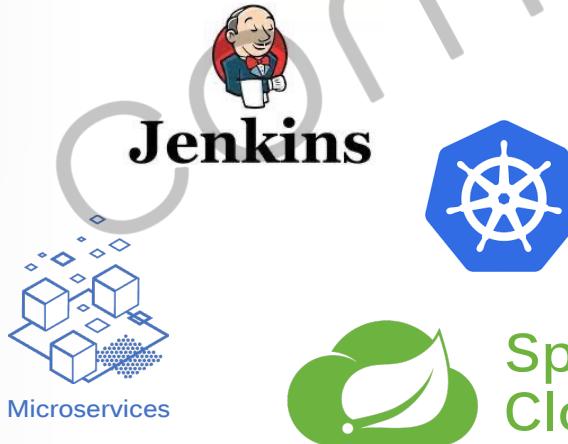


JenKins 를 이용한 CI/CD Pipeline 구축



```
public static void main(String[] args)
{
    < servlet >
        < servlet-name >BoardController</servlet-name>
        < servlet-class >com.joneconsulting.controller.BoardController</servlet-class>
        < init-param >
            < param-name >user_name</param-name>
            < param-value >Kenneth Lee</param-value>
        </init-param >
    </servlet >
```

```
    < servlet >
        < servlet-name >BookController</servlet-name>
        < servlet-class >com.joneconsulting.controller.BookController</servlet-class>
        < init-param >
            < param-name >self_title, price, author</param-name>
            < param-value >self_title
                self_price
                self_author = author
            </param-value>
        </init-param >
    </servlet >
```

```
    < servlet >
        < servlet-name >UIApplicationDelegate</servlet-name>
        < servlet-class >com.joneconsulting.UIApplicationDelegate</servlet-class>
        < init-param >
            < param-name >NEXT_INNOVATION_DELEGATE</param-name>
            < param-value >@Interface NextInnovationDelegate : NSObject < UIApplicationDelegate >
                ...
            </param-value>
        </init-param >
    </servlet >
```



프로필

Dowon Lee



지식공유자 인증

5452 ★ 4.8(420)

멘토링 활성



- 홈
- 강의
- 로드맵
- 수강후기
- 블로그

강의 (3)

최신순 ▾



Spring Cloud로 개발하는 마이크로 서비스 애플리케이션(MSA)

Dowon Lee

★★★★★(72)

학습중

+1400명

독점



Spring Boot를 이용한 RESTful Web Services 개발

Dowon Lee

★★★★★(183)

학습중

+1600명

독점



웹 애플리케이션 개발을 위한 IntelliJ IDEA 설정

Dowon Lee

★★★★★(165)

학습중

+2400명



목차

- Section 1: DevOps와 CI/CD
- Section 2: Jenkins를 이용한 CI/CD 사용
- Section 3: Jenkins + Infrastructure as Code
- Section 4: Jenkins + Ansible + Kubernetes 연동
- Section 5: Advanced Jenkins 사용
- Section 6: Public Cloud에 배포
- **Appendix**

Appendix

- 필수 SW 설치
- Docker Desktop, Git, Maven
- Tomcat Server
- SSH Server
- SSH Client
- AWS 계정 생성
- AWS EC2 인스턴스 생성, 접속
- Node.js 애플리케이션 배포



Prerequisites

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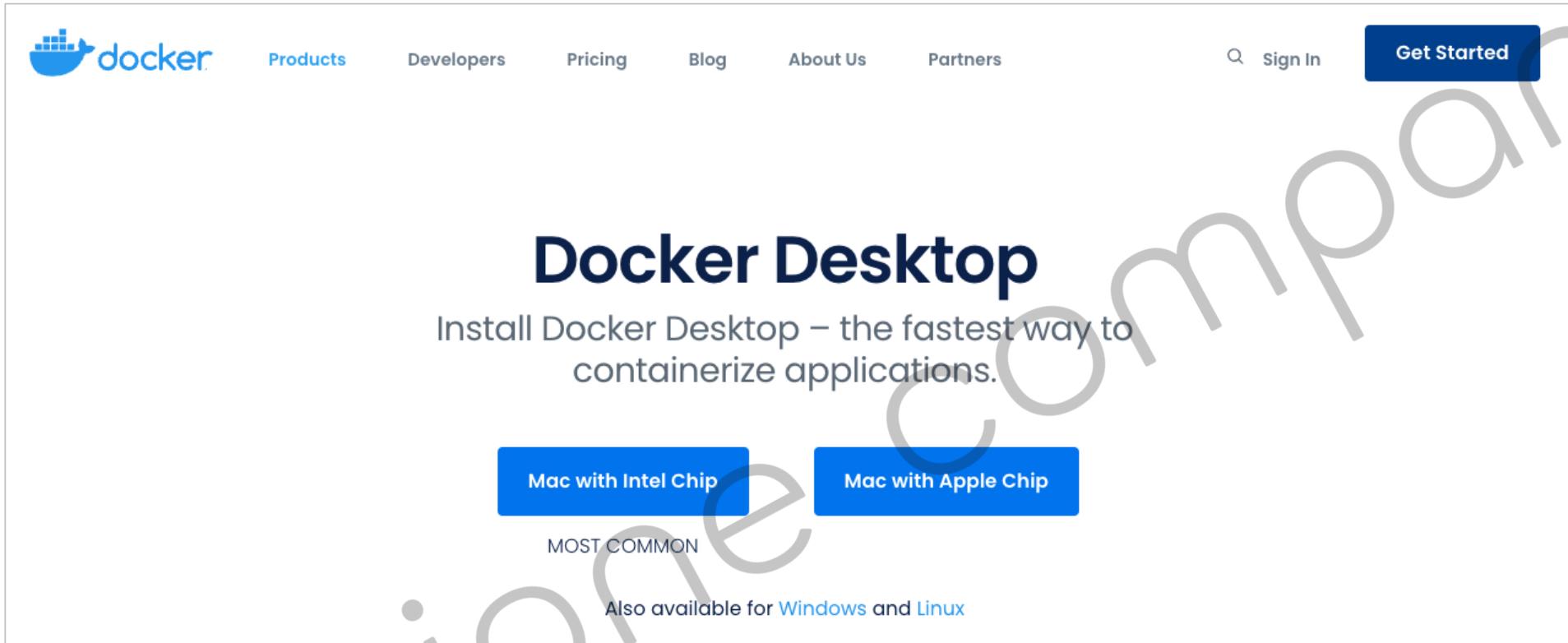
- Docker Desktop for Windows (or MacOS)
- Installed SW on Local
 - JDK 1.8+, Git, Maven
 - Tomcat server
 - SSH Server/Client (Windows, MacOS or **Docker**)
- 소스 코드, Script
 - 샘플 웹 애플리케이션 → <https://github.com/joneconsulting/cicd-web-project>
 - Jenkins Pipeline Scripts → https://github.com/joneconsulting/jenkins_pipeline_script



