

Setup Apache Tomcat 8.5.x (CentOS 7.x)

Spring Project Deploy (war) in Apache Tomcat CentOS 7.x

1. CentOS 에서 네트워크 설정과 DNS 설정 확인하기

```
root@itbank:/  
[root@itbank bin]# ifconfig | head -2  
ens33: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500  
        inet 192.168.25.100  netmask 255.255.255.0  broadcast 192.168.25.255  
  
[root@itbank bin]# route -n  
Kernel IP routing table  
Destination      Gateway          Genmask         Flags Metric Ref    Use Iface  
0.0.0.0          192.168.25.2    0.0.0.0         UG      0      0      0 ens33  
  
[root@itbank ~]# ping google.com -c 4  
  
PING google.com (172.217.175.110) 56(84) bytes of data.  
64 bytes from nrt20s21-in-f14.1e100.net (172.217.175.110): icmp_seq=1 ttl=128 time=36.3 ms  
64 bytes from nrt20s21-in-f14.1e100.net (172.217.175.110): icmp_seq=2 ttl=128 time=36.5 ms  
64 bytes from nrt20s21-in-f14.1e100.net (172.217.175.110): icmp_seq=3 ttl=128 time=36.4 ms  
64 bytes from nrt20s21-in-f14.1e100.net (172.217.175.110): icmp_seq=4 ttl=128 time=36.4 ms  
  
--- google.com ping statistics ---  
4 packets transmitted, 4 received, 0% packet loss, time 3013ms  
rtt min/avg/max/mdev = 36.381/36.466/36.591/0.078 ms
```

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2. JRE, JDK 설치 및 작동 확인

```
root@itbank: /  
[root@itbank ~]# yum install java-1.8.0-openjdk-devel -y  
...  
...  
Complete!  
  
[root@itbank ~]# rpm -qa | grep java-1.8.0  
java-1.8.0-openjdk-headless-1.8.0.242.b08-0.el7_7.x86_64  
java-1.8.0-openjdk-1.8.0.242.b08-0.el7_7.x86_64  
java-1.8.0-openjdk-devel-1.8.0.242.b08-0.el7_7.x86_64  
  
[root@itbank ~]# java -version  
openjdk version "1.8.0_242"  
OpenJDK Runtime Environment (build 1.8.0_242-b08)  
OpenJDK 64-Bit Server VM (build 25.242-b08, mixed mode)  
  
[root@itbank ~]# javac -version  
javac 1.8.0_242
```

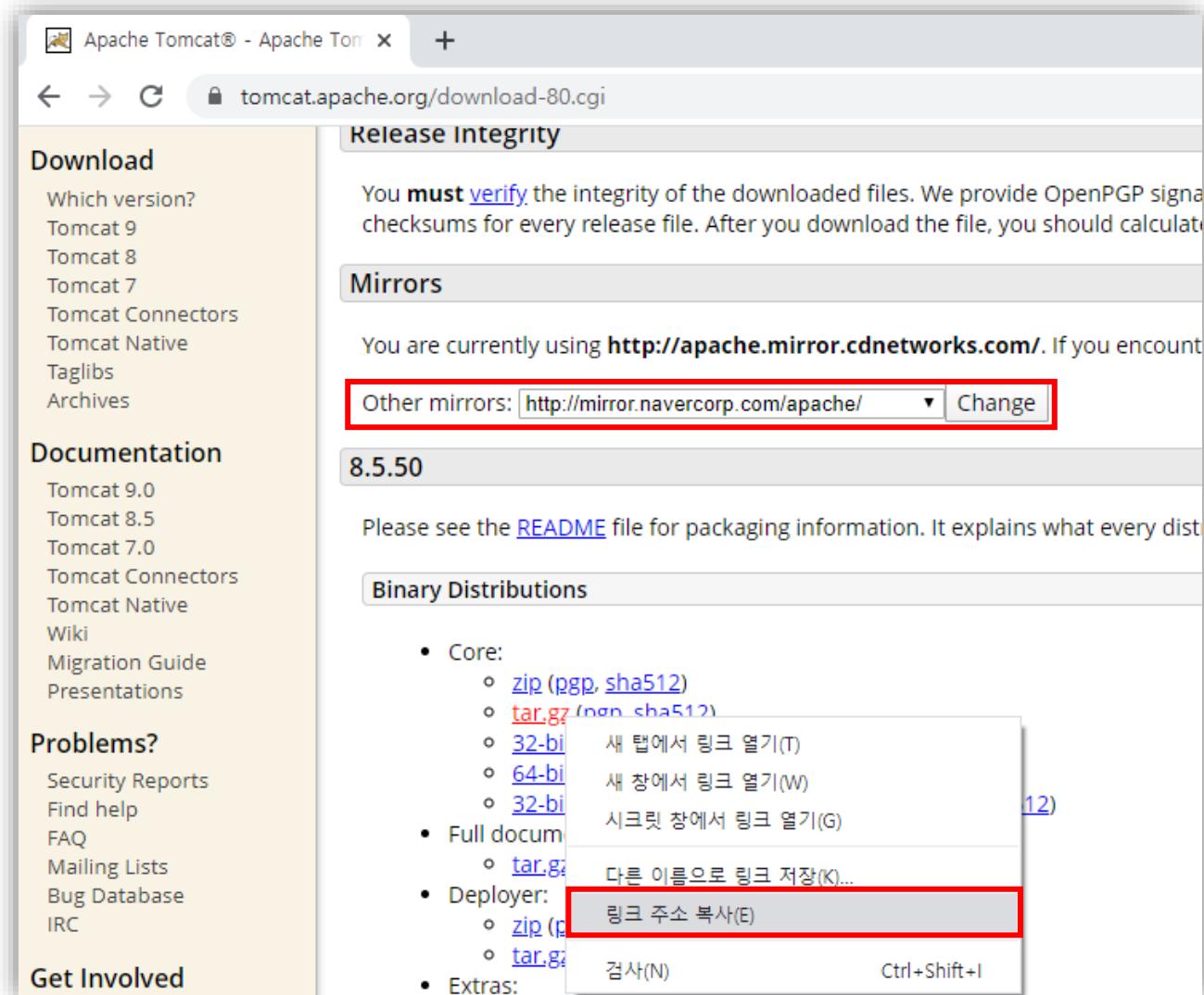
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3. google.com 에서 tomcat 검색하여 Tomcat 8 Downloads 페이지로 이동



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4. Tomcat 8 최신버전의 tar.gz (리눅스용 Core) 우클릭 후 링크 주소 복사



속도가 너무 느리면

Mirrors를 navercorp로 변경 후 다운받자

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5. 복사해 둔 링크 주소를 CentOS 에서 다운로드 (wget)

```
root@itbank: /  
[root@itbank ~]# cd /usr/local/  
[root@itbank local]# wget http://apache.mirror.cdnetworks.com/tomcat/tomcat-8/v8.5.50/bin/apache-tomcat-8.5.50.tar.gz  
  
--2020-02-03 17:33:56-- http://apache.mirror.cdnetworks.com/tomcat/tomcat-8/v8.5.50/bin/apache-tomcat-8.5.50.tar.gz  
Resolving apache.mirror.cdnetworks.com (apache.mirror.cdnetworks.com)... 14.0.101.165  
Connecting to apache.mirror.cdnetworks.com (apache.mirror.cdnetworks.com)|14.0.101.165|:80... connected.  
HTTP request sent, awaiting response... 200 OK  
Length: 10305939 (9.8M) [application/x-gzip]  
Saving to: 'apache-tomcat-8.5.50.tar.gz'  
  
100%[=====>] 10,305,939 13.2MB/s in 0.7s  
  
2020-02-03 17:33:57 (13.2 MB/s) - 'apache-tomcat-8.5.50.tar.gz' saved [10305939/10305939]
```

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6. 압축 해제 및 확인

```
root@itbank:/  
[root@itbank local]# tar xf apache-tomcat-8.5.50.tar.gz  
  
[root@itbank local]# ls -l  
합계 12676  
drwxr-xr-x. 9 root root      220  2월  3 20:17 apache-tomcat-8.5.50  
-rw-r--r--  1 root root 10305939 12월  8 04:42 apache-tomcat-8.5.50.tar.gz  
drwxr-xr-x. 2 root root      49 12월  2 12:54 bin  
drwxr-xr-x. 2 root root       6  4월 11 2018 etc  
drwxr-xr-x. 2 root root       6  4월 11 2018 games  
drwxr-xr-x. 2 root root       6  4월 11 2018 include  
drwxr-xr-x. 2 root root       6  4월 11 2018 lib  
drwxr-xr-x. 2 root root       6  4월 11 2018 lib64  
drwxr-xr-x. 2 root root       6  4월 11 2018 libexec  
drwxr-xr-x. 2 root root       6  4월 11 2018 sbin  
drwxr-xr-x. 5 root root      49 11월 26 19:52 share  
drwxr-xr-x. 2 root root       6  4월 11 2018 src
```

