

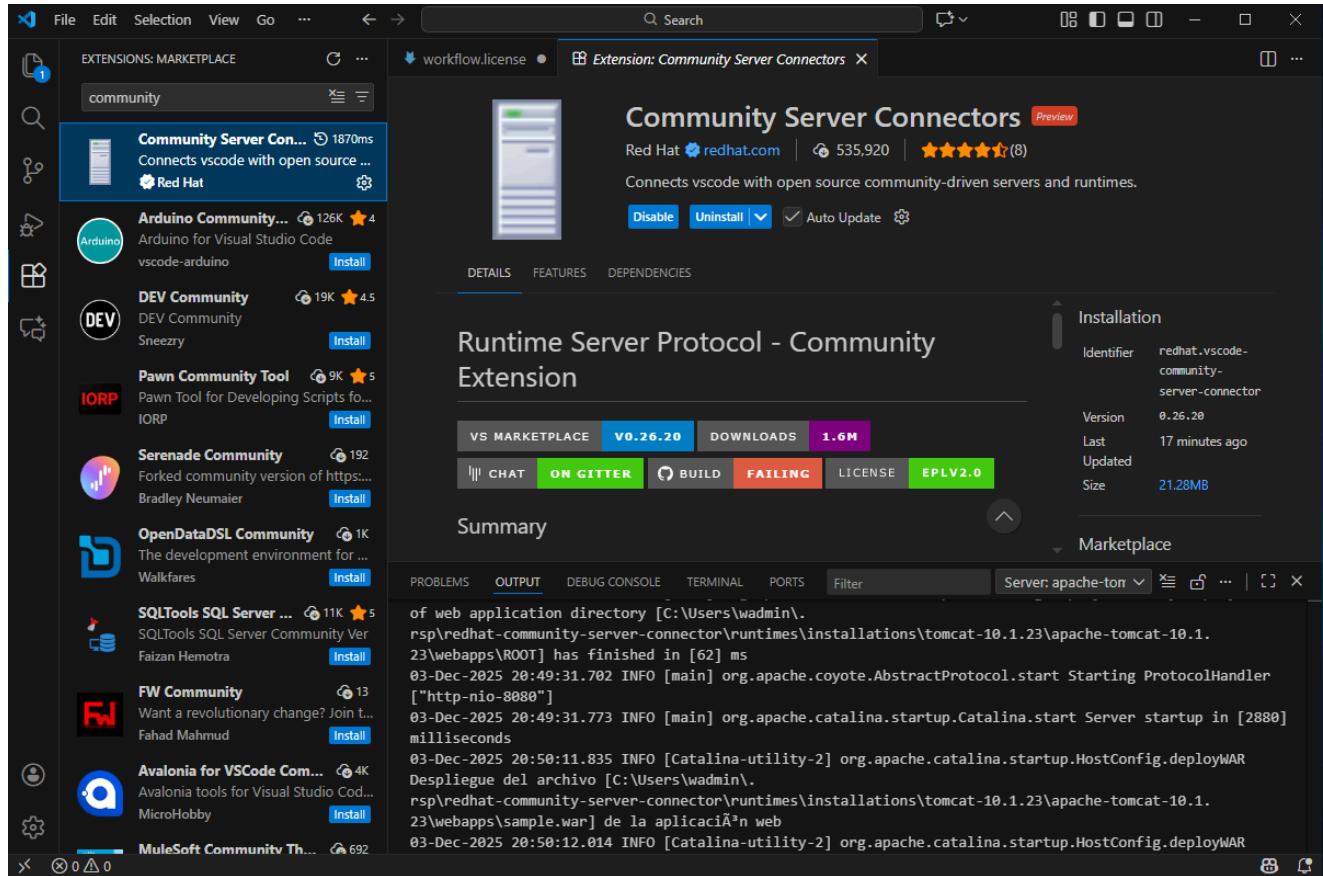
1. Funcionamiento de Tomcat en Windows con XAMPP

Se te facilita una máquina Windows, que ya viene con un Xampp operativo. Se te pedirá lo siguiente.

