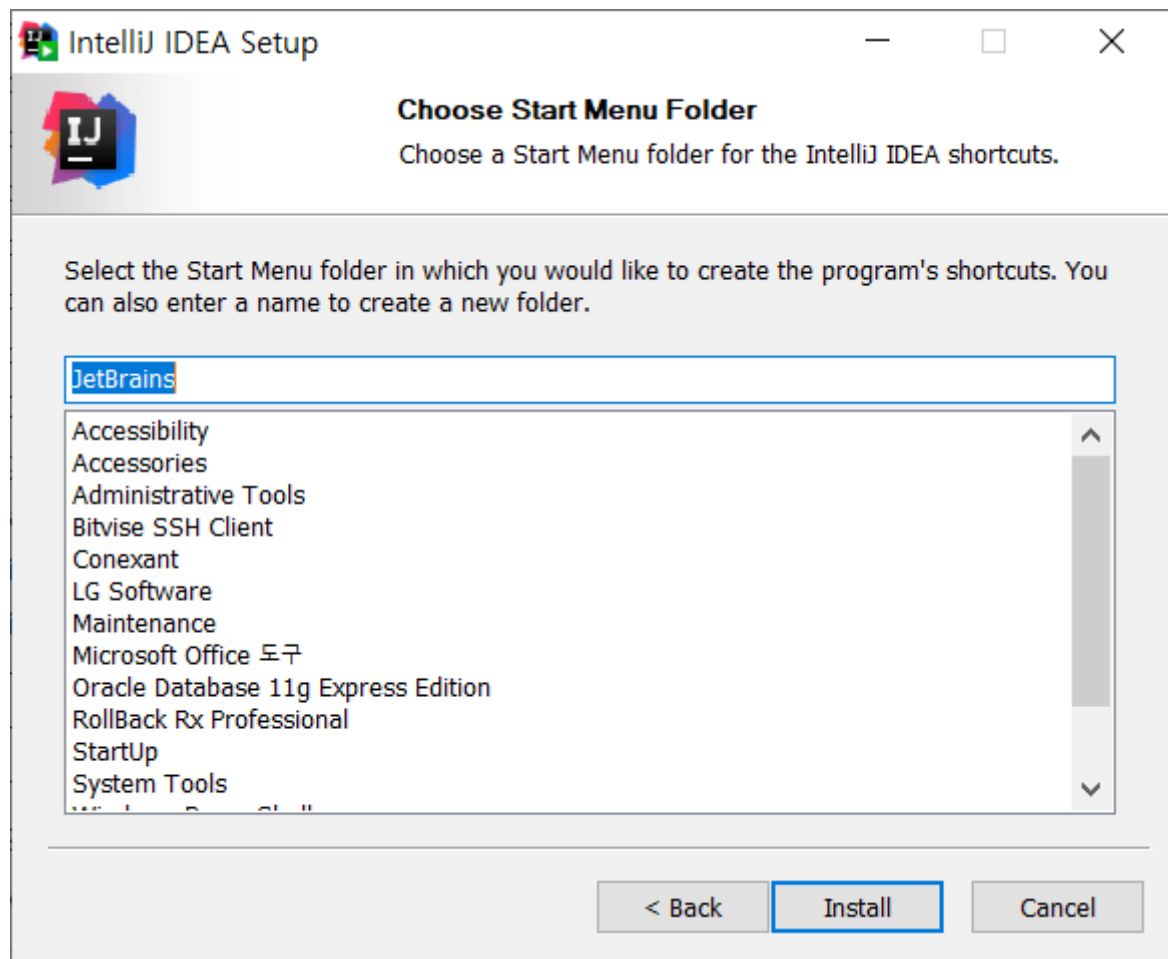
IntelliJ IDEA Ultimate 설치 2



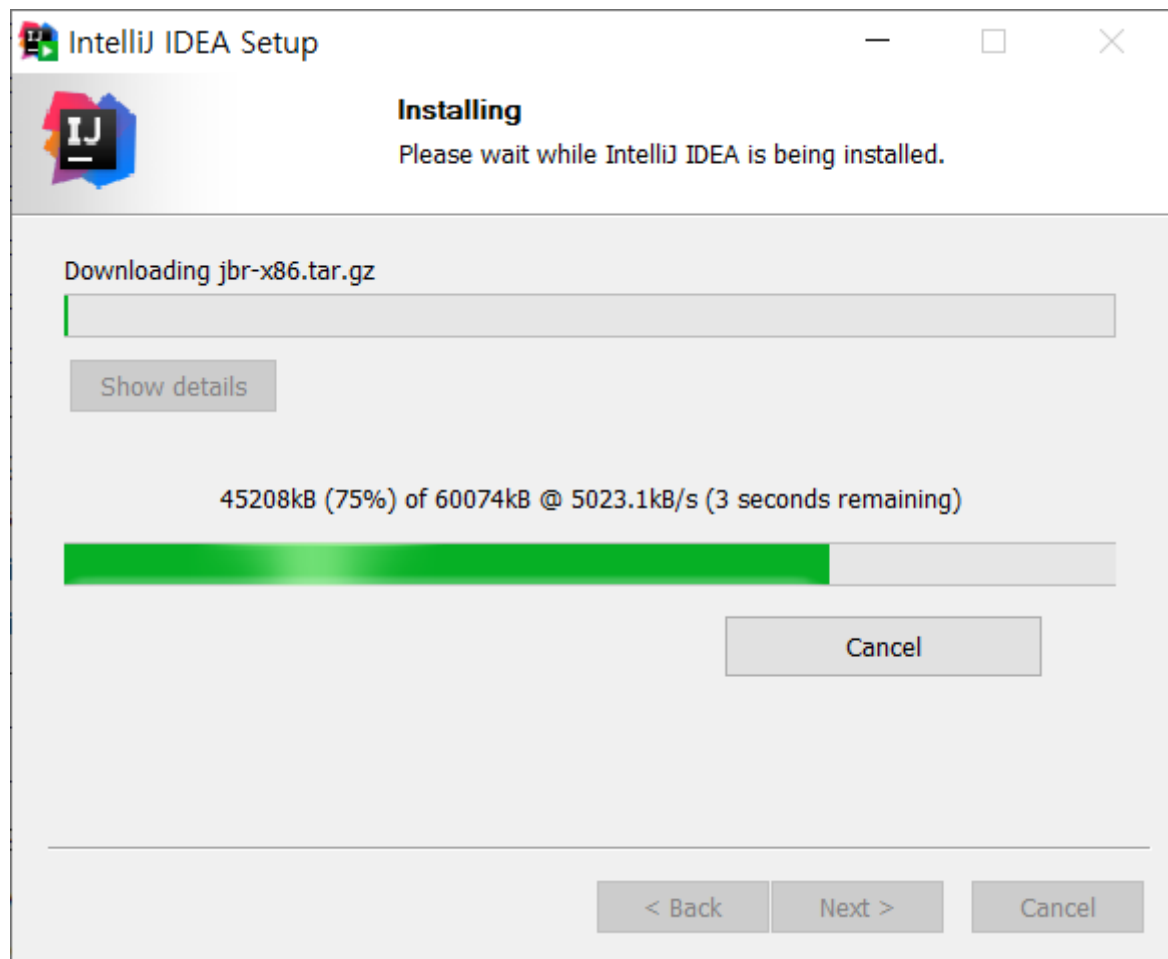
IntelliJ IDEA Ultimate 설치 3



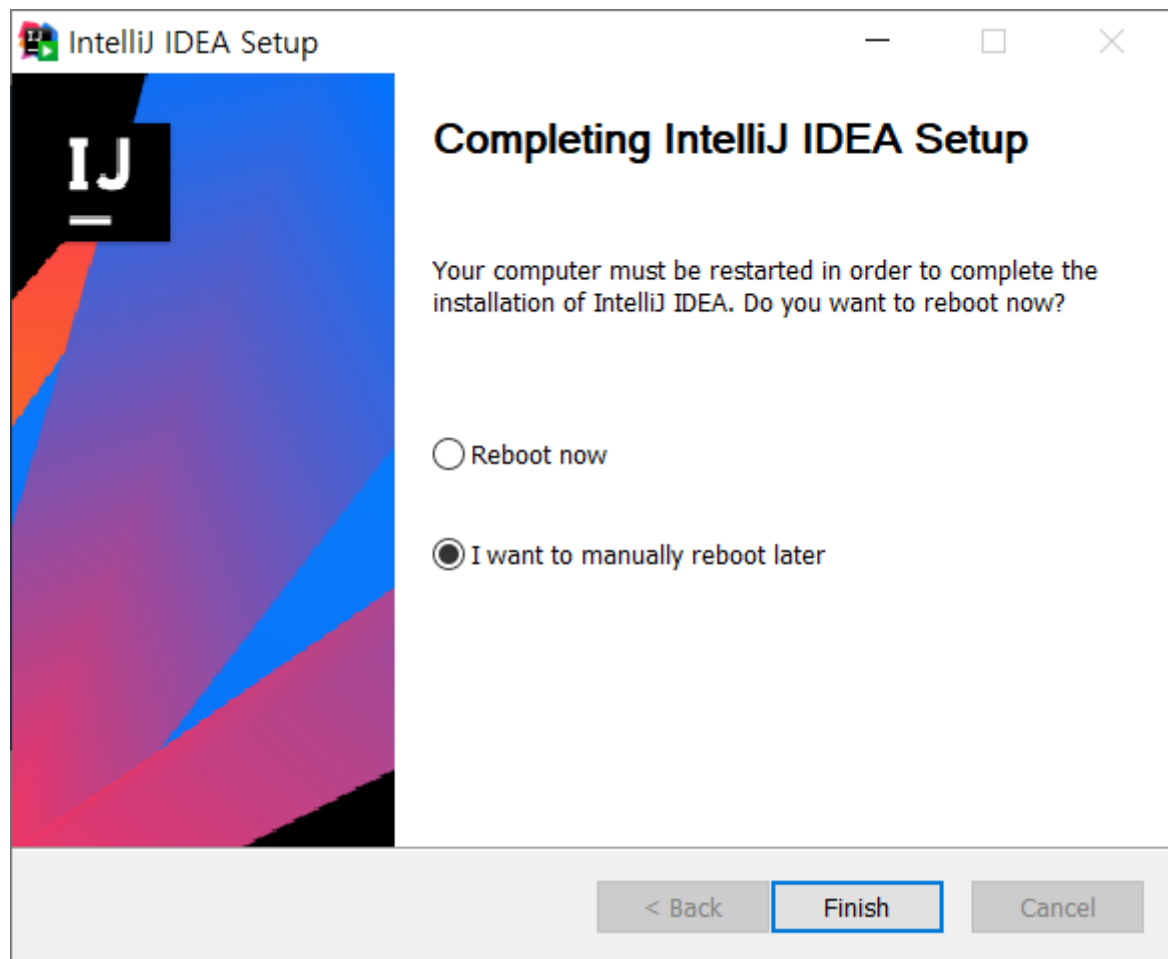
IntelliJ IDEA Ultimate 설치 4



IntelliJ IDEA Ultimate 설치 5



IntelliJ IDEA Ultimate 설치 6



Apache Tomcat 설치

Servlet Spec	JSP Spec	EL Spec	WebSocket Spec	Authentication (JASPIC) Spec	Apache Tomcat Version	Latest Released Version	Supported Java Versions
6.0	3.1	5.0	2.1	3.0	10.1.x	10.1.0-M17 (beta)	11 and later
5.0	3.0	4.0	2.0	2.0	10.0.x	10.0.23	8 and later
4.0	2.3	3.0	1.1	1.1	9.0.x	9.0.65	8 and later
3.1	2.3	3.0	1.1	1.1	8.5.x	8.5.82	7 and later
3.1	2.3	3.0	1.1	N/A	8.0.x (superseded)	8.0.53 (superseded)	7 and later
3.0	2.2	2.2	1.1	N/A	7.0.x (archived)	7.0.109 (archived)	6 and later (7 and later for WebSocket)