Docker Desktop

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- <https://www.docker.com/products/docker-desktop/>



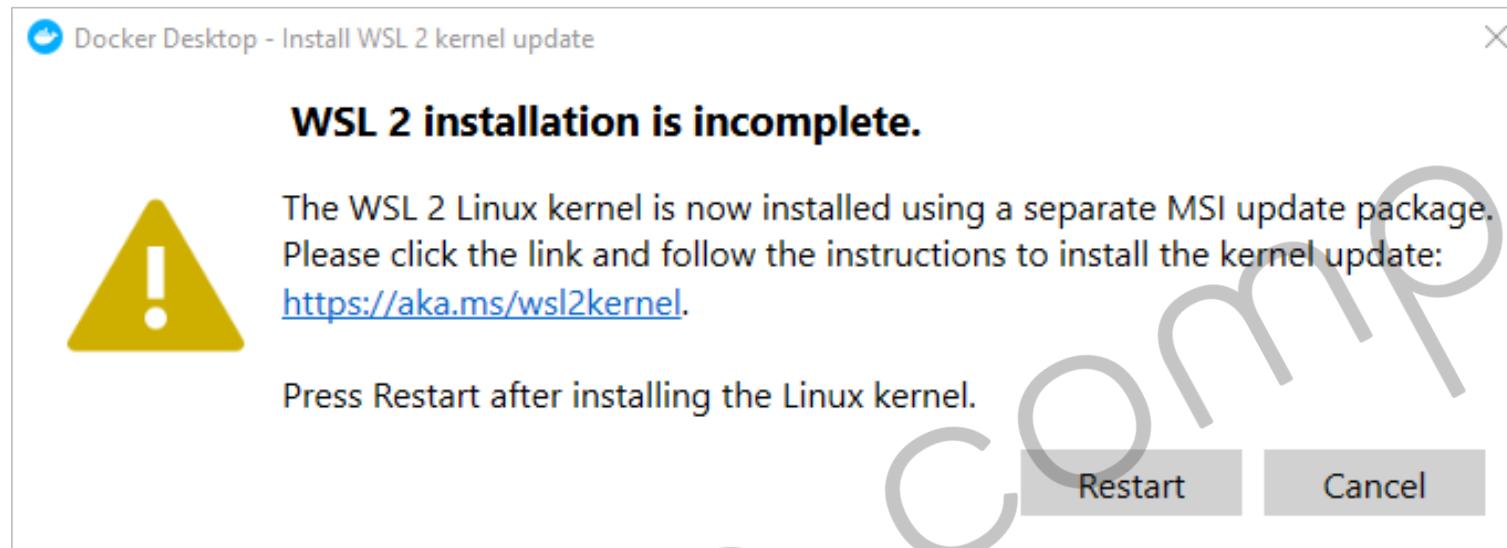
The screenshot shows the Docker Desktop product page. At the top, there is a navigation bar with links for Products, Developers, Pricing, Blog, About Us, and Partners. On the right side of the nav bar are a search icon, a Sign In link, and a prominent blue "Get Started" button. The main headline is "Docker Desktop" in large, bold, dark blue font. Below it is a sub-headline: "Install Docker Desktop – the fastest way to containerize applications." Two blue buttons are visible: "Mac with Intel Chip" and "Mac with Apple Chip". A small note above the Mac with Apple Chip button says "MOST COMMON". At the bottom, it states "Also available for Windows and Linux". A large, faint watermark reading "njone company" is diagonally across the page.



Docker Desktop

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- <https://aka.ms/wsl2kernel>



Install Git

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- <https://git-scm.com/>

- **\$ git --version**

The screenshot shows the official Git website at <https://git-scm.com/>. The page features a large header with the Git logo and the tagline "fast-version-control". Below the header, there's a search bar and a brief introduction stating that Git is a free and open source distributed version control system designed for speed and efficiency. A diagram illustrates the distributed nature of Git with multiple repositories connected by red lines. The main content area includes sections for "About", "Downloads", "Documentation", and "Community". A prominent section highlights the latest source release, "2.33.0", with a "Download for Mac" button. At the bottom, there are links for "Mac GUIs", "Tarballs", "Windows Build", and "Source Code".

git --fast-version-control

Search entire site...

Git is a **free and open source** distributed version control system designed to handle everything from small to very large projects with speed and efficiency.

Git is **easy to learn** and has a **tiny footprint with lightning fast performance**. It outclasses SCM tools like Subversion, CVS, Perforce, and ClearCase with features like **cheap local branching**, convenient staging areas, and **multiple workflows**.

About
The advantages of Git compared to other source control systems.

Downloads
GUI clients and binary releases for all major platforms.

Documentation
Command reference pages, Pro Git book content, videos and other material.

Community
Get involved! Bug reporting, mailing list, chat, development and more.