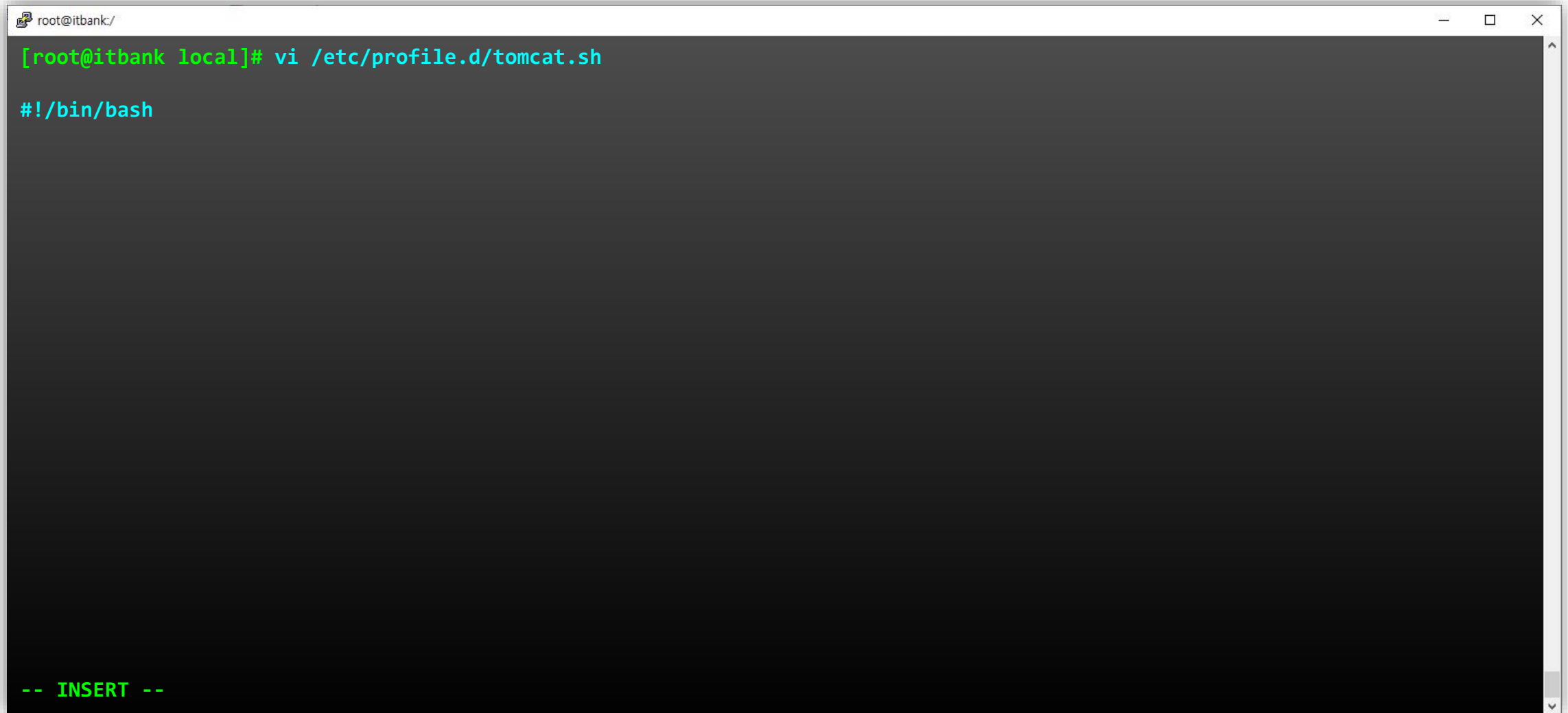
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7. 심볼릭 링크 생성

```
root@itbank:/  
[root@itbank local]# ln -s apache-tomcat-8.5.50 tomcat  
  
[root@itbank local]# ls -l  
합계 12676  
drwxr-xr-x. 9 root root      220  2월  3 20:17 apache-tomcat-8.5.50  
-rw-r--r--  1 root root 10305939 12월  8 04:42 apache-tomcat-8.5.50.tar.gz  
drwxr-xr-x. 2 root root      49 12월  2 12:54 bin  
drwxr-xr-x. 2 root root       6  4월 11 2018 etc  
drwxr-xr-x. 2 root root       6  4월 11 2018 games  
drwxr-xr-x. 2 root root       6  4월 11 2018 include  
drwxr-xr-x. 2 root root       6  4월 11 2018 lib  
drwxr-xr-x. 2 root root       6  4월 11 2018 lib64  
drwxr-xr-x. 2 root root       6  4월 11 2018 libexec  
drwxr-xr-x. 2 root root       6  4월 11 2018 sbin  
drwxr-xr-x. 5 root root      49 11월 26 19:52 share  
drwxr-xr-x. 2 root root       6  4월 11 2018 src  
lrwxrwxrwx  1 root root       20  2월  3 20:17 tomcat -> apache-tomcat-8.5.50
```


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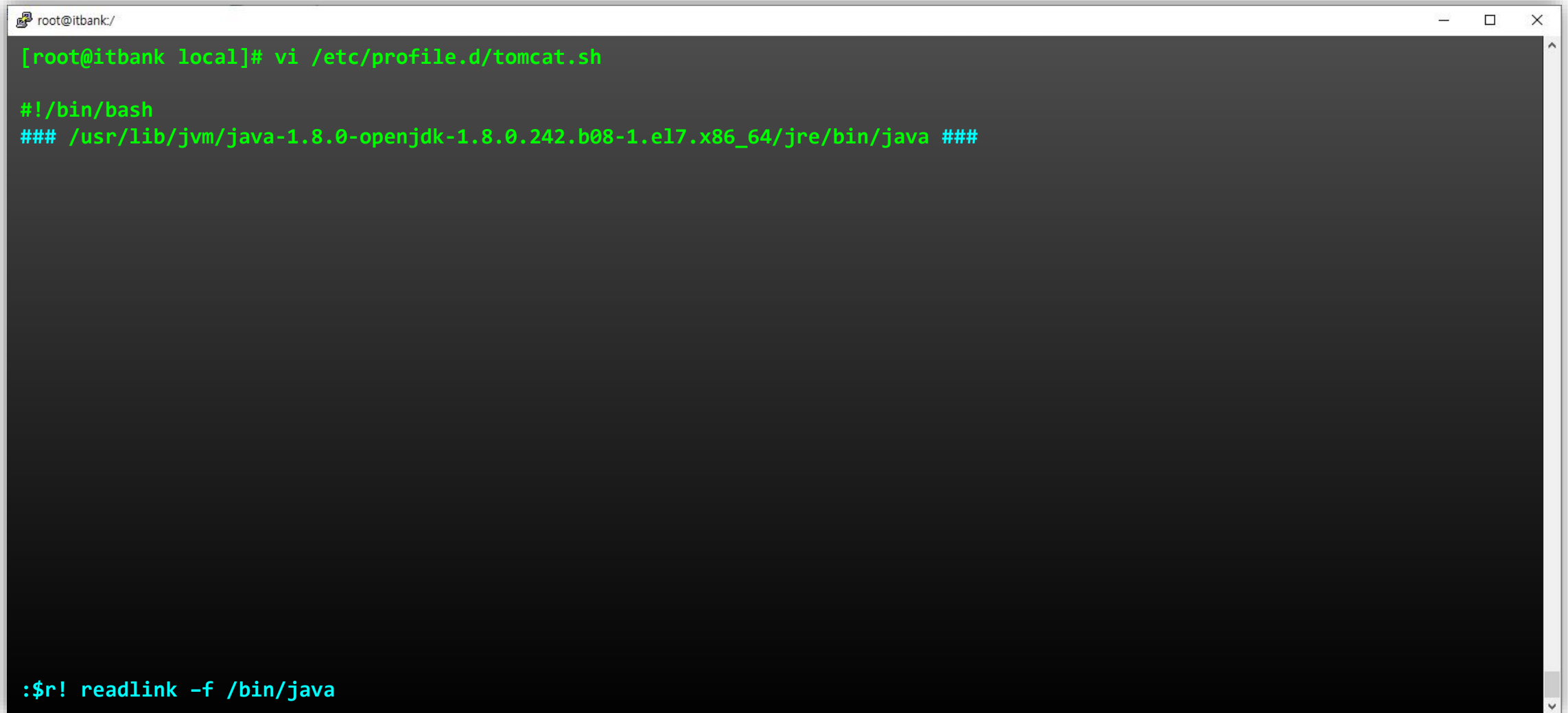
8. 환경 변수 설정 (1: 톰캣 환경변수 전용 파일 만들기)

A terminal window titled 'root@itbank:/' with standard window controls. The prompt is '[root@itbank local]#'. The command 'vi /etc/profile.d/tomcat.sh' has been entered. The file is now open in vi editor, showing the first line '#!/bin/bash'. The bottom of the screen shows '-- INSERT --' in green, indicating the editor is in insert mode.

```
root@itbank:/  
[root@itbank local]# vi /etc/profile.d/tomcat.sh  
#!/bin/bash  
  
-- INSERT --
```

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8. 환경 변수 설정 (2: java 실행파일의 경로 가져와서 주석 처리하기)