Apache Tomcat

Home
Taglibs
Maven Plugin

Download

Which version?
Tomcat 10
Tomcat 9
Tomcat 8
Tomcat Migration Tool
for Jakarta EE
Tomcat Connectors
Tomcat Native
Taglibs
Archives

Documentation

Tomcat 10.1 (beta)
Tomcat 10.0
Tomcat 9.0
Tomcat 8.5
Tomcat Connectors
Tomcat Native 2
Tomcat Native 1.2
Wiki
Migration Guide
Presentations
Specifications

Problems?

Security Reports
Find help
FAQ
Mailing Lists
Bug Database
IRC

Tomcat 9 Software Downloads

Welcome to the Apache Tomcat® 9.x software download page. This page provides download links for obtaining the latest version of Tomcat 9.0.x software, as well as links to the archives of older releases.

Unsure which version you need? Specification versions implemented, minimum Java version required and lots more useful information may be found on the '[which version?](#)' page.

Quick Navigation

[KEYS](#) | [9.0.65](#) | [Browse](#) | [Archives](#)

Release Integrity

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 <https://dlcdn.apache.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:

9.0.65

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

Binary Distributions

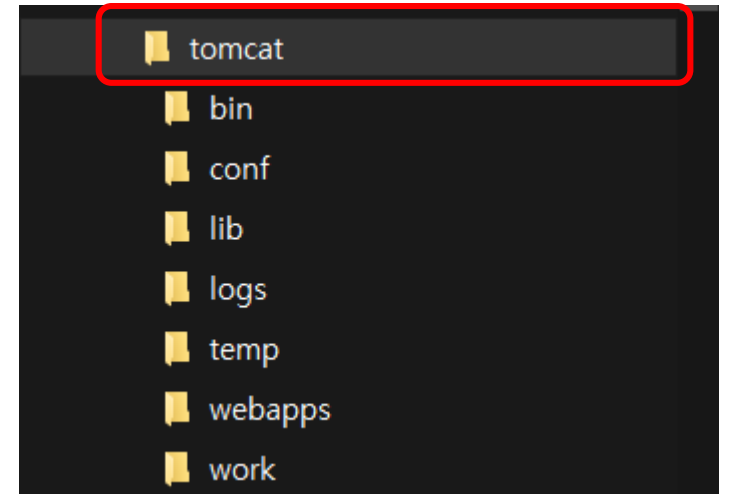
- Core:
 - [zip \(pgp, sha512\)](#)
 - [tar.gz \(pgp, sha512\)](#)
 - [32-bit Windows zip \(pgp, sha512\)](#)
 - [64-bit Windows zip \(pgp, sha512\)](#)
 - [32-bit/64-bit Windows Service Installer \(pgp, sha512\)](#)
- Full documentation:

• 단계별 설치

- Apache Tomcat 홈페이지에서 다운로드
 - <https://tomcat.apache.org/download-90.cgi>
 - Binary distribution > Core > zip

