

INSTITUTO POLITÉCNICO NACIONAL
ESCUELA SUPERIOR DE COMPUTO



**TAREA 6 IMPLEMENTACIÓN DE UN SERVICIO
WEB ESTILO REST**

**MATERIA: DISEÑO DE SISTEMAS
DISTRIBUIDOS**

GRUPO: 4CV13

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**FECHA ENTREGA: VIERNES 29 OCTUBRE
2021**

1. Crear una máquina virtual con Ubuntu 18 con al menos 1GB de memoria RAM. Abrir el puerto 8080 para el protocolo TCP.

Primero en el portal de azure seleccionamos maquina virtual

The screenshot shows the Microsoft Azure portal homepage. At the top, there are several service icons: 'Crear un recurso', 'Grupos de recursos', 'Todos los recursos', 'Máquinas virtuales' (which is highlighted with a yellow box), 'Cost Management', 'Administración de costos +...', 'Centro de inicio rápido', 'App Services', 'Cuentas de almacenamiento', and 'Más servicios'. Below this is a section titled 'Recursos recientes' with a table showing three items: 'NetworkWatcherRG' (Grupo de recursos), 'Tarea5' (Grupo de recursos), and 'Azure para estudiantes' (Suscripción). A 'Navegar' sidebar on the left includes links for 'Suscripciones', 'Grupos de recursos', 'Todos los recursos', and 'Panel'. The URL in the address bar is https://portal.azure.com/#blade/Microsoft_Azure_GTM/ModernBillingMenuBlade. The system tray at the bottom right shows the date as 19/10/2021 and the time as 04:44 p.m.

Le damos clic en crear y crear maquina virtual:

The screenshot shows the 'Máquinas virtuales' blade in the Microsoft Azure portal. The top navigation bar has 'Máquinas virtuales' selected. The main area displays a table with one row: 'Nombre' (empty), 'Suscripción' (empty), 'Grupo de recursos' (set to 'todo'), 'Ubicación' (set to 'todo'), 'Estado' (empty), 'Sistema operativo' (empty), 'Tamaño' (empty), and 'Dirección IP pública' (empty). Above the table, there are buttons for 'Crear' (highlighted with a yellow box), 'Cambiar al modo clásico', 'Reservas', 'Administrar vista', 'Actualizar', 'Exportar a CSV', 'Abrir consulta', 'Asignar etiquetas', 'Iniciar', 'Reiniciar', and '...'. Below the table, a message says 'No hay máquinas virtuales para mostrar' and provides instructions: 'Crea una máquina virtual que ejecuta Linux o Windows. Seleccione una imagen de Marketplace o use una imagen personalizada propia.' There are also links for 'Más información acerca de Windows Virtual Machines' and 'Más información sobre Linux Virtual Machines'. The URL in the address bar is <https://portal.azure.com/#blade/HubsExtension/BrowseResource/resourceType/Microsoft.Compute%2FVirtualMachines>. The system tray at the bottom right shows the date as 19/10/2021 and the time as 04:45 p.m.

Seleccionamos el grupo de recursos, la región y el nombre de nuestra maquina virtual, en mi caso: REST2018631591, tambien seleccionamos el sistema operativo a utilizar

The screenshot shows the Microsoft Azure portal interface for creating a new virtual machine. On the left, there's a sidebar with various icons and a message: 'No hay máquinas virtuales para mostrar'. The main area is titled 'Crear una máquina virtual' and contains several configuration steps:

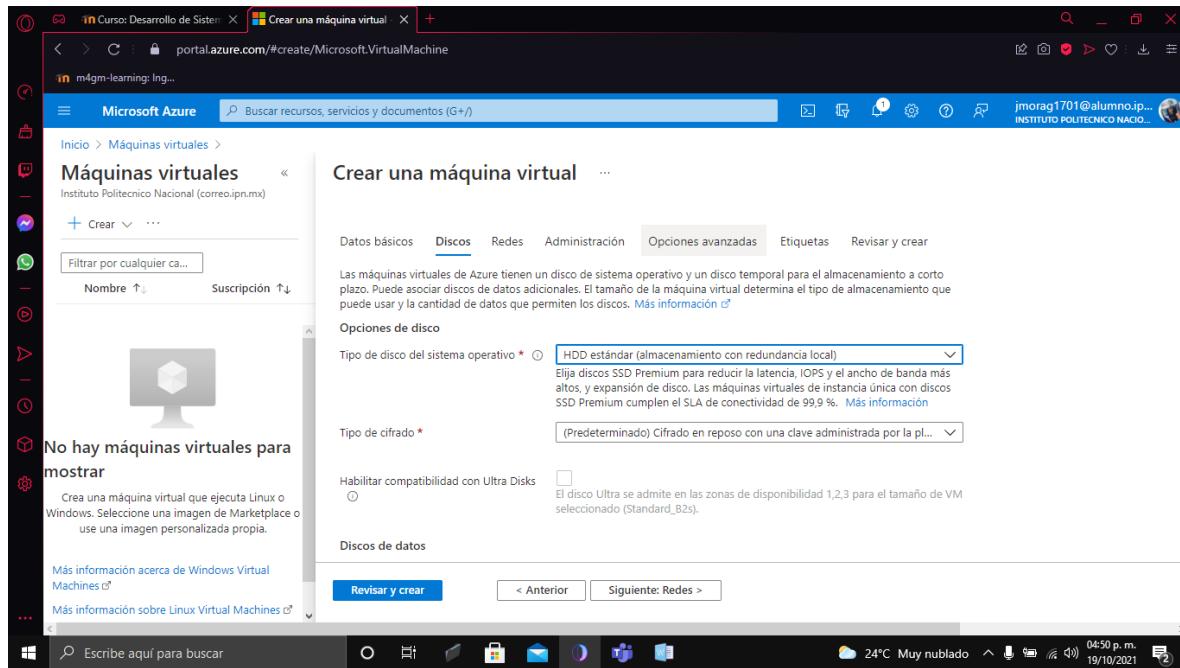
- Detalles del proyecto:** Subscription is set to 'Azure para estudiantes' and Resource group is set to 'ServiceREST'.
- Detalles de instancia:** Name is 'REST2018631591', Region is '(US) Oeste de EE.UU.', Availability options are 'No se requiere redundancia de la infraestructura', and Image is 'Ubuntu Server 18.04 LTS - Gen1'.
- Buttons at the bottom:** 'Revisar y crear' (Review and create) and 'Siguiente: Discos >' (Next: Disks >).

Seleccionamos el tamaño y en tipo de autenticación seleccionamos contraseña y ponemos un usuario y contraseña

This screenshot continues the 'Create a virtual machine' wizard. It shows the second step, 'Create administrator'.

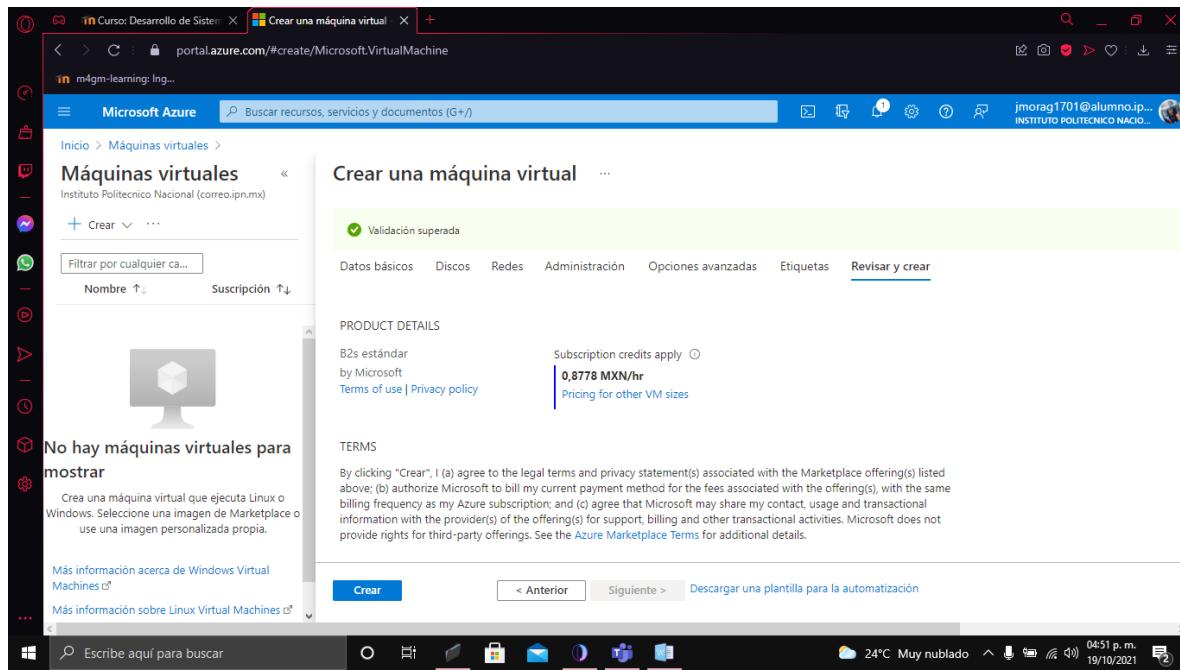
- Tamaño:** Standard_B2s - 2 vcpu, 4 GiB de memoria (MXN 640.76/mes).
- Cuenta de administrador:** Tipo de autenticación is set to 'Contraseña'. The 'Nombre de usuario' field contains 'REST2018631591' and the 'Contraseña' and 'Confirmar contraseña' fields both contain '*****'.
- Reglas de puerto de entrada:** Puerto de entrada público is set to 'Ninguno'.
- Buttons at the bottom:** 'Revisar y crear' (Review and create) and 'Siguiente: Discos >' (Next: Disks >).

En discos seleccionamos HDD estándar



The screenshot shows the Microsoft Azure portal interface for creating a new virtual machine. The main title is 'Crear una máquina virtual'. The 'Disks' tab is selected. Under 'Options de disco', the 'Tipo de disco del sistema operativo' dropdown is set to 'HDD standard (almacenamiento con redundancia local)'. Other options like 'SSD Premium' and 'Ultra Disks' are also available. The 'Tipo de cifrado' dropdown is set to '(Predeterminado) Cifrado en reposo con una clave administrada por la pl...'. Below these, there's a checkbox for 'Habilitar compatibilidad con Ultra Disks'. The 'Discos de datos' section is collapsed. At the bottom, there are 'Revisar y crear' and 'Siguiente: Redes >' buttons.

Le damos en revisar y crear



The screenshot shows the 'Review + Create' step of the Azure VM creation wizard. A green bar at the top indicates 'Validación superada'. The 'Review + Create' tab is selected. The 'PRODUCT DETAILS' section shows a B2s standard VM by Microsoft with a price of 0,8778 MXN/hr. The 'TERMS' section contains legal text about accepting terms and conditions and agreeing to Microsoft's privacy policy. At the bottom, there are 'Create', '< Anterior', 'Siguiente >', and 'Descargar una plantilla para la automatización' buttons.

Una vez creada vamos al recurso y seleccionamos redes

REST2018631591 - Microsoft Azure

Microsoft Azure

Inicio > REST2018631591

Máquina virtual

Buscar (Ctrl+F)

Conectar Iniciar Reiniciar Detener Captura Eliminar Actualizar Abrir en dispositivos móviles Comentarios

Hemos resuelto recientemente un problema con su máquina virtual. →

Información general Registro de actividad Control de acceso (IAM) Etiquetas Diagnosticar y solucionar problemas Configuración Redes Conectar Discos Tamaño Seguridad Recomendaciones de Advisor Extensiones Entrega continua Disponibilidad u escalado

Información esencial

Grupo de recur... (cambiar) : ServiceREST Estado : En ejecución Ubicación : Oeste de EE. UU. 2 Suscripción (cambiar) : Azure para estudiantes Id. de suscripción : cfeb6bbb-d4ab-4974-9558-171a19128766 Etiquetas (cambiar) : Haga clic aquí para agregar etiquetas.

Sistema operativo : Linux (ubuntu 18.04) Tamaño : B2s estándar (2 vcpu, 4 GiB de memoria) Dirección IP pública : 20.80.183.108 Red virtual/subred : ServiceREST-vnet/default Nombre DNS : Sin configurar

Vista JSON

Propiedades Supervisión Funcionalidades (7) Recomendaciones Tutoriales

Máquina virtual Redes

Nombre del equipo : REST2018631591 Estado de mantenimiento : - Sistema operativo : Linux (ubuntu 18.04) Publicador : Canonical Oferta : UbuntuServer Dirección IP pública : 20.80.183.108 Dirección IP pública (IPv6) : - Dirección IP privada : 10.0.0.4 Dirección IP privada (IPv6) : - Red virtual/subred : ServiceREST-vnet/default

Escribe aquí para buscar

Agregamos regla de puerto de entrada

REST2018631591 - Microsoft Azure

Microsoft Azure

Inicio > REST2018631591

REST2018631591 | Redes

Máquina virtual

Buscar (Ctrl+F)

Adjuntar interfaz de red Desasociar interfaz de red Comentarios

rest201863159198

Configuración de IP : ipconfig1 (Principal)

Interfaz de red: rest201863159198 Reglas de seguridad vigentes Solucionar problemas de conexión de VM Topología

Red virtual/subred: ServiceREST-vnet/default IP pública de NIC: 20.80.183.108 IP privada de NIC: 10.0.0.4 Redes aceleradas: Deshabilitado

Reglas de puerto de entrada Reglas de puerto de salida Grupos de seguridad de aplicación Equilibrio de carga

Grupo de seguridad de red REST2018631591-nsg (se conectó a la interfaz de red: rest201863159198)

Impactos 0 subredes, 1 interfaces de red

Agregar regla de puerto de entrada

Prioridad	Nombre	Puerto	Protocolo	Origen	Destino	Acción	...
300	SSH	22	TCP	Cualquiera	Cualquiera	Permitir	...
65000	AllowVnetInBound	Cualquiera	Cualquiera	<input type="button" value="Eliminar"/>	Network	Permitir	...
65001	AllowAzureLoadBalancer...	Cualquiera	Cualquiera	AzureLoadBalancer	Cualquiera	Permitir	...
65500	DenyAllInBound	Cualquiera	Cualquiera	Cualquiera	Cualquiera	Denegar	...

Escribe aquí para buscar

Y abrimos el puerto 8080

The screenshot shows the Microsoft Azure portal interface. On the left, there's a sidebar with navigation links like 'Información general', 'Registro de actividad', 'Control de acceso (IAM)', 'Etiquetas', 'Diagnosticar y solucionar problemas', 'Configuración' (selected), 'Redes' (selected), 'Conectar', 'Discos', 'Tamaño', 'Seguridad', 'Recomendaciones de Advisor', 'Extensiones', 'Entrega continua', and 'Disponibilidad u escalado'. The main area displays 'Redes' settings for a resource group named 'rest2018631591'. It shows an IP configuration 'ipconfig1 (Principal)' and a network interface 'rest201863159198' with IP '20.80.183.108'. A table lists security rules:

Prioridad	Nombre	Puerto	Protocolo
300	SSH	22	TCP
65000	AllowVnetInBound	Cualquier	Cua
65001	AllowAzureLoadBalancer...	Cualquier	Cua
65500	DenyAllInBound	Cualquier	Cua

The right side of the screenshot shows the 'Agregar regla de seguridad de entrada' (Add security rule) dialog. It has fields for 'Origen' (Any), 'Intervalos de puertos de origen' (8080), 'Destino' (Any), 'Servicio' (Custom), 'Intervalos de puertos de destino' (8080), and 'Protocolo' (TCP). Buttons for 'Agregar' (Add) and 'Cancelar' (Cancel) are at the bottom.

2. Instalar JDK8 ejecutando los siguientes comandos en la máquina virtual:

The screenshot shows a Windows Command Prompt window titled 'Documento1 - Word'. The command 'sudo apt update' is being run in the terminal. The output shows the system fetching packages from the Ubuntu repositories:

```
REST2018631591@REST2018631591:~$ sudo apt update
Hit:1 http://azure.archive.ubuntu.com/ubuntu bionic InRelease
Get:2 http://azure.archive.ubuntu.com/ubuntu bionic-updates InRelease [88.7 kB]
Get:3 http://azure.archive.ubuntu.com/ubuntu bionic-backports InRelease [74.6 kB]
Get:4 http://security.ubuntu.com/ubuntu bionic-security InRelease [88.7 kB]
Get:5 http://azure.archive.ubuntu.com/ubuntu bionic/universe amd64 Packages [8570 kB]
Get:6 http://azure.archive.ubuntu.com/ubuntu bionic/universe Translation-en [4941 kB]
Get:7 http://azure.archive.ubuntu.com/ubuntu bionic/multiverse amd64 Packages [151 kB]
Get:8 http://azure.archive.ubuntu.com/ubuntu bionic/multiverse Translation-en [108 kB]
Get:9 http://azure.archive.ubuntu.com/ubuntu bionic-updates/main amd64 Packages [2267 kB]
Get:10 http://azure.archive.ubuntu.com/ubuntu bionic-updates/main Translation-en [440 kB]
Get:11 http://azure.archive.ubuntu.com/ubuntu bionic-updates/restricted amd64 Packages [508 kB]
Get:12 http://azure.archive.ubuntu.com/ubuntu bionic-updates/restricted Translation-en [69.0 kB]
Get:13 http://azure.archive.ubuntu.com/ubuntu bionic-updates/universe amd64 Packages [1758 kB]
Get:14 http://azure.archive.ubuntu.com/ubuntu bionic-updates/universe Translation-en [378 kB]
Get:15 http://azure.archive.ubuntu.com/ubuntu bionic-updates/multiverse amd64 Packages [27.3 kB]
Get:16 http://azure.archive.ubuntu.com/ubuntu bionic-updates/multiverse Translation-en [6808 B]
Get:17 http://azure.archive.ubuntu.com/ubuntu bionic-backports/main amd64 Packages [10.0 kB]
Get:18 http://azure.archive.ubuntu.com/ubuntu bionic-backports/main Translation-en [4764 B]
Get:19 http://azure.archive.ubuntu.com/ubuntu bionic-backports/universe amd64 Packages [10.3 kB]
Get:20 http://azure.archive.ubuntu.com/ubuntu bionic-backports/universe Translation-en [4588 B]
Get:21 http://security.ubuntu.com/ubuntu bionic-security/main amd64 Packages [1910 kB]
Get:22 http://security.ubuntu.com/ubuntu bionic-security/main Translation-en [346 kB]
Get:23 http://security.ubuntu.com/ubuntu bionic-security/restricted amd64 Packages [474 kB]
Get:24 http://security.ubuntu.com/ubuntu bionic-security/restricted Translation-en [64.0 kB]
Get:25 http://security.ubuntu.com/ubuntu bionic-security/universe amd64 Packages [1142 kB]
Get:26 http://security.ubuntu.com/ubuntu Bionic-security/universe Translation-en [262 kB]
Get:27 http://security.ubuntu.com/ubuntu bionic-security/multiverse amd64 Packages [28.9 kB]
Get:28 http://security.ubuntu.com/ubuntu bionic-security/multiverse Translation-en [4732 B]
Fetched 23.7 MB in 5s (4985 kB/s)
```

