

Activitat 01: Instal·lació del servidor d'aplicacions Apache Tomcat

Introducció

Es tracta de descarregar, instal·lar i configurar el servidor s'aplicacions Apache Tomcat en una màquina virtual Linux (preferiblement ubuntu 22.04)¹

Fes captures de cada pas i contesta en una còpia d'aquest document amb les captures adients.

Pre-requisit: Instal·lació del JDK

Primer hauriem d'actualitzar el sistema a les darreres actualitzacions per evitar tenir paquets obsolets i versions incompatibles de les coses.

```
sudo apt update
```

```
sudo apt upgrade
```

Després hauriem d'instal·lar el OpenJDK en la darrera versió que és compatible amb Ubuntu

```
sudo apt install openjdk-17-jdk
```

```
java -version
```

Ha de ser el 17 o superior

```
achraf@achraf-VirtualBox:~$ java -version
openjdk version "17.0.14" 2025-01-21
OpenJDK Runtime Environment (build 17.0.14+7-Ubuntu-122.04.1)
OpenJDK 64-Bit Server VM (build 17.0.14+7-Ubuntu-122.04.1, mixed mode, sharing)
achraf@achraf-VirtualBox:~$
```

Instal·lació

Creació de l'usuari propietari

Crea el grup tomcat amb

```
sudo groupadd tomcat
```

Ara crea l'usuari tomcat amb

¹ En la literatura tècnica hi ha qui no considera Tomcat com un servidor d'Aplicacions complet perquè només aporta un contenidor de Servlets i JSP (Web) i no d'EJB's ni JMS, però nosaltres sí que el considerem un S.AA

```
sudo useradd -s /bin/false -g tomcat -d /opt/tomcat tomcat
```

```
achraf@achraf-VirtualBox:~$ sudo groupadd tomcat
achraf@achraf-VirtualBox:~$ sudo useradd -s /bin/false -g tomcat -d /opt/tomcat tomcat
achraf@achraf-VirtualBox:~$
```

Descarregar Tomcat

Des de la carpeta temporal descarrega la darrera versió de tomcat:

```
cd /tmp
```

```
wget
```

```
https://dlcdn.apache.org/tomcat/tomcat-11/v11.0.5/bin/apache-tomcat-11.0.5.tar.gz
```

Instal·lar Tomcat

Crea la carpeta de la ubicació recomanada i descomprimeix allà el Tomcat

```
sudo mkdir -p /opt/tomcat/tomcat-11.0.5/
```

```
cd /opt/tomcat/tomcat-11.0.5/
```

```
achraf@achraf-VirtualBox:~$ cd /tmp
achraf@achraf-VirtualBox:/tmp$ wget https://dlcdn.apache.org/tomcat/tomcat-11/v11.0.5/bin/apache-tomcat-11.0.5.tar.gz
--2025-03-21 19:00:26-- https://dlcdn.apache.org/tomcat/tomcat-11/v11.0.5/bin/apache-tomcat-11.0.5.tar.gz
Resolving dlcdn.apache.org (dlcdn.apache.org)... 151.101.2.132, 2a04:4e42::644
Connecting to dlcdn.apache.org (dlcdn.apache.org)|151.101.2.132|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 13860898 (13M) [application/x-gzip]
Saving to: 'apache-tomcat-11.0.5.tar.gz'

apache-tomcat-11.0. 100%[=====>] 13,22M 16,2MB/s in 0,8s

2025-03-21 19:00:30 (16,2 MB/s) - 'apache-tomcat-11.0.5.tar.gz' saved [13860898/13860898]

achraf@achraf-VirtualBox:/tmp$
```

```
sudo tar xzvf /tmp/apache-tomcat-xx.x.x.tar.gz -C /opt/tomcat/tomcat-11.0.5/
--strip-components=1
```