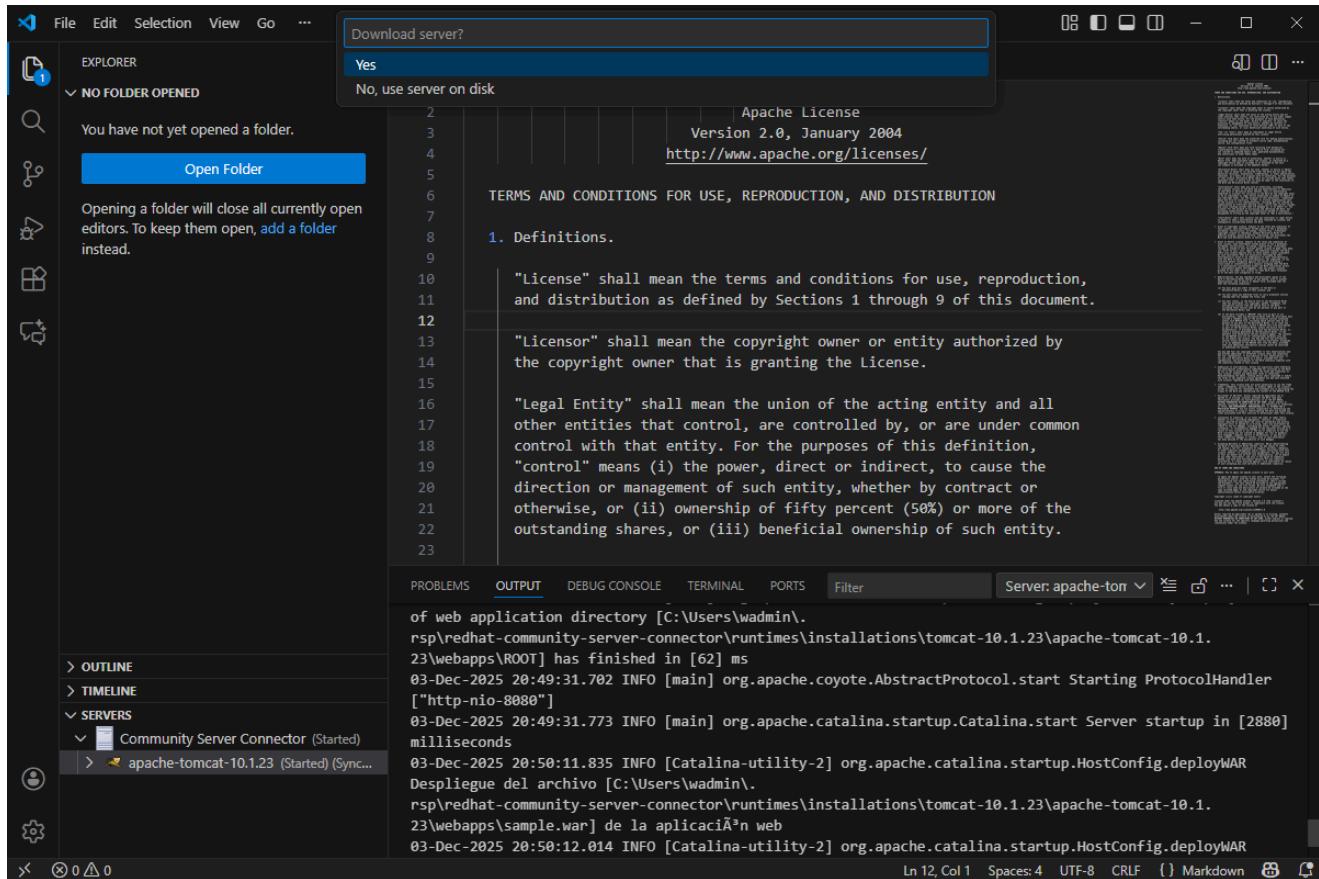
1.1. Arranque y configuración inicial

Configura para que arranque, y se pueda acceder a su página principal

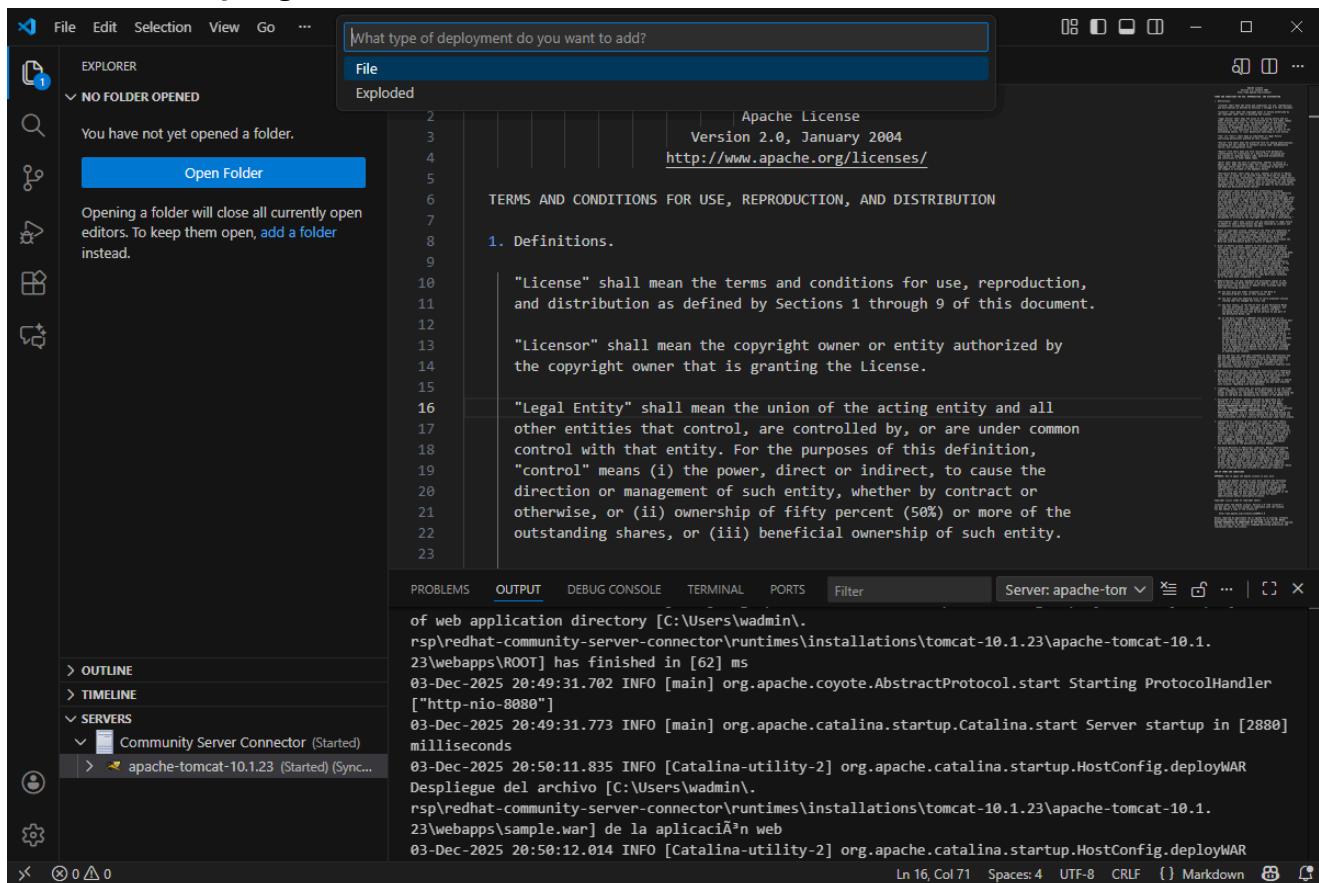
Instalar la extensión *Community Server Connectors*



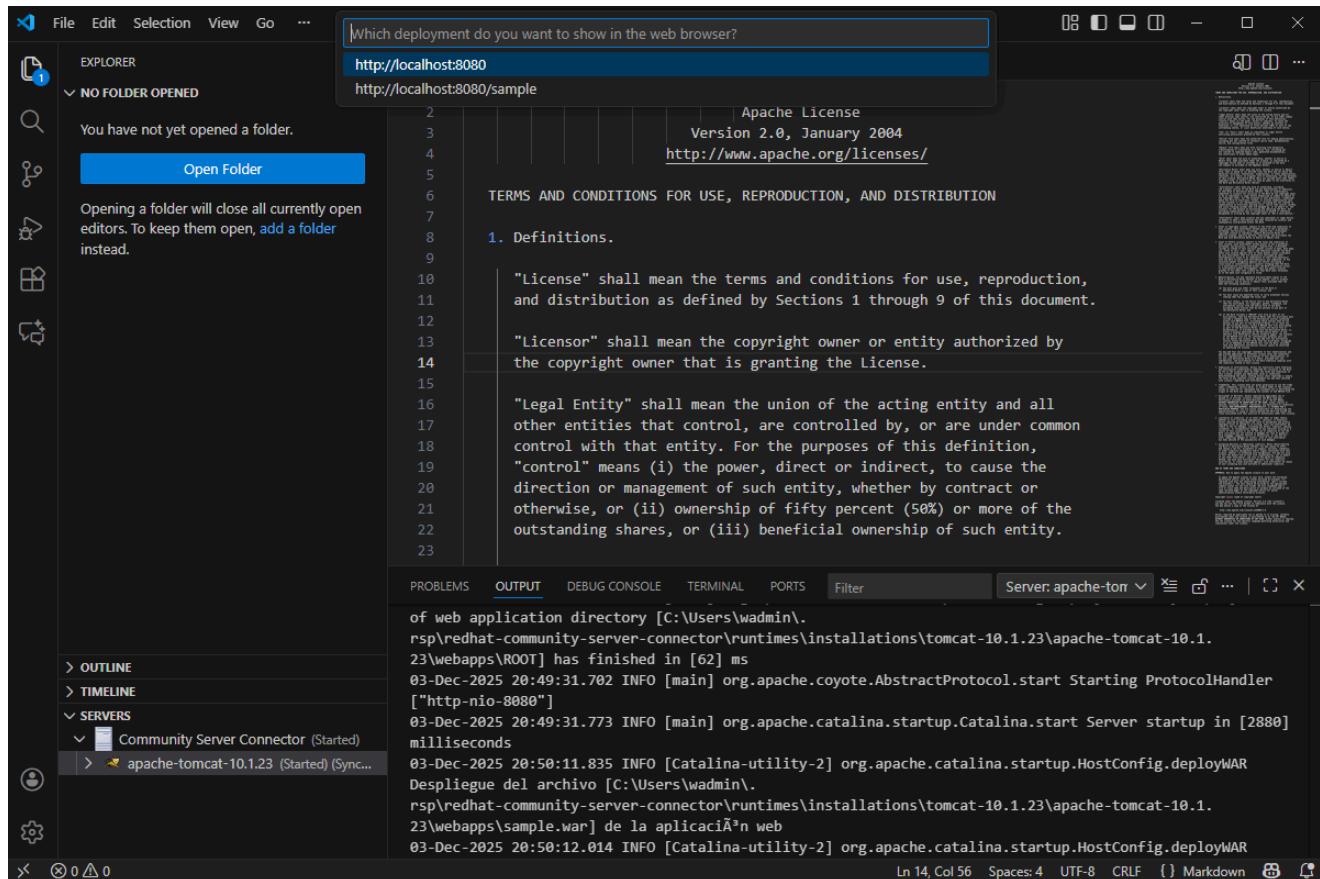
Crear un nuevo servidor



Añadir un despliegue



Mostrar en el servidor



1.2 Acceso a opciones de gestión y administración

Realiza la configuración para que pueda acceder a server status, Manager App y Host Manager