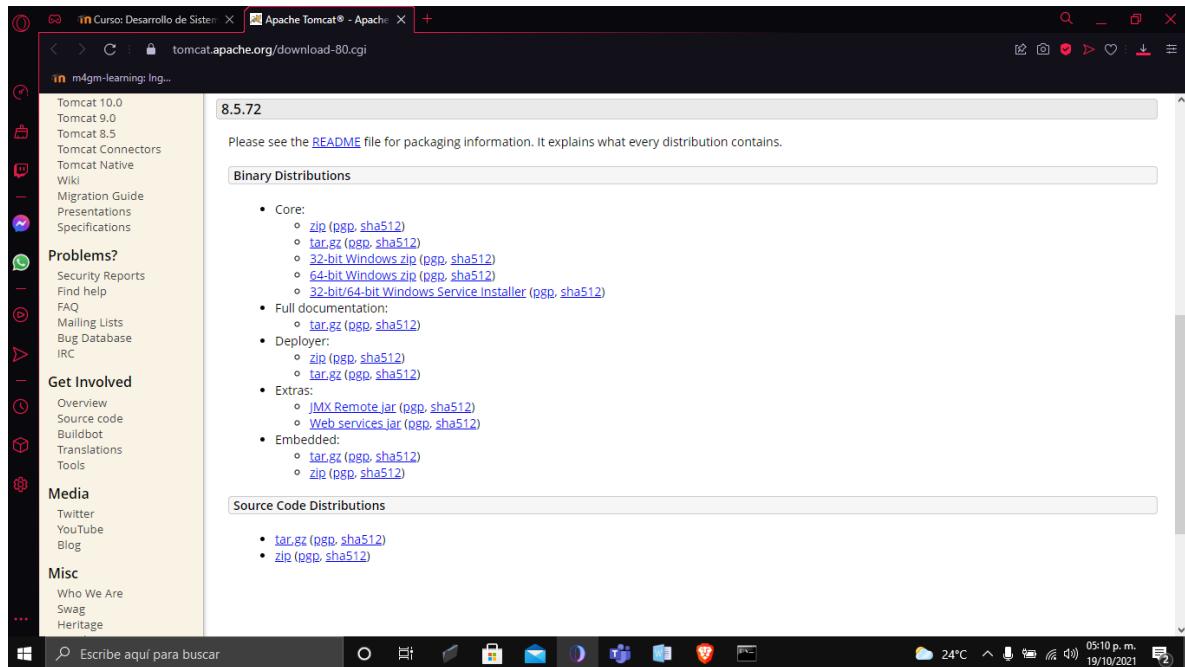
```
sudo apt install openjdk-8-jdk-headless
```

The screenshot shows a Microsoft Word document window titled "Documento1 - Word". The content of the document is a terminal session output:

```
REST2018631591@REST2018631591:~$ sudo apt install openjdk-8-jdk-headless
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following package was automatically installed and is no longer required:
  linux-headers-4.15.0-159
Use 'sudo apt autoremove' to remove it.
The following additional packages will be installed:
  ca-certificates-java fontconfig-config fonts-dejavu-core java-common libfontconfig1 libjpeg-turbo8 libjpeg8
  liblcms2-2 libnspr4 libnss3 libpcsc-lite1 libx11 libxrender1 libxtst6 openjdk-8-jre-headless x11-common
Suggested packages:
  default-jre liblcms2-utils pccsd openjdk-8-demos openjdk-8-source libnsns-mdds fonts-dejavu-extra fonts-ipafont-gothic
  fonts-ipafont-mincho fonts-wqy-microhei fonts-wqy-zenhei fonts-indic
The following NEW packages will be installed:
  ca-certificates-java fontconfig-config fonts-dejavu-core java-common libfontconfig1 libjpeg-turbo8 libjpeg8
  liblcms2-2 libnspr4 libnss3 libpcsc-lite1 libx11 libxrender1 libxtst6 openjdk-8-jdk-headless openjdk-8-jre-headless
x11-common
0 upgraded, 17 newly installed, 0 to remove and 4 not upgraded.
Need to get 39.5 MB of additional disk space will be used.
After this operation, 153 MB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://azure.archive.ubuntu.com/ubuntu bionic-updates/main amd64 libjpeg-turbo8 amd64 1.5.2-0ubuntu5.18.04.4 [110 kB]
Get:2 http://azure.archive.ubuntu.com/ubuntu bionic/main amd64 java-common all 0.69ubuntu1-18.04.1 [14.5 kB]
Get:3 http://azure.archive.ubuntu.com/ubuntu bionic-updates/main amd64 liblcms2-2 amd64 2.9-1ubuntu0.1 [139 kB]
Get:4 http://azure.archive.ubuntu.com/ubuntu bionic/main amd64 libjpeg8 amd64 8c-2ubuntu0 [2394 B]
Get:5 http://azure.archive.ubuntu.com/ubuntu bionic/main amd64 fonts-dejavu-core all 2.37-1 [1041 kB]
Get:6 http://azure.archive.ubuntu.com/ubuntu bionic/main amd64 fontconfig-config all 2.12.6-0ubuntu2 [55.8 kB]
Get:7 http://azure.archive.ubuntu.com/ubuntu bionic/main amd64 libfontconfig1 amd64 2.12.6-0ubuntu2 [137 kB]
Get:8 http://azure.archive.ubuntu.com/ubuntu bionic/main amd64 libnspr4 amd64 2.4.18-0ubuntu1 [112 kB]
```

The terminal session continues with more package details and download links. The status bar at the bottom indicates "Página 6 de 6 131 palabras" and "Accesibilidad: es necesario investigar". The taskbar shows various icons and the system tray shows "24°C" and the date "19/10/2021".

3. Descargar la distribución binaria de Tomcat 8 de la siguiente URL (descargar la opción Core "zip"): <https://tomcat.apache.org/download-80.cgi>



4. Copiar a la máquina virtual el archivo ZIP descargado anteriormente y desempacarlo utilizando el comando unzip.

Scp archivo user@ip: ~/

The screenshot shows a Windows desktop environment. In the center is a Microsoft Edge browser window displaying a REST API documentation page. To its left is a terminal window titled "REST2018631591 - Microsoft Azure" running on "C:\Windows\system32\cmd.exe". The terminal window contains the following command-line session:

```
In[1]: C:\Users\tomon\Downloads>scp apache-tomcat-8.5.72 REST2018631591@20.80.183.108: /home  
/home: No such file or directory  
In[2]: C:\Users\tomon\Downloads>scp apache-tomcat-8.5.72 REST2018631591@20.80.183.108: /  
El sistema no puede encontrar el archivo especificado.  
In[3]: REST2018631591@20.80.183.108's password:  
C:\Users\tomon\Downloads>scp apache-tomcat-8.5.72.zip REST2018631591@20.80.183.108: /  
Acceso denegado.  
In[4]: 0 archivo(s) copiado(s).  
REST2018631591@20.80.183.108's password:  
In[5]: C:\Users\tomon\Downloads>scp apache-tomcat-8.5.72.zip REST2018631591@20.80.183.108: /  
Acceso denegado.  
In[6]: 0 archivo(s) copiado(s).  
REST2018631591@20.80.183.108's password:  
In[7]: C:\Users\tomon\Downloads>scp apache-tomcat-8.5.72.zip REST2018631591@20.80.183.108: /  
Acceso denegado.  
In[8]: REST2018631591@20.80.183.108's password:  
Permission denied, please try again.  
In[9]: REST2018631591@20.80.183.108's password:  
apache-tomcat-8.5.72.zip  
100% 11MB 546.7KB/s 00:19  
In[10]: C:\Users\tomon\Downloads>
```

The taskbar at the bottom shows various pinned icons and the system clock indicating 05:21 p.m. on 19/10/2021.

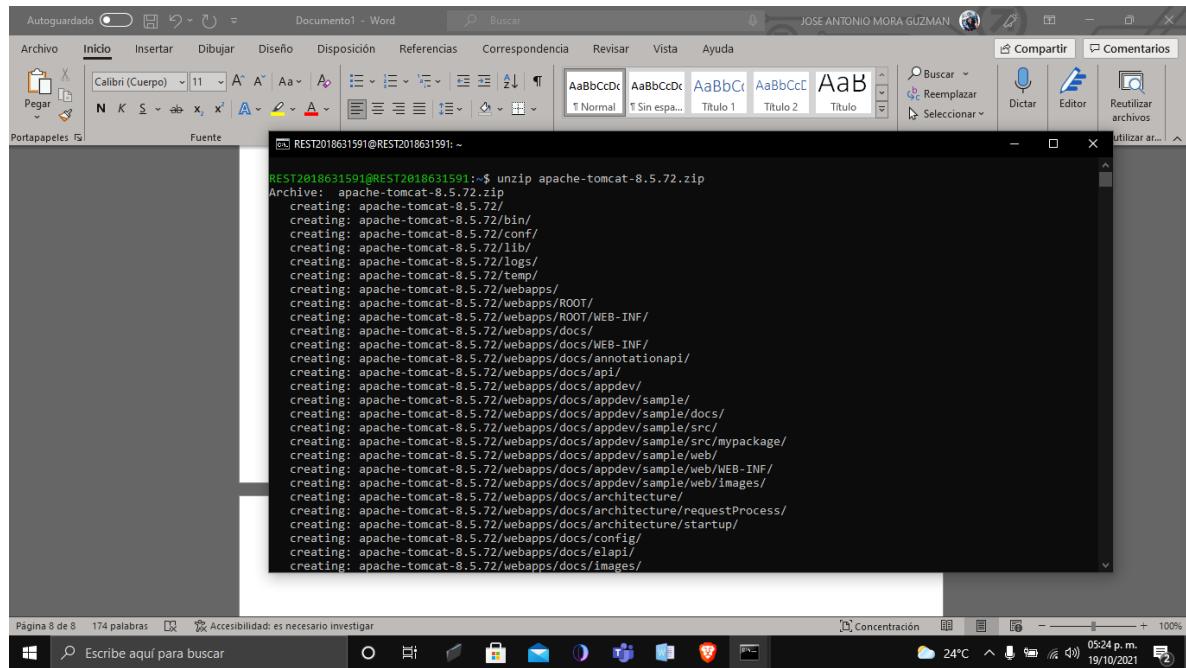
Primero instalamos el unzip

The screenshot shows a Windows desktop environment. In the center is a Microsoft Edge browser window displaying a Moodle course page titled "Apache Tomcat® - Apache". To its left is a terminal window titled "m4gm.com/moodle/course/view.php" running on "m4gm-learning: Ing.". The terminal window contains the following command-line session:

```
REST2018631591@REST2018631591:~  
sudo apt update  
Command 'unzip' not found, but can be installed with:  
sudo apt install unzip  
3. Descargar el archivo ZIP  
REST2018631591@REST2018631591:~$ sudo apt install unzip  
Reading package lists... Done  
Building dependency tree  
Reading state information... Done  
The following package was automatically installed and is no longer required:  
4. Copiar a la máquina virtual  
linux-headers-4.15.0-159  
Use 'sudo apt autoremove' to remove it.  
Suggested Packages:  
5. Eliminar el archivo ZIP  
este se debe de borrar  
The following NEW packages will be installed:  
unzip  
NOTA DE SEGUIMIENTO:  
0 upgraded, 1 newly installed, 0 to remove and 4 not upgraded.  
Need to get 168 kB of archives.  
con Tomcat  
After this operation, 567 kB of additional disk space will be used.  
Get:1 http://azure.archive.ubuntu.com/ubuntu bionic-updates/main amd64 unzip amd64 6.0-21ubuntu1.1 [168 kB]  
6. Descargar el archivo ZIP  
Fetched 168 kB in 0s (7672 kB/s)  
Selecting previously unselected package unzip.  
estilo REST  
(Reading database ... 77543 files and directories currently installed.)  
Preparing to unpack .../unzip_6.0-21ubuntu1.1_amd64.deb ...  
Unpacking unzip (6.0-21ubuntu1.1) ...  
Processing triggers for mime-support (3.60ubuntu1) ...  
7. Copiar a la máquina virtual  
Processing triggers for man-db (2.8.3-2ubuntu0.1) ...  
REST2018631591@REST2018631591:~$  
8. Borrar el archivo javax.servlet-api-3.0.1.jar del directorio "lib" de Tomcat (esto debe hacerse ya que existe una incompatibilidad entre Tomcat y Jersey).  
9. Descargar el archivo gson-2.2.1.jar de la URL:
```

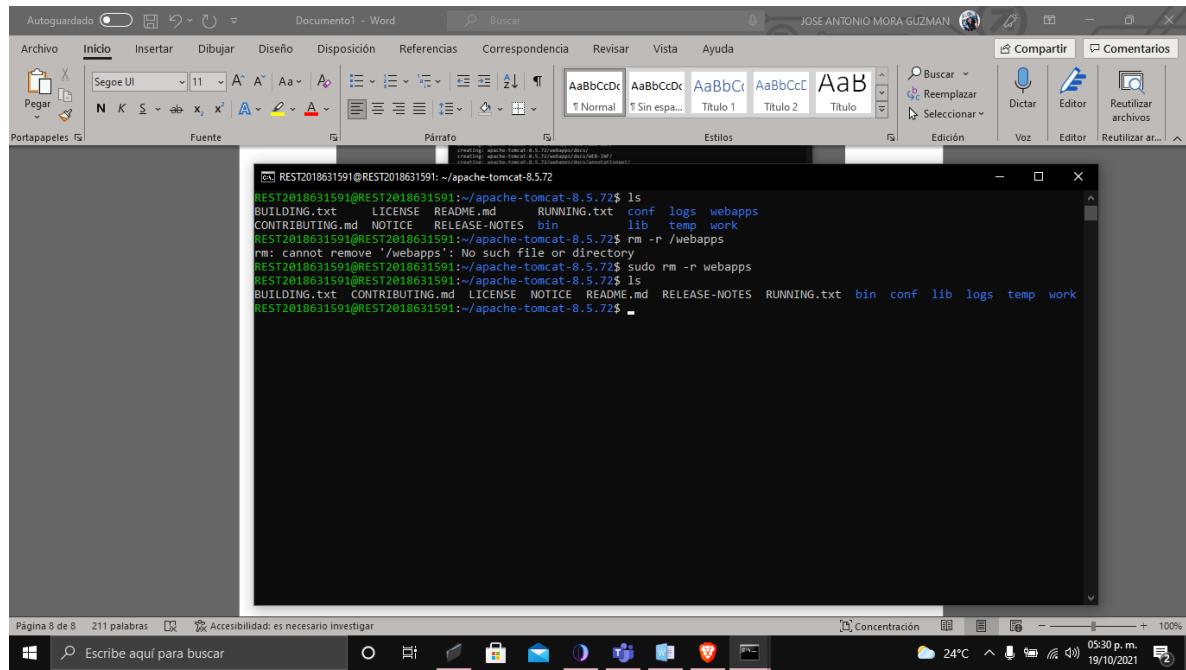
The taskbar at the bottom shows various pinned icons and the system clock indicating 05:23 p.m. on 19/10/2021.

Y despues usamos el unzip para desempaquetar el archivo

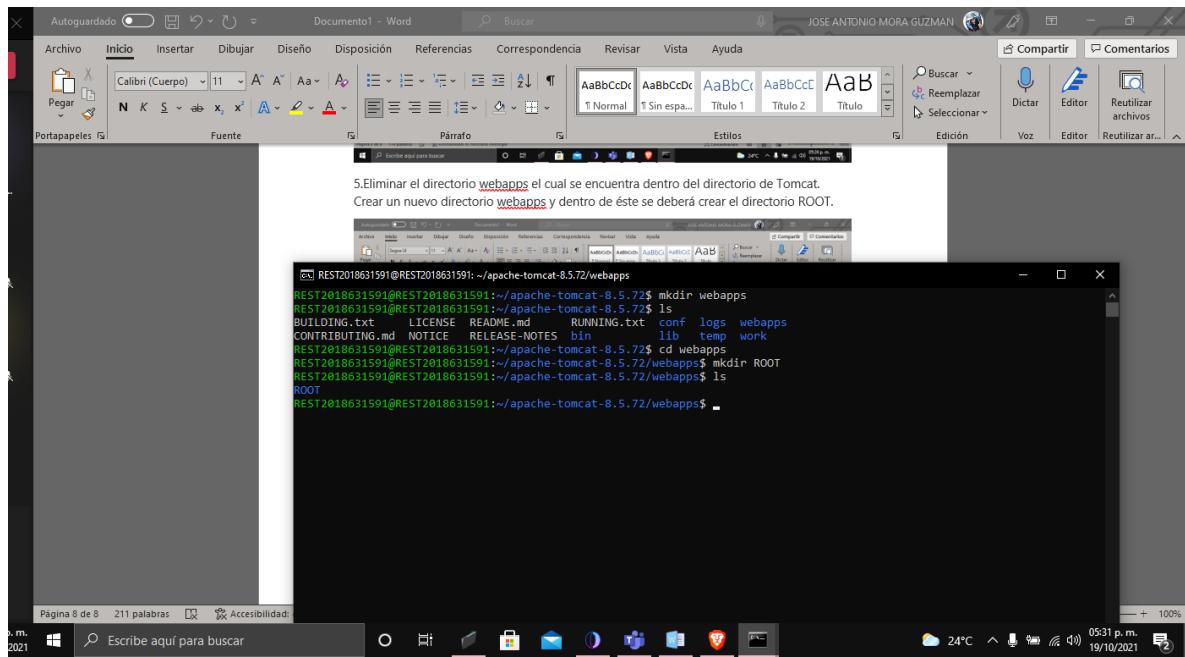


REST2018631591@REST2018631591:~\$ unzip apache-tomcat-8.5.72.zip
Archive: apache-tomcat-8.5.72.zip
creating: apache-tomcat-8.5.72/
creating: apache-tomcat-8.5.72/bin/
creating: apache-tomcat-8.5.72/conf/
creating: apache-tomcat-8.5.72/lib/
creating: apache-tomcat-8.5.72/logs/
creating: apache-tomcat-8.5.72/temp/
creating: apache-tomcat-8.5.72/webapps/
creating: apache-tomcat-8.5.72/webapps/ROOT/
creating: apache-tomcat-8.5.72/webapps/ROOT/WEB-INF/
creating: apache-tomcat-8.5.72/webapps/docs/
creating: apache-tomcat-8.5.72/webapps/docs/WEB-INF/
creating: apache-tomcat-8.5.72/webapps/docs/annotationapi/
creating: apache-tomcat-8.5.72/webapps/docs/api/
creating: apache-tomcat-8.5.72/webapps/docs/appdev/
creating: apache-tomcat-8.5.72/webapps/docs/appdev/sample/
creating: apache-tomcat-8.5.72/webapps/docs/appdev/sample/docs/
creating: apache-tomcat-8.5.72/webapps/docs/appdev/sample/src/
creating: apache-tomcat-8.5.72/webapps/docs/appdev/sample/src/mypackage/
creating: apache-tomcat-8.5.72/webapps/docs/appdev/sample/web/
creating: apache-tomcat-8.5.72/webapps/docs/appdev/sample/web/WEB-INF/
creating: apache-tomcat-8.5.72/webapps/docs/appdev/sample/web/images/
creating: apache-tomcat-8.5.72/webapps/docs/architecture/
creating: apache-tomcat-8.5.72/webapps/docs/architecture/requestProcess/
creating: apache-tomcat-8.5.72/webapps/docs/architecture/startup/
creating: apache-tomcat-8.5.72/webapps/docs/config/
creating: apache-tomcat-8.5.72/webapps/docs/elapi/
creating: apache-tomcat-8.5.72/webapps/docs/images/

5.Eliminar el directorio webapps el cual se encuentra dentro del directorio de Tomcat.
Crear un nuevo directorio webapps y dentro de éste se deberá crear el directorio ROOT.