• 압축해제

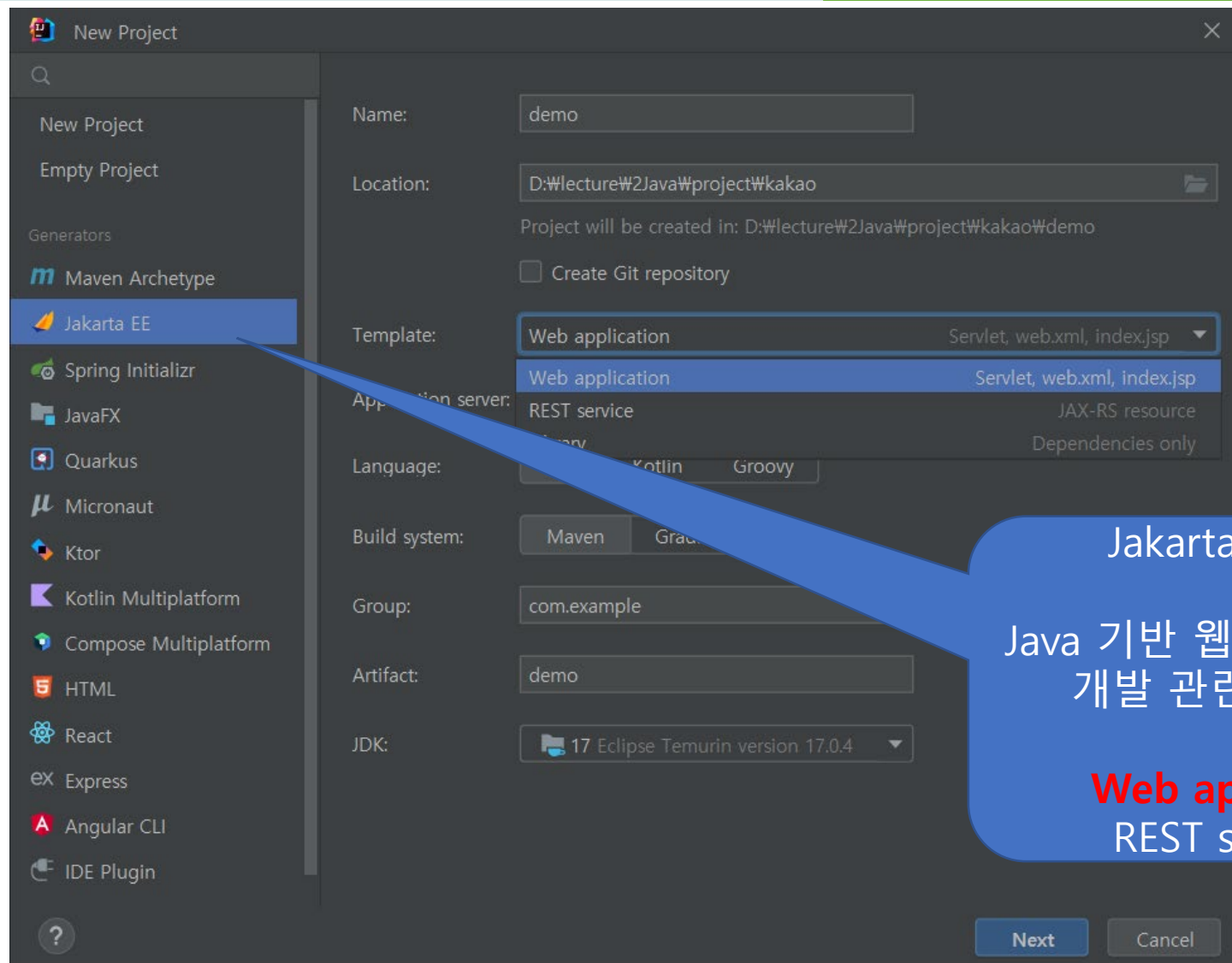
- **Home Directory : CATALINA_HOME**
 - bin, lib 등의 상위 디렉터리
- **Base Directory : CATALINA_BASE**



Java Web Application 프로젝트 생성

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프로젝트 생성 - Jakarta EE 선택



The image shows the 'New Project' dialog in the Eclipse IDE. The 'Generators' list on the left has 'Jakarta EE' selected. The main form fields are as follows:

Field	Value
Name	demo
Location	D:\lectureW2Java\project\kakao
Project will be created in	D:\lectureW2Java\project\kakao\demo
Create Git repository	<input type="checkbox"/>
Template	Web application (Servlet, web.xml, index.jsp)
Application server	REST service (JAX-RS resource)
Language	Java (Kotlin, Groovy also visible)
Build system	Maven (Gradle also visible)
Group	com.example
Artifact	demo
JDK	17 Eclipse Temurin version 17.0.4

Buttons at the bottom: Next, Cancel.

Jakarta EE 선택

Java 기반 웹 애플리케이션
개발 관련 프로젝트

Web application
REST service ...


New Project


Search


New Project


Empty Project


Generators


 Maven Archetype


 Jakarta EE


 Spring Initializr


 JavaFX


 Quarkus


 Micronaut


 Ktor


 Kotlin Multiplatform


 Compose Multiplatform

 HTML

 React

 Express

 Angular CLI

 IDE Plugin

Name: 1

Location: 2
Project will be created in: D:\lecture\2Java\project\kakao\servletjsp

☐ Create Git repository

Template: 3 Servlet, web.xml, index.jsp ▾

Application server: ▾ 4

Language:

Build system: 5

Group: 6

Artifact: 7

JDK: ▾

계속 - Java EE 8 선택

New Project

Version: Jakarta EE 9
Java EE 8
Depend Jakarta EE 9

Specifications

☒ Full Platform (9.1.0)

☐ Web Profile (9.1.0)

☐ Batch (2.0.0)

☐ Bean Validation (3.0.0)

☐ Contexts and Dependency Injection (CDI) (3.0.0)

☐ Concurrency Utils (2.0.0)

☐ Connector Architecture (JCA) (2.0.0)

☐ Enterprise Java Beans (EJB) (4.0.0)

☐ JSON Binding (JSON-B) (2.0.0)

☐ JSON Processing (JSON-P) (2.0.1)

☐ Message Service (JMS) (3.0.0)

☐ Model View Controller (MVC) (2.0.0)