Fes propietari al grup tomcat de tota la carpeta d'instal·lació

```
sudo chgrp -R tomcat /opt/tomcat
```

```
achraf@achraf-VirtualBox:/tmp$ sudo mkdir -p /opt/tomcat/tomcat-11.0.5/
achraf@achraf-VirtualBox:/tmp$ sudo tar xzvf /tmp/apache-tomcat-11.0.5.tar.gz -C /opt/tomcat/tom
cat-11.0.5/ --strip-components=1
apache-tomcat-11.0.5/conf/
apache-tomcat-11.0.5/conf/catalina.properties
apache-tomcat-11.0.5/conf/context.xml
apache-tomcat-11.0.5/conf/jaspic-providers.xml
apache-tomcat-11.0.5/conf/jaspic-providers.xsd
apache-tomcat-11.0.5/conf/logging.properties
apache-tomcat-11.0.5/conf/server.xml
apache-tomcat-11.0.5/conf/tomcat-users.xml
apache-tomcat-11.0.5/conf/tomcat-users.xsd
apache-tomcat-11.0.5/conf/web.xml
apache-tomcat-11.0.5/bin/
apache-tomcat-11.0.5/lib/
apache-tomcat-11.0.5/logs/
apache-tomcat-11.0.5/temp/
apache-tomcat-11.0.5/webapps/
apache-tomcat-11.0.5/webapps/ROOT/
apache-tomcat-11.0.5/webapps/ROOT/WEB-INF/
apache-tomcat-11.0.5/webapps/docs/
apache-tomcat-11.0.5/webapps/docs/META-INF/
apache-tomcat-11.0.5/webapps/docs/WEB-INF/
apache-tomcat-11.0.5/webapps/docs/WEB-INF/jsp/
apache-tomcat-11.0.5/webapps/docs/annotationapi/
apache-tomcat-11.0.5/webapps/docs/api/
apache-tomcat-11.0.5/webapps/docs/appdev/
apache-tomcat-11.0.5/webapps/docs/appdev/sample/
apache-tomcat-11.0.5/webapps/docs/appdev/sample/docs/
apache-tomcat-11.0.5/webapps/docs/appdev/sample/src/
apache-tomcat-11.0.5/webapps/docs/appdev/sample/src/mypackage/
apache-tomcat-11.0.5/webapps/docs/appdev/sample/web/
apache-tomcat-11.0.5/webapps/docs/appdev/sample/web/WEB-INF/
apache-tomcat-11.0.5/webapps/docs/appdev/sample/web/images/
apache-tomcat-11.0.5/webapps/docs/architecture/
apache-tomcat-11.0.5/webapps/docs/architecture/requestProcess/
apache-tomcat-11.0.5/webapps/docs/architecture/startup/
apache-tomcat-11.0.5/webapps/docs/config/
apache-tomcat-11.0.5/webapps/docs/elapi/
apache-tomcat-11.0.5/webapps/docs/images/
apache-tomcat-11.0.5/webapps/docs/images/fonts/
apache-tomcat-11.0.5/webapps/docs/jaspicapi/
apache-tomcat-11.0.5/webapps/docs/jspapi/
```

Dona permisos al grup de lectura i execució sobre conf

```
sudo chmod -R g+r /opt/tomcat/tomcat-11.0.5/conf
```

```
sudo chmod g+x /opt/tomcat/tomcat-11.0.5/conf
```

Donar permisos per a executar bin

```
sudo chmod a+rx /opt/tomcat/tomcat-11.0.5/bin/
```

```
sudo chmod +x /opt/tomcat/tomcat-11.0.5/bin/*.sh
```

```
achraf@achraf-VirtualBox:/tmp$ sudo chgrp -R tomcat /opt/tomcat
achraf@achraf-VirtualBox:/tmp$ sudo chmod -R g+r /opt/tomcat/tomcat-11.0.5/conf
achraf@achraf-VirtualBox:/tmp$ sudo chmod g+x /opt/tomcat/tomcat-11.0.5/conf
achraf@achraf-VirtualBox:/tmp$ sudo chmod a+rx /opt/tomcat/tomcat-11.0.5/bin/
sudo chmod +x /opt/tomcat/tomcat-11.0.5/bin/*.sh
achraf@achraf-VirtualBox:/tmp$ sudo chmod +x /opt/tomcat/tomcat-11.0.5/bin/*.sh
achraf@achraf-VirtualBox:/tmp$
```

Convertir a l'usuari tomcat en el propietari de les carpetes principals

```
sudo chown -R tomcat:tomcat /opt/tomcat
```

```
achraf@achraf-VirtualBox:/tmp$ sudo chown -R tomcat:tomcat /opt/tomcat
achraf@achraf-VirtualBox:/tmp$
```