REST2018631591@REST2018631591:~/apache-tomcat-8.5.72\$ ls
BUILDING.txt LICENSE README.md RUNNING.txt conf logs webapps
CONTRIBUTING.md NOTICE RELEASE-NOTES bin lib temp work
REST2018631591@REST2018631591:~/apache-tomcat-8.5.72\$ rm -r /webapps
rm: cannot remove '/webapps': No such file or directory
REST2018631591@REST2018631591:~/apache-tomcat-8.5.72\$ sudo rm -r webapps
REST2018631591@REST2018631591:~/apache-tomcat-8.5.72\$ ls
BUILDING.txt CONTRIBUTING.md LICENSE NOTICE README.md RELEASE-NOTES RUNNING.txt bin conf lib logs temp work
REST2018631591@REST2018631591:~/apache-tomcat-8.5.72\$



NOTA DE SEGURIDAD: Lo anterior se recomienda debido a que se han detectado vulnerabilidades en algunas aplicaciones que vienen con Tomcat, estas aplicaciones se encuentran originalmente instaladas en los directorios webapps y webapps/ROOT.

6. Descargar la biblioteca "Jersey" de la siguiente URL. Jersey es una implementación de JAX-RS lo cual permite ejecutar servicios web estilo REST sobre Tomcat:

The screenshot shows a Windows desktop environment with two terminal windows and a browser window.

Terminal Window 1 (Left):

```
C:\Users\tonom\Downloads>scp jaxrs-ri-2.24.zip REST2018631591@20.80.183.108:~/  
REST2018631591@20.80.183.108's password:  
jaxrs-ri-2.24.zip  
C:\Users\tonom\Downloads> REST2018631591@REST2018631591:~$ ls  
apache-tomcat-8.5.72 apache-tomcat-8.5.72.zip jaxrs-ri-2.24.zip  
REST2018631591@REST2018631591:~$ unzip jaxrs-ri-2.24.zip  
Archive: jaxrs-ri-2.24.zip  
  creating: jaxrs-ri/  
  inflating: jaxrs-ri/JERSEY-LICENSE.txt  
  inflating: jaxrs-ri/third-party-license-readme.txt  
  creating: jaxrs-ri/api/  
  extracting: jaxrs-ri/api/javax.ws.rs-api-2.0.1.jar  
  creating: jaxrs-ri/lib/  
  extracting: jaxrs-ri/lib/Jersey-common.jar  
  extracting: jaxrs-ri/lib/Jersey-media-jaxb.jar  
  extracting: jaxrs-ri/lib/Jersey-client.jar  
  extracting: jaxrs-ri/lib/Jersey-server.jar  
  extracting: jaxrs-ri/lib/Jersey-container-servlet-core.jar  
  extracting: jaxrs-ri/lib/Jersey-container-servlet.jar  
  creating: jaxrs-ri/ext/  
  extracting: jaxrs-ri/ext/javax.inject-2.5.0-b05.jar  
  extracting: jaxrs-ri/ext/osgi-resource-locator-1.0.1.jar  
  extracting: jaxrs-ri/ext/javax.annotation-api-1.2.jar  
  extracting: jaxrs-ri/ext/Jersey-guava-2.24.jar  
  extracting: jaxrs-ri/ext/Hk2-api-2.5.0-b05.jar  
  extracting: jaxrs-ri/ext/Hk2-utils-2.5.0-b05.jar  
  extracting: jaxrs-ri/ext/applications-repackaged-2.5.0-b05.jar  
  extracting: jaxrs-ri/ext/Hk2-locator-2.5.0-b05.jar  
  extracting: jaxrs-ri/ext/Javassist-3.20.0-GA.jar  
  extracting: jaxrs-ri/ext/validation-api-1.1.0.Final.jar  
  extracting: jaxrs-ri/ext/org.osgi.core-4.2.0.jar  
  extracting: jaxrs-ri/ext/javax.spi-2.2.7.jar  
  extracting: jaxrs-ri/ext/javax.servlet-api-3.0.1.jar
```

Terminal Window 2 (Right):

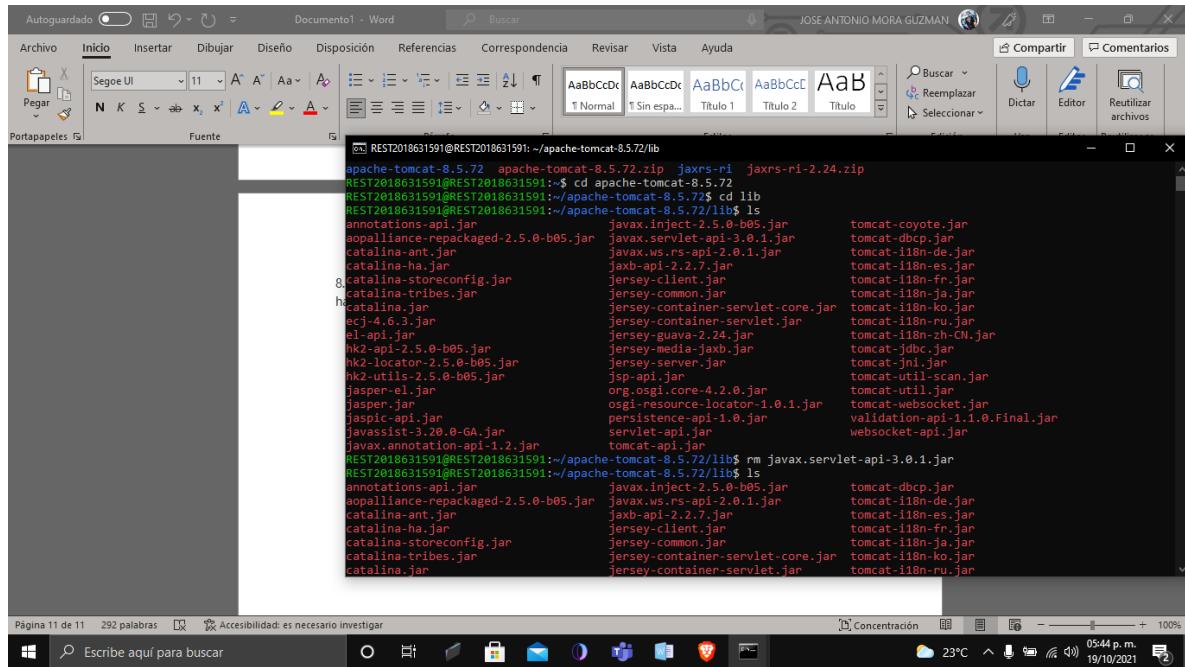
```
https://dev.mysql.com/downloads/connector/j/  
Seleccionar "Plataforma independiente" y descargar el archivo ZIP
```

Browser Window:

m4gm-learning: Ing... - m4gm - Español (Méjico) (es_mx)

The browser window shows a Moodle course page titled "m4gm-learning: Ing...". The address bar contains "m4gm.com/moodle/course/view.php". The page content includes a terminal window showing the extraction of the Jersey library files and a link to the MySQL connector download page.

8. Borrar el archivo javax.servlet-api-3.0.1.jar del directorio "lib" de Tomcat (esto debe hacerse ya que existe una incompatibilidad entre Tomcat y Jersey 2).

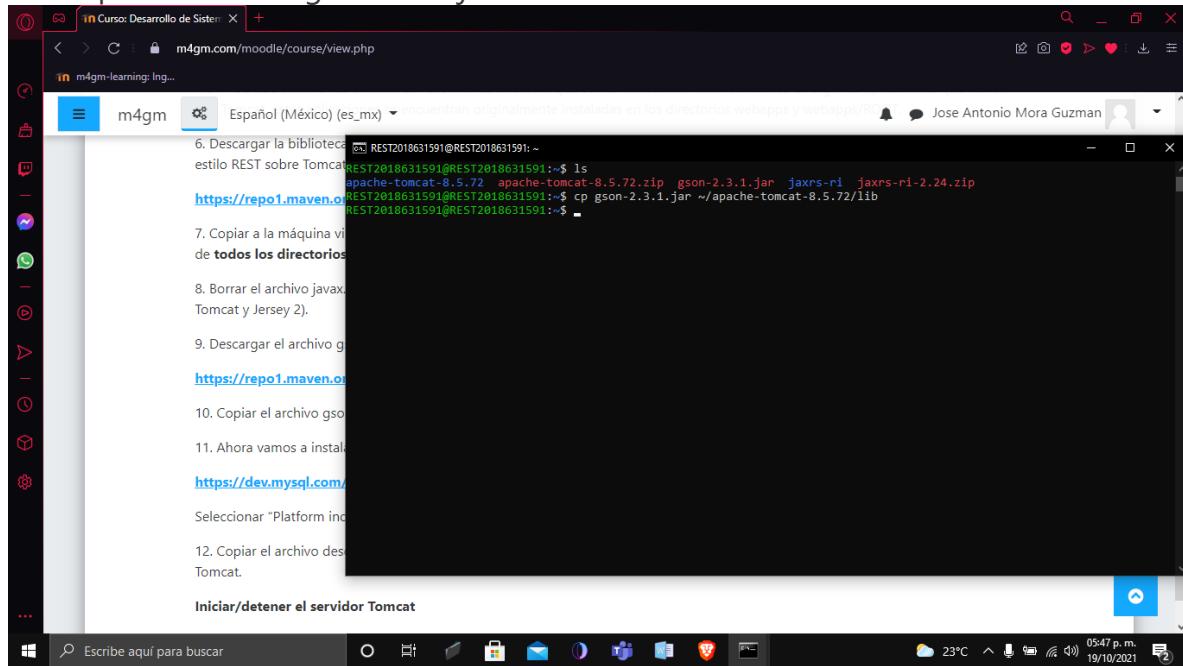


```
REST2018631591@REST2018631591: ~/apache-tomcat-8.5.72/lib$ ls
apache-tomcat-8.5.72 apache-tomcat-8.5.72.zip jaxrs-ri jaxrs-ri-2.24.zip
REST2018631591@REST2018631591:~/apache-tomcat-8.5.72$ cd lib
REST2018631591@REST2018631591:~/apache-tomcat-8.5.72/lib$ ls
annotations-api.jar javax.inject-2.5.0-b05.jar tomcat-coyote.jar
aopalliance-repackaged-2.5.0-b05.jar javax.servlet-api-3.0.1.jar tomcat-dbcp.jar
catalina-ant.jar javax.ws.rs-api-2.0.1.jar tomcat-18n-de.jar
catalina-ha.jar jaxb-api-2.2.7.jar tomcat-18n-es.jar
catalina-storeconfig.jar jersey-client.jar tomcat-18n-fr.jar
catalina-tribes.jar jersey-common.jar tomcat-18n-ja.jar
catalina.jar jersey-container-servlet.jar tomcat-18n-ko.jar
ecj-4.6.3.jar jersey-guava-2.24.jar tomcat-18n-zh-CN.jar
el-api.jar jersey-media-jaxb.jar tomcat-jdbc.jar
hk2-api-2.5.0-b05.jar jersey-server.jar tomcat-jni.jar
hk2-locator-2.5.0-b05.jar jsp-api.jar tomcat-util-scan.jar
hk2-utils-2.5.0-b05.jar jasper-el.jar tomcat-util.jar
jasper-el.jar osgi.osgi.core-4.2.0.jar tomcat-websocket.jar
jasper.jar osgi-resource-locator-1.0.1.jar validation-api-1.1.0.Final.jar
jaspic-api.jar persistence-api-1.0.jar
javassist-3.20.0-GA.jar servlet-api.jar websocket-api.jar
javassist.annotation-api-1.2.jar tomcat-api.jar
REST2018631591@REST2018631591:~/apache-tomcat-8.5.72/lib$ rm javax.servlet-api-3.0.1.jar
REST2018631591@REST2018631591:~/apache-tomcat-8.5.72/lib$ ls
annotations-api.jar javax.inject-2.5.0-b05.jar tomcat-dbcp.jar
aopalliance-repackaged-2.5.0-b05.jar javax.ws.rs-api-2.0.1.jar tomcat-18n-de.jar
catalina-ant.jar jaxb-api-2.2.7.jar tomcat-18n-es.jar
catalina-ha.jar jersey-client.jar tomcat-18n-fr.jar
catalina-storeconfig.jar jersey-common.jar tomcat-18n-ja.jar
catalina-tribes.jar jersey-container-servlet.jar tomcat-18n-ko.jar
catalina.jar jersey-container-servlet.jar tomcat-18n-ru.jar
```

9. Descargar el archivo gson-2.3.1.jar de la URL:

<https://repo1.maven.org/maven2/com/google/code/gson/gson/2.3.1/gson-2.3.1.jar>

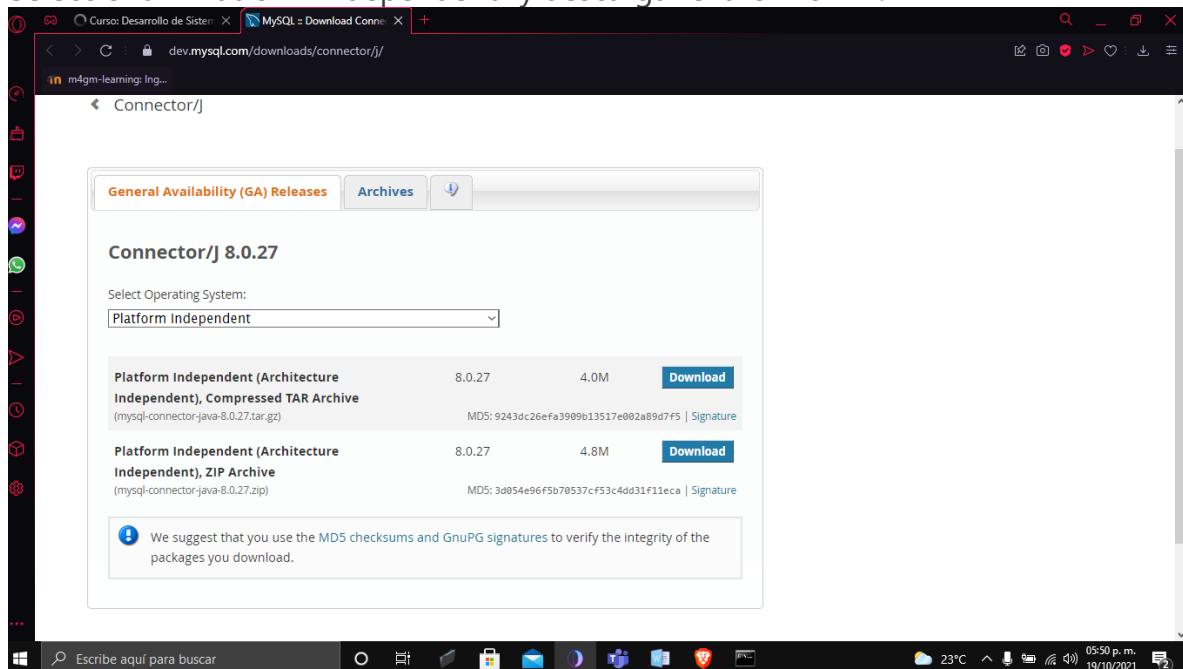
10. Copiar el archivo gson-2.3.1.jar al directorio "lib" de Tomcat.



11. Ahora vamos a instalar el driver de JDBC para MySQL. Ingresar a la siguiente URL:

<https://dev.mysql.com/downloads/connector/j/>

Seleccionar "Platform independent" y descargar el archivo ZIP.



12. Copiar el archivo descargado a la máquina virtual, desempacarlo y copiar el archivo mysql-connector.jar al directorio "lib" de Tomcat.

```
C:\Users\tonom\Downloads>scp jaxrs-ri-2.24.zip REST2018631591@20.80.183.108:~
REST2018631591@20.80.183.108's password: jaxrs-ri-2.24.zip
100% 4821KB 472.3KB/s 00:10

C:\Users\tonom\Downloads>scp gson-2.3.1.jar REST2018631591@20.80.183.108:~
REST2018631591@20.80.183.108's password: gson-2.3.1.jar
100% 203KB 203.0KB/s 00:00

C:\Users\tonom\Downloads>scp mysql-connector-apache-tomcat-8.5.72 gson-2.3.1.jar jaxrs-ri-2.24.zip
REST2018631591@20.80.183.108's password: apache-tomcat-8.5.72.zip jaxrs-ri mysql-connector-java-8.0.27.zip
mysql-connector-java-8.0.27.zip
REST2018631591@REST2018631591:~$ unzip mysql-connector-java-8.0.27
Archive: mysql-connector-java-8.0.27.zip
creating: mysql-connector-java-8.0.27/
creating: mysql-connector-java-8.0.27/src/
creating: mysql-connector-java-8.0.27/src/build/
creating: mysql-connector-java-8.0.27/src/build/java/
creating: mysql-connector-java-8.0.27/src/build/java/documentation/
creating: mysql-connector-java-8.0.27/src/build/java/instrumentation/
creating: mysql-connector-java-8.0.27/src/build/misc/
creating: mysql-connector-java-8.0.27/src/build/misc/debian.in/
creating: mysql-connector-java-8.0.27/src/build/misc/debian.in/source/
creating: mysql-connector-java-8.0.27/src/demo/
creating: mysql-connector-java-8.0.27/src/demo/java/
creating: mysql-connector-java-8.0.27/src/demo/java/demo/
creating: mysql-connector-java-8.0.27/src/demo/java/demo/x/
creating: mysql-connector-java-8.0.27/src/demo/java/demo/x/devapi/
creating: mysql-connector-java-8.0.27/src/generated/
creating: mysql-connector-java-8.0.27/src/generated/java/
creating: mysql-connector-java-8.0.27/src/generated/java/com/
creating: mysql-connector-java-8.0.27/src/generated/java/com/mysql/
creating: mysql-connector-java-8.0.27/src/generated/java/com/mysql/cj/
creating: mysql-connector-java-8.0.27/src/generated/java/com/mysql/cj/x/
creating: mysql-connector-java-8.0.27/src/generated/java/com/mysql/cj/x/protobuf/
creating: mysql-connector-java-8.0.27/src/legacy/
creating: mysql-connector-java-8.0.27/src/legacy/java/com/
creating: mysql-connector-java-8.0.27/src/legacy/java/com/mysql/
creating: mysql-connector-java-8.0.27/src/legacy/java/com/mysql/jdbc/
1. Para iniciar el servidor
export CATALINA_HOME=~/tomcat
2. Iniciar la ejecución de tomcat con el siguiente comando
sh $CATALINA_HOME/bin/catalina.sh start
```