☐ Persistence (JPA) (3.0.0)

☐ RESTful Web Services (JAX-RS) (3.0.0)

☐ Security (2.0.0)

☐ Server Faces (JSF) (3.0.1)

Full Platform

Includes most of Jakarta EE specifications.
Compatible servers: GlassFish 6.x, Open Liberty 21.*, Wildfly 23.x

[Web site](#) [Specification](#)

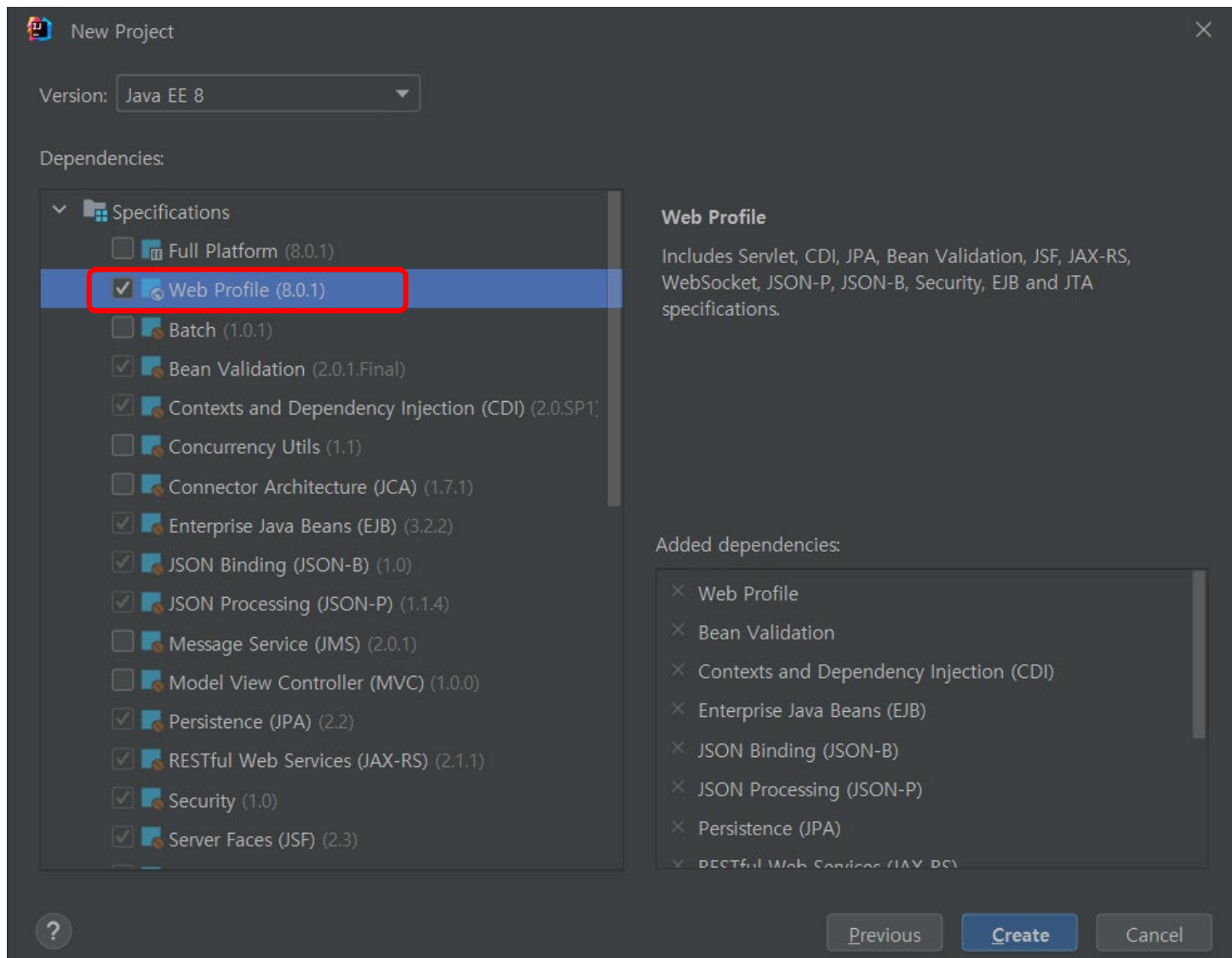
Added dependencies:

× Servlet

?

Previous Create Cancel

계속 - Web Profile 선택 (Servlet 기본 선택)



Server

Project

src > main > webapp > index.jsp

Project

▼ servletjsp D:\lecture\2Java\project\kakao\servletjsp

> .gradle

> .idea

> build

> gradle

> src

> main

> java

> iducs.javaweb.servletjsp

HelloServlet

> resources

> webapp

> WEB-INF

web.xml

index.jsp

> test

.gitignore

build.gradle

gradlew

gradlew.bat

settings.gradle

> External Libraries

> Scratches and Consoles

build.gradle (servletjsp) × HelloServlet.java × index.jsp ×

1 <%@ page contentType="text/html; charset=UTF-8" pageEncoding="UTF-8" %>

2 <!DOCTYPE html>

3 <html>

4 <head>

5 <title>JSP - Hello World</title>

6 </head>

7 <body>

8 <h1><%= "Hello World!" %>

9 </h1>

10

11 Hello Servlet

12 </body>

13 </html>

Current File

Edit Configurations...