Modificar el fichero tomcat-users.xml

Añadir las siguientes líneas

```
<role rolename="admin-gui"/>
<role rolename="manage-gui"/>
<role rolename="manager-script"/>
<role rolename="manager-jmx"/>
<role rolename="manager-status"/>
<user username="martinea" password="abc123." roles="admin-gui,manager-
gui,manager-script,manager-jmx,manager-status"/>
```

The screenshot shows the Apache Tomcat Manager application running in a web browser at localhost:8080/manager/html. The interface includes:

- Gestor de Aplicaciones Web de Tomcat** title bar.
- Mensaje:** OK message.
- Gestor** menu bar with options: Listar Aplicaciones, Ayuda HTML de Gestor, Ayuda de Gestor, and Estado de Servidor.
- Aplicaciones** table:

Ruta	Versión	Nombre a Mostrar	Ejecutándose	Sesiones	Comandos
/	Ninguno especificado	Welcome to Tomcat	true	0	Arrancar Parar Recargar Replegar Expirar sesiones sin trabajar ≥ 30 minutos
/docs	Ninguno especificado	Tomcat Documentation	true	0	Arrancar Parar Recargar Replegar Expirar sesiones sin trabajar ≥ 30 minutos
/examples	Ninguno especificado	Servlet and JSP Examples	true	0	Arrancar Parar Recargar Replegar Expirar sesiones sin trabajar ≥ 30 minutos
/host-manager	Ninguno especificado	Tomcat Host Manager Application	true	0	Arrancar Parar Recargar Replegar Expirar sesiones sin trabajar ≥ 30 minutos
/manager	Ninguno especificado	Tomcat Manager Application	true	1	Arrancar Parar Recargar Replegar Expirar sesiones sin trabajar ≥ 30 minutos
- Desplegar** section for deploying a WAR file.

localhost:8080/host-manager/html



Gestor de Máquina Virtual de Tomcat

Mensaje: OK

Gestor de Máquina

Lista de Máquinas Virtuales	Ayuda de Gestor de Máquina HTML (En breve)	Ayuda de Gestor de Máquina	Estado de Servidor
---	--	--	------------------------------------

Nombre de Máquina

Nombre de Máquina	Aliases de Máquina	Comandos
localhost		Instalado Gestor de Máquinas - comandos desactivados

Añadir Máquina Virtual

Maquina

Nombre: <input type="text"/>
Aliases: <input type="text"/>
App base: <input type="text"/>
AutoDeploy <input checked="" type="checkbox"/>
DeployOnStartup <input checked="" type="checkbox"/>
DeployXML <input checked="" type="checkbox"/>
UnpackWARs <input checked="" type="checkbox"/>
App de Gestor <input checked="" type="checkbox"/>
CopyXML <input type="checkbox"/>
<input type="button" value="Añadir"/>

Configuración persistente

All Save current configuration (including virtual hosts) to server.xml and per web application context.xml files

localhost:8080/manager/status



Estado de Servidor

Gestor

Listar Aplicaciones	Ayuda HTML de Gestor	Ayuda de Gestor	Estado Completo de Servidor
-------------------------------------	--------------------------------------	---------------------------------	---

Información de Servidor

Versión de Tomcat	Versión JVM	Vendedor JVM	Nombre del SO	Versión de SO	Arquitectura de SO	NombreDeMáquina	Dirección IP
Apache Tomcat/8.5.70	1.8.0_261-b12	Oracle Corporation	Windows 10	10.0	amd64	base	10.0.2.15

JVM

Memoria disponible: 88.56 MB Total Memory: 123.00 MB Max Memory: 1820.50 MB

Pool de Memoria	Type	Initial	Total	Maximum	Used
PS Eden Space	Heap memory	32.50 MB	32.50 MB	672.50 MB	22.45 MB (3%)
PS Old Gen	Heap memory	85.50 MB	85.50 MB	1365.50 MB	6.98 MB (0%)
PS Survivor Space	Heap memory	5.00 MB	5.00 MB	5.00 MB	5.00 MB (100%)
Code Cache	Non-heap memory	2.43 MB	8.00 MB	240.00 MB	6.70 MB (2%)
Compressed Class Space	Non-heap memory	0.00 MB	2.25 MB	1024.00 MB	2.06 MB (0%)
Metaspace	Non-heap memory	0.00 MB	19.25 MB	-0.00 MB	18.59 MB

"http-nio-8080"

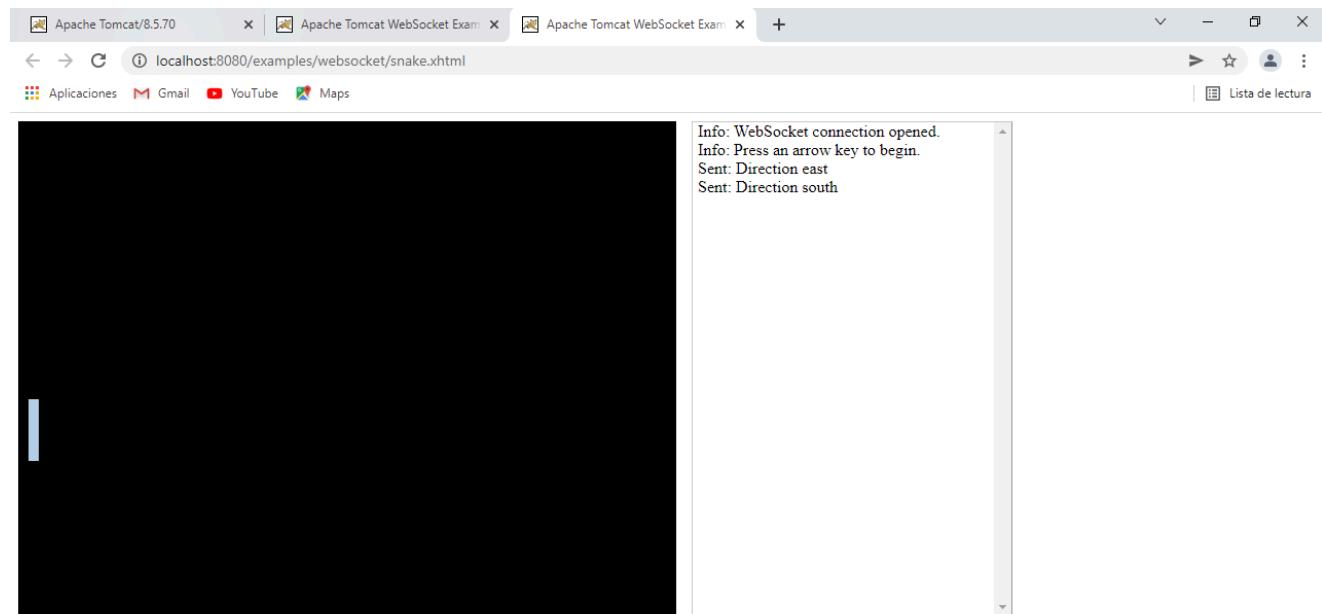
Max threads: 200 Current thread count: 10 Current threads busy: 1 Keep alive sockets count: 1
 Max processing time: 102 ms Tiempo de procesamiento: 0.312 s Request count: 9 Error count: 1 Bytes received: 0.00 MB Bytes sent: 0.05 MB