Latest source Release
2.33.0
Release Notes (2021-08-16)
Download for Mac

Mac GUIs Tarballs
Windows Build Source Code

Install Maven

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- <https://maven.apache.org/download.cgi>
 - *\$ mvn --version*

Apache Maven Project
http://maven.apache.org/

Apache / Maven / Download Apache Maven

Download Get Sources Last Published: 2021-09-01

Welcome
License

ABOUT MAVEN
What is Maven?
Features
Download
Use
Release Notes

DOCUMENTATION
Maven Plugins
Maven Extensions
Index (category)
User Centre
Plugin Developer Centre
Maven Central Repository
Maven Developer Centre
Books and Resources
Security

COMMUNITY
Community Overview
Project Roles
How to Contribute
Getting Help
Issue Management

Downloading Apache Maven 3.8.2

Apache Maven 3.8.2 is the latest release and recommended version for all users.

The currently selected download mirror is <https://mirror.navercorp.com/apache/>. 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. You may also consult the [complete list of mirrors](#).

Other mirrors:

System Requirements

Java Development Kit (JDK)	Maven 3.3+ require JDK 1.7 or above to execute - they still allow you to build against 1.3 and other JDK versions by Using Toolchains
Memory	No minimum requirement
Disk	Approximately 10MB is required for the Maven installation itself. In addition to that, additional disk space will be used for your local Maven repository. The size of your local repository will vary depending on usage but expect at least 500MB.
Operating System	No minimum requirement. Start up scripts are included as shell scripts and Windows batch files.

Files

Maven is distributed in several formats for your convenience. Simply pick a ready-made binary distribution archive and follow the [installation instructions](#). Use a source archive if you intend to build Maven yourself.

In order to guard against corrupted downloads/installations, it is highly recommended to [verify the signature](#) of the release bundles against the public [KEYS](#) used by the Apache Maven developers.

Link	Checksums	Signature
Binary tar.gz archive apache-maven-3.8.2-bin.tar.gz	apache-maven-3.8.2-bin.tar.gz.sha512 apache-maven-3.8.2-bin.zip.sha512	apache-maven-3.8.2-bin.tar.gz.asc apache-maven-3.8.2-bin.zip.asc
Binary zip archive apache-maven-3.8.2-bin.zip		



Install Maven on EC2

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■ Maven 설치

- <http://maven.apache.org/download.cgi> → apache-maven-3.8.1-bin.tar.gz

```
$ cd /opt
```

```
$ ls -ltr
```

```
$ wget https://mirror.navercorp.com/apache/maven/maven-3/3.8.1/binaries/apache-maven-3.8.1-bin.tar.gz
```

```
$ tar -xvzf apache-maven-3.8.1-bin.tar.gz
```

```
$ mv apache-maven-3.8.1-bin.tar.gz maven
```

```
$ cd maven/
```

```
$ vi ~/.bash_profile
```

```
M2_HOME=/opt/maven  
M2=/opt/maven/bin  
PATH=$PATH:$M2:$M2_HOME
```

Install Tomcat Server

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- <https://tomcat.apache.org/download-90.cgi>

- 압축해제
- **\$ chmod +x *.sh**

```
(base) downonlee > ~/Desktop/Work/01.edu/apache-tomcat-9.0.52/bin
▶ chmod +x *.sh
(base) downonlee > ~/Desktop/Work/01.edu/apache-tomcat-9.0.52/bin
▶ ls -l *.sh
-rwxr-xr-x@ 1 downonlee staff 25294 7 31 06:12 catalina.sh
-rwxr-xr-x@ 1 downonlee staff 1997 7 31 06:12 ciphers.sh
-rwxr-xr-x@ 1 downonlee staff 1922 7 31 06:12 configtest.sh
-rwxr-xr-x@ 1 downonlee staff 9100 7 31 06:12 daemon.sh
-rwxr-xr-x@ 1 downonlee staff 1965 7 31 06:12 digest.sh
-rwxr-xr-x@ 1 downonlee staff 3382 7 31 06:12 makebase.sh
-rwxr-xr-x@ 1 downonlee staff 3708 7 31 06:12 setclasspath.sh
-rwxr-xr-x@ 1 downonlee staff 1902 7 31 06:12 shutdown.sh
-rwxr-xr-x@ 1 downonlee staff 1904 7 31 06:12 startup.sh
-rwxr-xr-x@ 1 downonlee staff 5540 7 31 06:12 tool-wrapper.sh
-rwxr-xr-x@ 1 downonlee staff 1908 7 31 06:12 version.sh
(base) downonlee > ~/Desktop/Work/01.edu/apache-tomcat-9.0.52/bin
▶
```

Apache Tomcat®

Tomcat 9 Software Downloads

Welcome to the Apache Tomcat® 9.x software download page. This page provides download links for obtaining archives of older releases.

Unsure which version you need? Specification versions implemented, minimum Java version required and license information.

Quick Navigation

[KEYS](#) | [9.0.52](#) | [Browse](#) | [Archives](#)

Release Integrity

You must [verify](#) the integrity of the downloaded files. We provide OpenPGP signatures for every release file, the OpenPGP keys of Tomcat's Release Managers. We also provide [SHA-512](#) checksums for every release file download, and make sure it is the same as ours.

9.0.52

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:

Install Tomcat Server

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- `$ cd [TOMCAT_HOME]`
- `$./bin/startup.sh` (or `.\bin\startup.bat`)
- `$./bin/shutdown.sh` (or `.\bin\shutdown.bat`)

Home Documentation Configuration Examples Wiki Mailing Lists Find Help

Apache Tomcat/9.0.52

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](#)

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 9.0 access to the manager application is split between different users.

Documentation
[Tomcat 9.0 Documentation](#)
[Tomcat 9.0 Configuration](#)
[Tomcat Wiki](#)
Find additional important configuration information in:

Getting Help
[FAQ and Mailing Lists](#)
The following mailing lists are available:
[tomcat-announce](#)
Important announcements, releases, security vulnerability notifications. (Low volume).

Setup Tomcat Server

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The diagram illustrates two common errors during Tomcat setup:

- 401 Error!**: Unauthorized. This occurs when attempting to access the Manager application without proper authentication. A red arrow points from the "localhost:8080/manager/html" URL in the browser address bar to the login form, which is highlighted with a red dashed box.
- 403 Error!**: Access Denied. This occurs when attempting to access the Manager application after failing to log in. A red arrow points from the same URL in the browser address bar to the "403 Access Denied" page, which is also highlighted with a red dashed box.