A terminal window titled 'root@itbank:/' showing the editing of the file `/etc/profile.d/tomcat.sh` using the `vi` editor. The file content is as follows:

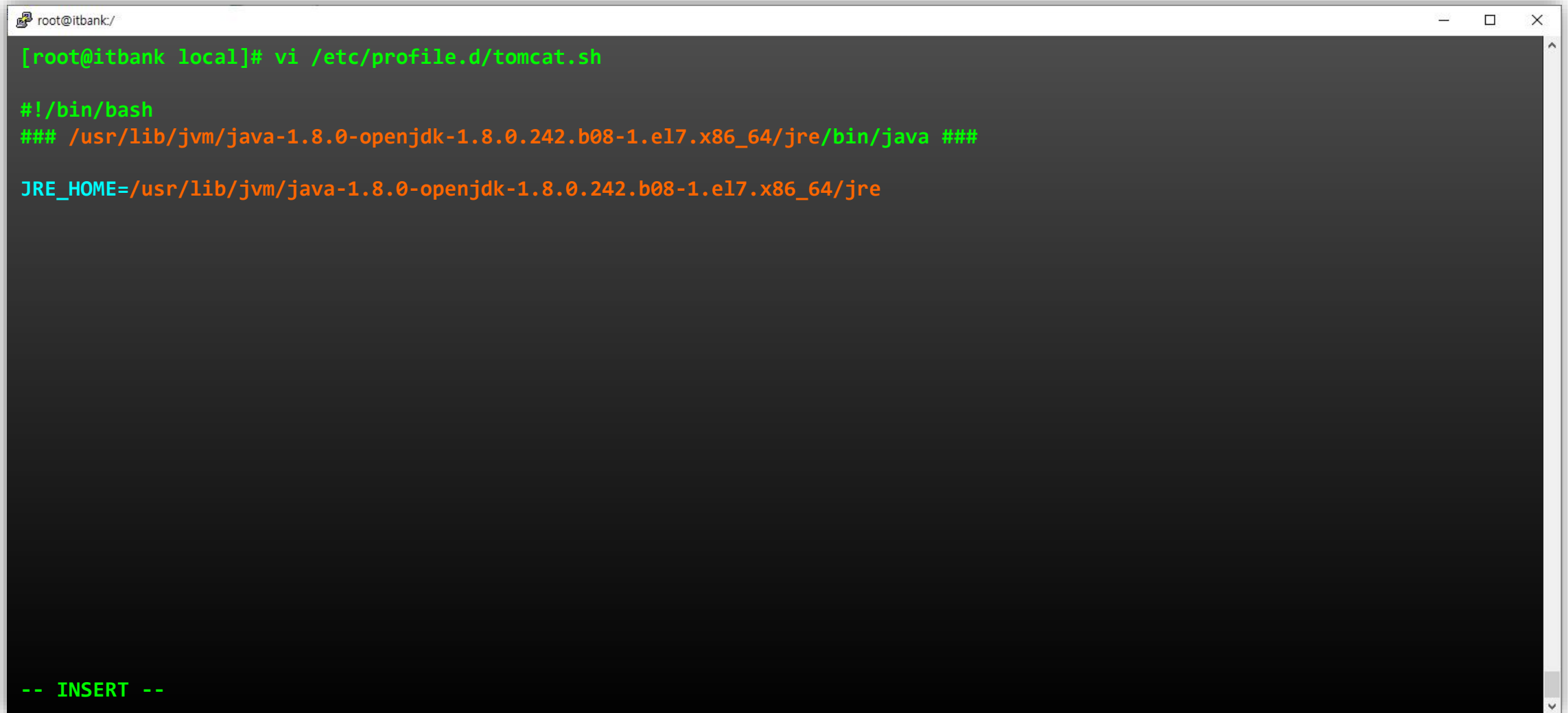
```
[root@itbank local]# vi /etc/profile.d/tomcat.sh

#!/bin/bash
### /usr/lib/jvm/java-1.8.0-openjdk-1.8.0.242.b08-1.el7.x86_64/jre/bin/java ###
```

At the bottom of the terminal, the command `:$r! readlink -f /bin/java` is entered.

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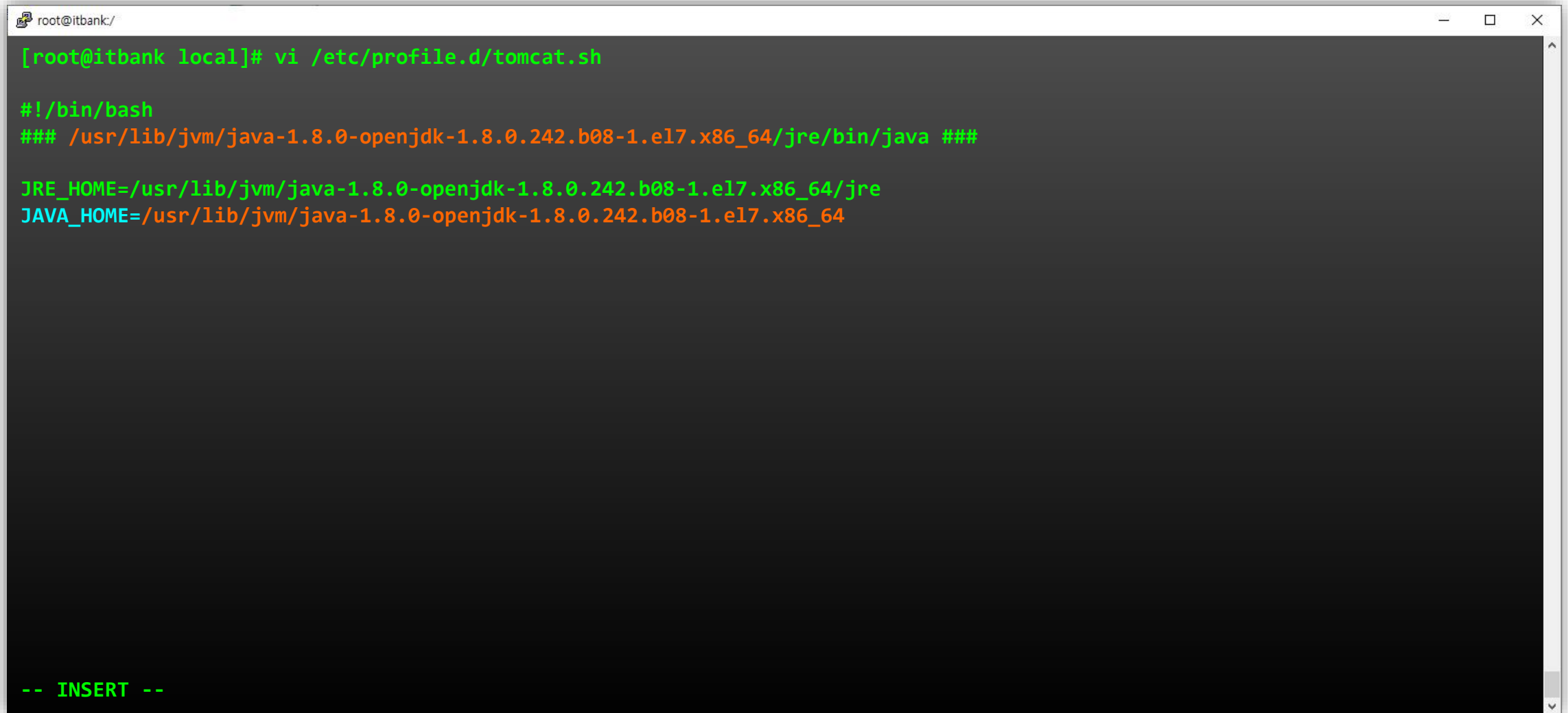
8. 환경 변수 설정 (3: JRE_HOME 설정, 가져온 경로에서 jre까지 복사)



```
root@itbank:/  
[root@itbank local]# vi /etc/profile.d/tomcat.sh  
#!/bin/bash  
### /usr/lib/jvm/java-1.8.0-openjdk-1.8.0.242.b08-1.el7.x86_64/jre/bin/java ###  
JRE_HOME=/usr/lib/jvm/java-1.8.0-openjdk-1.8.0.242.b08-1.el7.x86_64/jre  
  
-- INSERT --
```