Current File

Application Server 설정
및 Run Configurations

프로젝트 기본 구조

Build: Sync × Build Output ×

✓ Build servletjsp: successful At 2022-09-19 오후 12:33 7 sec, 273 ms

Starting Gradle Daemon...

Gradle Daemon started in 1 s 386 ms

> Task :compileJava

> Task :processResources

> Task :classes

> Task :compileTestJava NO-SOURCE

> Task :processTestResources NO-SOURCE

> Task :testClasses UP-TO-DATE

BUILD SUCCESSFUL in 6s

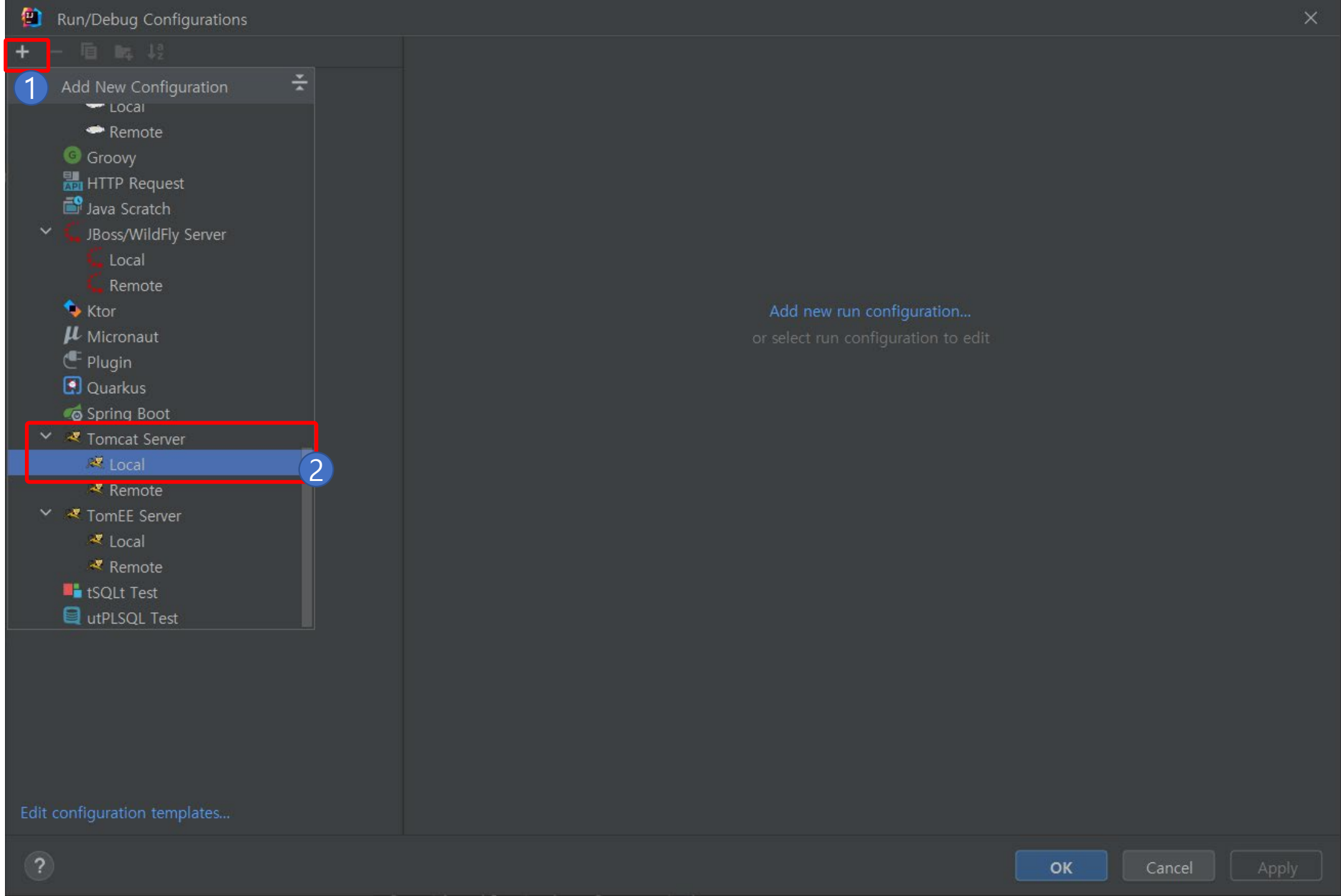
2 actionable tasks: 2 executed

오후 12:33:54: Execution finished ':classes :testClasses'.

Version Control Run TODO Problems Terminal Profiler Services Build Dependencies Endpoints

Open 'Edit Run/Debug configurations' dialog

13:8 LF UTF-8 4 spaces



Run/Debug Configurations

+

-

Tomcat Server

Unnamed

Name: Unnamed

☐ Store as project file

Server

Deployment

Logs

Code Coverage

Startup/Connection

Application server:

Configure...

Open browser

☒ After launch

Default

...

☐ with JavaScript debugger

URL:

http://localhost:8080/

VM options:

On 'Update' action:

Restart server

☒ Show dialog

JRE:

▼

Tomcat Server Settings

HTTP port:

☐ Deploy applications configured in Tomcat instance

HTTPs port:

☐ Preserve sessions across restarts and redeloys

AJP port:

Before launch

+

-

Edit configuration templates...

?