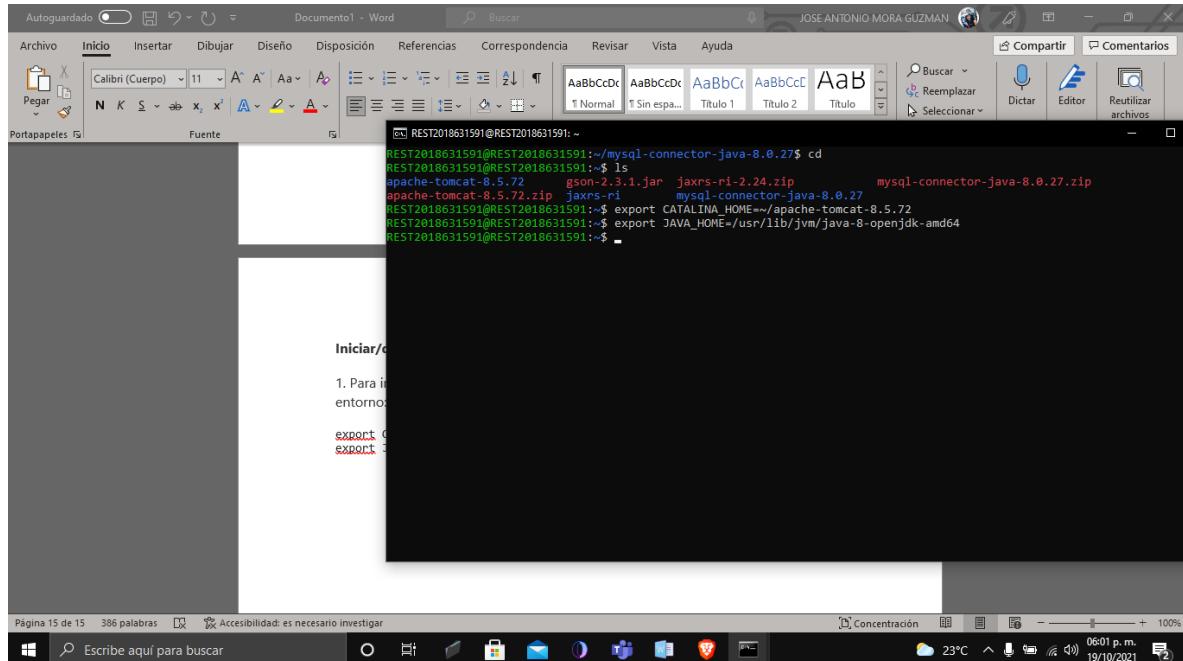
Autoguardado Documento1 - Word

```
REST2018631591@REST2018631591:~/mysql-connector-java-8.0.27
REST2018631591@REST2018631591:~$ ls
apache-tomcat-8.5.72 gson-2.3.1.jar jaxrs-ri-2.24.zip mysql-connector-java-8.0.27.zip
apache-tomcat-8.5.72.zip jaxrs-ri mysql-connector-java-8.0.27
REST2018631591@REST2018631591:~$ cd mysql-connector-java-8.0.27
REST2018631591@REST2018631591:~/mysql-connector-java-8.0.27$ ls
CHANGES INFO_BIN INFO_SRC LICENSE README build.xml mysql-connector-java-8.0.27.jar src
REST2018631591@REST2018631591:~/mysql-connector-java-8.0.27$ cp mysql-connector-java-8.0.27.jar ~/apache-tomcat-8.5.72/lib
REST2018631591@REST2018631591:~/mysql-connector-java-8.0.27$
```

Iniciar/detener el servidor Tomcat

1. Para iniciar el servidor Tomcat es **necesario** definir las siguientes variables de entorno:

```
export CATALINA_HOME=aquí va la ruta del directorio de Tomcat 8
export JAVA_HOME=/usr/lib/jvm/java-8-openjdk-amd64
```



The screenshot shows a Microsoft Word document window titled "Documento1 - Word". Inside the document, there is a terminal window with the following command history:

```
REST2018631591@REST2018631591:~/mysql-connector-java-8.0.27$ cd
REST2018631591@REST2018631591:~$ ls
apache-tomcat-8.5.72      gson-2.3.1.jar  jaxrs-ri-2.24.zip      mysql-connector-java-8.0.27.zip
apache-tomcat-8.5.72.zip   taxrs-ri        mysql-connector-java-8.0.27
REST2018631591@REST2018631591:~$ export CATALINA_HOME=/home/REST2018631591/apache-tomcat-8.5.72
REST2018631591@REST2018631591:~$ export JAVA_HOME=/usr/lib/jvm/java-8-openjdk-amd64
REST2018631591@REST2018631591:~$
```

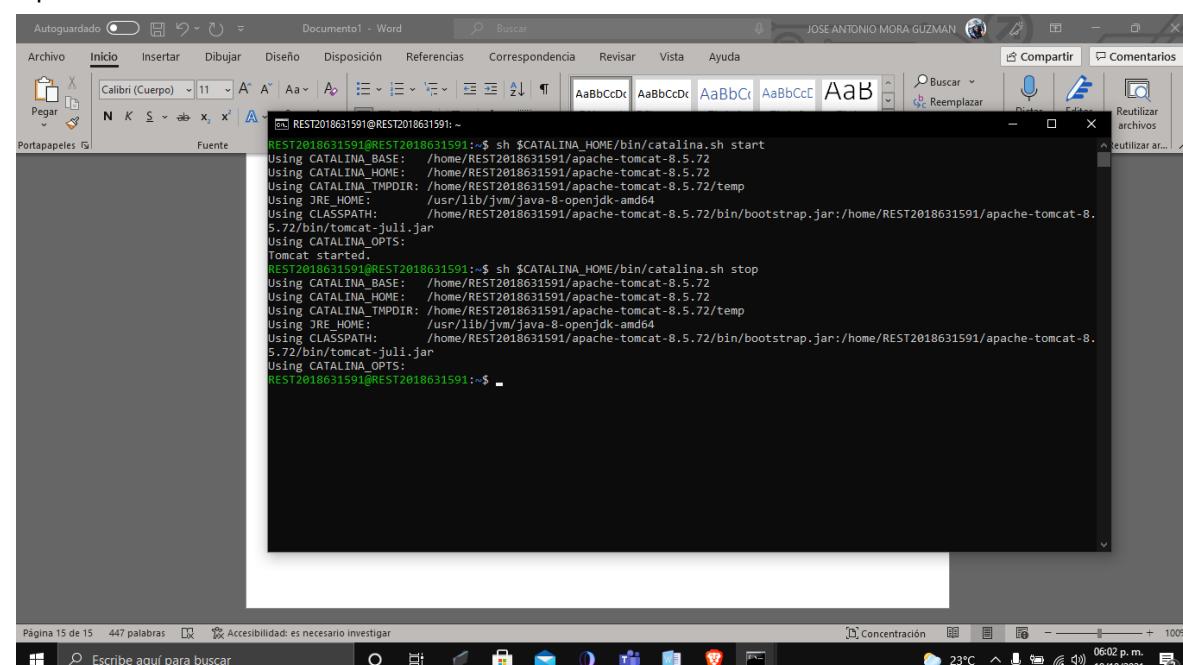
2. Iniciar la ejecución de Tomcat ejecutando el siguiente comando:

```
sh $CATALINA_HOME/bin/catalina.sh start
```

3. Para detener la ejecución de Tomcat se deberá ejecutar el siguiente comando:

```
sh $CATALINA_HOME/bin/catalina.sh stop
```

Notar que Tomcat se ejecuta sin permisos de administrador (no se usa "sudo"), lo cual es muy importante para prevenir que algún atacante pueda entrar a nuestro sistema con permisos de super-usuario.



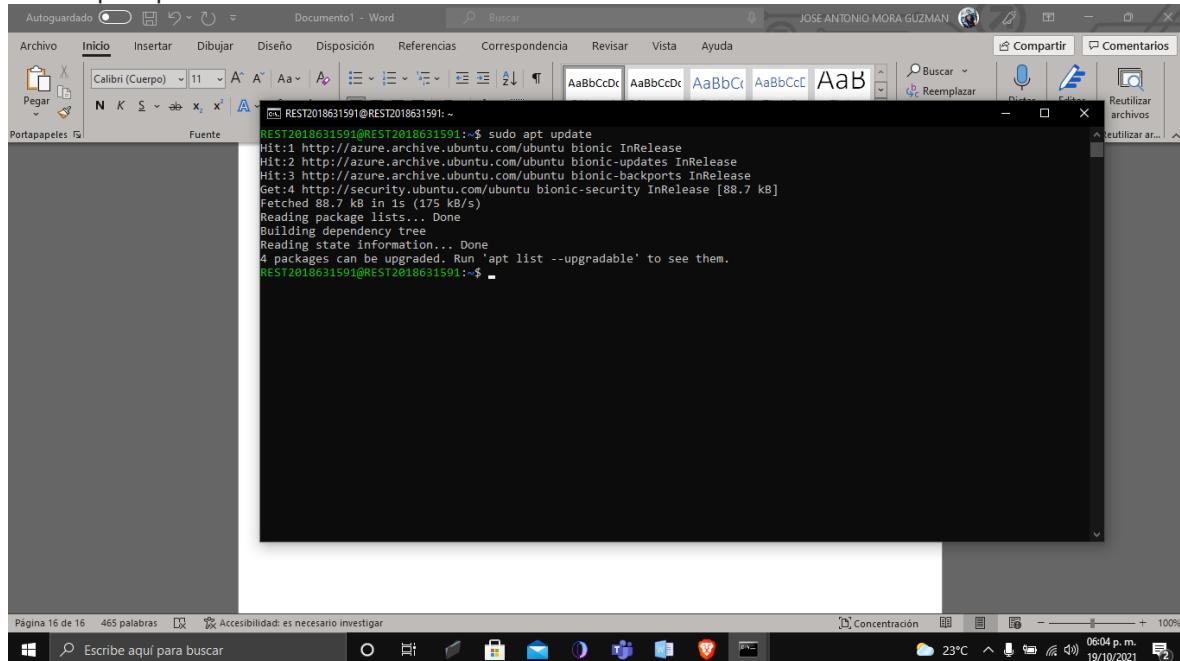
The screenshot shows a Microsoft Word document window titled "Documento1 - Word". Inside the document, there is a terminal window with the following command history:

```
REST2018631591@REST2018631591:~$ sh $CATALINA_HOME/bin/catalina.sh start
Using CATALINA_BASE: /home/REST2018631591/apache-tomcat-8.5.72
Using CATALINA_HOME: /home/REST2018631591/apache-tomcat-8.5.72
Using CATALINA_TMPDIR: /home/REST2018631591/apache-tomcat-8.5.72/temp
Using JRE_HOME: /usr/lib/jvm/java-8-openjdk-amd64
Using CLASSPATH: /home/REST2018631591/apache-tomcat-8.5.72/bin/bootstrap.jar:/home/REST2018631591/apache-tomcat-8.5.72/bin/tomcat-juli.jar
Using CATALINA_OPTS:
Tomcat started.
REST2018631591@REST2018631591:~$ sh $CATALINA_HOME/bin/catalina.sh stop
Using CATALINA_BASE: /home/REST2018631591/apache-tomcat-8.5.72
Using CATALINA_HOME: /home/REST2018631591/apache-tomcat-8.5.72
Using CATALINA_TMPDIR: /home/REST2018631591/apache-tomcat-8.5.72/temp
Using JRE_HOME: /usr/lib/jvm/java-8-openjdk-amd64
Using CLASSPATH: /home/REST2018631591/apache-tomcat-8.5.72/bin/bootstrap.jar:/home/REST2018631591/apache-tomcat-8.5.72/bin/tomcat-juli.jar
Using CATALINA_OPTS:
REST2018631591@REST2018631591:~$
```

Instalación de MySQL

1. Actualizar los paquetes en la máquina virtual ejecutando el siguiente comando:

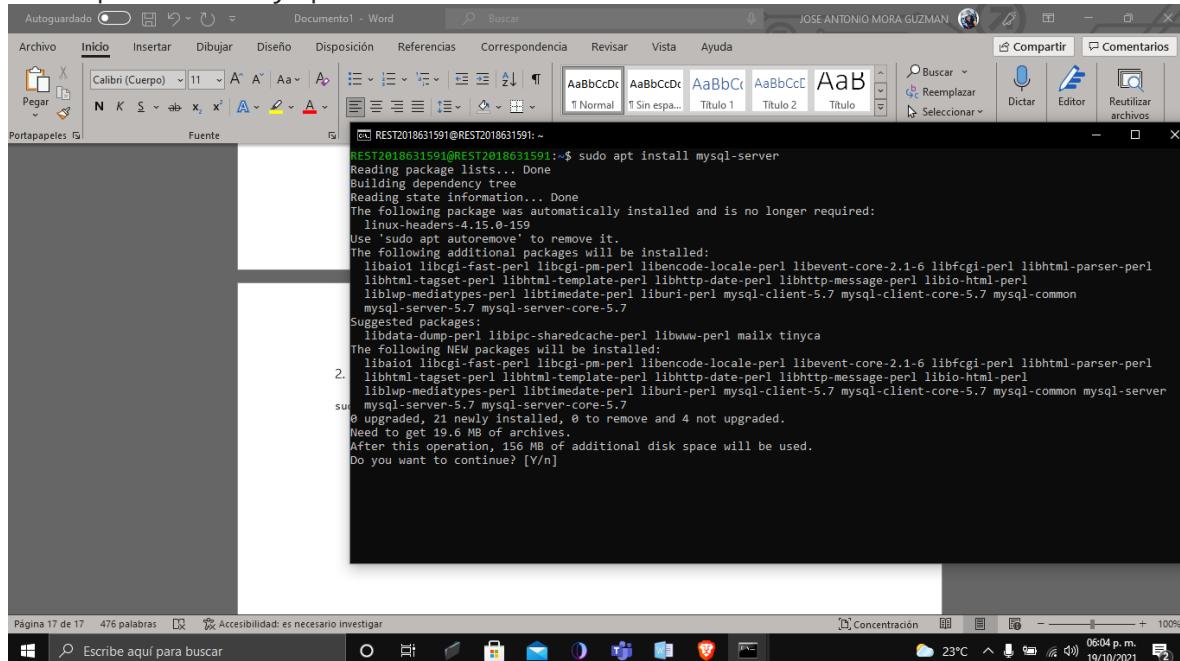
```
sudo apt update
```



A screenshot of a Microsoft Word document window. The title bar says "Documento1 - Word". The content area shows a terminal session with the following text:
REST2018631591@REST2018631591:~\$ sudo apt update
Hit:1 http://azure.archive.ubuntu.com/ubuntu bionic InRelease
Hit:2 http://azure.archive.ubuntu.com/ubuntu bionic-updates InRelease
Hit:3 http://azure.archive.ubuntu.com/ubuntu bionic-backports InRelease
Get:4 http://security.ubuntu.com/ubuntu bionic-security InRelease [88.7 kB]
Fetched 88.7 kB in 1.75 kB/s (Done)
Reading package lists... Done
Building dependency tree
Reading state information... Done
4 packages can be upgraded. Run 'apt list --upgradable' to see them.
REST2018631591@REST2018631591:~\$

2. Instalar el paquete default de MySQL:

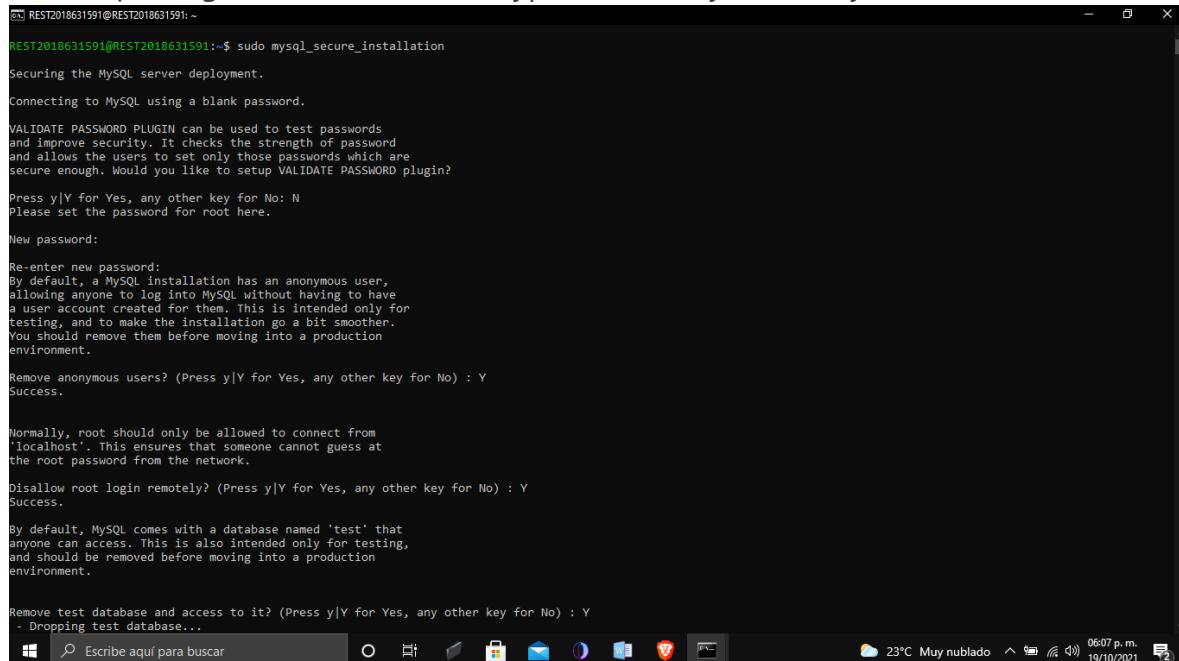
```
sudo apt install mysql-server
```



A screenshot of a Microsoft Word document window. The title bar says "Documento1 - Word". The content area shows a terminal session with the following text:
REST2018631591@REST2018631591:~\$ sudo apt install mysql-server
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following package was automatically installed and is no longer required:
linux-headers-4.15.0-159
Use 'sudo apt autoremove' to remove it.
The following additional packages will be installed:
libaio1 libcgifast-perl libcgipm-perl libencode-locale-perl libevent-core-2.1.6 libfcgi-perl libhtml-parser-perl
libhtml-tagset-perl libhtml-template-perl libhttp-date-perl libhttp-message-perl libio-html-perl
liblwp-mediatypes-perl libtimedate-perl liburi-perl mysql-client-5.7 mysql-client-core-5.7 mysql-common
mysql-server-5.7 mysql-server-core-5.7
Suggested packages:
libdata-dump-perl libipc-sharedcache-perl libwww-perl mailx tinyca
The following NEW packages will be installed:
libaio1 libcgifast-perl libcgipm-perl libencode-locale-perl libevent-core-2.1.6 libfcgi-perl libhtml-parser-perl
libhtml-tagset-perl libhtml-template-perl libhttp-date-perl libhttp-message-perl libio-html-perl
liblwp-mediatypes-perl libtimedate-perl liburi-perl mysql-client-5.7 mysql-client-core-5.7 mysql-common mysql-server
mysql-server-5.7 mysql-server-core-5.7
0 upgraded, 21 newly installed, 0 to remove and 4 not upgraded.
Need to get 19.6 MB of archives.
After this operation, 156 MB of additional disk space will be used.
Do you want to continue? [Y/n]