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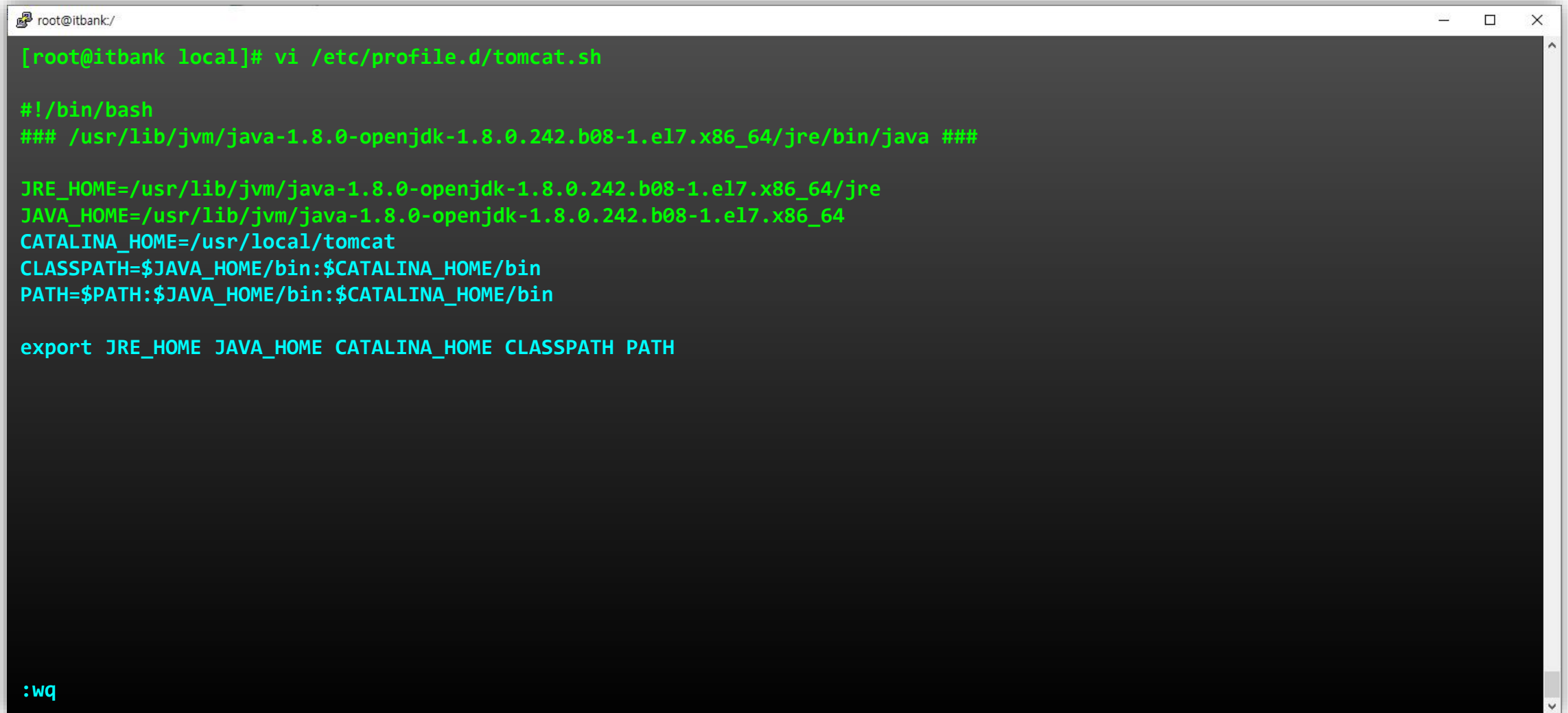
8. 환경 변수 설정 (4: JAVA_HOME 설정, 가져온 경로에서 64까지 복사)



```
root@itbank:/  
[root@itbank local]# vi /etc/profile.d/tomcat.sh  
#!/bin/bash  
### /usr/lib/jvm/java-1.8.0-openjdk-1.8.0.242.b08-1.el7.x86_64/jre/bin/java ###  
  
JRE_HOME=/usr/lib/jvm/java-1.8.0-openjdk-1.8.0.242.b08-1.el7.x86_64/jre  
JAVA_HOME=/usr/lib/jvm/java-1.8.0-openjdk-1.8.0.242.b08-1.el7.x86_64  
  
-- INSERT --
```

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8. 환경 변수 설정 (5: 나머지 작성하고 저장 후 종료)



```
root@itbank:/  
[root@itbank local]# vi /etc/profile.d/tomcat.sh  
  
#!/bin/bash  
### /usr/lib/jvm/java-1.8.0-openjdk-1.8.0.242.b08-1.e17.x86_64/jre/bin/java ###  
  
JRE_HOME=/usr/lib/jvm/java-1.8.0-openjdk-1.8.0.242.b08-1.e17.x86_64/jre  
JAVA_HOME=/usr/lib/jvm/java-1.8.0-openjdk-1.8.0.242.b08-1.e17.x86_64  
CATALINA_HOME=/usr/local/tomcat  
CLASSPATH=$JAVA_HOME/bin:$CATALINA_HOME/bin  
PATH=$PATH:$JAVA_HOME/bin:$CATALINA_HOME/bin  
  
export JRE_HOME JAVA_HOME CATALINA_HOME CLASSPATH PATH  
  
:wq
```

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9. 환경 변수 확인하고 적용하기 / Tomcat 기동 여부 확인

```
root@itbank:/
[root@itbank local]# cat -n /etc/profile.d/tomcat.sh
 1  #!/bin/bash
 2  ### /usr/lib/jvm/java-1.8.0-openjdk-1.8.0.242.b08-1.el7.x86_64/jre/bin/java ###
 3
 4  JRE_HOME=/usr/lib/jvm/java-1.8.0-openjdk-1.8.0.242.b08-1.el7.x86_64/jre
 5  JAVA_HOME=/usr/lib/jvm/java-1.8.0-openjdk-1.8.0.242.b08-1.el7.x86_64
 6  CATALINA_HOME=/usr/local/tomcat
 7  CLASSPATH=$JAVA_HOME/bin:$CATALINA_HOME/bin
 8  PATH=$PATH:$JAVA_HOME/bin:$CATALINA_HOME/bin
 9
10  export JRE_HOME JAVA_HOME CATALINA_HOME CLASSPATH PATH
11

[root@itbank local]# source /etc/profile.d/tomcat.sh

[root@itbank local]# echo $CATALINA_HOME
/usr/local/tomcat

[root@itbank local]# cd tomcat/bin
[root@itbank bin]# ./startup.sh
...
Tomcat started.

[root@itbank bin]# netstat -lntup | grep :8080
tcp6      0      0 :::8080          :::*              LISTEN      21699/java
```

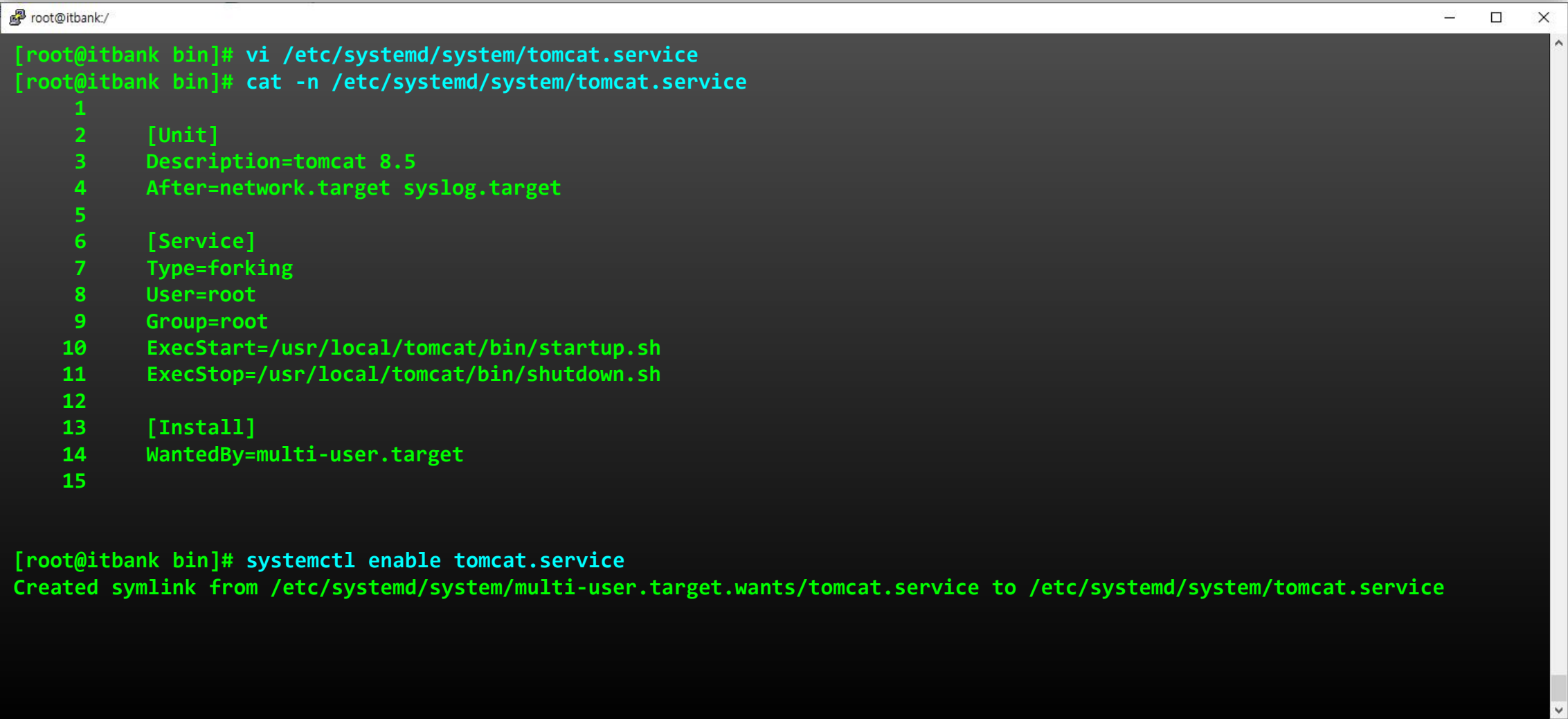
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10. 방화벽에 예외로 등록 및 포트포워딩 (클라이언트가 80포트로 접근하면 내부에서 8080으로 요청을 전달)

```
root@itbank:/  
[root@itbank bin]# firewall-cmd --permanent --zone=public --add-port=8080/tcp  
Success  
[root@itbank bin]# firewall-cmd --permanent --zone=public --add-port=80/tcp  
Success  
[root@itbank bin]# firewall-cmd --permanent --zone=public --add-forward-port=port=80:proto=tcp:toport=8080  
Success  
[root@itbank bin]# firewall-cmd --reload  
success  
  
[root@itbank bin]# firewall-cmd --list-all  
public (active)  
  target: default  
  icmp-block-inversion: no  
  interfaces: ens33  
  sources:  
  services: dhcpv6-client ssh  
  ports: 8080/tcp 80/tcp  
  protocols:  
  masquerade: no  
  forward-ports: port=80:proto=tcp:toport=8080:toaddr=  
  source-ports:  
  icmp-blocks:  
  rich rules:
```