Per executar des de la línia de comandaments

```
/opt/tomcat/tomcat-11.0.5/bin/startup.sh run
```


```
achraf@achraf-VirtualBox:/tmp$ /opt/tomcat/tomcat-11.0.5/bin/startup.sh
/bin/sh: 0: cannot open /opt/tomcat/tomcat-11.0.5/bin/startup.sh: Permission denied
achraf@achraf-VirtualBox:/tmp$ sudo /opt/tomcat/tomcat-11.0.5/bin/startup.sh
Using CATALINA_BASE:   /opt/tomcat/tomcat-11.0.5
Using CATALINA_HOME:   /opt/tomcat/tomcat-11.0.5
Using CATALINA_TMPDIR: /opt/tomcat/tomcat-11.0.5/temp
Using JRE_HOME:        /usr
Using CLASSPATH:        /opt/tomcat/tomcat-11.0.5/bin/bootstrap.jar:/opt/tomcat/tomcat-11.0.5/bi
n/tomcat-juli.jar
Using CATALINA_OPTS:
Tomcat started.
achraf@achraf-VirtualBox:/tmp$ sudo chown -R tomcat:tomcat /opt/tomcat
achraf@achraf-VirtualBox:/tmp$ sudo chmod +x /opt/tomcat/tomcat-11.0.5/bin/*.sh
achraf@achraf-VirtualBox:/tmp$
```

Apache Tomcat/11.0.5 × +


localhost:8080

Home Documentation Configuration Examples Wiki Mailing Lists Find Help

Apache Tomcat/11.0.5

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

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

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

Documentation

[Tomcat 11.0 Documentation](#)
[Tomcat 11.0 Configuration](#)
[Tomcat Wiki](#)

Find additional important configuration information in:

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

Developers may be interested in:

- [Tomcat 11.0 Bug Database](#)
- [Tomcat 11.0 JavaDocs](#)
- [Tomcat 11.0 Git Repository at GitHub](#)

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

Other Downloads

- [Tomcat Connectors](#)
- [Tomcat Native](#)
- [Taglibs](#)
- [Deployer](#)

Other Documentation

- [Tomcat Connectors](#)
- [mod_jk Documentation](#)
- [Tomcat Native](#)
- [Deployer](#)

Get Involved

- [Overview](#)
- [Source Repositories](#)
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Miscellaneous

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Crear un arxiu de control de Systemd

Has de crear un arxiu de configuració de systemd per tal de que Tomcat es pugui executar com un servei.

```
sudo nano /etc/systemd/system/tomcat.service
```

I en el contingut has d'escriure:

[Unit]

Description=Tomcat 11 servlet container

After=network.target

[Service]

Type=forking

Environment="JAVA_HOME=/usr/lib/jvm/default-java"

Environment="CATALINA_PID=/opt/tomcat/tomcat-11.0.5/temp/tomcat.pid"

Environment="CATALINA_HOME=/opt/tomcat/tomcat-11.0.5/"

Environment="CATALINA_BASE=/opt/tomcat/tomcat-11.0.5/"

Environment="CATALINA_OPTS=-Xms512M -Xmx1024M -server -XX:+UseParallelGC"

Environment="JAVA_OPTS=-Djava.net.preferIPv4Stack=true
-Djava.net.preferIPv4Addresses=true -server -Djava.awt.headless=true
-Djava.security.egd=<file:/dev/urandom>"

ExecStart=/opt/tomcat/tomcat-11.0.5/bin/startup.sh

ExecStop=/opt/tomcat/tomcat-11.0.5/bin/shutdown.sh

User=tomcat

Group=tomcat

UMask=0007

RestartSec=10

Restart=always

[Install]