OK

Cancel

Apply

Error: Application Server not specified

Run/Debug Configurations

Tomcat Server
Unnamed

Name: **Unnamed** ☐ Store as project file

Server Deployment Logs Code Coverage Startup/Connection

Application server:

Open browser

☒ After launch ☐ with JavaScript debugger

Tomcat Server

Tomcat Home: **1**

Tomcat Version: <unknown>

Warning: The selected directory is not a valid Tomcat home

Tomcat base directory:

Warning: Tomcat base directory path is not specified

Deploy applications configured in Tomcat instance

HTTPS port: ☐ Preserve sessions across restarts and redeloys

AJP port:

Before launch

Edit configuration templates...

Error: Application Server not specified



Run/Debug Configurations

+

−

📄

📁

⬇️

▼ Tomcat Server

🚫 Unnamed

Name: Unnamed

☐ Store as project file ⚙️

Server

Deployment

Logs

Code Coverage

Startup/Connection

Application server: Tomcat 9.0.65

Configure...

Open browser

☒ After launch

🌐 Default

...

☐ with JavaScript debugger

URL: http://localhost:8080/

📁

VM options:

↕️

On 'Update' action: Restart server

☒ Show dialog

JRE:

📁

▼

Tomcat Server Settings

HTTP port: 8080

☐ Deploy applications configured in Tomcat instance

HTTPs port:

☐ Preserve sessions across restarts and redeloys

AJP port:

▼ Before launch

+

−

✏️

⬆️

⬇️

⚠️ Warning: No artifacts marked for deployment

💡 Fix

?

OK

Cancel

Apply

Edit configuration templates...



Run/Debug Configurations

+ - [icon] [icon] [icon]

Tomcat Server

Unnamed

Name: Unnamed

☐ Store as project file [icon]

Server

Deployment

Logs

Code Coverage

Startup/Connection

Deploy at the server startup

+ - [icon] [icon] [icon]

Nothing to deploy

Select an artifact to deploy

[icon] Gradle : iducs.javaweb : servletjsp-1.0-SNAPSHOT.war

[icon] Gradle : iducs.javaweb : servletjsp-1.0-SNAPSHOT.war (exploded)

Before launch

Edit configuration templates...

[icon] ?

Warning: No artifacts marked for deployment

[icon] Fix

OK

Cancel

Apply



Run/Debug Configurations

+

-

Tomcat Server

Unnamed

Name:

☐ Store as project file

Server

Deployment

Logs

Code Coverage

Startup/Connection

Deploy at the server startup

+

-

Gradle : iducs.javaweb : servletjsp-1.0-SNAPSHOT.war (exploded)

Application context:

Before launch

OK

Cancel

Apply

배포 형식 : war vs. war(exploded)

- 패키지 : war

- 아카이브(.war, .ear) 파일로 배포

- 아카이브는 WAS에 의해 압축이 해제
- 파일이 많은 경우 압축을 해제시간이 오래 걸릴 수 있음
- 원격 서버에 배포시 한 개의 파일만 전송하면 됨
- WAS에서 제공하는 업로드를 통한 배포 기능을 활용할 수 있음

- war exploded(expanded)

- 아카이브를 압축 해제한 형태의 디렉터리로 배포
- 별도의 디렉터리에 원본 소스를 복사하여 생성

- 압축 및 해제 과정이 불필요함
- 파일이 많은 경우 복사하는 시간이 오래 걸릴 수 있음
- 원본 소스를 건드리지 않고 배포를 원하는 경우에 적합
- 원격 서버에 배포시 파일이 많은 경우 전송 시간이 오래 걸릴 수 있음



Run/Debug Configurations

Tomcat Server

Tomcat 9.0.65

Name: Tomcat 9.0.65 ☐ Store as project file

Server Deployment Logs Code Coverage Startup/Connection

Application server: Tomcat 9.0.65

Open browser

☒ After launch ☐ with JavaScript debugger

URL: http://localhost:8080/Gradle__iducs.javaweb__servletjsp_1_0_SNAPSHOT_war_exploded_/

VM options: -Duser.language=en -Duser.region=en

On 'Update' action: Update classes and resources ☐ Show dialog

On frame deactivation: Update classes and resources

JRE: 17

Tomcat Server Settings

HTTP port: 8080 ☐ Deploy applications configured in Tomcat instance

HTTPS port: ☐ Preserve sessions across restarts and redeloys

JMX port: 1099

AJP port:

Before launch

Build

Build 'Gradle : iducs.javaweb : servletjsp-1.0-SNAPSHOT.war (exploded)' artifact

Edit configuration templates...