3. Ejecutar el script de seguridad:

```
sudo mysql_secure_installation
Press y|Y for Yes, any other key for No: N
New password: contraseña-de-root-en-mysql
Re-enter new password: contraseña-de-root-en-mysql
Remove anonymous users? (Press y|Y for Yes, any other key for No) : Y
Disallow root login remotely? (Press y|Y for Yes, any other key for No) : Y
Remove test database and access to it? (Press y|Y for Yes, any other key for No) : Y
Reload privilege tables now? (Press y|Y for Yes, any other key for No) : Y
```



```
REST2018631591@REST2018631591:~$ sudo mysql_secure_installation
Securing the MySQL server deployment.

Connecting to MySQL using a blank password.

VALIDATE PASSWORD PLUGIN can be used to test passwords
and improve security. It checks the strength of password
and allows the users to set only those passwords which are
secure enough. Would you like to setup VALIDATE PASSWORD plugin?

Press y|Y for Yes, any other key for No: N
Please set the password for root here.

New password:
Re-enter new password:
By default, a MySQL installation has an anonymous user,
allowing anyone to log into MySQL without having to have
a user account created for them. This is intended only for
testing, and to make the installation go a bit smoother.
You should remove them before moving into a production
environment.

Remove anonymous users? (Press y|Y for Yes, any other key for No) : Y
Success.

Normally, root should only be allowed to connect from
'localhost'. This ensures that someone cannot guess at
the root password from the network.

Disallow root login remotely? (Press y|Y for Yes, any other key for No) : Y
Success.

By default, MySQL comes with a database named 'test' that
anyone can access. This is also intended only for testing,
and should be removed before moving into a production
environment.

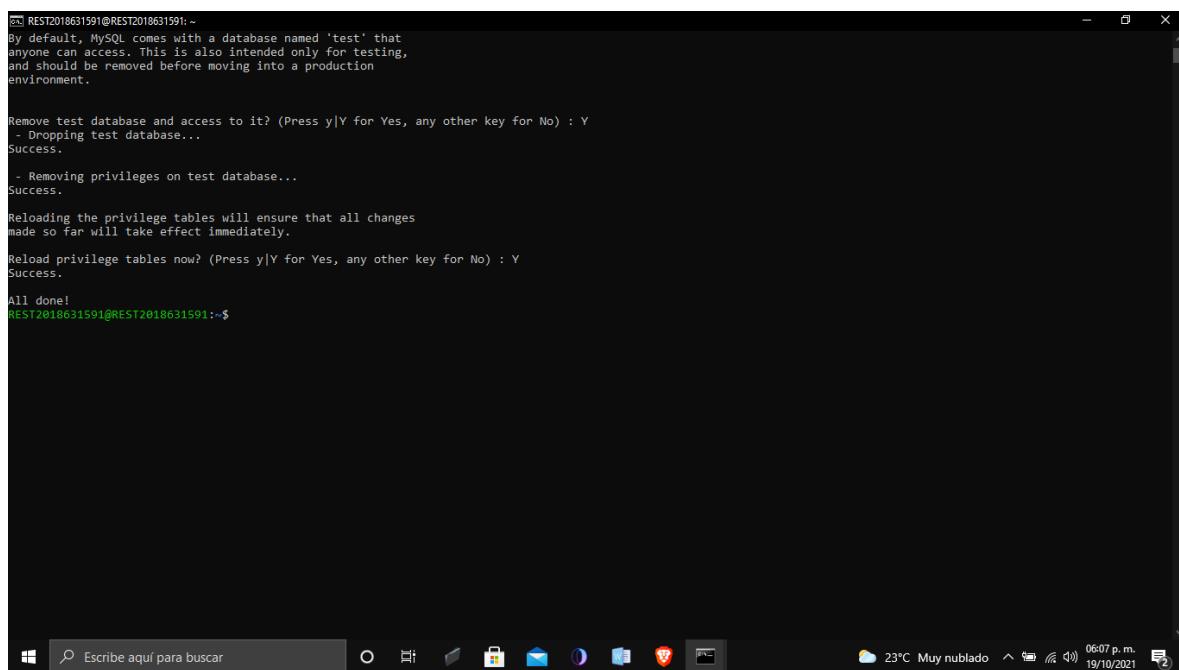
Remove test database and access to it? (Press y|Y for Yes, any other key for No) : Y
- Dropping test database...
Success.

- Removing privileges on test database...
Success.

Reloading the privilege tables will ensure that all changes
made so far will take effect immediately.

Reload privilege tables now? (Press y|Y for Yes, any other key for No) : Y
Success.

All done!
REST2018631591@REST2018631591:~$
```



```
REST2018631591@REST2018631591:~$ By default, MySQL comes with a database named 'test' that
anyone can access. This is also intended only for testing,
and should be removed before moving into a production
environment.

Remove test database and access to it? (Press y|Y for Yes, any other key for No) : Y
- Dropping test database...
Success.

- Removing privileges on test database...
Success.

Reloading the privilege tables will ensure that all changes
made so far will take effect immediately.

Reload privilege tables now? (Press y|Y for Yes, any other key for No) : Y
Success.

All done!
REST2018631591@REST2018631591:~$
```

4. Ejecutar el monitor de MySQL:

```
sudo mysql
```

The screenshot shows a Microsoft Word document window. In the center is a terminal window titled 'REST2018631591@REST2018631591:~'. The terminal displays the following MySQL startup message:

```
REST2018631591@REST2018631591:~$ sudo mysql
Welcome to the MySQL monitor. Commands end with ; or \g.
Your MySQL connection id is 4
Server version: 5.7.35-0ubuntu0.18.04.2 (Ubuntu)

Copyright (c) 2000, 2021, Oracle and/or its affiliates.

Oracle is a registered trademark of Oracle Corporation and/or its
affiliates. Other names may be trademarks of their respective
owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql>
```

The Word document interface is visible around the terminal window, including the ribbon menu and status bar at the bottom.

5. Ejecutar el siguiente comando SQL para modificar la contraseña de root:

```
ALTER USER 'root'@'localhost' IDENTIFIED WITH mysql_native_password BY
'contraseña-de-root-en-mysql';
```

The screenshot shows a Microsoft Word document window. In the center is a terminal window titled 'REST2018631591@REST2018631591:~'. The terminal displays the MySQL startup message followed by the execution of an ALTER USER command:

```
REST2018631591@REST2018631591:~$ sudo mysql
Welcome to the MySQL monitor. Commands end with ; or \g.
Your MySQL connection id is 4
Server version: 5.7.35-0ubuntu0.18.04.2 (Ubuntu)

Copyright (c) 2000, 2021, Oracle and/or its affiliates.

Oracle is a registered trademark of Oracle Corporation and/or its
affiliates. Other names may be trademarks of their respective
owners.

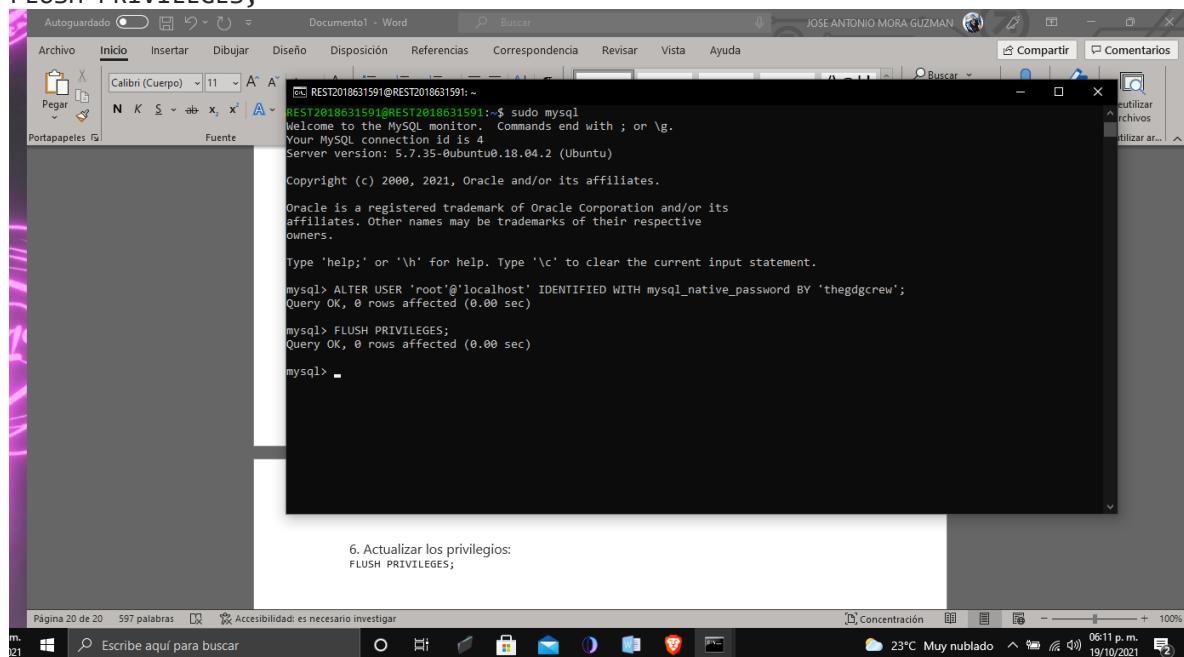
Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql> ALTER USER 'root'@'localhost' IDENTIFIED WITH mysql_native_password BY 'thegdgcrew';
Query OK, 0 rows affected (0.00 sec)

mysql>
```

The Word document interface is visible around the terminal window, including the ribbon menu and status bar at the bottom.

6. Actualizar los privilegios: FLUSH PRIVILEGES;



```
REST2018631591@REST2018631591:~$ sudo mysql
Welcome to the MySQL monitor. Commands end with ; or \g.
Your MySQL connection id is 4
Server version: 5.7.35-0ubuntu0.18.04.2 (Ubuntu)

Copyright (c) 2000, 2021, Oracle and/or its affiliates.

Oracle is a registered trademark of Oracle Corporation and/or its
affiliates. Other names may be trademarks of their respective
owners.

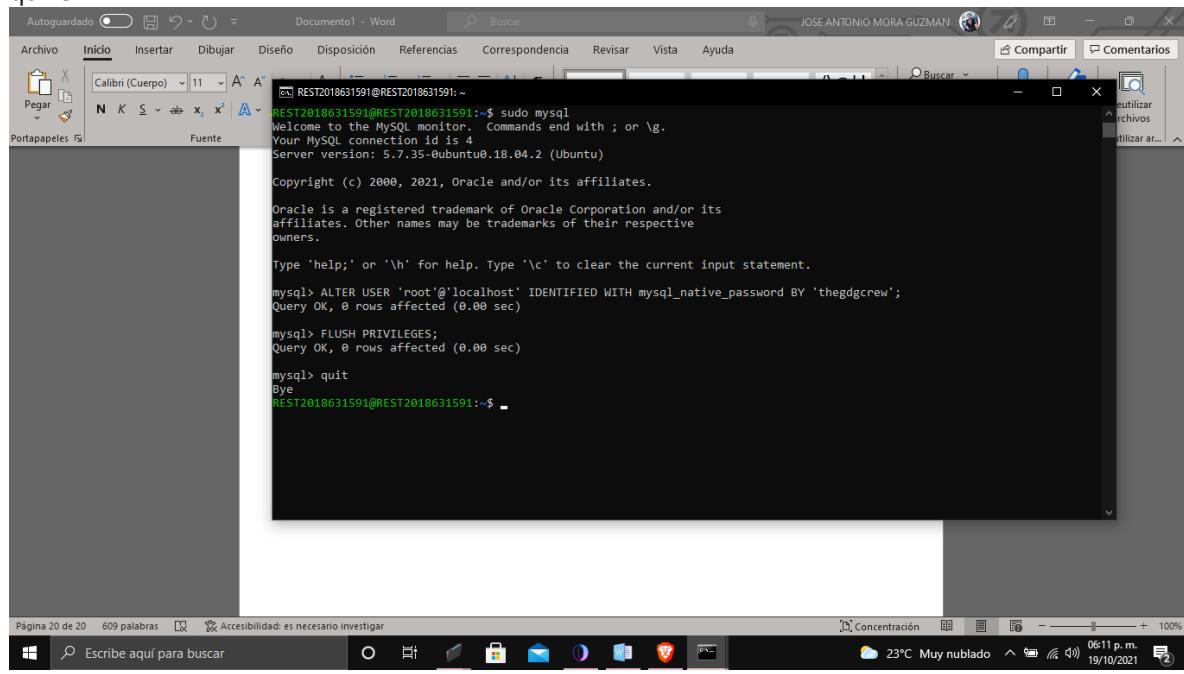
Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql> ALTER USER 'root'@'localhost' IDENTIFIED WITH mysql_native_password BY 'thegdgcrew';
Query OK, 0 rows affected (0.00 sec)

mysql> FLUSH PRIVILEGES;
Query OK, 0 rows affected (0.00 sec)

mysql>
```

7. Ejecutar el siguiente comando para salir del monitor de MySQL: quit



```
REST2018631591@REST2018631591:~$ sudo mysql
Welcome to the MySQL monitor. Commands end with ; or \g.
Your MySQL connection id is 4
Server version: 5.7.35-0ubuntu0.18.04.2 (Ubuntu)

Copyright (c) 2000, 2021, Oracle and/or its affiliates.

Oracle is a registered trademark of Oracle Corporation and/or its
affiliates. Other names may be trademarks of their respective
owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql> ALTER USER 'root'@'localhost' IDENTIFIED WITH mysql_native_password BY 'thegdgcrew';
Query OK, 0 rows affected (0.00 sec)

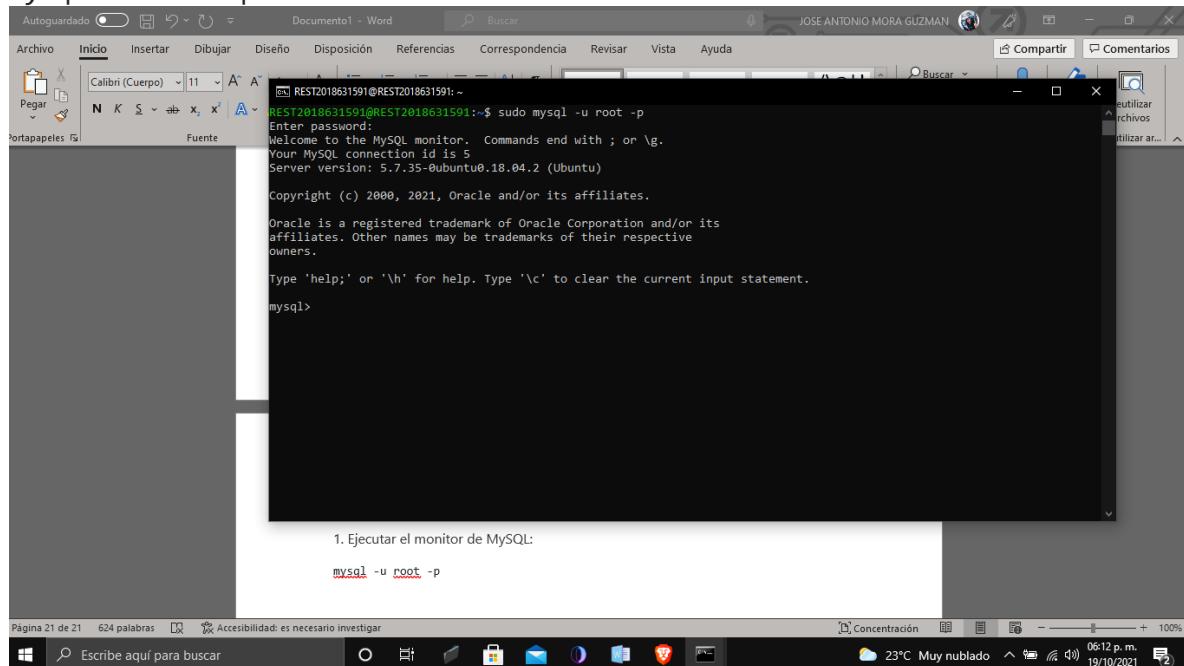
mysql> FLUSH PRIVILEGES;
Query OK, 0 rows affected (0.00 sec)

mysql> quit
Bye
REST2018631591@REST2018631591:~$
```

Crear un usuario en MySQL

1. Ejecutar el monitor de MySQL:

```
mysql -u root -p
```



A screenshot of a Microsoft Word document titled "Documento1 - Word". The content of the document is a terminal session for MySQL. The terminal shows the command `sudo mysql -u root -p` being run, followed by the MySQL prompt `mysql>`. The terminal window has a dark background and white text. The Microsoft Word interface is visible around the terminal window.

```
REST2018631591@REST2018631591:~$ sudo mysql -u root -p
Enter password:
Welcome to the MySQL monitor. Commands end with ; or \g.
Your MySQL connection id is 5
Server version: 5.7.35-0ubuntu0.18.04.2 (Ubuntu)

Copyright (c) 2000, 2021, Oracle and/or its affiliates.

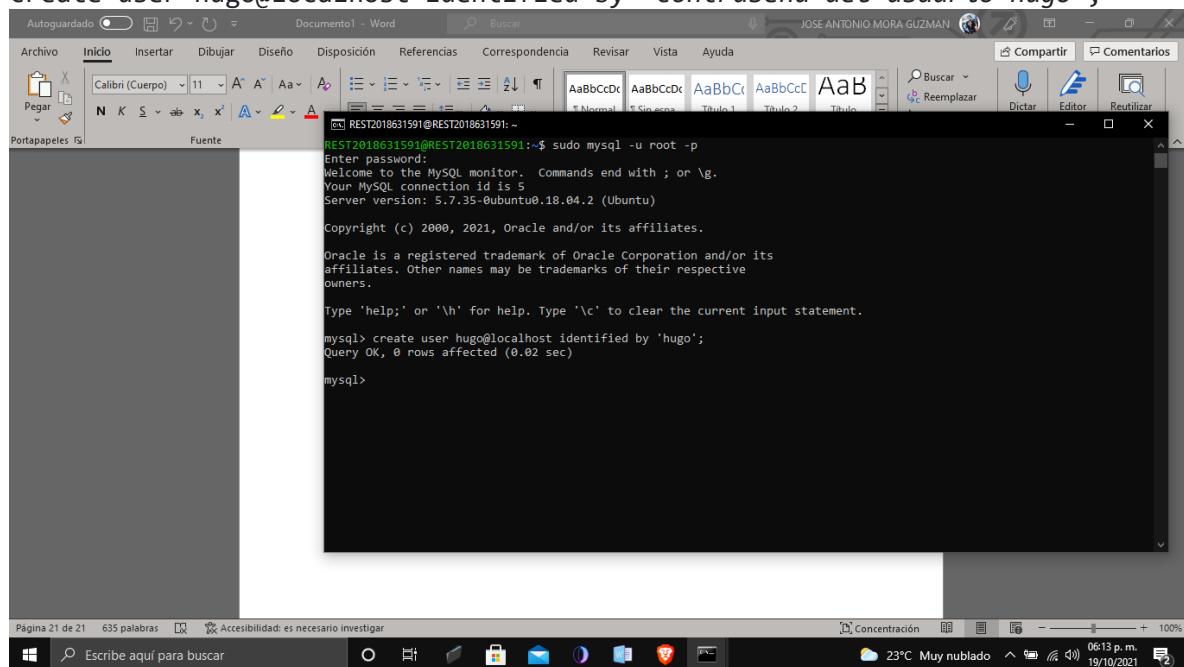
Oracle is a registered trademark of Oracle Corporation and/or its
affiliates. Other names may be trademarks of their respective
owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql>
```