Spring Project Deploy (war) in Apache Tomcat CentOS 7.x

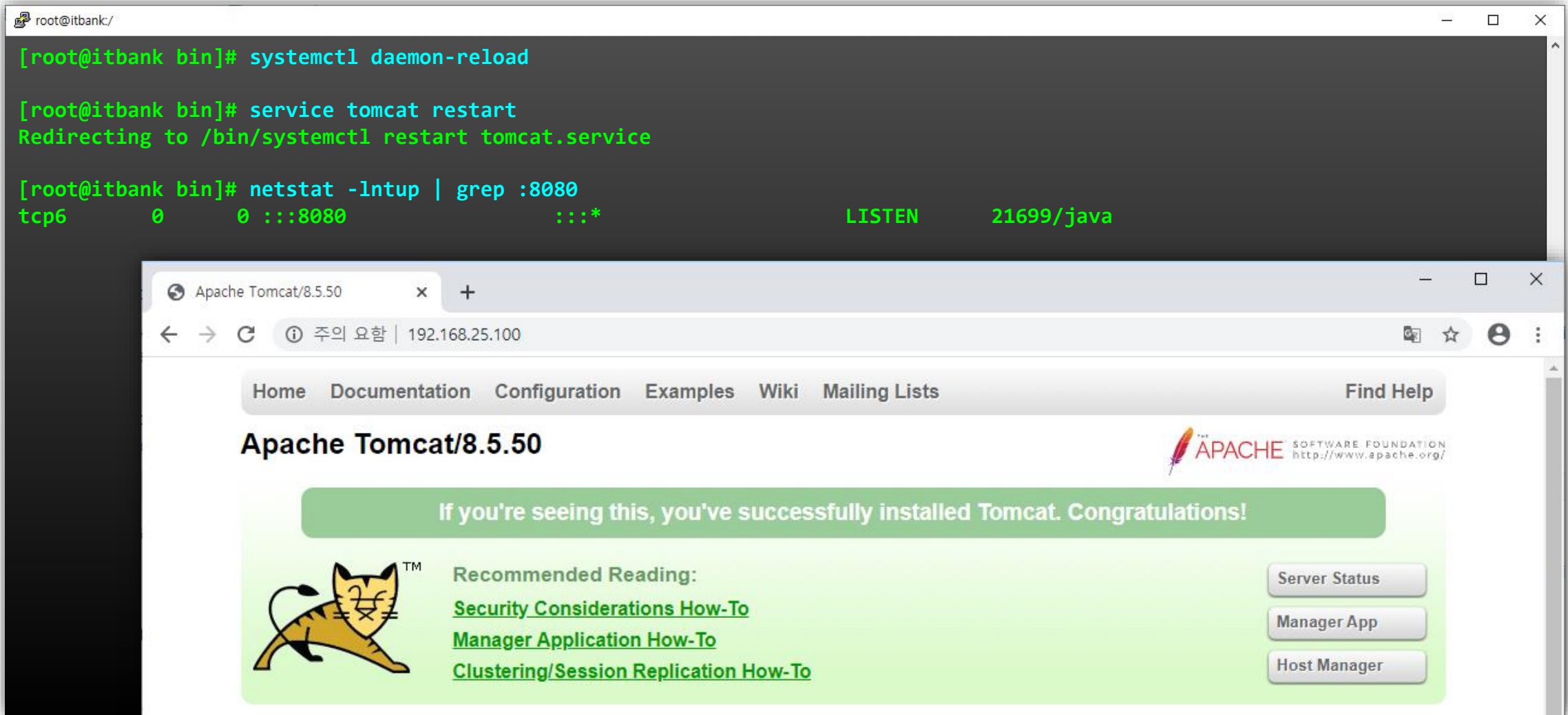
11. 서버 시작 시 자동으로 시작하기 위해 서비스 등록



```
root@itbank:/  
[root@itbank bin]# vi /etc/systemd/system/tomcat.service  
[root@itbank bin]# cat -n /etc/systemd/system/tomcat.service  
1  
2     [Unit]  
3     Description=tomcat 8.5  
4     After=network.target syslog.target  
5  
6     [Service]  
7     Type=forking  
8     User=root  
9     Group=root  
10    ExecStart=/usr/local/tomcat/bin/startup.sh  
11    ExecStop=/usr/local/tomcat/bin/shutdown.sh  
12  
13    [Install]  
14    WantedBy=multi-user.target  
15  
  
[root@itbank bin]# systemctl enable tomcat.service  
Created symlink from /etc/systemd/system/multi-user.target.wants/tomcat.service to /etc/systemd/system/tomcat.service
```


Spring Project Deploy (war) in Apache Tomcat CentOS 7.x

12. 서비스 등록 확인



The image shows a terminal window and a web browser window. The terminal window displays the following commands and output:

```
[root@itbank bin]# systemctl daemon-reload

[root@itbank bin]# service tomcat restart
Redirecting to /bin/systemctl restart tomcat.service

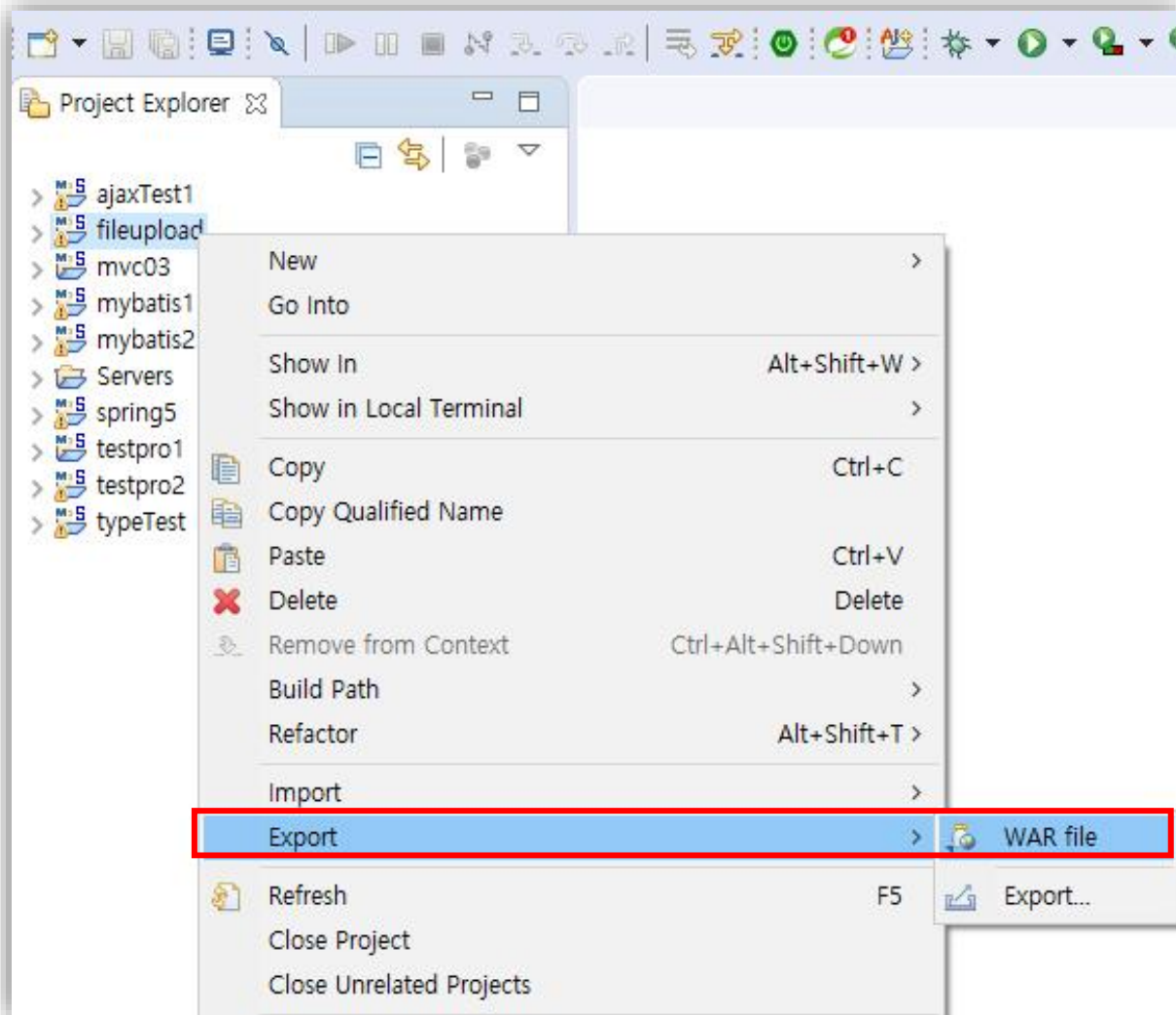
[root@itbank bin]# netstat -lntup | grep :8080
tcp6      0      0 :::8080          :::*             LISTEN     21699/java
```