Apache Tomcat/9.0.52

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](#)

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 9.0 access to the manager application is split between different users.

Documentation
[Tomcat 9.0 Documentation](#)
[Tomcat 9.0 Configuration](#)
[Tomcat Wiki](#)

Getting Help
[FAQ and Mailing Lists](#)
The following mailing lists are available:
[tomcat-announce](#)
Important announcements, releases, security vulnerability notifications. (Low volume.)

Find additional important configuration information in:

localhost:8080/manager/html

로그인
http://localhost:8080
사용자이름 tomcat
비밀번호
취소 로그인

403 Access Denied
You are not authorized to view this page.

By default the Manager is only accessible from a browser running on the same machine as Tomcat. If you wish to modify this restriction, you'll need to edit the Manager's `context.xml` file.

If you have already configured the Manager application to allow access and you have used your browsers back button, used a saved book-mark or similar then you may have triggered the cross been enabled for the HTML interface of the Manager application. You will need to reset this protection by returning to the main Manager page. Once you return to this page, you will be able to interface normally. If you continue to see this access denied message, check that you have the necessary permissions to access this application.

If you have not changed any configuration files, please examine the file `conf/tomcat-users.xml` in your installation. That file must contain the credentials to let you use this webapp.

For example, to add the `manager-gui` role to a user named `tomcat` with a password of `s3cret`, add the following to the config file listed above.

```
<role rolename="manager-gui"/>
<user username="tomcat" password="s3cret" roles="manager-gui"/>
```

Note that for Tomcat 7 onwards, the roles required to use the manager application were changed from the single `manager` role to the following four roles. You will need to assign the role(s) r



Setup Tomcat Server

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403 Access Denied

You are not authorized to view this page.

By default the Manager is only accessible from a browser running on the same machine as Tomcat. If you wish to modify this restriction, you'll need to edit the Manager's `context.xml` file.

If you have already configured the Manager application to allow access and you have used your browsers back button, used a saved book-mark or similar then you may have triggered the cross-site scripting protection that has been enabled for the HTML interface of the Manager application. You will need to reset this protection by returning to the [main Manager page](#). Once you return to this page, you will be able to interface normally. If you continue to see this access denied message, check that you have the necessary permissions to access this application.

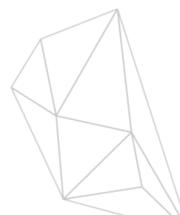
If you have not changed any configuration files, please examine the file `conf/tomcat-users.xml` in your installation. That file must contain the credentials to let you use this webapp.

For example, to add the `manager-gui` role to a user named `tomcat` with a password of `s3cret`, add the following to the config file listed above.

```
<role rolename="manager-gui"/>
<user username="tomcat" password="s3cret" roles="manager-gui"/>
```

- **%TOMCAT_HOME%/webapps/manager/META-INF/context.xml 파일 수정**
- **%TOMCAT_HOME%/webapps/host-manager/META-INF/context.xml 파일 수정**

```
18  <Context antiResourceLocking="false" privileged="true" >
19    <CookieProcessor className="org.apache.tomcat.util.http.Rfc6265CookieProcessor"
20      sameSiteCookies="strict" />
21    <!-- <Valve className="org.apache.catalina.valves.RemoteAddrValve"
22      | allow="127\\.\\d+\\.\\d+\\.\\d+|::1|0:0:0:0:0:1" /> -->
23    <Manager sessionAttributeValueClassNameFilter="java\\.lang\\.\\(?:Boolean|Integer|Long|N
24      |apache\\.catalina\\.filters\\.CsrfPreventionFilter\\$LruCache\\(?:\\$1)?|java\\.util\\.\\(?:Lin
```





Setup Tomcat Server

- %TOMCAT_HOME%/conf/tomcat-users.xml 파일 수정

```
56 <role rolename="manager-gui" />
57 <role rolename="manager-script" />
58 <role rolename="manager-jmx" />
59 <role rolename="manager-status" />
60 <user username="admin" password="admin"
61 |   roles="manager-gui, manager-script, manager-jmx, manager-status"/>
62 <user username="deployer" password="deployer"
63 |   roles="manager-script"/>
64 <user username="tomcat" password="tomcat"
65 |   roles="manager-gui"/>
66 </tomcat-users>
```

- %TOMCAT_HOME%/bin/shutdown.sh (or .\bin\shutdown.bat)
- %TOMCAT_HOME%/bin/startup.sh (or .\bin\startup.bat)

Setup Tomcat Server

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The screenshot shows the Tomcat Manager Application interface at <http://192.168.0.8:8080/manager/html>. A red arrow points from the browser address bar to the login dialog.

Tomcat 웹 애플리케이션 매니저

메시지: OK

매니저

애플리케이션들의 목록을 표시		HTML 매니저 도움말	매니저 도움말	서버 상태	
경로	버전	표시 이름	실행 중	세션들	명령들
/	지정 안됨	Welcome to Tomcat	true	0	시작 중지 다시 로드 배치된 것을 제거 세션들을 만료시키기 idle 값 ≥ 30 분
/docs	지정 안됨	Tomcat Documentation	true	0	시작 중지 다시 로드 배치된 것을 제거 세션들을 만료시키기 idle 값 ≥ 30 분
/examples	지정 안됨	Servlet and JSP Examples	true	0	시작 중지 다시 로드 배치된 것을 제거 세션들을 만료시키기 idle 값 ≥ 30 분
/host-manager	지정 안됨	Tomcat Host Manager Application	true	0	시작 중지 다시 로드 배치된 것을 제거 세션들을 만료시키기 idle 값 ≥ 30 분
/manager	지정 안됨	Tomcat Manager Application	true	1	시작 중지 다시 로드 배치된 것을 제거 세션들을 만료시키기 idle 값 ≥ 30 분

로그인

http://192.168.0.8:8080
이 사이트로의 연결은 비공개가 아닙니다.