2. Crea el usuario "hugo":

```
create user hugo@localhost identified by 'contraseña-del-usuario-hugo';
```



A screenshot of a Microsoft Word document titled "Documento1 - Word". The content of the document is a terminal session for MySQL. The terminal shows the command `create user hugo@localhost identified by 'hugo';` being run, followed by the message `Query OK, 0 rows affected (0.02 sec)` and the MySQL prompt `mysql>`. The terminal window has a dark background and white text. The Microsoft Word interface is visible around the terminal window.

```
REST2018631591@REST2018631591:~$ sudo mysql -u root -p
Enter password:
Welcome to the MySQL monitor. Commands end with ; or \g.
Your MySQL connection id is 5
Server version: 5.7.35-0ubuntu0.18.04.2 (Ubuntu)

Copyright (c) 2000, 2021, Oracle and/or its affiliates.

Oracle is a registered trademark of Oracle Corporation and/or its
affiliates. Other names may be trademarks of their respective
owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql> create user hugo@localhost identified by 'hugo';
Query OK, 0 rows affected (0.02 sec)

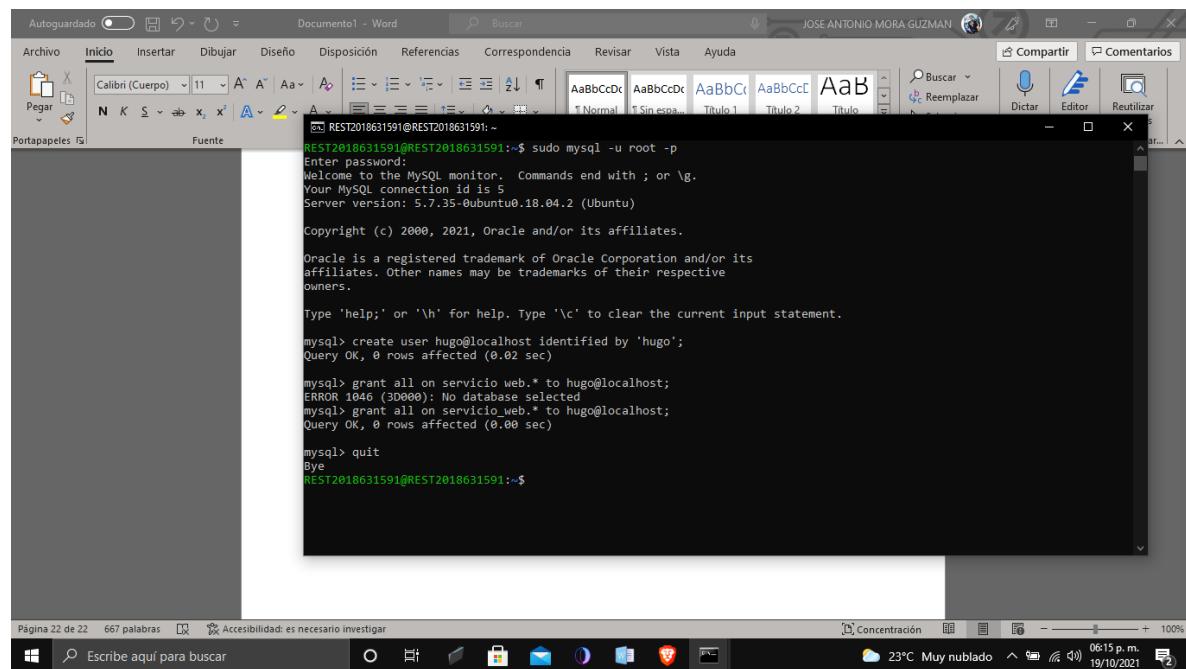
mysql>
```

3. Otorgar todos los permisos al usuario "hugo" sobre la base de datos "servicio_web":

```
grant all on servicio_web.* to hugo@localhost;
```

4. Ejecutar el siguiente comando para salir del monitor de MySQL:

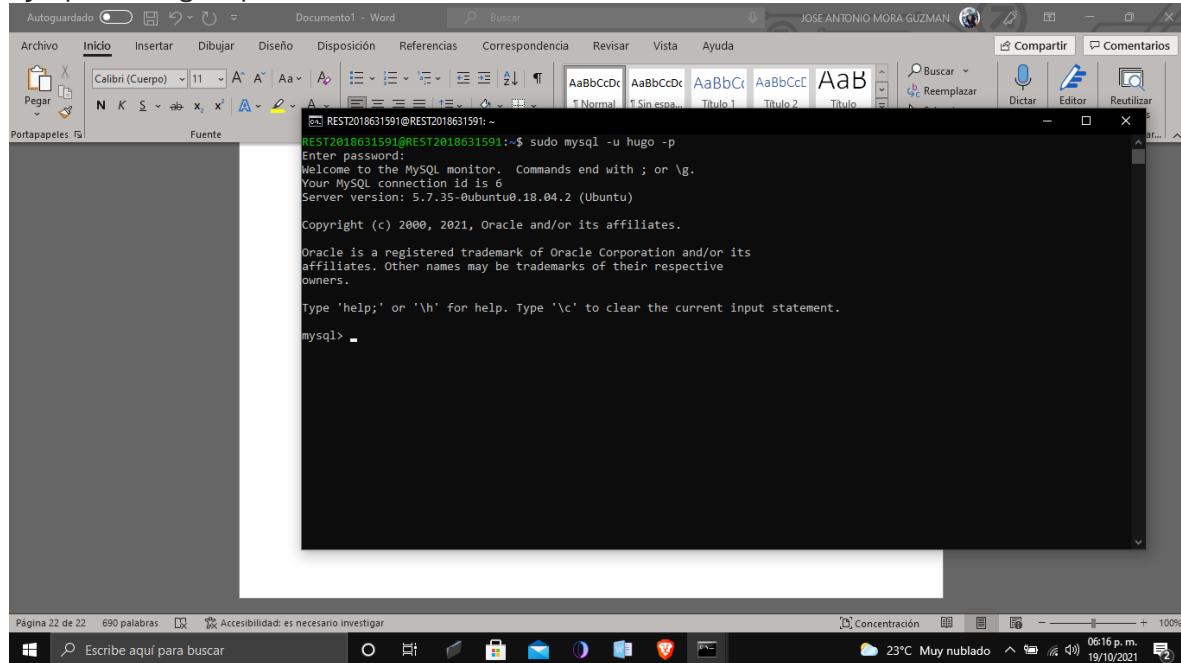
```
quit
```



Crear la base de datos

1. Ejecutar el monitor de MySQL (notar que ahora se utiliza el usuario "hugo"):

```
mysql -u hugo -p
```



A screenshot of a Microsoft Word document titled 'Documento1 - Word'. Inside the document, there is a terminal window with the following content:

```
REST2018631591@REST2018631591:~$ sudo mysql -u hugo -p
Enter password:
Welcome to the MySQL monitor. Commands end with ; or \g.
Your MySQL connection id is 6
Server version: 5.7.35-0ubuntu0.18.04.2 (Ubuntu)

Copyright (c) 2000, 2021, Oracle and/or its affiliates.

Oracle is a registered trademark of Oracle Corporation and/or its
affiliates. Other names may be trademarks of their respective
owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

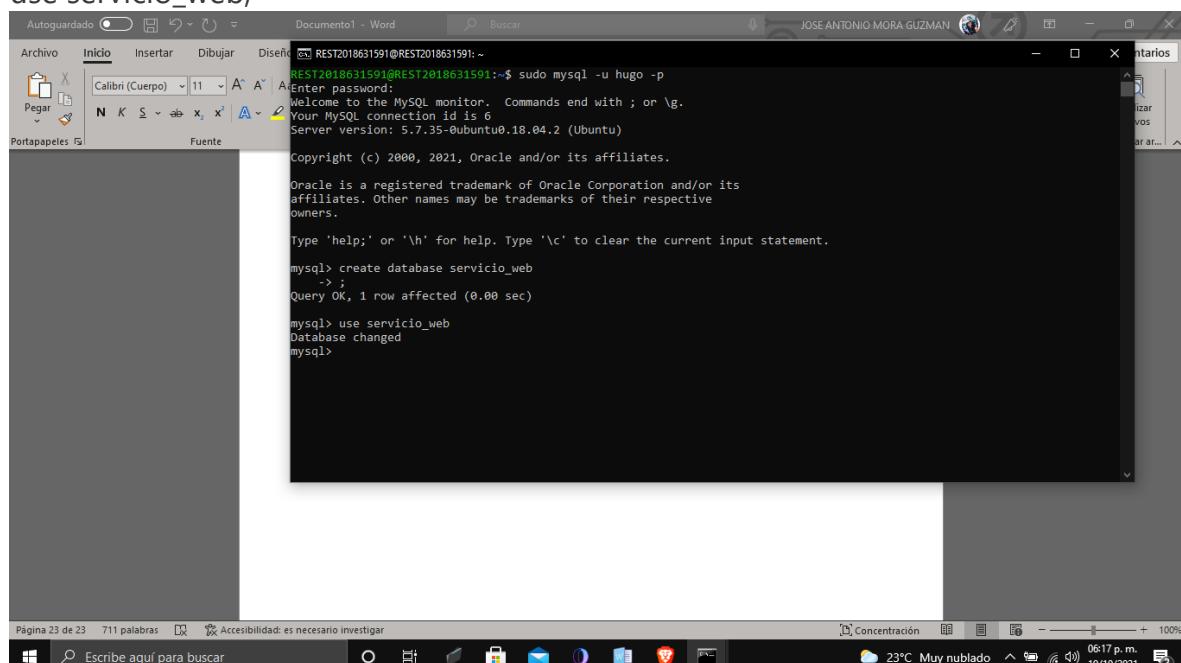
mysql> -
```

2. Crear la base de datos "servicio_web":

```
create database servicio_web;
```

3. Conectar a la base de datos creada anteriormente:

```
use servicio_web;
```



A screenshot of a Microsoft Word document titled 'Documento1 - Word'. Inside the document, there is a terminal window with the following content:

```
REST2018631591@REST2018631591:~$ sudo mysql -u hugo -p
Enter password:
Welcome to the MySQL monitor. Commands end with ; or \g.
Your MySQL connection id is 6
Server version: 5.7.35-0ubuntu0.18.04.2 (Ubuntu)

Copyright (c) 2000, 2021, Oracle and/or its affiliates.

Oracle is a registered trademark of Oracle Corporation and/or its
affiliates. Other names may be trademarks of their respective
owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql> create database servicio_web
      -> ;
Query OK, 1 row affected (0.00 sec)

mysql> use servicio_web
Database changed
mysql>
```

4. Crear las tablas "usuarios" y "fotos_usuarios", así mismo, se crea una regla de integridad referencial y un índice único:

```
create table usuarios
```

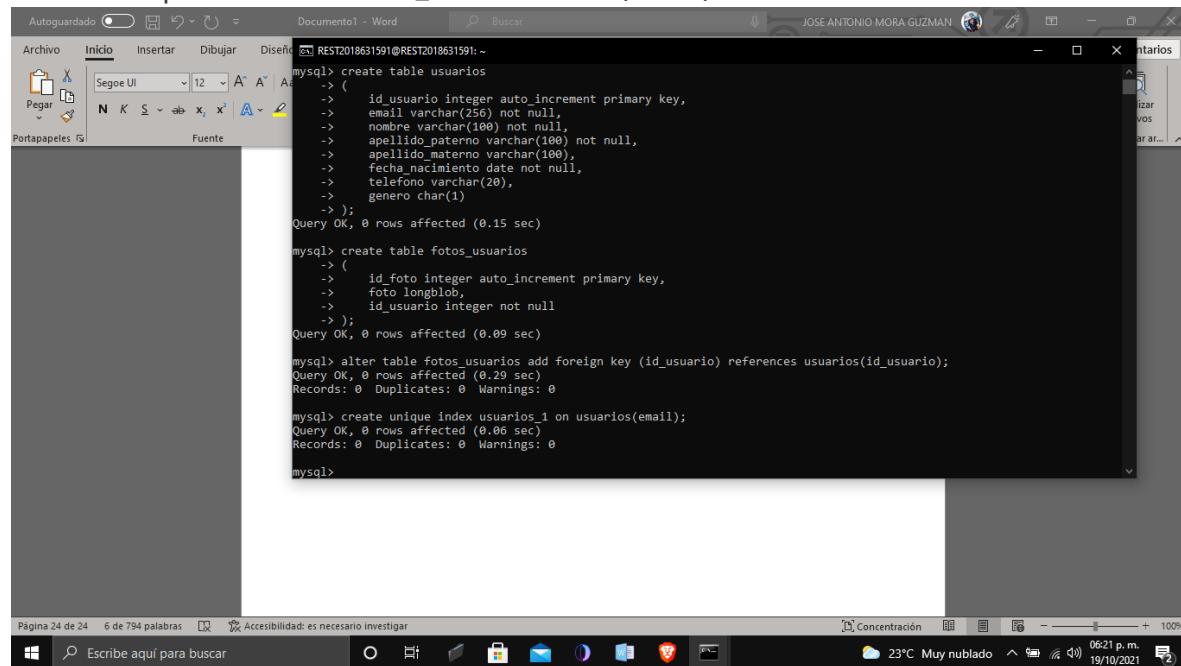
```
(  
    id_usuario integer auto_increment primary key,  
    email varchar(256) not null,  
    nombre varchar(100) not null,  
    apellido_paterno varchar(100) not null,  
    apellido_materno varchar(100),  
    fecha_nacimiento date not null,  
    telefono varchar(20),  
    genero char(1)  
);
```

```
create table fotos_usuarios
```

```
(  
    id_foto integer auto_increment primary key,  
    foto longblob,  
    id_usuario integer not null  
);
```

```
alter table fotos_usuarios add foreign key (id_usuario) references  
usuarios(id_usuario);
```

```
create unique index usuarios_1 on usuarios(email);
```

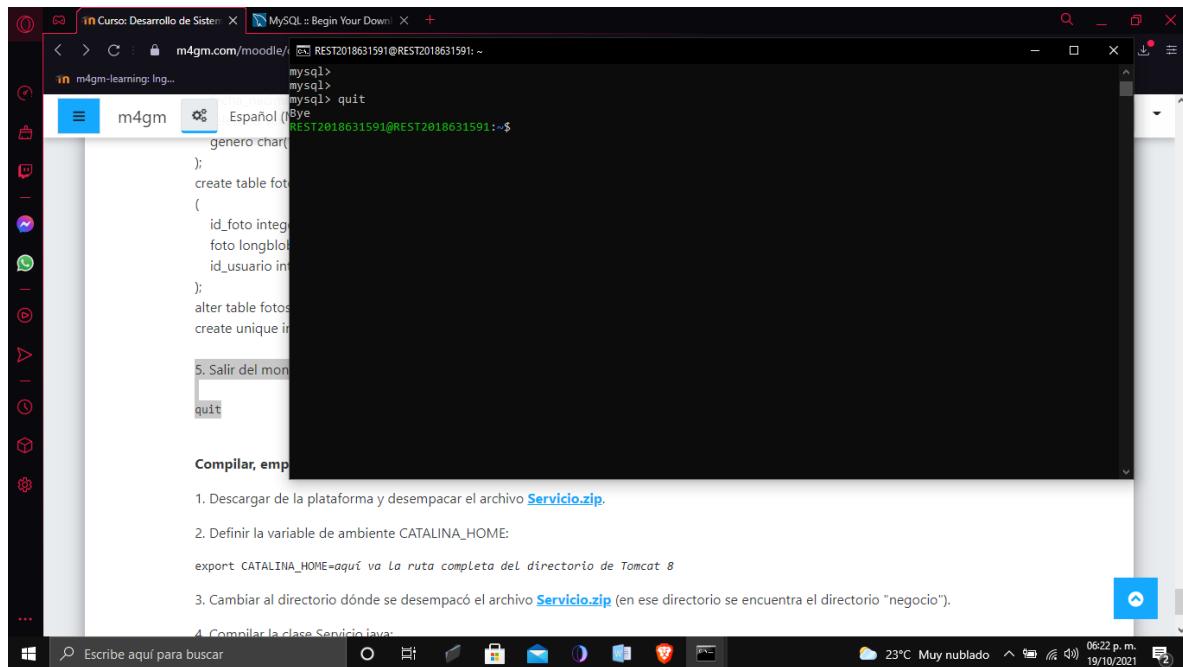


The screenshot shows a Microsoft Word document window titled 'Documento1 - Word'. The content of the document is a MySQL command history. The commands are as follows:

```
mysql> create table usuarios  
> (  
    >     id_usuario integer auto_increment primary key,  
    >     email varchar(256) not null,  
    >     nombre varchar(100) not null,  
    >     apellido_paterno varchar(100) not null,  
    >     apellido_materno varchar(100),  
    >     fecha_nacimiento date not null,  
    >     telefono varchar(20),  
    >     genero char(1)  
    > );  
Query OK, 0 rows affected (0.15 sec)  
  
mysql> create table fotos_usuarios  
> (  
    >     id_foto integer auto_increment primary key,  
    >     foto longblob,  
    >     id_usuario integer not null  
    > );  
Query OK, 0 rows affected (0.09 sec)  
  
mysql> alter table fotos_usuarios add foreign key (id_usuario) references usuarios(id_usuario);  
Query OK, 0 rows affected (0.29 sec)  
Records: 0 Duplicates: 0 Warnings: 0  
  
mysql> create unique index usuarios_1 on usuarios(email);  
Query OK, 0 rows affected (0.06 sec)  
Records: 0 Duplicates: 0 Warnings: 0  
  
mysql>
```

5. Salir del monitor de MySQL:

quit



The screenshot shows a terminal window with the following content:

```
m4gm@REST2018631591:~$ mysql>
mysql> quit
Bye
m4gm@REST2018631591:~$
```

A tooltip is displayed over the word "quit" with the text "5. Salir del monitor". Below the terminal, there is a section titled "Compilar, empacar" containing the following steps:

1. Descargar de la plataforma y desempacar el archivo [Servicio.zip](#).
2. Definir la variable de ambiente CATALINA_HOME:
`export CATALINA_HOME=aquí va La ruta completa del directorio de Tomcat 8`
3. Cambiar al directorio dónde se desempacó el archivo [Servicio.zip](#) (en ese directorio se encuentra el directorio "negocio").
4. Compilar la clase Servicio.java:

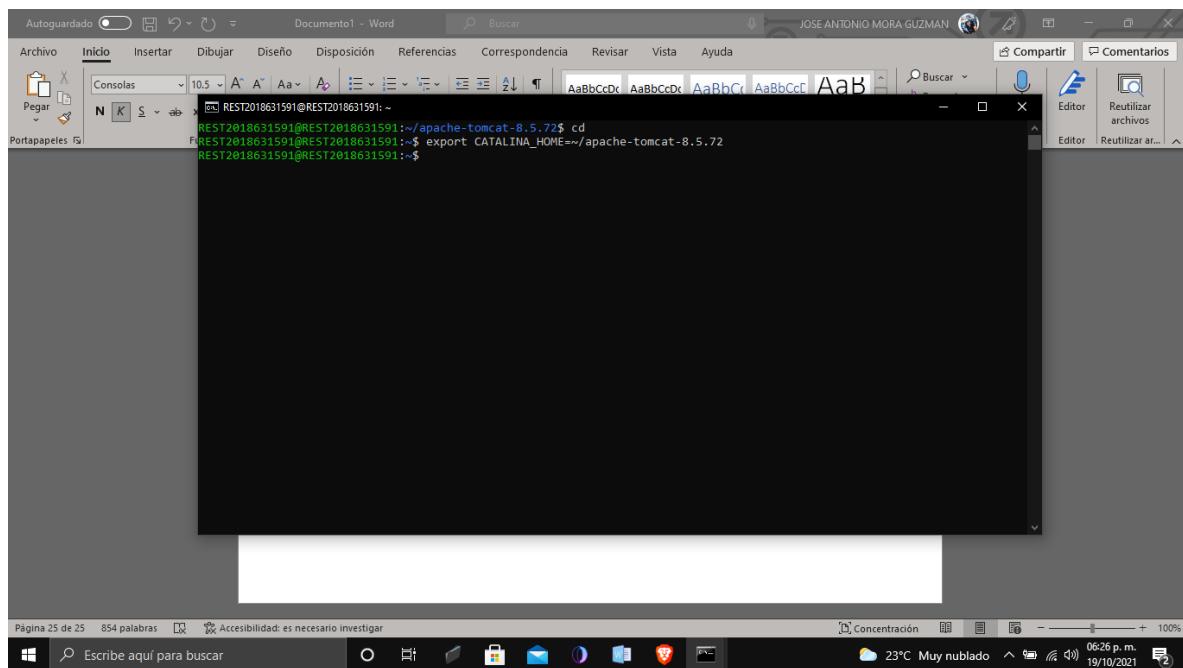
The system tray at the bottom right shows the date as 19/10/2021 and the time as 06:22 p.m.