The web browser window shows the Apache Tomcat/8.5.50 homepage. The address bar displays "192.168.25.100". The page content includes a navigation bar with links: Home, Documentation, Configuration, Examples, Wiki, Mailing Lists, and a "Find Help" button. The main heading is "Apache Tomcat/8.5.50". A green banner states: "If you're seeing this, you've successfully installed Tomcat. Congratulations!". Below this, there is a cartoon cat logo and a section titled "Recommended Reading:" with links to "Security Considerations How-To", "Manager Application How-To", and "Clustering/Session Replication How-To". On the right side, there are three buttons: "Server Status", "Manager App", and "Host Manager".

Export Spring Project Web Application aRchive (WAR)

Spring Project Deploy (war) in Apache Tomcat CentOS 7.x

1. 이클립스에서 스프링 프로젝트 Export 하기

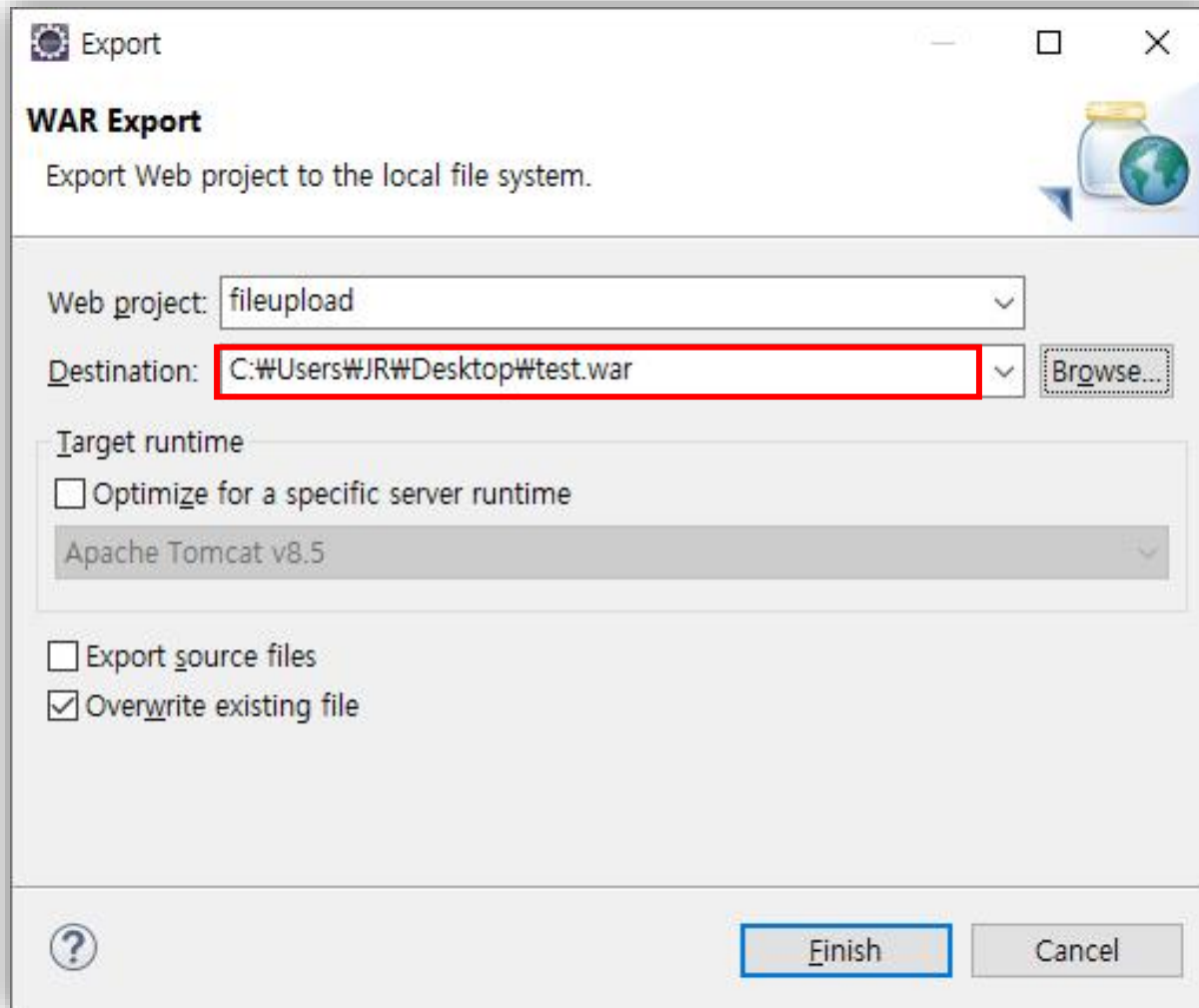


이클립스에서 원하는 프로젝트를 선택

우클릭 메뉴에서 Export – WAR 파일 선택

Spring Project Deploy (war) in Apache Tomcat CentOS 7.x

2. war 파일의 경로를 지정하고, Export

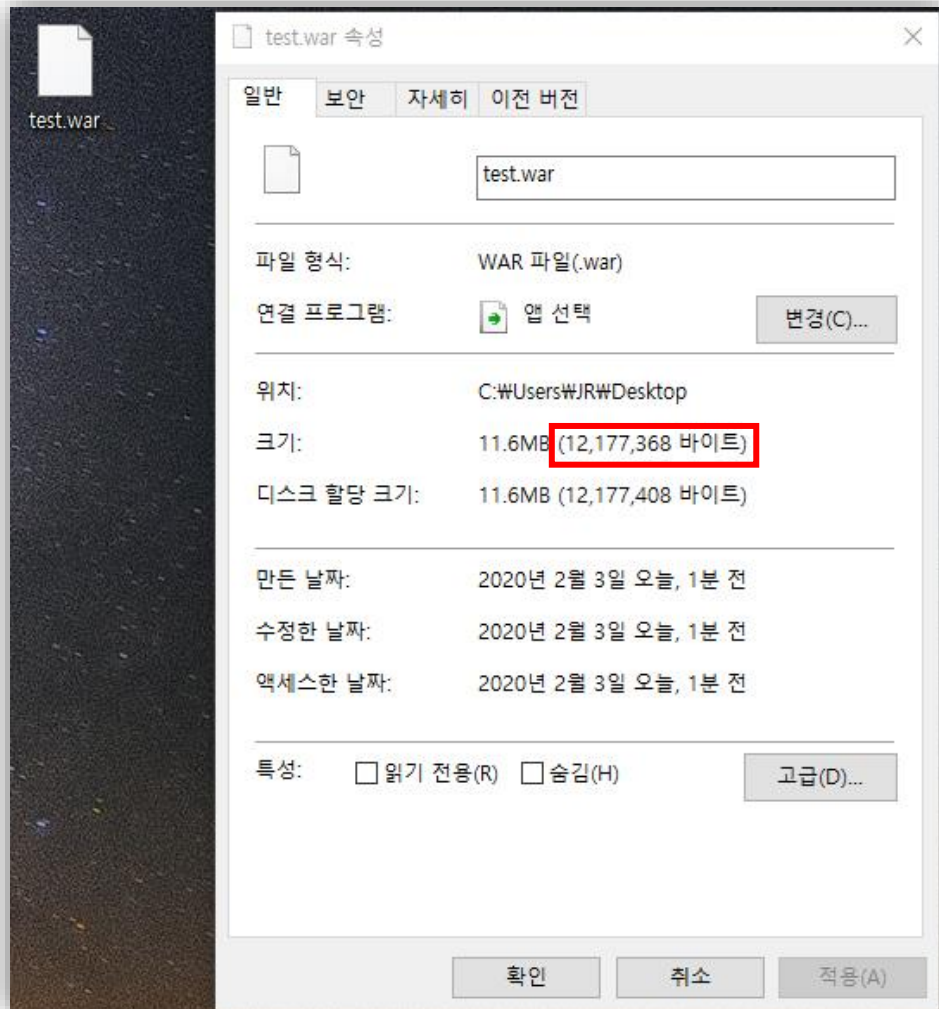


Destination에 경로와 파일이름 지정

Overwrite existing file 선택하면 덮어쓰기

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3. 추출된 war 파일 확인



생성된 파일의 이름과 용량을 확인해두기

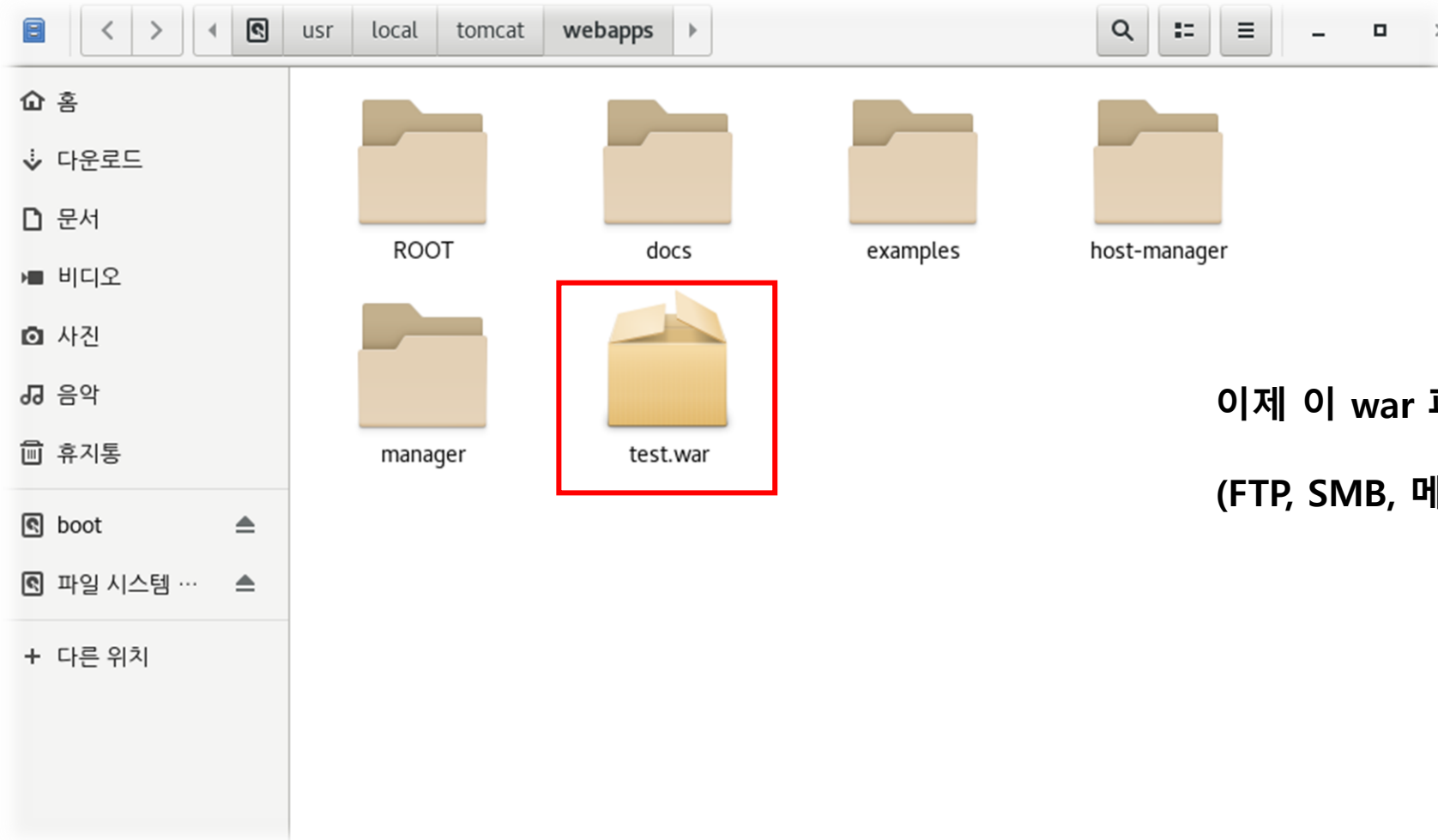
이제 이 파일을 서버에 업로드한다

(FTP, SMB 등의 방법으로 업로드하기)

Deploy WAR in Tomcat

Spring Project Deploy (war) in Apache Tomcat CentOS 7.x

1. 리눅스 서버에 파일 업로드 (경로 : \$CATALINA_HOME/webapps/)



이제 이 war 파일을 서버에 업로드한다
(FTP, SMB, 메일 등의 방법으로 업로드하기)

Spring Project Deploy (war) in Apache Tomcat CentOS 7.x

2. 터미널에서 확인하고 서비스 재시작

```
root@itbank:/  
[root@itbank bin]# cd $CATALINA_HOME  
  
[root@itbank tomcat]# ls -l webapps/  
합계 11896  
drwxr-x--- 3 root root    283  2월  4 09:37 ROOT  
drwxr-x--- 15 root root  4096  2월  4 09:37 docs  
drwxr-x--- 6 root root    83  2월  4 09:37 examples  
drwxr-x--- 5 root root    87  2월  4 09:37 host-manager  
drwxr-x--- 5 root root   103  2월  4 09:37 manager  
-rwxrw-rw- 1 root root 12177368  2월  3 15:27 test.war  
  
[root@itbank tomcat]# service tomcat restart  
Redirecting to /bin/systemctl restart tomcat.service  
  
[root@itbank tomcat]# ls -l webapps/  
합계 11896  
drwxr-x--- 3 root root    283  2월  4 09:37 ROOT  
drwxr-x--- 15 root root  4096  2월  4 09:37 docs  
drwxr-x--- 6 root root    83  2월  4 09:37 examples  
drwxr-x--- 5 root root    87  2월  4 09:37 host-manager  
drwxr-x--- 5 root root   103  2월  4 09:37 manager  