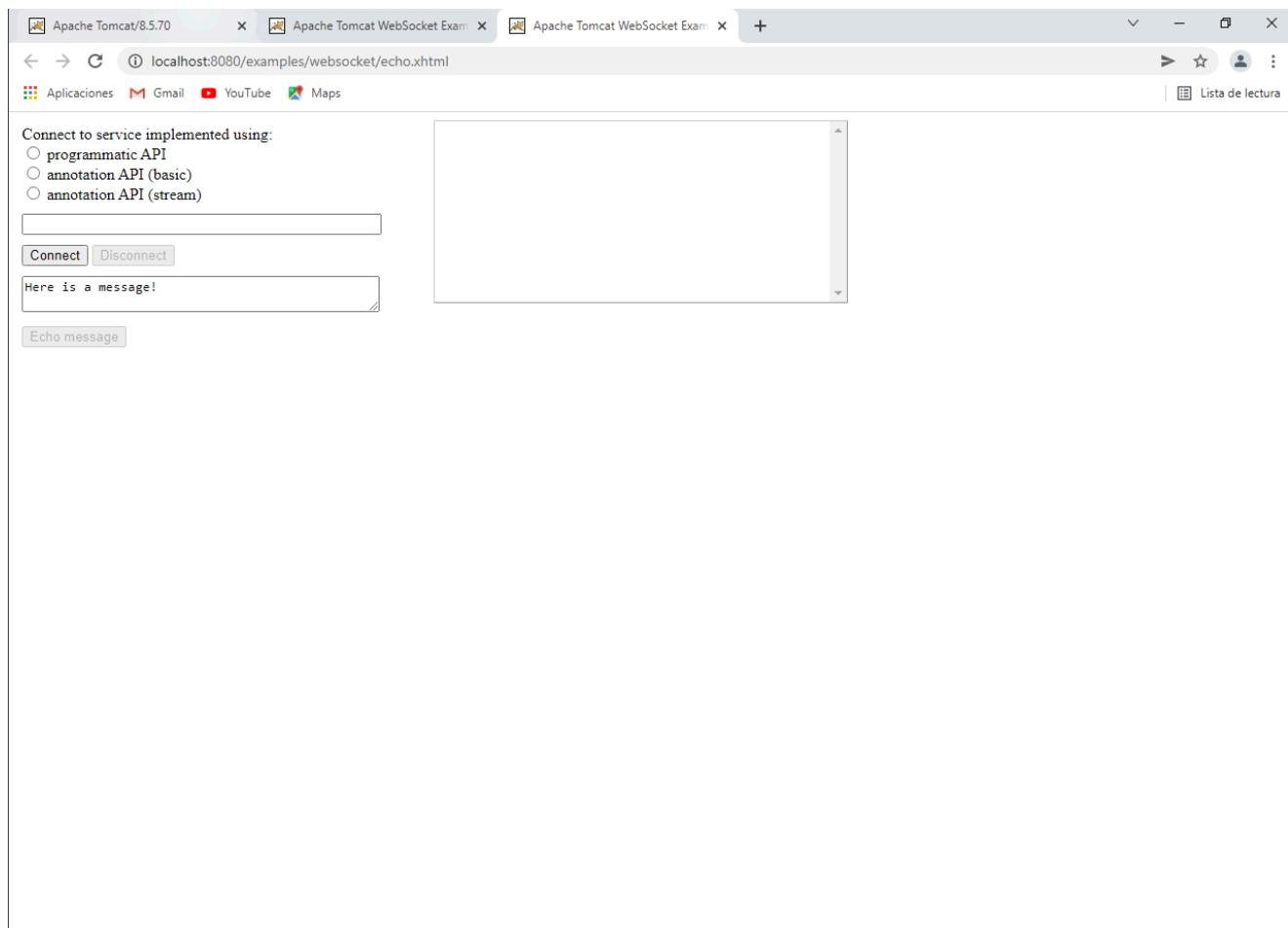
Stage	Time	Bytes Sent	Bytes Recv	Client (Forwarded)	Client (Actual)	VHost	Solicitud
S	39 ms	0 KB	0 KB	0.0.0.0.0.0.1	0.0.0.0.0.0.1	localhost	GET /manager/status HTTP/1.1
R	?	?	?	?	?	?	
R	?	?	?	?	?	?	

P: Parse and prepare request S: Service F: Finishing R: Ready K: Keepalive

1.3 Ejemplos

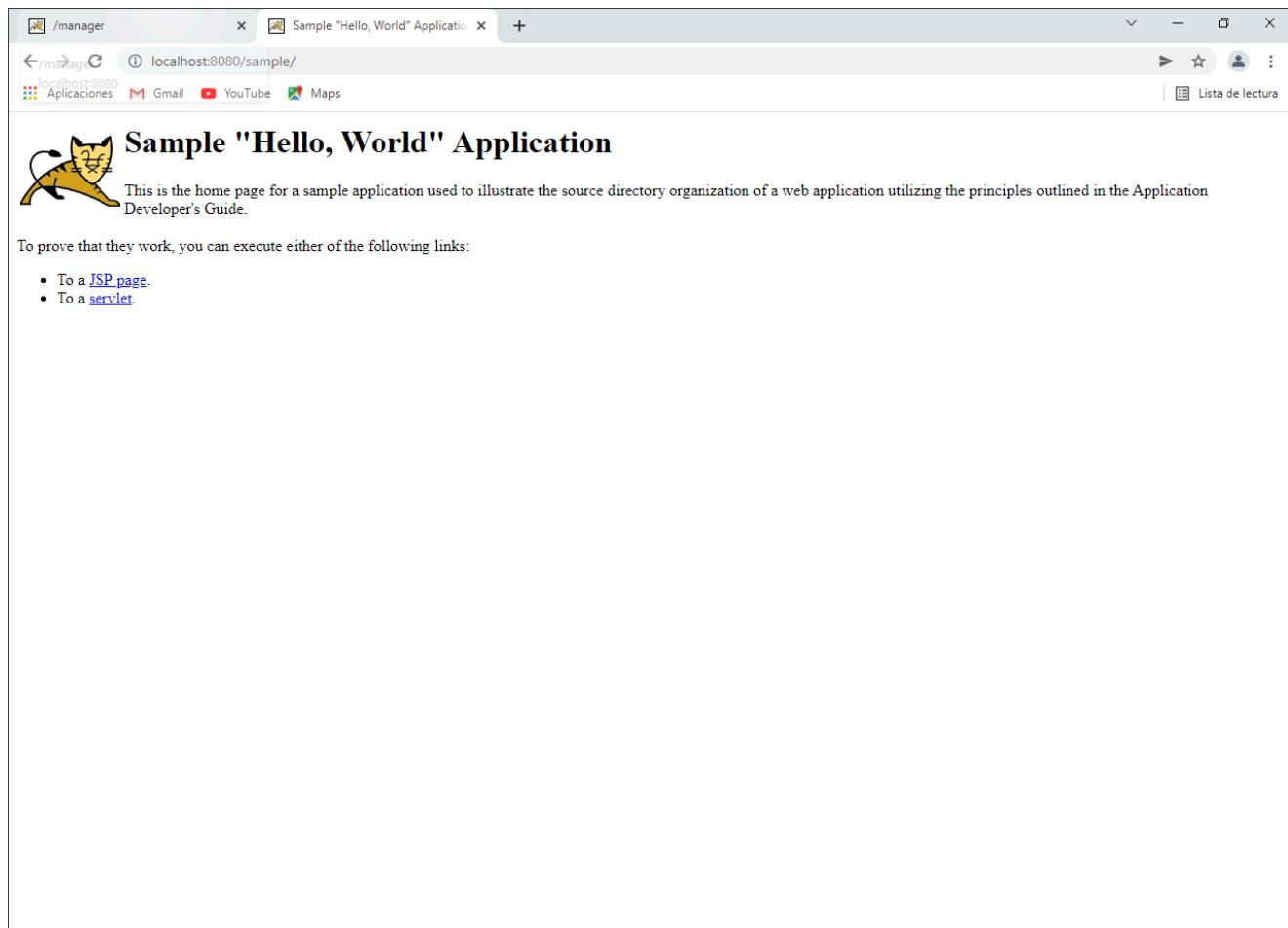
Muestra su funcionamiento con alguno de los ejemplos disponibles