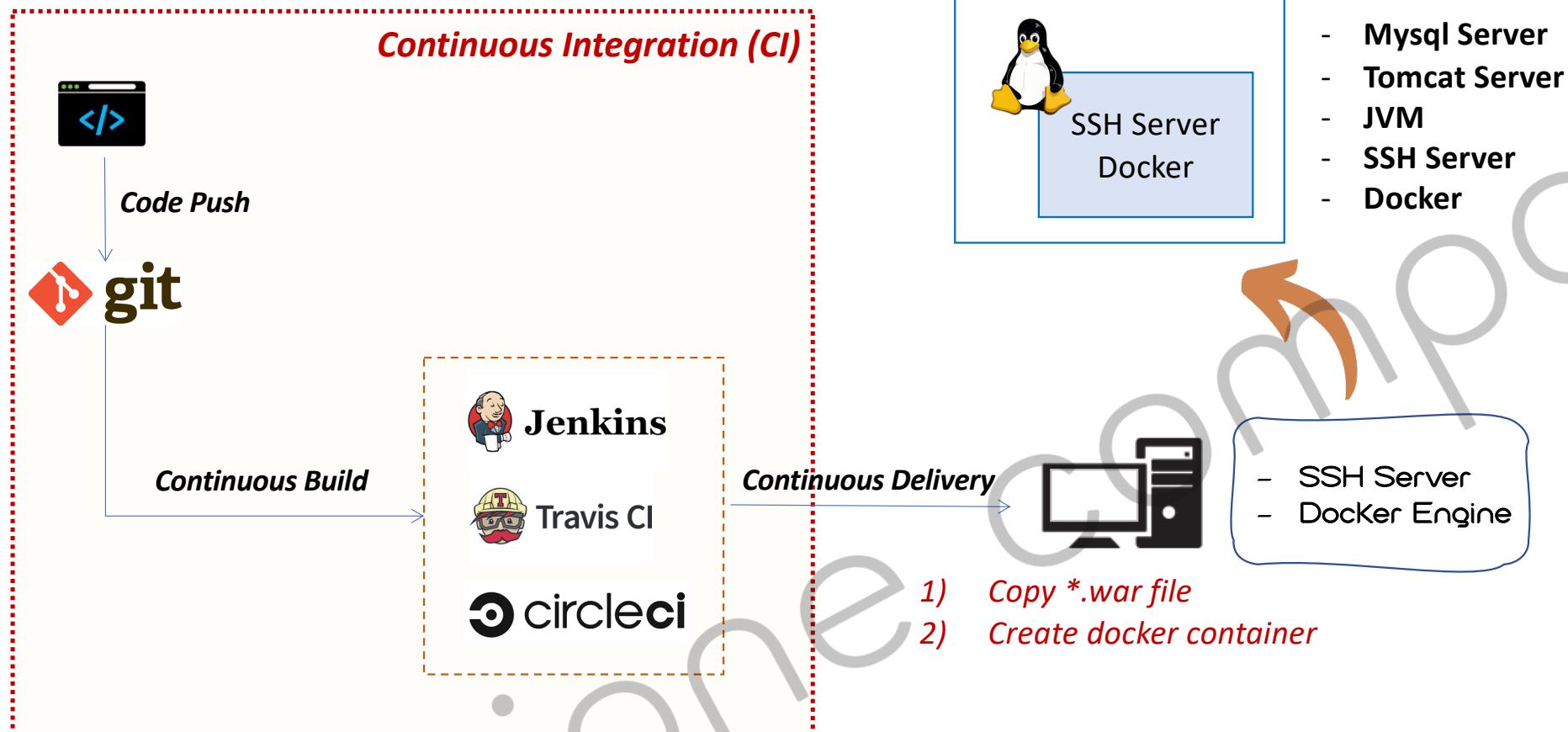
사용자이름: tomcat
비밀번호:

취소 로그인

Install SSH Server

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- Docker in Docker

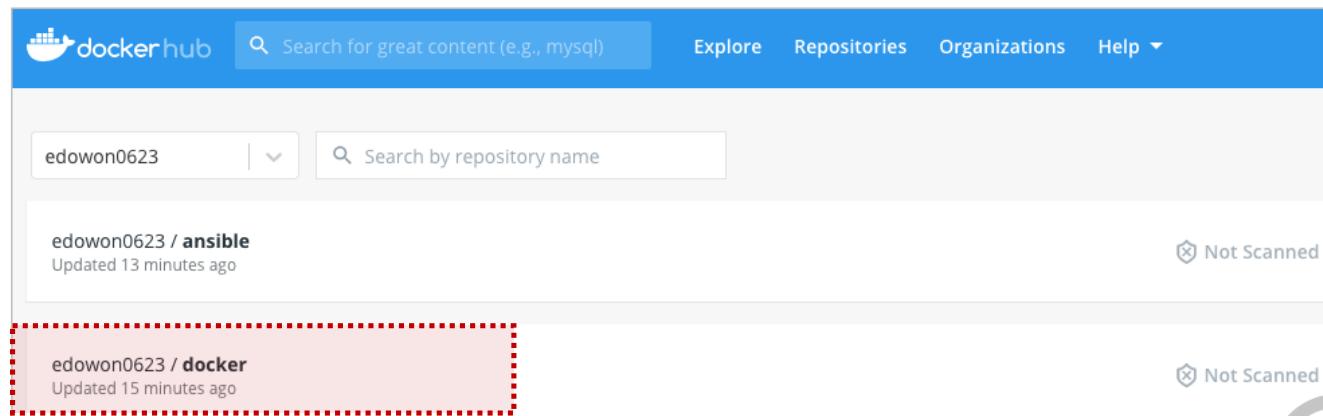




Install SSH Server (Windows, MacOS)

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- <https://hub.docker.com/r/edowon0623/docker>