drwxr-x--- 5 root root    80  2월  4 10:30 test  
-rwxrw-rw- 1 root root 12177368  2월  3 15:27 test.war
```


Spring Project Deploy (war) in Apache Tomcat CentOS 7.x

3. 폴더이름으로 접근 (http://ServerName/folderName)

The screenshot shows a terminal window on the left and a web browser window on the right. The terminal window displays the command `ls -l webapps/` and its output, which lists the contents of the `webapps` directory. The `test` directory and `test.war` file are highlighted with a red box. The web browser window shows the URL `http://192.168.25.100/test/` in the address bar, which is also highlighted with a red box. The browser displays the title "파일 업로드 연습" (File Upload Practice) and a list of examples: `ex01 - 단순 파일 업로드`, `ex02 - DB에 파일 정보 업로드 (path)`, and `ex03 - DB에 파일 내용 업로드 (blob)`.

```
[root@itbank tomcat]# ls -l webapps/
합계 11896
drwxr-x--- 3 root root    283  2월  4 09:37 ROOT
drwxr-x--- 15 root root  4096  2월  4 09:37 docs
drwxr-x--- 6 root root    83  2월  4 09:37 examples
drwxr-x--- 5 root root    87  2월  4 09:37 host-manager
drwxr-x--- 5 root root   103  2월  4 09:37 manager
drwxr-x--- 5 root root    80  2월  4 10:30 test
-rwxrwx-rw- 1 root root 12177368  2월  3 15:27 test.war
```

파일 업로드 연습

- [ex01 - 단순 파일 업로드](#)
- [ex02 - DB에 파일 정보 업로드 \(path\)](#)
- [ex03 - DB에 파일 내용 업로드 \(blob\)](#)

Spring Project Deploy (war) in Apache Tomcat CentOS 7.x

4. 서비스 재시작 후 압축 해제된 폴더의 이름이 ROOT 이면 최상위 경로로 접근 가능해진다

```
root@itbank:/  
[root@itbank tomcat]# service tomcat stop  
Redirecting to /bin/systemctl stop tomcat.service  
  
[root@itbank tomcat]# mv webapps/ROOT webapps/ROOT_  
[root@itbank tomcat]# mv webapps/test webapps/ROOT  
  
[root@itbank tomcat]# ls -l webapps/  
합계 11896  
drwxr-x--- 5 root root      80  2월  4 10:30 ROOT  
drwxr-x--- 3 root root     283  2월  4 09:37 ROOT_  
drwxr-x--- 15 root root    4096  2월  4 09:37 docs  
drwxr-x--- 6 root root      83  2월  4 09:37 examples  
drwxr-x--- 5 root root      87  2월  4 09:37 host-manager  
drwxr-x--- 5 root root     103  2월  4 09:37 manager  
-rwxrw-rw- 1 root root 12177368  2월  3 15:27 test.war  
  
[root@itbank tomcat]# service tomcat restart  
Redirecting to /bin/systemctl restart tomcat.service  
  
[root@itbank tomcat]# netstat -lntup | grep :8080  
tcp6      0      0 :::8080          :::*              LISTEN      11423/java
```

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5. 서버이름으로 접근 (http://ServerName)