1.4 Despliega tu propia aplicación web

Despliega un fichero Sample.war, y comprueba que puedes acceder a la aplicación



The screenshot shows a web browser window with the following details:

- Title Bar:** /manager > Sample "Hello, World" Application
- Address Bar:** localhost:8080/sample/
- Toolbar:** Back, Forward, Stop, Refresh, Home, Favorites, User Account, More, and a search bar.
- Navigation Bar:** Back, Forward, Stop, Refresh, Home, Favorites, User Account, More, and a search bar.
- Content Area:**
 - A yellow cartoon cat icon is on the left.
 - The title "Sample 'Hello, World' Application" is centered at the top.
 - A sub-header "This is the home page for a sample application used to illustrate the source directory organization of a web application utilizing the principles outlined in the Application Developer's Guide." is present.
 - Text below the sub-header: "To prove that they work, you can execute either of the following links:"
 - List of links:
 - To a [JSP page](#).
 - To a [servlet](#).

1.5 Puerto de escucha

Cambia el puerto donde escucha por defecto de Tomcat

Modificar el fichero server.xml

```
<Connector port="8181" protocol="HTTP/1.1"
           connectionTimeout="20000"
           redirectPort="8080" />
```

The screenshot shows a web browser window with the title "Apache Tomcat/8.5.70". The address bar shows "localhost:8181". The page content includes:

- A green banner at the top center says "If you're seeing this, you've successfully installed Tomcat. Congratulations!"
- To the left is a cartoon cat icon.
- 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](#)
- Documentation:**
 - [Tomcat 8.5 Documentation](#)
 - [Tomcat 8.5 Configuration](#)
 - [Tomcat Wiki](#)
- Getting Help:**
 - [FAQ and Mailing Lists](#)
 - Information about mailing lists:
 - 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.

2. Instalación, configuración y funcionamiento de Tomcat en Linux

2.1 Instalación

Instala y realiza configuración para que pueda acceder a server status, Manager App y Host Manager

Instalar Java

```
sudo apt update  
sudo apt install openjdk-21-jdk
```

Descargar Tomcat y añadir usuario

```
curl -O https://dlcdn.apache.org/tomcat/tomcat-11/v11.0.4/bin/apache-tomcat-  
11.0.4.tar.gz  
tar zxvf apache-tomcat-11.0.4.tar.gz  
sudo mv apache-tomcat-11.0.4 /usr/libexec/tomcat11  
sudo useradd -M -d /usr/libexec/tomcat11 tomcat  
sudo chown -R tomcat:tomcat /usr/libexec/tomcat11
```

Fichero de servicio

```
sudo nano /usr/lib/systemd/system/tomcat11.service
```

```
[Unit]  
Description=Apache Tomcat 11  
After=network.target  
  
[Service]  
Type=oneshot  
ExecStart=/usr/libexec/tomcat11/bin/startup.sh  
ExecStop=/usr/libexec/tomcat11/bin/shutdown.sh  
RemainAfterExit=yes  
User=tomcat  
Group=tomcat  
  
[Install]  
WantedBy=multi-user.target
```

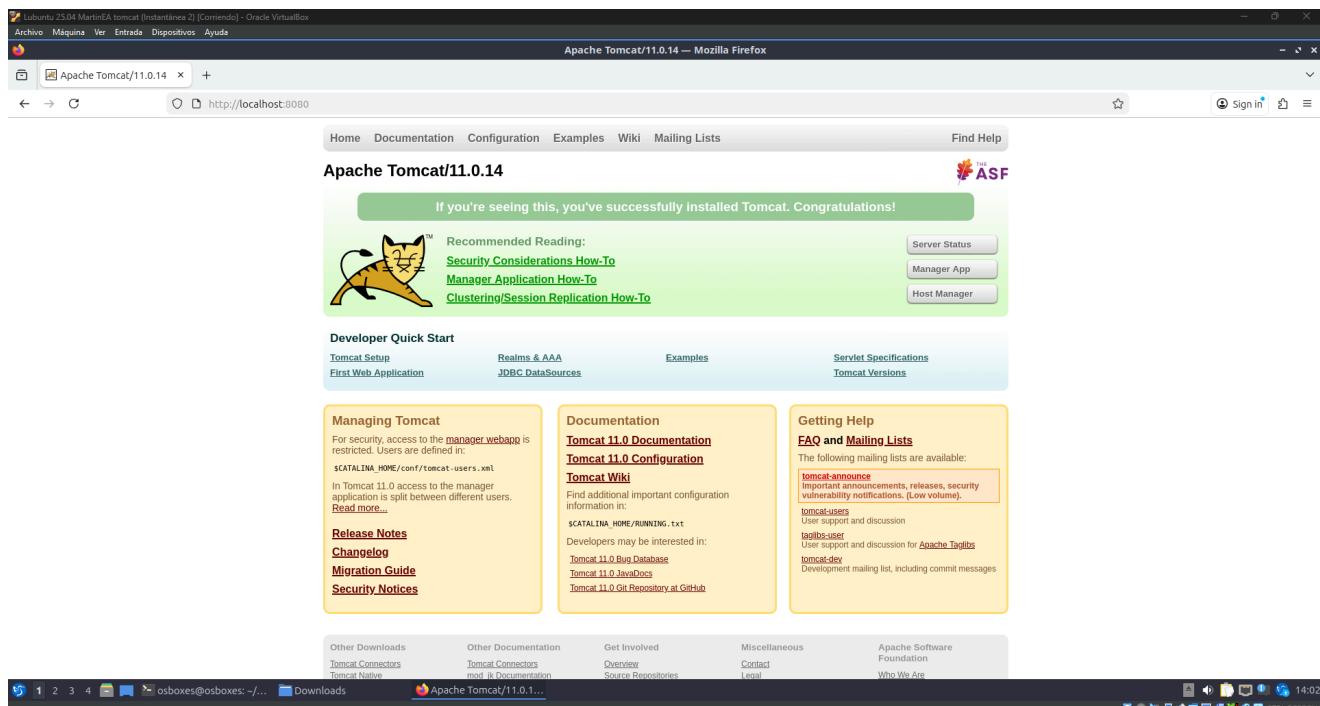
Activar el servicio

```
sudo systemctl enable --now tomcat11  
sudo systemctl restart tomcat11
```

Crear cuenta

```
sudo nano /usr/libexec/tomcat11/conf/tomcat-users.xml
```

```
<role rolename="manager-gui"/>
<role rolename="admin-gui"/>
<user username="martinea" password="abc123.." roles="manager-gui,admin-
gui"/>
</tomcat-users>
```