- \$ ssh root@192.168.0.8 -p 10022
The authenticity of host '[192.168.0.8]:10022 ([192.168.0.8]:10022)' can't be established.
ECDSA key fingerprint is SHA256:Hb19SDvwGcsag34M/5Wuro3FwuYX5sjAznvJwxlVfU0.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '[192.168.0.8]:10022' (ECDSA) to the list of known hosts.
\$ root@192.168.0.8's password: P@ssw0rd
System is booting up. See pam_nologin(8)
Last login: Mon Sep 6 05:32:40 2021 from 172.17.0.4
[root@ae2b6f08d2dc ~]#



Install SSH Server (Windows, MacOS)

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```
$ vi /etc/sysconfig/docker
```

```
# /etc/sysconfig/docker

# Modify these options if you want to change the way the docker daemon Exercises
OPTIONS='--selinux-enabled=false --log-driver=journald --signature-verification=false'
if [ -z "${DOCKER_CERT_PATH}" ]; then
    DOCKER_CERT_PATH=/etc/docker
fi
```

```
$ yum install -y iptables net-tools
```

```
$ sed -i -e 's/overlay2/vfs/g' /etc/sysconfig/docker-storage
```

```
$ systemctl start docker
```

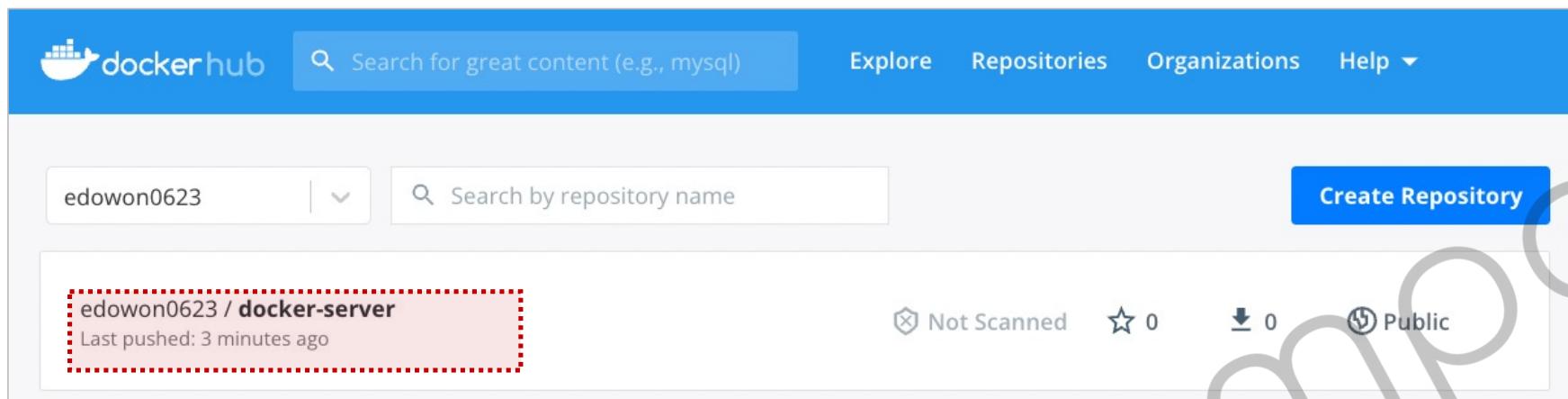
```
[root@ae2b6f08d2dc ~]# sed -i -e 's/overlay2/vfs/g' /etc/sysconfig/docker-storage
[root@ae2b6f08d2dc ~]# systemctl start docker
[root@ae2b6f08d2dc ~]# systemctl status docker
● docker.service - Docker Application Container Engine
  Loaded: loaded (/usr/lib/systemd/system/docker.service; disabled; vendor preset: disabled)
  Active: active (running) since Mon 2021-09-06 05:26:06 UTC; 48min ago
    Docs: http://docs.docker.com
   Main PID: 283 (dockerd-current)
```



Install SSH Server (Apple Silicon chip)

njone company

- <https://hub.docker.com/r/edowon0623/docker-server>



- Docker ➔
\$ docker run -it alpine:latest /bin/sh
ssh root@192.168.0.8 -p 10022
The authenticity of host '[192.168.0.8]:10022 ([192.168.0.8]:10022)' can't be established.
ECDSA key fingerprint is SHA256:Hb19SDvwGcsag34M/5Wuro3FwuYX5sjAznvJwxlVfU0.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '[192.168.0.8]:10022' (ECDSA) to the list of known hosts.
\$ ssh root@192.168.0.8
root@192.168.0.8's password: P@ssw0rd
System is booting up. See pam_nologin(8)
Last login: Mon Sep 6 05:32:40 2021 from 172.17.0.4
[root@ae2b6f08d2dc ~]#

Install SSH Client

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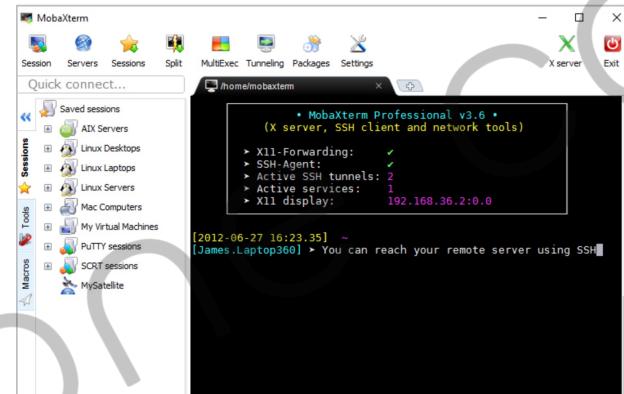
■ Windows

- Xshell (<https://www.netsarang.com/ko/free-for-home-school/>)
- MobaXterm (<https://mobaxterm.mobatek.net/download-home-edition.html>)
- Terminus (<https://terminus.com>)

■ Windows, MacOS

- Terminus (<https://terminus.com>)