Compilar, empacar y desplegar el servicio web

1. Descargar de la plataforma y desempacar el archivo [Servicio.zip](#).

2. Definir la variable de ambiente CATALINA_HOME:

`export CATALINA_HOME=aquí va La ruta completa del directorio de Tomcat 8`



The screenshot shows a Microsoft Word document with a terminal window embedded in it. The terminal window displays the following commands:

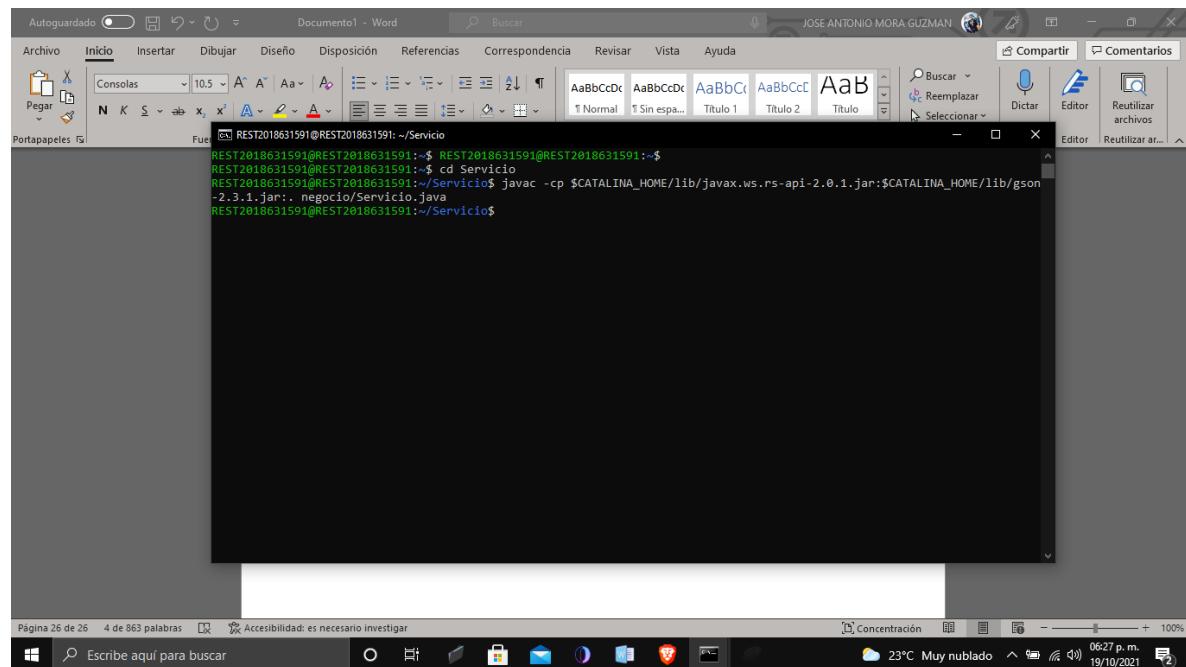
```
REST2018631591:~$ cd apache-tomcat-8.5.72
REST2018631591:~/apache-tomcat-8.5.72$ export CATALINA_HOME=~/apache-tomcat-8.5.72
REST2018631591:~/apache-tomcat-8.5.72$
```

The Word document has a dark theme and includes standard Microsoft Word ribbon tabs like Archivo, Inicio, Insertar, etc. The system tray at the bottom right shows the date as 19/10/2021 and the time as 06:26 p.m.

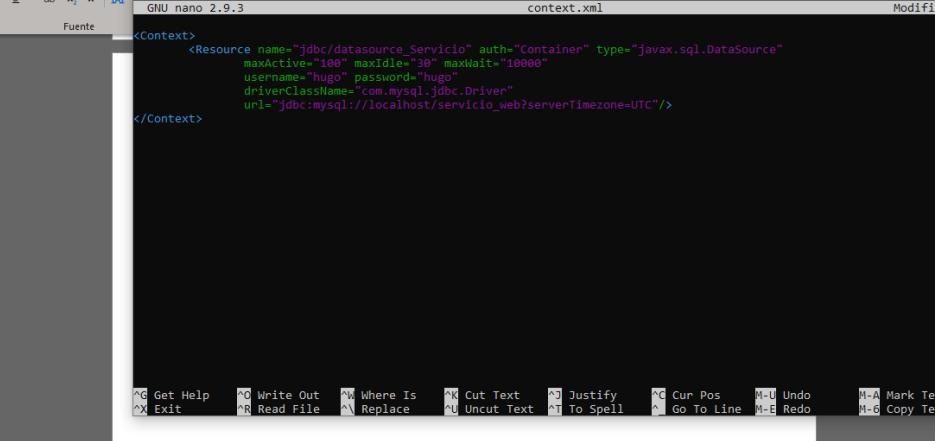
3. Cambiar al directorio dónde se desempacó el archivo **Servicio.zip** (en ese directorio se encuentra el directorio "negocio").

4. Compilar la clase Servicio.java:

```
javac -cp $CATALINA_HOME/lib/javax.ws.rs-api-  
2.0.1.jar:$CATALINA_HOME/lib/gson-2.3.1.jar:. negocio/Servicio.java
```



5. Editar el archivo "context.xml" que está en el directorio "META-INF" y definir el username de la base de datos y el password correspondiente. El usuario "hugo" fue creado en el paso 2 de la sección **Crear un usuario en MySQL**.

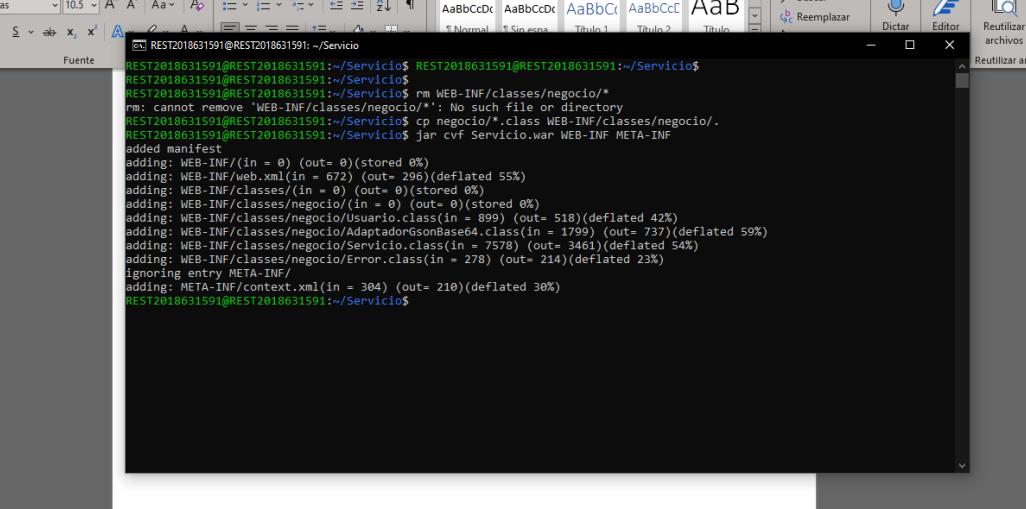


The screenshot shows a Microsoft Word document window. The title bar reads "Autoguardado Documento1 - Word". The ribbon menu has "Inicio" selected. A code editor window is open, showing XML code for a JDBC datasource. The code includes declarations for Context, Resource, auth, maxIdle, maxWait, username, password, driverClassName, and url. The file is named "context.xml" and is located at "REST2018631591@REST2018631591:/~Servicio/META-INF". The code editor interface includes a toolbar with font size (11), font style (Aa), and alignment (A), and a status bar at the bottom.

```
<Context>
    <Resource name="jdbc/datasource_Servicio" auth="Container" type="javax.sql.DataSource"
        maxActive="100" maxIdle="30" maxWait="10000"
        username="hugo" password="hugo"
        driverClassName="com.mysql.jdbc.Driver"
        url="jdbc:mysql://localhost/servicio_web?serverTimezone=UTC"/>
</Context>
```

6. Ejecutar los siguientes comandos para crear el servicio web para Tomcat (notar que los servicios web para Tomcat son archivos JAR con la extensión .war):

```
rm WEB-INF/classes/negocio/*  
cp negocio/*.class WEB-INF/classes/negocio/.  
jar cvf Servicio.war WEB-INF META-INF
```



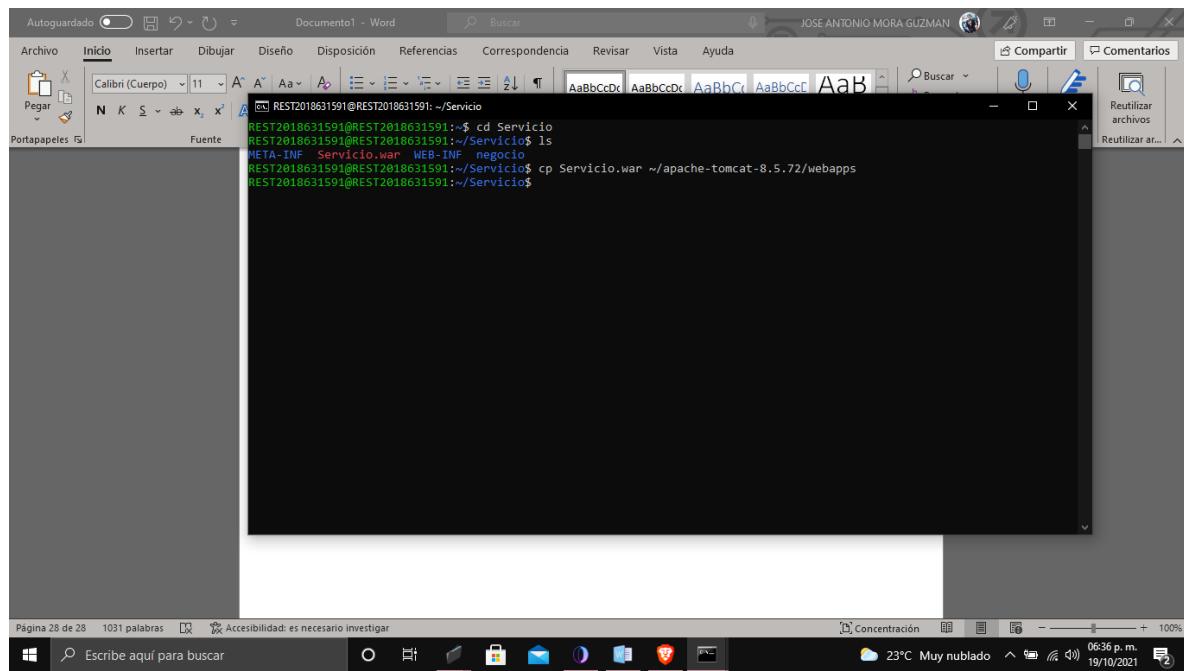
The screenshot shows a Microsoft Word document window. At the top, the ribbon menu is visible with options like Archivo, Inicio, Insertar, Dibujar, Diseño, Disposición, Referencias, Correspondencia, Revisar, Vista, and Ayuda. The title bar indicates the document is titled "Documento1 - Word". On the left, there's a toolbar with icons for Página, Compartir, and Comentarios. The main area of the window contains a terminal-like window displaying the following Java command-line output:

```
REST2018631591@REST2018631591:~/Servicio$ REST2018631591@REST2018631591:~/Servicio$ REST2018631591@REST2018631591:~/Servicio$ REST2018631591@REST2018631591:~/Servicio$ rm WEB-INF/classes/negocio/*  
rm: cannot remove 'WEB-INF/classes/negocio/*': No such file or directory  
REST2018631591@REST2018631591:~/Servicio$ cp negocio/*.class WEB-INF/classes/negocio/.  
REST2018631591@REST2018631591:~/Servicio$ jar cvf Servicio.war WEB-INF META-INF  
added manifest  
adding: WEB-INF/(in = 0) (out= 0)(stored 0%)  
adding: WEB-INF/web.xml(in = 672) (out= 296)(deflated 55%)  
adding: WEB-INF/classes/(in = 0) (out= 0)(stored 0%)  
adding: WEB-INF/classes/negocio/(in = 0) (out= 0)(stored 0%)  
adding: WEB-INF/classes/negocio/Usuario.class(in = 899) (out= 518)(deflated 42%)  
adding: WEB-INF/classes/negocio/AdaptadorJsonBase64.class(in = 1799) (out= 737)(deflated 59%)  
adding: WEB-INF/classes/negocio/Servicio.class(in = 7578) (out= 3461)(deflated 54%)  
adding: META-INF/classes/negocio/Error.class(in = 278) (out= 214)(deflated 23%)  
ignoring entry META-INF/  
adding: META-INF/context.xml(in = 304) (out= 210)(deflated 30%)  
REST2018631591@REST2018631591:~/Servicio$
```

7. Para desplegar (*deploy*) el servicio web, copiar el archivo **Servicio.war** al directorio "webapps" de Tomcat. Notar que Tomcat desempaca automáticamente los archivos con extensión .war que se encuentran en el directorio webapps de Tomcat.

Para eliminar el servicio web se deberá eliminar el archivo "Servicio.war" y el directorio "Servicio", en éste orden.

Cada vez que se modifique el archivo Servicio.java se deberá compilar, generar el archivo Servicio.war, borrar el archivo Servicio.war y el directorio Servicio del directorio webapps de Tomcat, y copiar el archivo Servicio.war al directorio webapps de Tomcat.



The screenshot shows a Microsoft Word document titled "Documento1 - Word". A terminal window is embedded within the document, displaying the following commands:

```
REST2018631591@REST2018631591:~/Servicio
$ cd Servicio
REST2018631591@REST2018631591:~/Servicio$ ls
META-INF  Servicio.war  WEB-INF  negocio
REST2018631591@REST2018631591:~/Servicio$ cp Servicio.war ~/apache-tomcat-8.5.72/webapps
REST2018631591@REST2018631591:~/Servicio$
```

The terminal window is positioned over the Microsoft Word ribbon and toolbar. The status bar at the bottom of the Word window shows "Página 28 de 28 1031 palabras" and "Accesibilidad: es necesario investigar". The taskbar at the bottom of the screen shows various application icons, including File Explorer, Edge, Mail, and others. The system tray indicates "Concentración" mode, a weather forecast of "23°C Muy nublado", the date and time as "06:36 p. m. 19/10/2021", and a battery icon.

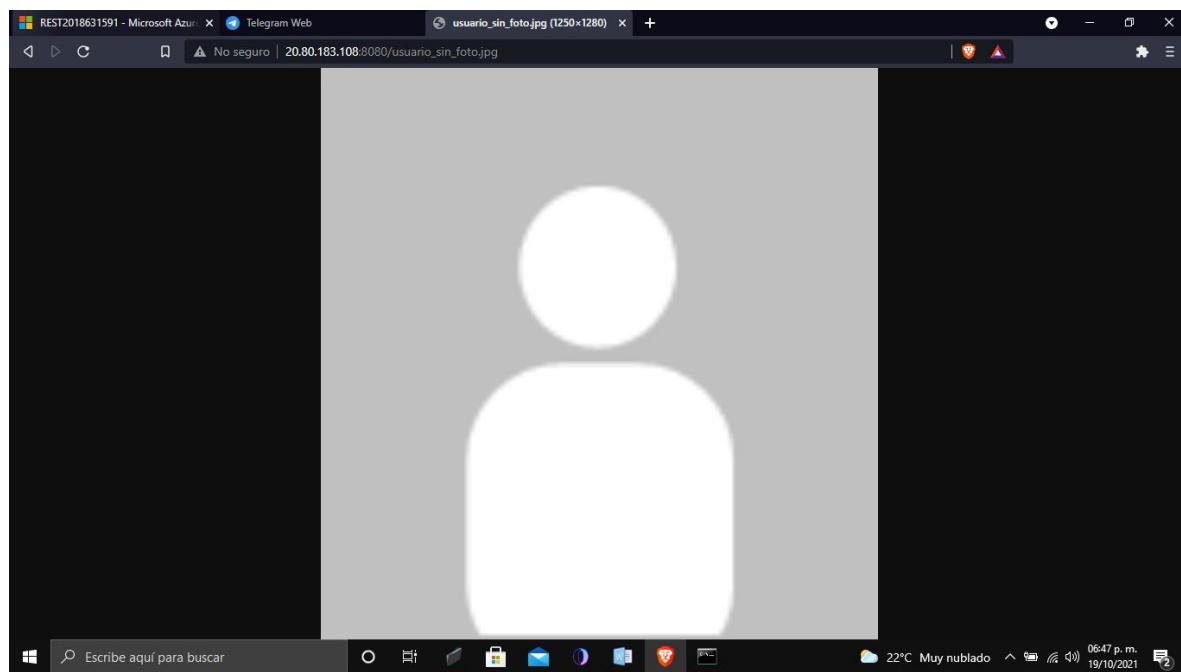
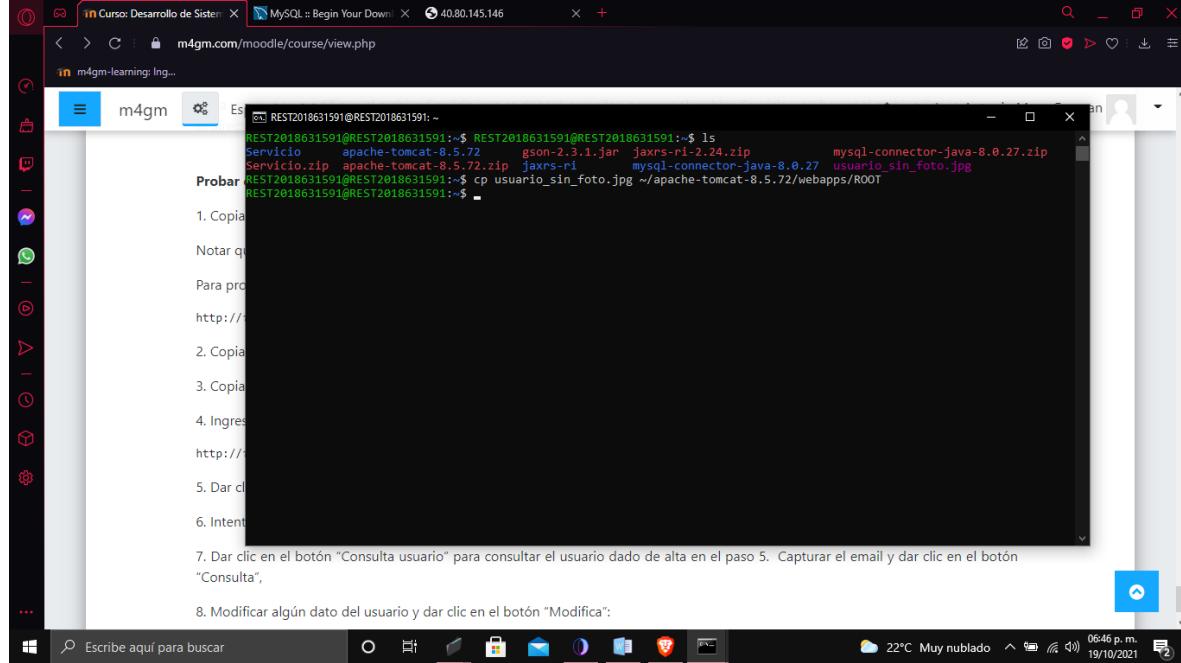
Probar el servicio web utilizando HTML-Javascript

1. Copiar el archivo [usuario sin foto.png](#) al subdirectorio webapps/ROOT de Tomcat.

Notar que todos los archivos que se encuentran en el directorio webapps/ROOT de Tomcat son accesibles públicamente.