WantedBy=multi-user.target

```
GNU nano 6.2 /etc/systemd/system/tomcat.service
[Unit]
Description=Tomcat 11 servlet container
After=network.target

[Service]
Type=forking

Environment="JAVA_HOME=/usr/lib/jvm/default-java"
Environment="CATALINA_PID=/opt/tomcat/tomcat-11.0.5/temp/tomcat.pid"
Environment="CATALINA_HOME=/opt/tomcat/tomcat-11.0.5/"
Environment="CATALINA_BASE=/opt/tomcat/tomcat-11.0.5/"
Environment="CATALINA_OPTS=-Xms512M -Xmx1024M -server -XX:+UseParallelGC"
Environment="JAVA_OPTS=-Djava.net.preferIPv4Stack=true -Djava.net.preferIPv4Addresses=true -se"

ExecStart=/opt/tomcat/tomcat-11.0.5/bin/startup.sh
ExecStop=/opt/tomcat/tomcat-11.0.5/bin/shutdown.sh

User=tomcat
Group=tomcat
UMask=0007

[ Read 25 lines ]
^G Help      ^O Write Out  ^W Where Is   ^K Cut        ^T Execute    ^C Location
^X Exit      ^R Read File  ^\ Replace    ^U Paste      ^J Justify    ^_ Go To Line
```

A continuació avisa al sistema de que s'ha creat un nou daemon:

```
sudo systemctl daemon-reload
```

```
achraf@achraf-VirtualBox:/tmp$ sudo systemctl daemon-reload
achraf@achraf-VirtualBox:/tmp$
```

Per executar el servei de tomcat pots executar:

```
sudo systemctl enable --now tomcat
```

```
sudo systemctl status tomcat
```

Per executar parar i reiniciar el servei es pot fer amb:

```
sudo systemctl start tomcat
```

```
sudo systemctl stop tomcat
```

```
sudo systemctl restart tomcat
```

Es poden configurar les variables d'entorn CATALINA_BASE i CATALINA_HOME per tal que apuntin a la carpeta /opt/tomcat/tomcat-11.0.5/. Fes-ho i que sigui un canvi permanent

Aquesta part ha costat molt i molt perquè l'error estava en la ruta a on apuntava java, la ruta posada en el apartat que ens has donat; aquesta

"Environment="JAVA_HOME=/usr/lib/jvm/default-java"", he conseguit al final identificar l'error i amb restart ja ha funcionat:


```
achraf@achraf-VirtualBox:/tmp$ sudo systemctl status tomcat
● tomcat.service - Tomcat 11 servlet container
   Loaded: loaded (/etc/systemd/system/tomcat.service; enabled; vendor preset: enabled)
   Active: active (running) since Fri 2025-03-21 21:43:05 CET; 9s ago
     Process: 29421 ExecStart=/opt/tomcat/tomcat-11.0.5/bin/startup.sh (code=exited, status=0/S>
   Main PID: 29429 (java)
     Tasks: 31 (limit: 4607)
    Memory: 115.3M
       CPU: 4.732s
    CGroup: /system.slice/tomcat.service
            └─29429 /usr/lib/jvm/java-17-openjdk-amd64/bin/java -Djava.util.logging.config.fi>

mar 21 21:43:05 achraf-VirtualBox systemd[1]: Starting Tomcat 11 servlet container...
mar 21 21:43:05 achraf-VirtualBox startup.sh[29421]: Tomcat started.
mar 21 21:43:05 achraf-VirtualBox systemd[1]: Started Tomcat 11 servlet container.
lines 1-14/14 (END)
```

Configurar la interfície administrativa de Tomcat

Edita el fitxer de configuració d'usuaris de Tomcat

```
sudo nano /opt/tomcat/tomcat-11.0.5/conf/tomcat-users.xml
```

```
GNU nano 6.2 /opt/tomcat/tomcat-11.0.5/conf/tomcat-users.xml *
<?xml version="1.0" encoding="UTF-8"?>
<!--
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contributor license agreements. See the NOTICE file distributed with
this work for additional information regarding copyright ownership.
The ASF licenses this file to You under the Apache License, Version 2.0
(the "License"); you may not use this file except in compliance with
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distributed under the License is distributed on an "AS IS" BASIS,
WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
See the License for the specific language governing permissions and
limitations under the License.
-->
<tomcat-users xmlns="http://tomcat.apache.org/xml"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://tomcat.apache.org/xml tomcat-users.xsd"
  version="1.0">
  <user username="admin" password="password" roles="manager-gui,admin-gui"/>
<!--
By default, no user is included in the "manager-gui" role required
to operate the "/manager/html" web application. If you wish to use this app,
you must define such a user - the username and password are arbitrary.

Built-in Tomcat manager roles:
-->
^G Help      ^O Write Out  ^W Where Is   ^K Cut        ^T Execute    ^C Location
^X Exit      ^R Read File  ^\ Replace    ^U Paste      ^J Justify    ^_ Go To Line
```