```
[SSH] EC2-Dev - user@mysvr3: ~ - xshell 7
파일과 디렉터리 보기로 도구로 창으로 도움말로
SSH: user ***@mysvr3 netsharang.com:22
세션 관리 1 SSH[EC2-Dev] 2 [SSP]Ubuntu 20.04
[mysvr3] ~$ ls -al
total 64
drwxr-xr-x 5 user user 4096 Oct 14 11:09 .
drwxr-xr-x 4 user user 4096 May 20 19:15 ..
-rw-r--r-- 1 user user 834 Oct 14 11:09 .xauthority
-rw-r--r-- 1 user user 1600 May 20 19:15 .Xdefaults
-rw-r--r-- 1 user user 944 Oct 13 16:15 .bash_history
-rw-r--r-- 1 user user 1024 May 20 19:15 .bash_logout
-rw-r--r-- 1 user user 3771 May 20 19:15 .bashrc
drwxr-xr-x 2 user user 4096 May 20 19:16 .cache
drwxr-xr-x 2 user user 4096 May 20 19:16 .config
drwxr-xr-x 3 user user 4096 May 20 19:16 .gnupg
-rw-r--r-- 1 user user 807 May 20 19:15 .profile
-rw-r--r-- 1 user user 1024 May 20 19:15 .zshrc
-rw-r--r-- 1 user user 134 May 20 19:15 .xscreensaver
-rw-r--r-- 1 user user 8980 May 20 19:15 examples.desktop
[mysvr3] ~$
```



```
Last login: Wed Sep 19 02:44:06 2018 from 14.1.63.253
FreeBSD 11.1-RELEASE (GENERIC) #0 r321389: Fri Jul 21 02:08:26 UTC 2017
Welcome to FreeBSD!
Release Notes, Errata: https://www.FreeBSD.org/releases/
Security Advisories: https://www.FreeBSD.org/security/
FreeBSD Handbook: https://www.FreeBSD.org/handbook/
FreeBSD FAQ: https://www.FreeBSD.org/faq/
Question List: https://www.FreeBSD.org/faq/listinfo/freebsd-questions/
FreeBSD Forums: https://forums.FreeBSD.org/
Documents installed with the system are in the /usr/local/share/doc/freebsd/
directory, or can be installed later with: pkg install en-freebsd-doc
For other languages, replace "en" with a language code like de or fr.
Show the version of FreeBSD installed: freebsd-version ; uname -a
Please include that output and any error messages when posting questions.
Introduction to manual pages: man man
FreeBSD directory layout: man hier
Edit /etc/motd to change this login announcement.
You can use "pkg info" to see a list of packages you have installed.
[james@reast-test-server:~]
```



Node.js + PM2

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- Node 프로젝트 샘플

- <https://github.com/joneconsulting/cicd-node-project>

- Node.js 프로젝트

```
var express = require('express');
var app = express();

app.get('/', (req, res) => {
  res.status(200).json({
    message: `Hello, ${req.query.name}!`
  });
}

app.listen(8000, () => {
  console.log(`Example app for CI/CD listening on port 8000`)
})
```



- Babel transpiler

- 자바스크립트 컴파일러
- ES6+ 버전 이상의 자바스크립트나 타입스크립트 코드를 하위버전의 자바 스크립트로 변환
- Node 서버 + Babel → <https://github.com/babel/example-node-server>



Nodejs + PM2

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- PM2

- Node.js 애플리케이션을 쉽게 관리할 수 있게 해주는 Process Manager
- Cluster mode 실행 가능
- **\$ npm install -g pm2**
- ecosystem.config.js

```
module.exports = [{}  
  ...  
  {  
    script: 'dist/app.js',  
    name: 'node-server',  
    instances: 1  
  }]
```



Nodejs + PM2

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- Dockerfile

```
1  FROM node:10
2
3  WORKDIR /usr/src/app
4
5  RUN npm install -g pm2
6
7  COPY package.json .
8  RUN npm install
9
10 COPY app.js .
11 COPY babel.config.json .
12 COPY ecosystem.config.js .
13
14 EXPOSE 8000
15
16 RUN npm run build
17
18 CMD ["pm2-runtime", "start", "ecosystem.config.js", "--env", "production"]
```

- **\$ docker build -t edowon0623/cicd-node-example .**
- **\$ docker run -p 8000:8000 edowon0623/cicd-node-example**



Nodejs + PM2

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■ Jenkins 설정

SSH Publishers

SSH Server

Name ?

docker-server

고급...

Transfers

Transfer Set

Source files ?

**

Remote directory ?

.

Exec command ?

```
docker build -t edowon0623/cicd-node-project -f Dockerfile .;
docker run -d -p 8000:8000 edowon0623/cicd-node-project:latest;
```

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```
SSH: Connecting from host [e1253d619fc1]
SSH: Connecting with configuration [docker-server] ...
SSH: EXEC: completed after 318,396 ms
SSH: Disconnecting configuration [docker-server] ...
SSH: Transferred 5 file(s)
Finished: SUCCESS
```

Docker Out Of Docker

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inflearn.com/course/ Jenkins-ci-cd-파이프라인/unit/122411