The image shows a terminal window and a web browser window. The terminal window displays the following commands and output:

```
[root@itbank tomcat]# service tomcat stop
Redirecting to /bin/systemctl stop tomcat.service

[root@itbank tomcat]# mv webapps/ROOT webapps/ROOT_
[root@itbank tomcat]# mv webapps/test webapps/ROOT

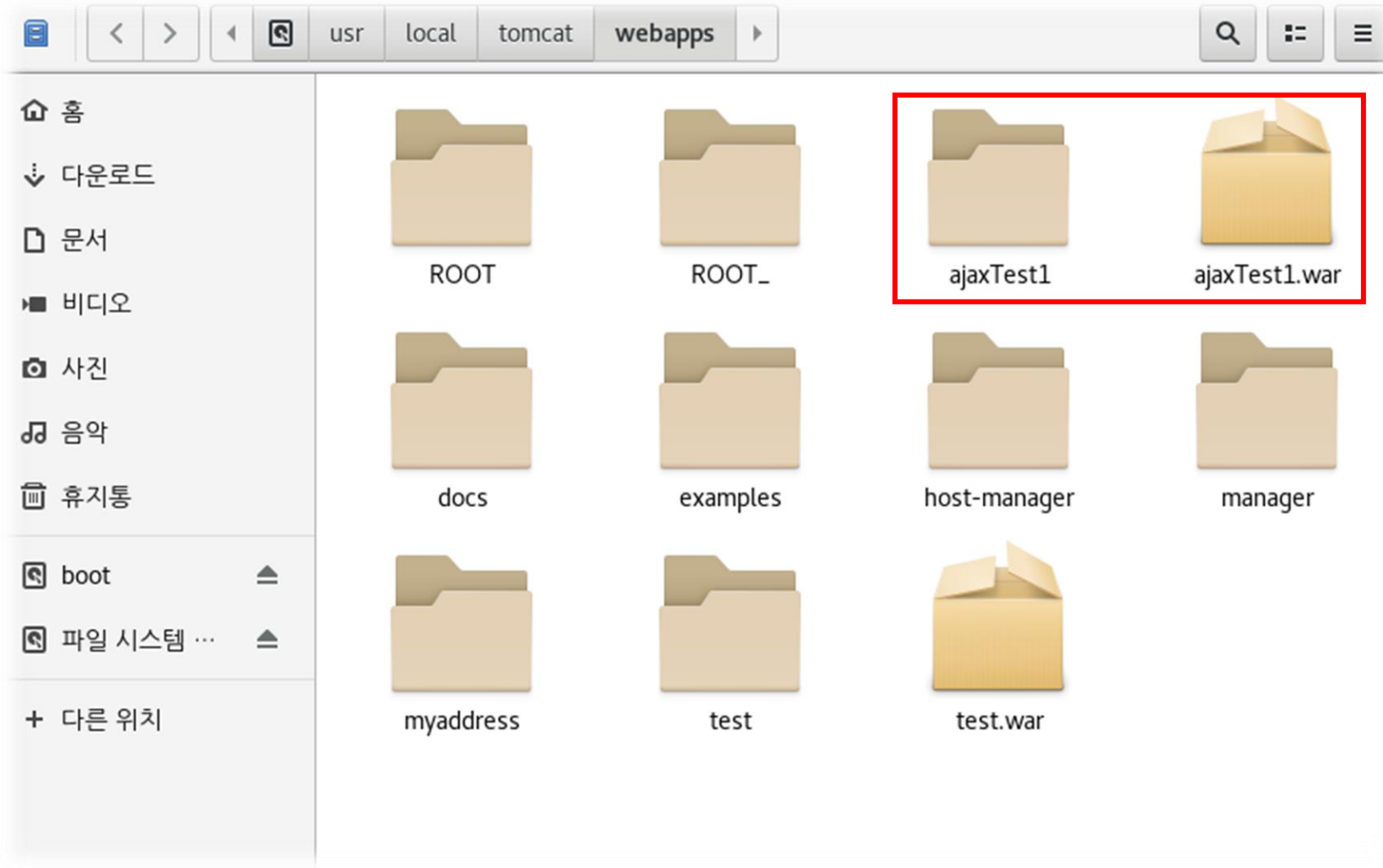
[root@itbank tomcat]# ls -l webapps/
합계 11896
drwxr-x--- 5 root root      80  2월  4 10:30 ROOT
drwxr-x--- 3 root root     283  2월  4 09:37 ROOT_
drwxr-x--- 15 root root   4096  2월  4 09:37 docs
drwxr-x---
drwxr-x---
drwxr-x---
-rwxr--r--
```

The web browser window shows the URL `192.168.25.100` in the address bar. The page title is "파일 업로드 연습" (File Upload Practice). The page content includes a list of examples:

- [ex01 - 단순 파일 업로드](#)
- [ex02 - DB에 파일 정보 업로드 \(path\)](#)
- [ex03 - DB에 파일 내용 업로드 \(blob\)](#)

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6. 추가 프로젝트 업로드 및 경로 설정 (server.xml)



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7. 상세 설정을 위해서는 \$CATALINA_HOME/conf/server.xml 의 설정을 참조하기

```
root@itbank:/  
[root@itbank tomcat]# cat -n conf/server.xml | tail -21  
147  
148     <Host name="localhost"  appBase="webapps"  
149           unpackWARs="true" autoDeploy="true">  
150  
151         <!-- SingleSignOn valve, share authentication between web applications  
152              Documentation at: /docs/config/valve.html -->  
153         <!--  
154         <Valve className="org.apache.catalina.authenticator.SingleSignOn" />  
155         -->  
156  
157         <!-- Access log processes all example.  
158              Documentation at: /docs/config/valve.html  
159              Note: The pattern used is equivalent to using pattern="common" -->  
160         <Valve className="org.apache.catalina.valves.AccessLogValve" directory="logs"  
161               prefix="localhost_access_log" suffix=".txt"  
162               pattern="%h %l %u %t &quot;%r&quot; %s %b" />  
163  
164     </Host>  
165 </Engine>  
166 </Service>  
167 </Server>
```

Spring Project Deploy (war) in Apache Tomcat CentOS 7.x

8. <Host> 태그 내에서 <Context> 를 설정하기

```
root@itbank:/  
[root@itbank tomcat]# cat -n conf/server.xml | tail -23  
148     <Host name="localhost"  appBase="webapps"  
149         unpackWARs="true" autoDeploy="true">  
150  
151         <Context path="" docBase="ROOT" reloadable="true" />  
152         <Context path="/myaddress/" docBase="ajaxTest1" reloadable="true" />  
153  
154         <!-- SingleSignOn valve, share authentication between web applications  
155              Documentation at: /docs/config/valve.html -->  
156         <!--  
157         <Valve className="org.apache.catalina.authenticator.SingleSignOn" />  
158         -->  
159  
160         <!-- Access log processes all example.  
161              Documentation at: /docs/config/valve.html  
162              Note: The pattern used is equivalent to using pattern="common" -->  
163         <Valve className="org.apache.catalina.valves.AccessLogValve" directory="logs"  
164             prefix="localhost_access_log" suffix=".txt"  
165             pattern="%h %l %u %t &quot;%r&quot; %s %b" />  
166  
167     </Host>  
168 </Engine>  
169 </Service>  
170 </Server>
```

Spring Project Deploy (war) in Apache Tomcat CentOS 7.x

9. 서비스 재 시작 이후, 지정한 경로로 접근되는지 (최상위 경로)

The screenshot shows a terminal window and a web browser. The terminal window displays the command `cat -n conf/server.xml | tail -23` and its output, which shows the configuration for the `localhost` host in `server.xml`. The configuration includes `unpackWARs="true"` and `autoDeploy="true"` for the `localhost` host, and two `<Context>` elements: one for the root path and one for the `/myaddress/` path.

The web browser window shows the URL `192.168.25.100` and the page title `파일 업로드 연습`. The page content includes a list of examples:

- [ex01 - 단순 파일 업로드](#)
- [ex02 - DB에 파일 정보 업로드 \(path\)](#)
- [ex03 - DB에 파일 내용 업로드 \(blob\)](#)

Spring Project Deploy (war) in Apache Tomcat CentOS 7.x

10. 서비스 재 시작 이후, 지정한 경로로 접근되는지 (지정 주소)

The screenshot shows a terminal window and a web browser. The terminal window displays the command `cat -n conf/server.xml | tail -23` and its output, which includes XML configuration for a host named 'localhost' with `appBase="webapps"`, `unpackWARs="true"`, and `autoDeploy="true"`. It also shows two context configurations: `<Context path="" docBase="ROOT" reloadable="true" />` and `<Context path="/myaddress/" docBase="ajaxTest1" reloadable="true" />`. The web browser window shows the URL `192.168.25.100/myaddress/` and displays the title "AJAX 예시" (AJAX Example). Below the title, there is a list of links:

- [ex01 - AJAX \(Javascript\)](#)
- [ex02 - AJAX \(jQuery\)](#)
- [join - AJAX](#)
- [search - AJAX\(vo\)](#)
- [list - AJAX\(list\)](#)
- [banner - jQuery](#)