Dins pot ficar el user i pass:

```
tomcat-users.xml — Admin User
```



```
<tomcat-users>
```

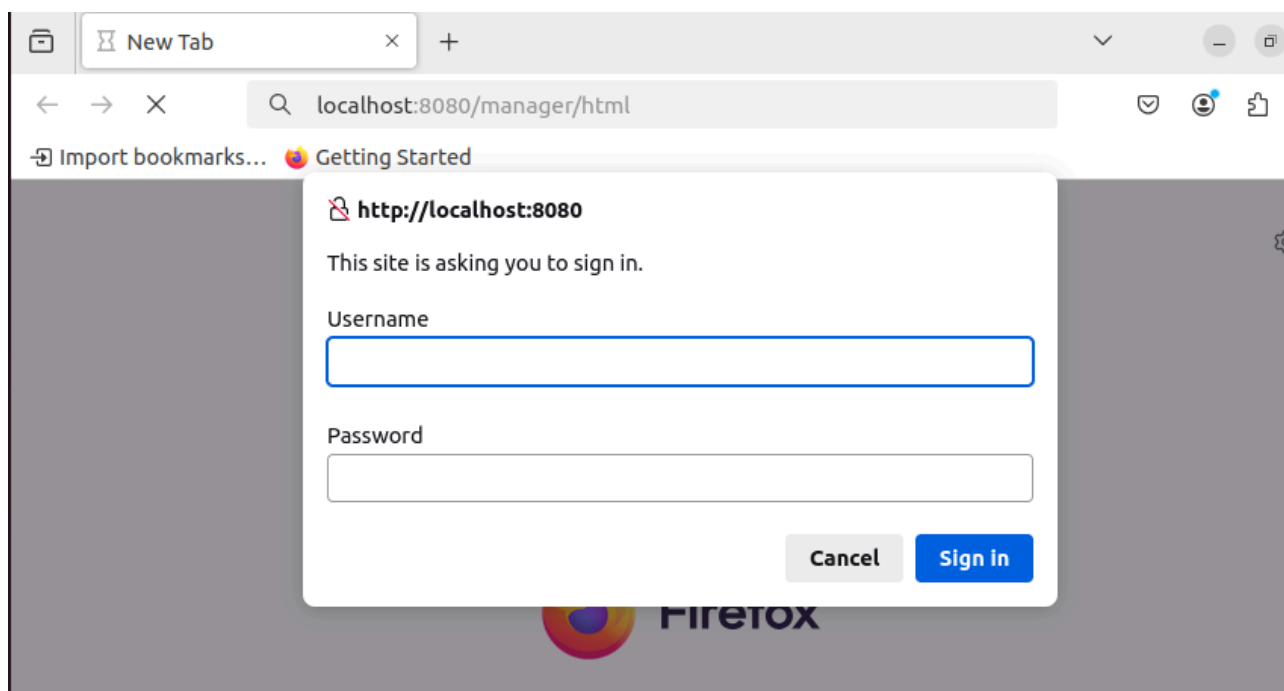
```
...
```

```
<user username="admin" password="password"  
roles="manager-gui,admin-gui"/>
```

```
</tomcat-users>
```

Reinicia el servei:

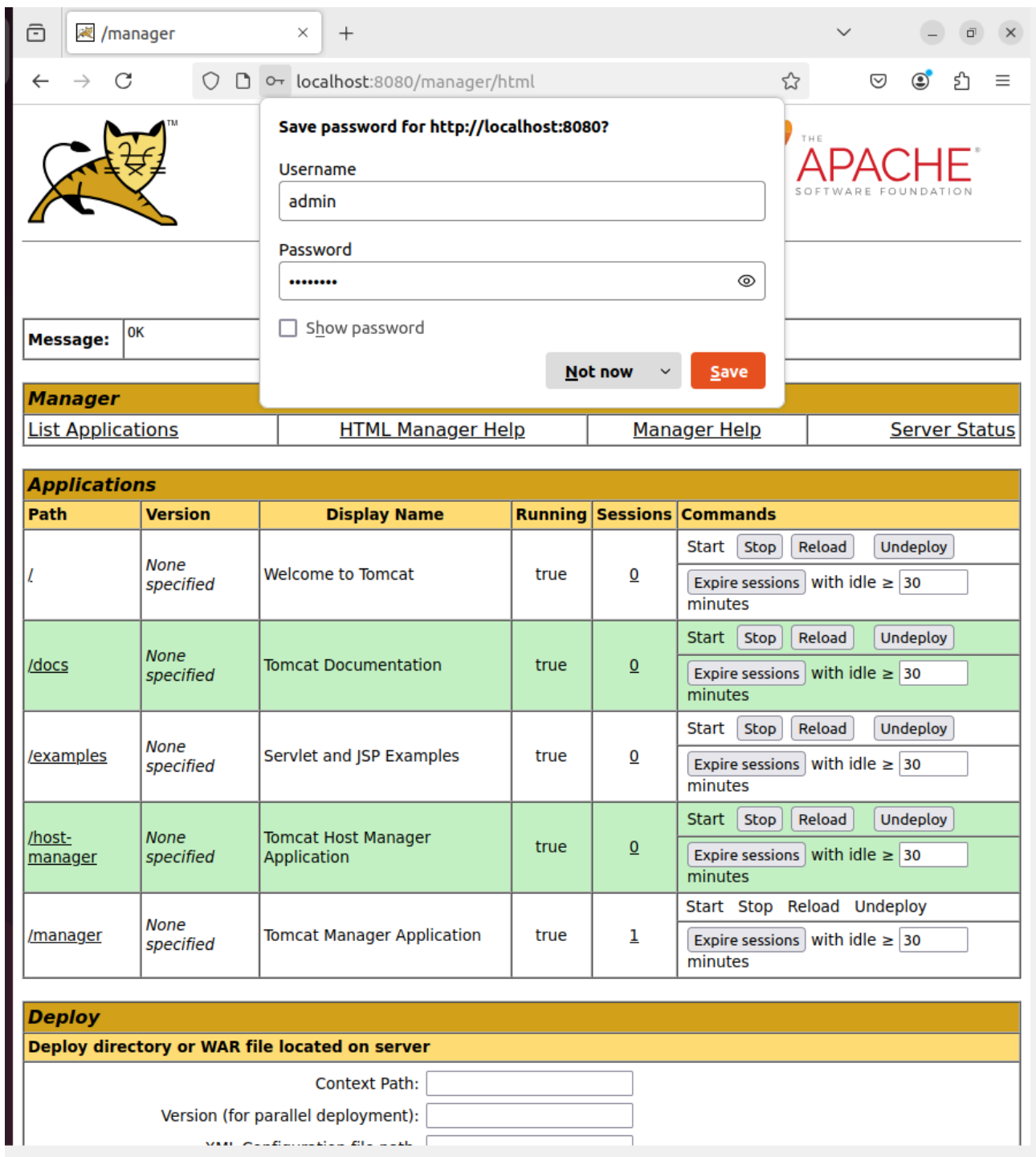
```
sudo systemctl restart tomcat
```



Al iniciar-ho des del servei que hem creat falla per un tema de permisos.

Tracta d'arreglar el tema dels permisos del servei que has creat per tal que arranqui correctament i no tinguis que fer `sudo /opt/tomcat/tomcat-11.0.5/bin/startup.sh` per arrancar-ho.

Accedeix a la interfície d'administració:



Manager

[List Applications](#) [HTML Manager Help](#) [Manager Help](#) [Server Status](#)

Path	Version	Display Name	Running	Sessions	Commands
/	None specified	Welcome to Tomcat	true	0	Start Stop Reload Undeploy Expire sessions with idle ≥ 30 minutes
/docs	None specified	Tomcat Documentation	true	0	Start Stop Reload Undeploy Expire sessions with idle ≥ 30 minutes
/examples	None specified	Servlet and JSP Examples	true	0	Start Stop Reload Undeploy Expire sessions with idle ≥ 30 minutes
/host-manager	None specified	Tomcat Host Manager Application	true	0	Start Stop Reload Undeploy Expire sessions with idle ≥ 30 minutes
/manager	None specified	Tomcat Manager Application	true	1	Start Stop Reload Undeploy Expire sessions with idle ≥ 30 minutes

Deploy

Deploy directory or WAR file located on server

Context Path:

Version (for parallel deployment):

XML Configuration file path:

http://dominio_o_IP:8080/manager/html