Status

localhost:8080 /manager

Aplicaciones Gmail YouTube Maps Lista de lectura



Estado de Servidor

Gestor	Listar Aplicaciones	Ayuda HTML de Gestor	Ayuda de Gestor	Estado Completo de Servidor			
Información de Servidor							
Versión de Tomcat	Versión JVM	Vendedor JVM	Nombre del SO	Versión de SO	Arquitectura de SO	NombreDeMáquina	Dirección IP
Apache Tomcat/8.5.70	1.8.0_261-b12	Oracle Corporation	Windows 10	10.0	amd64	base	10.0.2.15

JVM

Memoria disponible: 88.56 MB Total Memory: 123.00 MB Max Memory: 1820.50 MB

Pool de Memoria	Type	Initial	Total	Maximum	Used
PS Eden Space	Heap memory	32.50 MB	32.50 MB	672.50 MB	22.45 MB (3%)
PS Old Gen	Heap memory	85.50 MB	85.50 MB	1365.50 MB	6.98 MB (0%)
PS Survivor Space	Heap memory	5.00 MB	5.00 MB	5.00 MB	5.00 MB (100%)
Code Cache	Non-heap memory	2.43 MB	8.00 MB	240.00 MB	6.70 MB (2%)
Compressed Class Space	Non-heap memory	0.00 MB	2.25 MB	1024.00 MB	2.06 MB (0%)
Metaspace	Non-heap memory	0.00 MB	19.25 MB	-0.00 MB	18.59 MB

"http-nio-8080"

Max threads: 200 Current thread count: 10 Current threads busy: 1 Keep alive sockets count: 1
Max processing time: 102 ms Tiempo de procesamiento: 0.312 s Request count: 9 Error count: 1 Bytes received: 0.00 MB Bytes sent: 0.05 MB

Stage	Time	Bytes Sent	Bytes Recv	Client (Forwarded)	Client (Actual)	VHost	Solicitud
S	39 ms	0 KB	0 KB	0:0:0:0:0:0:1	0:0:0:0:0:0:1	localhost	GET /manager/status HTTP/1.1
R	?	?	?	?	?	?	
R	?	?	?	?	?	?	

P: Parse and prepare request S: Service F: Finishing R: Ready K: Keepalive

Manager App

Lobanira 23.04 MananEA tomcat (Instancia 2) [Comiendo] - Oracle VirtualBox

Archivo Máquinas Ver Entradas Dispositivos Ayudas

/manager — Mozilla Firefox

Apache Tomcat/11.0.14 localhost:8080 /manager

http://localhost:8080/manager/html



Tomcat Web Application Manager

Message: OK

Manager		HTML Manager Help	Manager Help	Server Status	
List Applications					
Applications					
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:

Downloads CTRL DERECHA

Host Manager

Lubuntu 23.04 Martin/A tomcat (Instancia 2) [Corriendo] - Oracle VirtualBox

Archivo Máquina Ver Entrada Dispositivos Ayuda

/host-manager — Mozilla Firefox

Apache Tomcat/11.0.14 /host-manager http://localhost:8080/host-manager/html

sign in

THE ASF

Tomcat Virtual Host Manager

Message: OK

Host Manager

List Virtual Hosts | HTML Host Manager Help | Host Manager Help | Server Status

Host name

Host name	Host aliases	Commands
localhost		Host Manager installed - commands disabled

Add Virtual Host

Host

Name: <input type="text"/>
Aliases: <input type="text"/>
App base: <input type="text"/>
AutoDeploy <input checked="" type="checkbox"/>
DeployOnStartup <input checked="" type="checkbox"/>
DeployXML <input checked="" type="checkbox"/>
UnpackWARs <input checked="" type="checkbox"/>
Manager App <input checked="" type="checkbox"/>
CopyXML <input type="checkbox"/>

Persist configuration

osboxes@osboxes: ~... Downloads /host-manager — Moz... 14:08

CTRL DEPRECADA

2.2. Despliegue de aplicación web

Despliega un fichero Sample.war, y comprueba que puedes acceder a la aplicación

The screenshot shows the Apache Tomcat Manager interface in Mozilla Firefox. The URL is `http://localhost:8080/manager/html`. The main section is titled "Deploy" and contains fields for "Context Path", "Version (for parallel deployment)", "XML Configuration file path", and "WAR or Directory path". Below this is a section titled "WAR file to deploy" with a "Browse..." button and a "Deploy" button. Further down are sections for "Configuration" (with "Re-read TLS configuration files" and "TLS host name (optional)"), "Diagnostics" (with "Find leaks" and "TLS connector configuration diagnostics" sections for Ciphers, Certificates, and Trusted Certificates), and "Server Information" (listing Tomcat Version, JVM Version, JVM Vendor, OS Name, OS Version, OS Architecture, Hostname, and IP Address). The status bar at the bottom shows the command line: `osboxes@osboxes: ~/...`.

The screenshot shows the Apache Tomcat Manager interface in Mozilla Firefox. The URL is `http://localhost:8080/manager/html`. The main section is titled "Deploy" and shows the uploaded "sample.war" file. Below this is a section titled "WAR file to deploy" with a "Deploy" button. Further down are sections for "Configuration" (with "Re-read TLS configuration files" and "TLS host name (optional)"), "Diagnostics" (with "Find leaks" and "TLS connector configuration diagnostics" sections for Ciphers, Certificates, and Trusted Certificates), and "Server Information" (listing Tomcat Version, JVM Version, JVM Vendor, OS Name, OS Version, OS Architecture, Hostname, and IP Address). The status bar at the bottom shows the command line: `osboxes@osboxes: ~/...`.

The screenshot shows the Apache Tomcat Manager interface in Mozilla Firefox. The URL is `http://localhost:8080/manager/html`. The main section is titled "Deploy" and shows the uploaded "sample.war" file. Below this is a section titled "WAR file to deploy" with a "Deploy" button. Further down are sections for "Configuration" (with "Re-read TLS configuration files" and "TLS host name (optional)"), "Diagnostics" (with "Find leaks" and "TLS connector configuration diagnostics" sections for Ciphers, Certificates, and Trusted Certificates), and "Server Information" (listing Tomcat Version, JVM Version, JVM Vendor, OS Name, OS Version, OS Architecture, Hostname, and IP Address). The status bar at the bottom shows the command line: `osboxes@osboxes: ~/...`.

3. Securización

Configura para que el acceso sea seguro mediante certificados SSL, accediendo por HTTPS

Creación del keystore

```
sudo $JAVA_HOME/bin/keytool -genkey -alias tomcat -keyalg RSA -keysize 2048 -validity 365 -keystore /usr/libexec/tomcat11/conf/keystore.jks -storepass abc123..
```

```
osboxes@osboxes:~$ sudo $JAVA_HOME/bin/keytool -genkey -alias tomcat -keyalg RSA -keysize 2048 -validity 365 -keystore /usr/libexec/tomcat11/conf/keystore.jks -storepass abc123..  
Enter the distinguished name. Provide a single dot (.) to leave a sub-component empty or press ENTER to use the default value in braces.  
What is your first and last name?  
[Unknown]: localhost  
What is the name of your organizational unit?  
[Unknown]:  
What is the name of your organization?  
[Unknown]:  
What is the name of your City or Locality?  
[Unknown]:  
What is the name of your State or Province?  
[Unknown]:  
What is the two-letter country code for this unit?  
[Unknown]: ES  
Is CN=localhost, OU=Unknown, O=Unknown, L=Unknown, ST=Unknown, C=ES correct?  
[no]: yes  
Generating 2,048 bit RSA key pair and self-signed certificate (SHA384withRSA) with a validity of 365 days  
for: CN=localhost, OU=Unknown, O=Unknown, L=Unknown, ST=Unknown, C=ES
```

```
sudo chown tomcat:tomcat /usr/libexec/tomcat11/conf/keystore.jks
```

```
sudo chmod 777 /usr/libexec/tomcat11/conf/keystore.jks
```

```
sudo nano /usr/libexec/tomcat11/conf/server.xml
```

```
<Connector port="8443" protocol="org.apache.coyote.http11.Http11NioProtocol"  
maxThreads="150" SSLEnabled="true">  
    <SSLHostConfig>  
        <Certificate  
            certificateKeystoreFile="/usr/libexec/tomcat11/conf/keystore.jks"  
            certificateKeystorePassword="abc123.." type="RSA"/>  
    </SSLHostConfig>  
</Connector>
```

```
sudo systemctl restart tomcat11
```