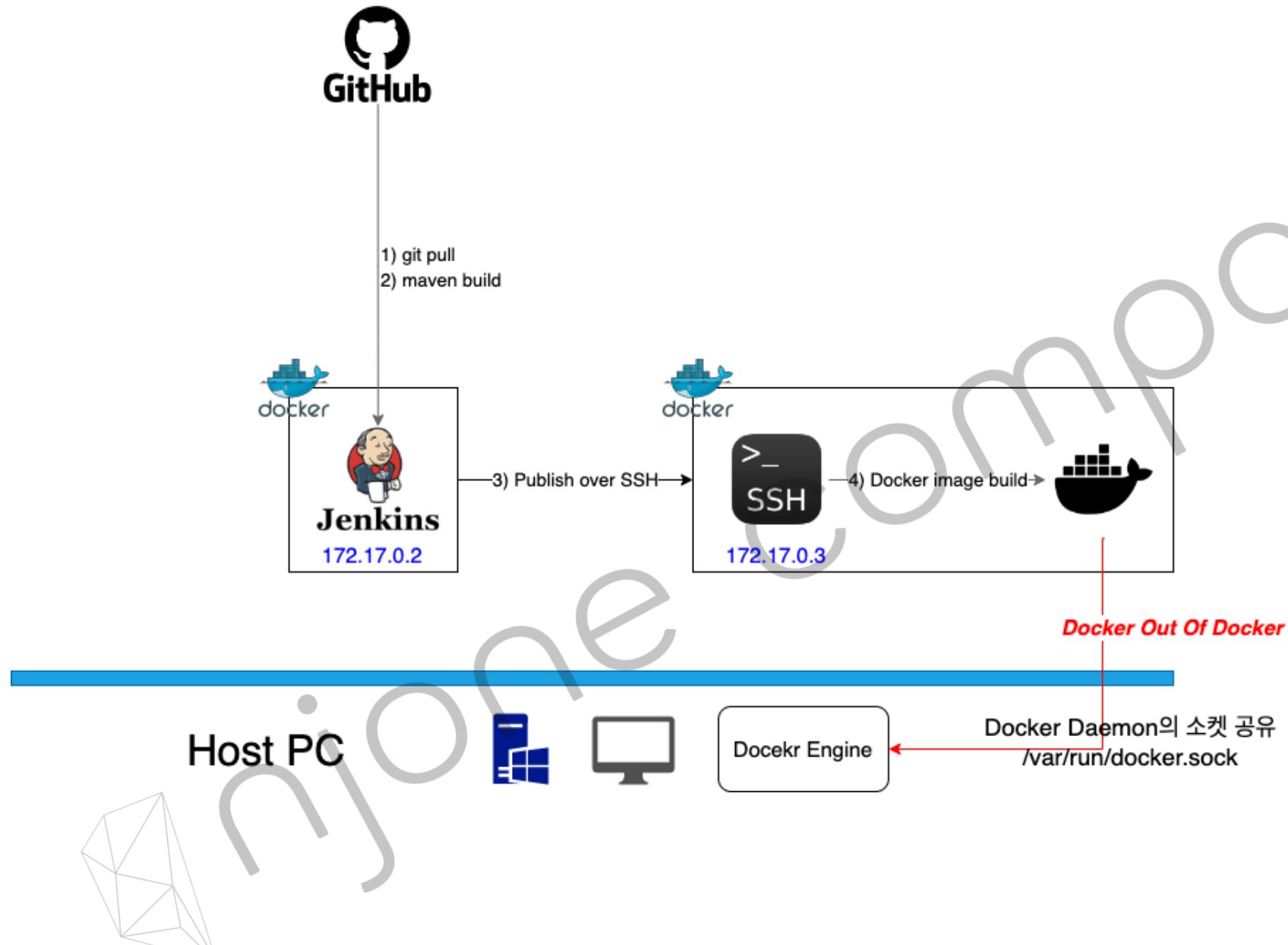
SSH + Docker가 설치되어 있는 VM(컨테이너) 사용하기 (Updated)

7:02 / 19:15

- Windows) SSH 서버 (with 도커) 실행 명령어 (방법1)
docker run --privileged --name docker-server -itd -p 10022:22 -p 8081:8080 -e container=docker -v /sys/fs/cgroup:/sys/fs/cgroup edowon0623/docker:latest /usr/sbin/init
- Windows) SSH 서버 (with 도커) 실행 명령어 (방법2, 위 명령어로 실행되지 않을 경우)
docker run -itd --name docker-server -p 10022:22 -e container=docker --tmpfs /run --tmpfs /tmp -v /sys/fs/cgroup:/sys/fs/cgroup:ro -v /var/run/docker.sock:/var/run/docker.sock edowon0623/docker:latest /usr/sbin/init
- MacOS Intel chip) SSH 서버 (with 도커) 실행 명령어
docker run --privileged --name docker-server -itd -p 10022:22 -p 8081:8080 -e container=docker -v /sys/fs/cgroup:/sys/fs/cgroup edowon0623/docker:latest /usr/sbin/init
- MacOS apple silicon chip, m1) SSH 서버 (with 도커) 실행 명령어
docker run --privileged --name docker-server -itd -p 10022:22 -p 8081:8080 -e container=docker -v /sys/fs/cgroup:/sys/fs/cgroup:rw --cgroupns=host edowon0623/docker-server:m1 /usr/sbin/init

Docker Out Of Docker

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Docker Out Of Docker

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■ DooD 특징

- Host PC Docker daemon이 사용하는 Socket을 이용하여 Docker Client에서 Container 실행
- Docker Client의 환경과 Host PC Docker daemon 환경이 동일
 - *Docker Images 및 Container 목록이 동일*
- 컨테이너 내에서 도커 데몬을 실행하기 위한 명령어 사용할 수 없음
 - *systemctl start docker* 등
- **--privileged 옵션 사용하지 않음**
- Host PC Docker daemon이 사용하는 리소스 명과 충돌하지 않도록 설정 주의
 - *Container, Volume mount, Port* 등

```
$ docker run -itd --name docker-server -p 10022:22 -e container=docker --tmpfs /run --tmpfs /tmp \
-v /sys/fs/cgroup:/sys/fs/cgroup:ro -v /var/run/docker.sock:/var/run/docker.sock |
edowan0623/docker:latest /usr/sbin/init
```



Thank you!

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- Section 1: DevOps와 CI/CD
- Section 2: Jenkins를 이용한 CI/CD 사용
- Section 3: Jenkins + Infrastructure as Code
- Section 4: Jenkins + Ansible + Kubernetes 연동
- Section 5: Advanced Jenkins 사용 1)
- Section 6: Advanced Jenkins 사용 2)
- Section 7: Public Cloud에 배포
- Appendix



후속 강의 소개

- *(Update) Spring Boot를 이용한 RESTful Web Services 개발*
- *(Update) Spring Cloud로 개발하는 마이크로서비스 애플리케이션(MSA)*

- *Microservice Architecture 와 Patterns*
- *Spring Boot 와 WebFlux를 이용한 Reactive RESTful API 개발*