☐ Show this page ☒ Activate tool window

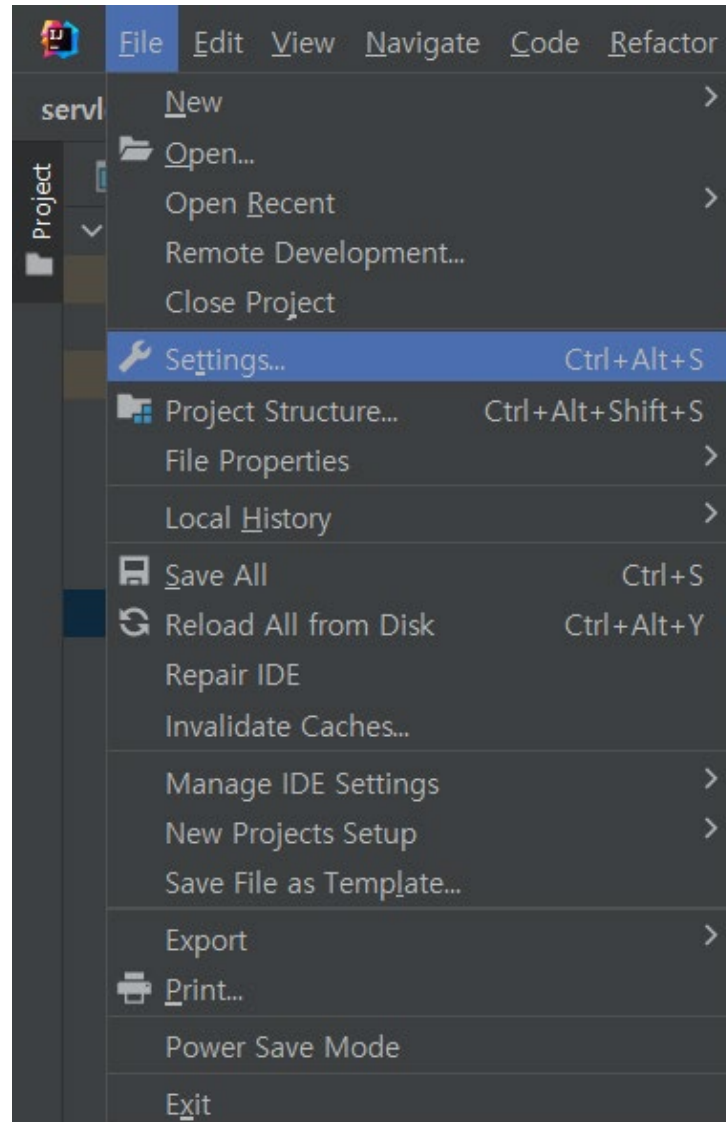
OK Close Apply

war(exploded)

Update applications on application servers

Option	Description	Available for
Update resources	Update all changed resources, such as HTML, JSP, JavaScript, CSS and images.	Exploded artifacts in local application server run configurations
Update classes and resources	Update all changed resources and recompile all changed Java classes (EJBs, servlets, and so on). When debugging, IntelliJ IDEA will deploy and reload updated classes. For more information, see Reload modified classes . Otherwise, when running the application regularly, IntelliJ IDEA will only update the changed classes in the output folder. Whether it will deploy and reload such classes in the running application, depends on the capabilities of the Java runtime that you are using.	Exploded artifacts in local application server run configurations
Hot swap classes	When debugging, IntelliJ IDEA will deploy and reload updated classes. For more information, see Reload modified classes . This option is not available for regularly running applications.	Archived artifacts in local application server run configurations and both exploded and archived artifacts in remote configurations.
Redeploy	Rebuild and redeploy the application artifacts without restarting the server. The operation may be time-consuming.	Exploded and archived artifacts in local and remote application server run configurations
Restart server	Restart the application server, rebuild and redeploy the artifacts. The operation may be very time-consuming.	Exploded and archived artifacts in local application server run configurations

프로젝트 인코딩 설정



File > Settings > File Encoding
> Project Encoding

System default -> UTF-8

가장 많이 사용되
는 가변 길이 유니
코드 인코딩

Settings

Q

> Appearance & Behavior

Keymap

< Editor

> General

Code Editing

Font

> Color Scheme

> Code Style

Inspections

File and Code Templates

File Encodings

Live Templates

File Types

Android Design Tools

> Copyright

Inlay Hints

Duplicates

> Emmet

GUI Designer

Intentions

> Language Injections

Live Edit of Compose Literals

> Natural Languages

Reader Mode

Editor > File Encodings

Global Encoding: UTF-8

Project Encoding: <System Default: x-windows-949>

+ -

Path

<Default>

ISO-8859-1

US-ASCII

UTF-16

UTF-8

x-windows-949

More

	Encoding
Encodings are not configured	

To change encoding IntelliJ IDEA uses for a file, a directory, or the entire project, add its path if necessary and then select encoding from the encoding list. Built-in file encoding (e.g. JSP, HTML or XML) overrides encoding you specify here. If not specified, files and directories inherit encoding settings from the parent directory or from the Project Encoding.

Properties Files (*.properties)

Default encoding for properties files: <Properties Default: ISO-8859-1>

☐ Transparent native-to-ascii conversion

BOM for new UTF-8 files

Create UTF-8 files: with NO BOM

IDEA will NOT add UTF-8 BOM to every created file in UTF-8 encoding

?

OK

Cancel

Apply



Name: Tomcat 9.0.65

☐ Store as project file [icon]

Server

Deployment

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Code Coverage

Startup/Connection

Application server: Tomcat 9.0.65

Configure...

Open browser

☒ After launch

Default

...

☐ with JavaScript debugger

URL: http://localhost:8080/Gradle__iducs_java__servelt_jsp_1_0_SNAPSHOT_war_exploded_/

VM options:

`-Duser.language=en -Duser.region=en`

On 'Update' action:

Redeploy

☐ Show dialog

JRE: Default (17 - project SDK)

Tomcat Server Settings

HTTP port: 8080

☐ Deploy applications configured in Tomcat instance

HTTPs port:

☐ Preserve sessions across restarts and redeloys

AJP port:

Before launch

Edit configuration templates...

?

OK

Close

Apply

한글 관련
VM 옵션