Lubuntu 22.04 Manjaro Tomcat [Instalaciones 2] [Corriendo] - Oracle VirtualBox

Archivo Máquina Ver Entrada Dispositivos Ayuda

Apache Tomcat/11.0.14 — Mozilla Firefox

Apache Tomcat/11.0.14

localhost:80443

Home Documentation Configuration Examples Wiki Mailing Lists Find Help

Apache Tomcat/11.0.14

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 Realms & AAA Examples Servlet Specifications
First Web Application JDBC DataSources 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...](#)

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 bulletins and 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 Other Documentation Get Involved Miscellaneous Apache Software Foundation
Tomcat Connectors Tomcat Connectors Overview Source Repositories Contact Legal Who We Are
Tomcat Native mod_ik Documentation

osboxes@osboxes: ~ Apache Tomcat/11.0.1... web - Visual Studio Co... 16:10

4. Integración con un IDE

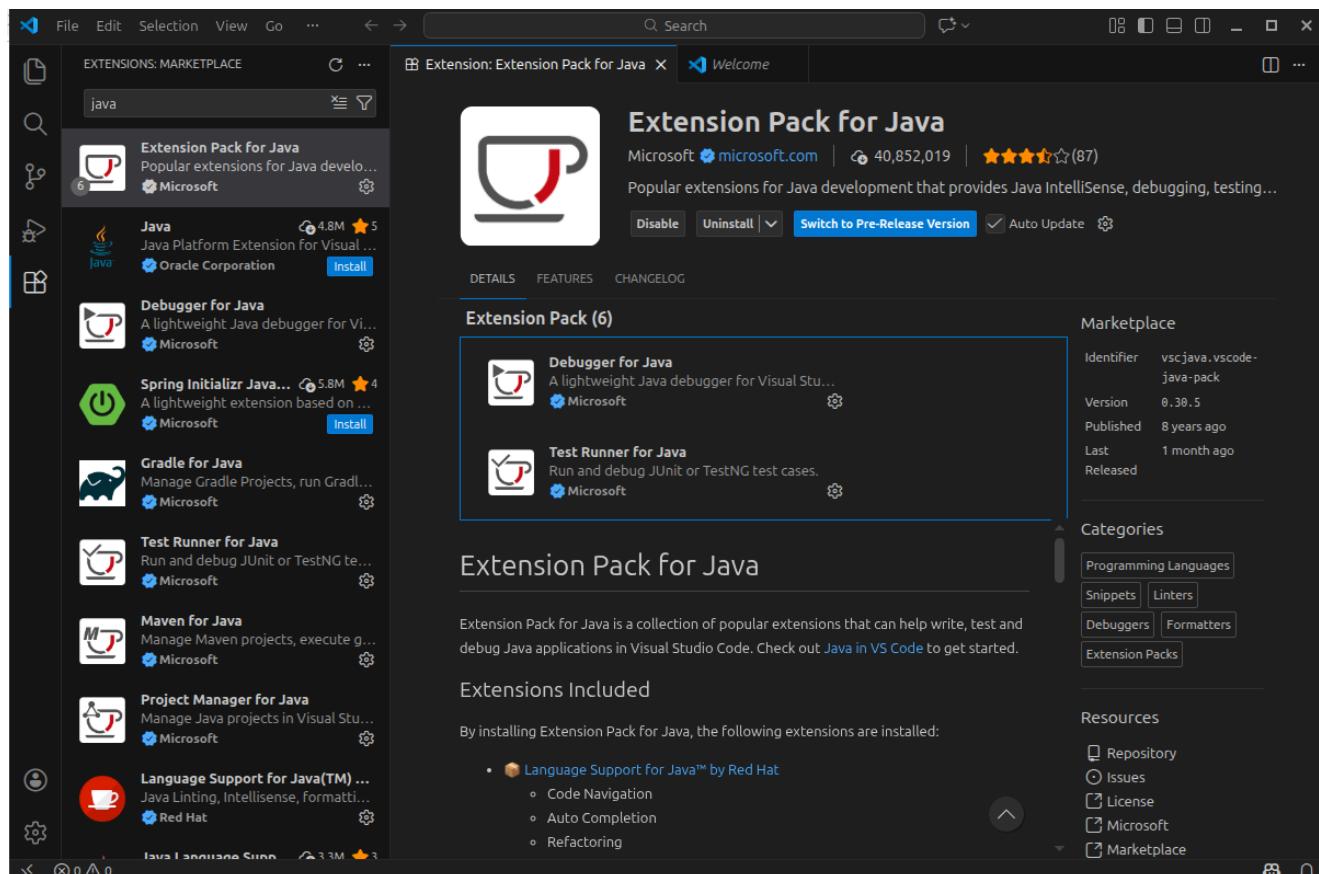
Realiza la integración de Tomcat con un IDE de tu elección (IntelliJ IDEA, Eclipse, Netbeans, Visual Studio Code,...)

Descargar Visual Studio Code

https://code.visualstudio.com/docs/setup/linux#_install-vs-code-on-linux

```
sudo apt install /home/Downloads/code_1.108.1-1768404234_amd64.deb
```

Instalar Extension Pack for Java



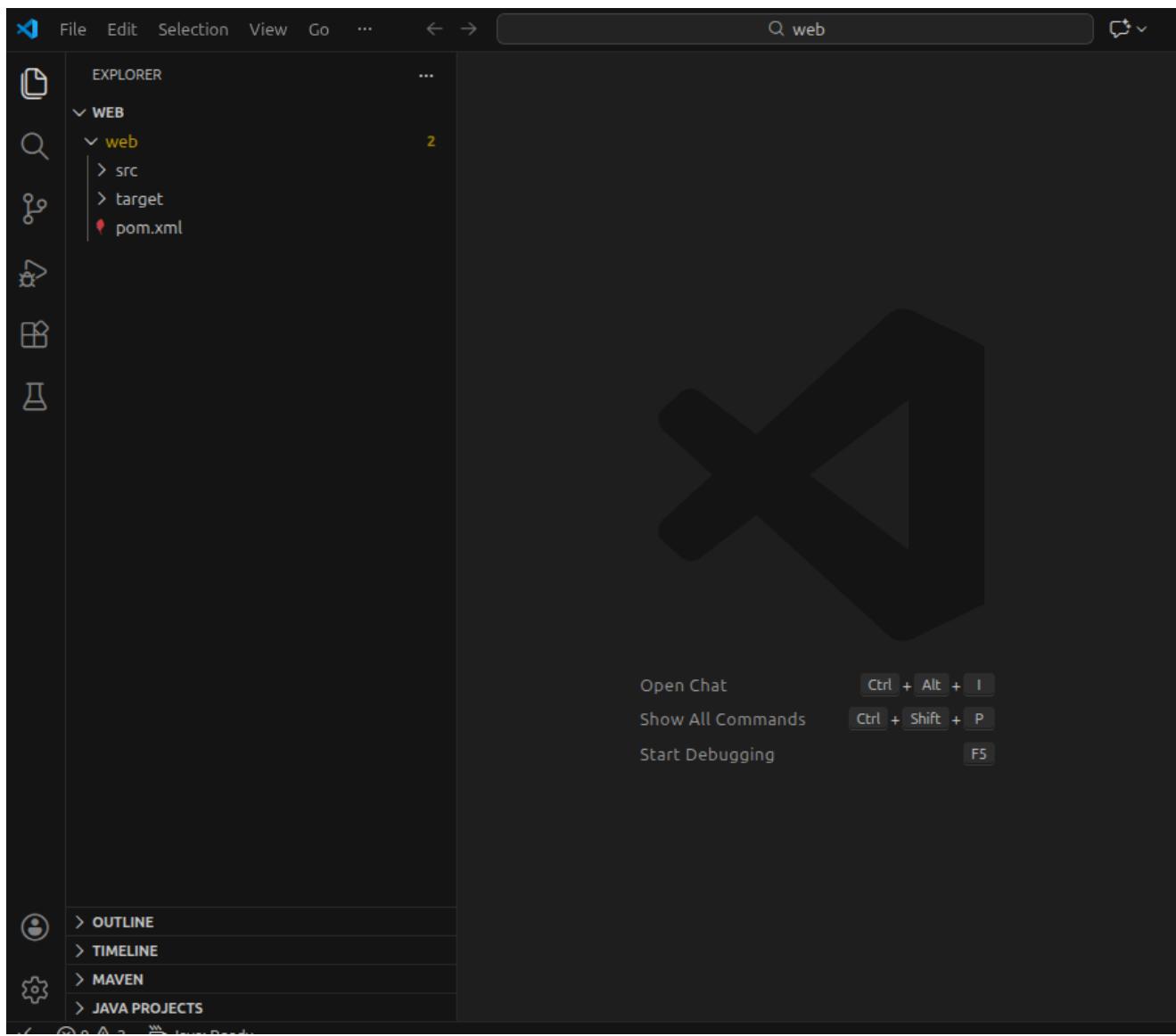
ctrl+shift+p => Maven: New project

Seleccionar arquitectura

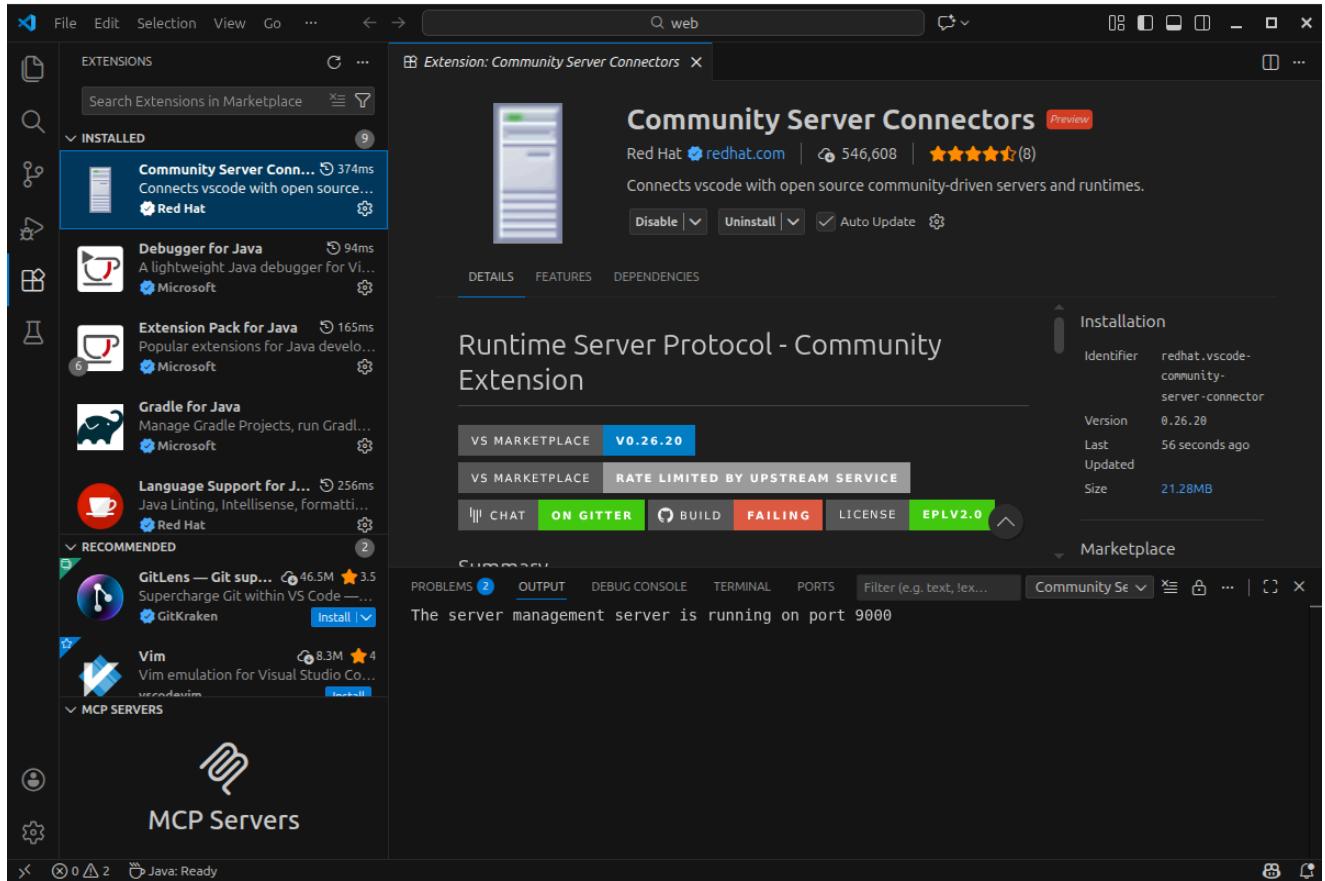
Seleccionar versión

Nombre del proyecto

Seleccionar carpeta



Instalar extensión Community Server Connectors



<https://code.visualstudio.com/docs/java/java-tomcat-jetty>

Crear un servidor Tomcat 11 y aceptar licencias

Seleccionar Server Actions y mostrar en navegador

5. Cuestiones

a) ¿Qué versión de Apache Tomcat instalarás dependiendo de tu versión de Java?

La versión más reciente de Tomcat que sea compatible con la de Java.

a.1) Y para la versión 8?

La versión más adecuada es la Apache Tomcat 9.x.

a.2) Y para la versión 21?

La versión más adecuada es la Apache Tomcat 10.1.x.

b) ¿Qué otros servidores de aplicaciones hay en el mercado? ¿Cuáles son software libre y cuales productos comerciales?

Software libre:

- WildFly
- Jetty
- GlassFish

Productos comerciales:

- WebLogic Server (Oracle)
- WebSphere Application Server (IBM)
- JBoss EAP (Red Hat)

c) Una de las cuestiones a tener en cuenta es el rendimiento de las aplicaciones. ¿Sabrías indicar alguna herramienta para pruebas de carga?

- Apache JMeter
- Gatling
- Locust

d) Otra de las cuestiones a tener en cuenta es la monitorización del servidor de aplicaciones. ¿Sabrías indicarme alguna herramienta para monitorizar tomcat u otro servidor de aplicaciones? ¿Qué indicadores puede interesar monitorizar?

Herramientas de monitorización:

- JConsole (Monitorización vía JMX)
- VisualVM (Monitorización vía JMX)
- Prometheus (Métricas y dashboards)
- Zabbix (Monitorización de infraestructura)

Interesa monitorizar el rendimiento, las peticiones al servidor, el estado de los procesos...