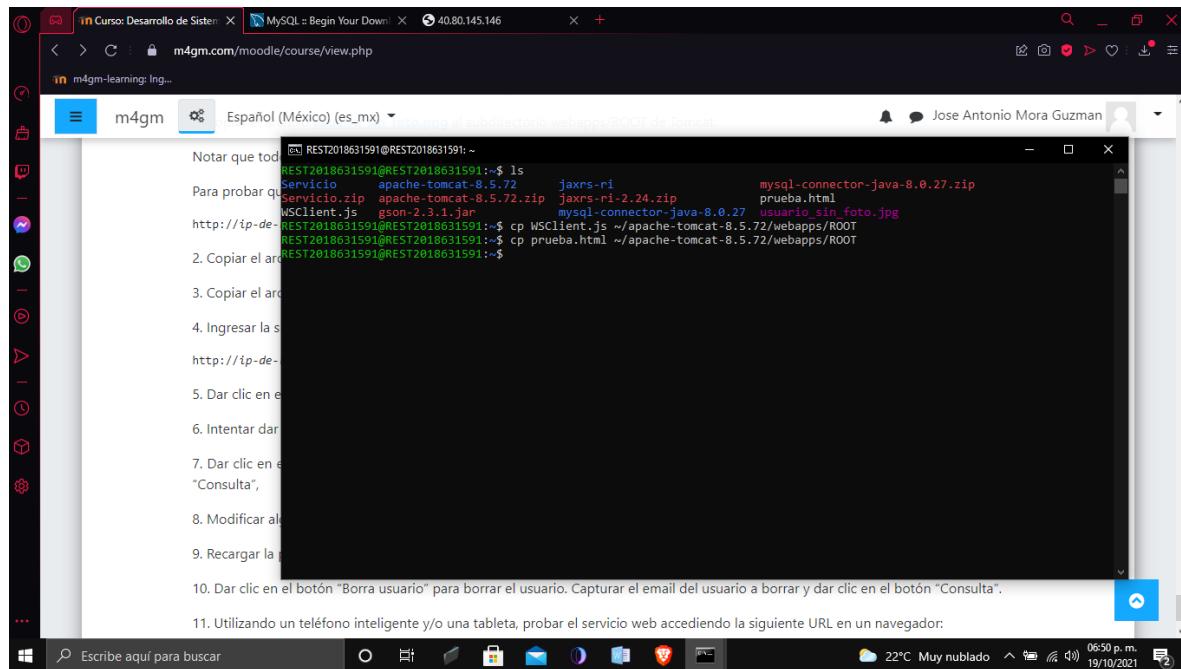
Para probar que Tomcat esté en línea y el puerto 8080 esté abierto, ingresar la siguiente URL en un navegador:

http://ip-de-La-máquina-virtual:8080/usuario_sin_foto.png



2. Copiar el archivo **WSClient.js** al directorio webapps/ROOT de Tomcat.

3. Copiar el archivo **prueba.html** al directorio webapps/ROOT de Tomcat.



The screenshot shows a Windows desktop environment. In the center, there is a terminal window titled "m4gm.com/moodle/course/view.php" with the following content:

```
REST2018631591@REST2018631591:~$ ls
Servicio      apache-tomcat-8.5.72      jaxrs-ri
Servicio.zip   apache-tomcat-8.5.72.zip  jaxrs-ri-2.24.zip    mysql-connector-java-8.0.27.zip
WSClient.js    gson-2.3.1.jar           mysql-connector-java-8.0.27
http://ip-de- REST2018631591@REST2018631591:~$ cp WSClient.js ~/apache-tomcat-8.5.72/webapps/ROOT
REST2018631591@REST2018631591:~$ cp prueba.html ~/apache-tomcat-8.5.72/webapps/ROOT
REST2018631591@REST2018631591:~$
```

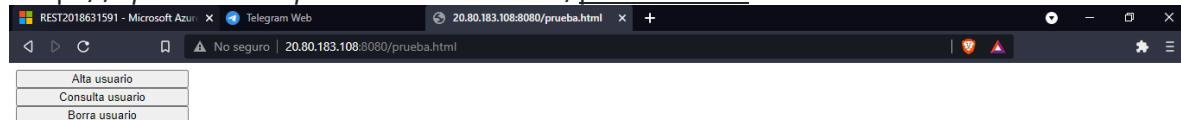
Below the terminal, a numbered list of steps is visible:

2. Copiar el ar...
3. Copiar el ar...
4. Ingresar la s...
5. Dar clic en e...
6. Intentar dar...
7. Dar clic en e...
8. Modificar al...
9. Recargar la p...
10. Dar clic en e...
11. Utilizando un teléfono inteligente y/o una tableta, probar el servicio web accediendo la siguiente URL en un navegador:

The taskbar at the bottom shows the date and time as 06:50 p.m. 19/10/2021.

4. Ingresar la siguiente URL en un navegador:

<http://ip-de-La-máquina-virtual:8080/prueba.html>



5. Dar clic en el botón “Alta usuario” para dar de alta un nuevo usuario. Capturar los campos y dar clic en el botón “Alta”.

Alta de usuario

Email *
tonomorada@hotmail.com

Nombre *
Tony

Apellido paterno *
Mora

Apellido materno
Guzman

Fecha de nacimiento *
23/09/1999

Teléfono
5538259924

Género
Masculino

Elegir archivos usuario_sin_foto.jpg

Alta Regresa

20.80.183.108:8080 dice
El usuario se dio de alta

Aceptar



6. Intentar dar de alta otro usuario con el mismo email (se deberá mostrar una ventana de error indicando que el email ya existe)

Alta de usuario

Email *
tonomorada@hotmail.com

Nombre *
Tony

Apellido paterno *
Mora

Apellido materno
Guzman

Fecha de nacimiento *
23/09/1999

Teléfono
5538259924

Género
Masculino

Elegir archivos usuario_sin_foto.jpg

Alta Regresa

20.80.183.108:8080 dice
("message":"El email ya existe")

Aceptar



7. Dar clic en el botón “Consulta usuario” para consultar el usuario dado de alta en el paso 5. Capturar el email y dar clic en el botón “Consulta”,

Consulta/Modifica usuario

Email *
tonomoradta@hotmail.com

Nombre *
Tony

Apellido paterno *
Mora

Apellido materno
Guzman

Fecha de nacimiento *
23/09/1999

Teléfono
5538259924

Género
Masculino

Elegir archivos No se eligió archivo

Consulta Modifica Regresa

8. Modificar algún dato del usuario y dar clic en el botón “Modifica”:

Consulta/Modifica usuario

Email *
tonomoradta@hotmail.com

Nombre *
Tony

Apellido paterno *
Mora

Apellido materno
Guzman

Fecha de nacimiento *
23/09/1999

Teléfono
5612001842

Género
Masculino

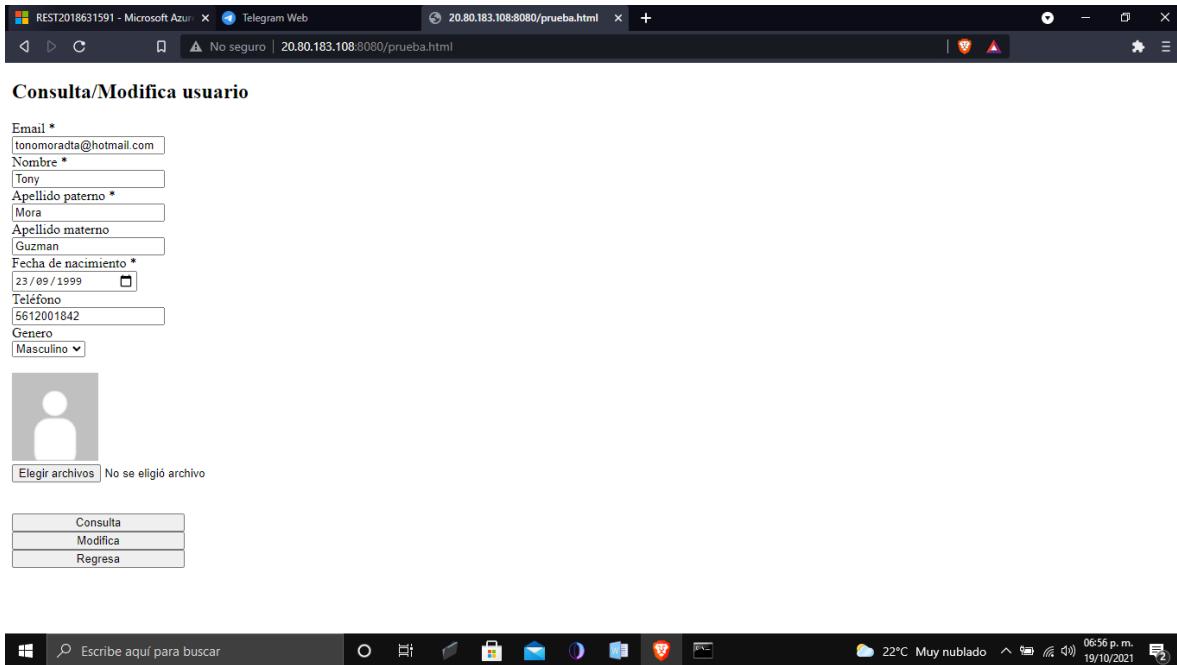
Elegir archivos No se eligió archivo

Consulta Modifica Regresa

20.80.183.108:8080 dice
El usuario se modificó

Aceptar

9. Recargar la página actual y consultar el usuario modificado, para verificar que la modificación se realizó.



Consulta/Modifica usuario

Email *
tonomoradta@hotmail.com

Nombre *
Tony

Apellido paterno *
Mora

Apellido materno
Guzman

Fecha de nacimiento *
23/09/1999

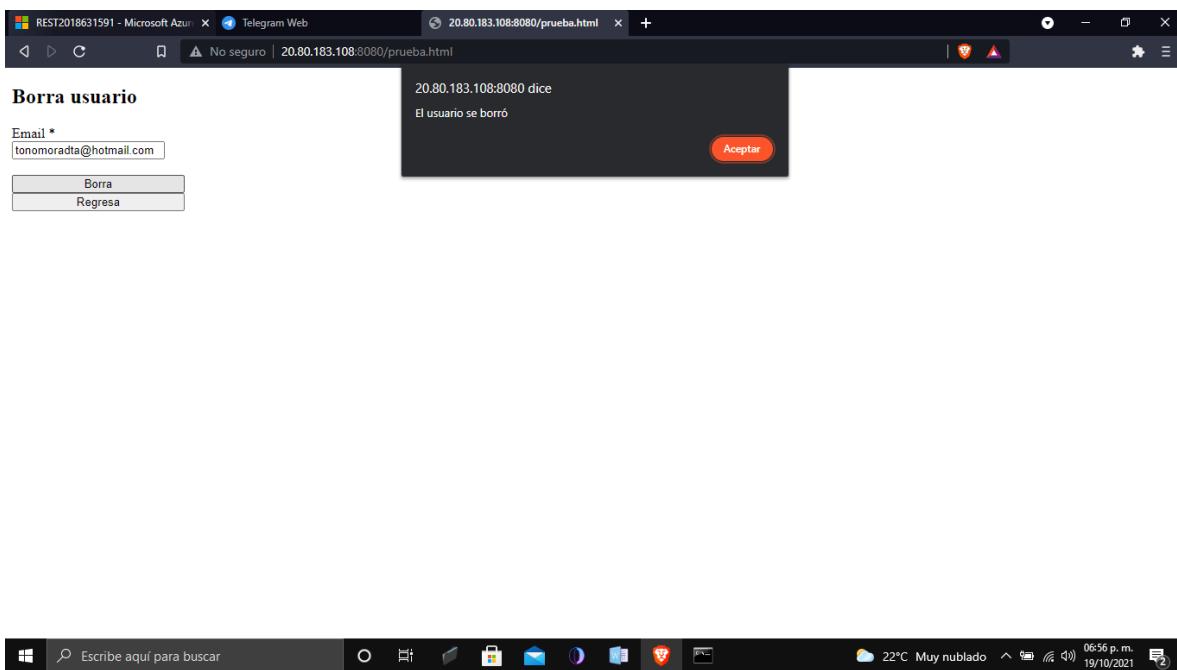
Teléfono
5612001842

Género
Masculino

 Elegir archivos No se eligió archivo

Consulta
Modifica
Regresa

10. Dar clic en el botón “Borra usuario” para borrar el usuario. Capturar el email del usuario a borrar y dar clic en el botón “Consulta”.



Borra usuario

Email *
tonomoradta@hotmail.com

Borra
Regresa

20.80.183.108:8080 dice
El usuario se borró

Aceptar

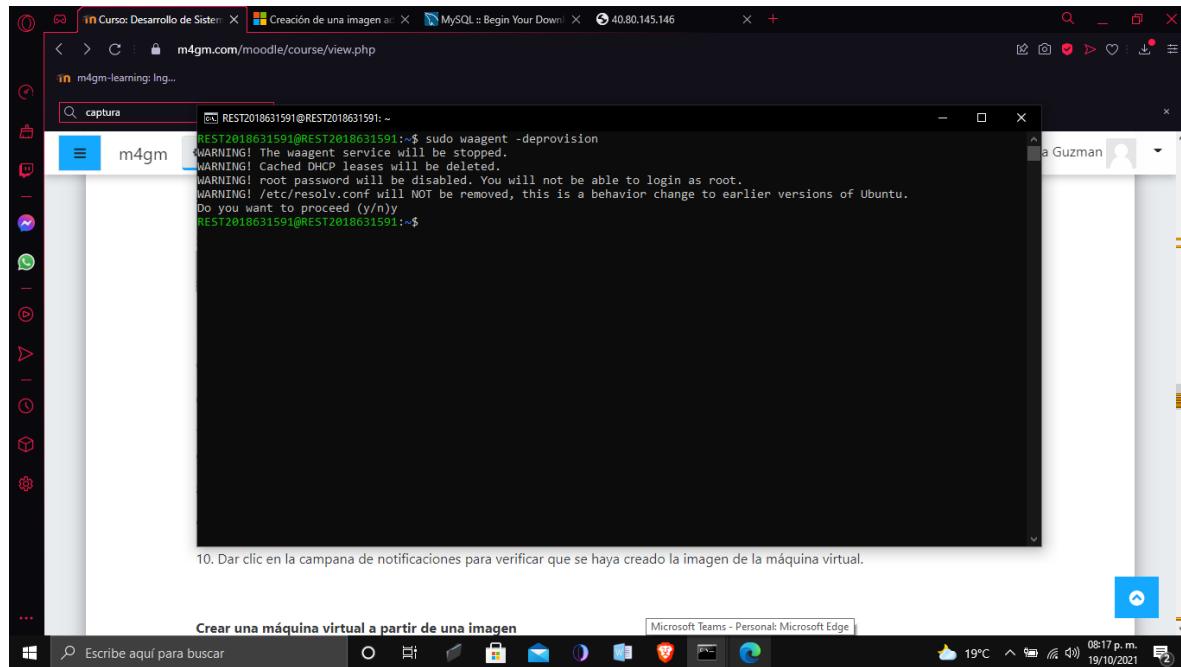
11. Utilizando un teléfono inteligente y/o una tableta, probar el servicio web accediendo la siguiente URL en un navegador:

<http://ip-de-La-máquina-virtual:8080/prueba.html>



Ahora capturamos la imagen:

Primero usamos el comando sudo waagent -deprovision



En azure seleccionamos la opcion captura:

REST2018631591 - Microsoft Azure | Captura de una imagen administrada | +

portal.azure.com/#@correo.ipn.mx/resource/subscriptions/cfeb66bb-d4ab-4974-9558-171a19128766/resourcegroups/ServiceREST/pro... | Microsoft Edge

Microsoft Azure | Buscar recursos, servicios y documentos (G+)

Inicio >

REST2018631591

Máquina virtual

Buscar (Ctrl+F)

Conectar Iniciar Reiniciar Detener Captura Eliminar Actualizar Abrir en dispositivos móviles Comentarios

Información general

Control de acceso (IAM)

Etiquetas

Diagnosticar y solucionar problemas

Configuración

Redes Conectar Discos Tamaño Seguridad Recomendaciones de Advisor Extensiones Entrega continua Disponibilidad y escalado

Hemos resuelto recientemente un problema con su máquina virtual. →

Información esencial

Grupo de recurso (cambiar) : ServiceREST	Sistema operativo : Linux (ubuntu 18.04)
Estado : En ejecución	Tamaño : B2s
Ubicación : Oeste de EE. UU. 2	Dirección IP pública : 20.80.183.108
Suscripción (cambiar) : Azure para estudiantes	Red virtual/subred : ServiceREST-vnet/default
Id. de suscripción : cfeb66bb-d4ab-4974-9558-171a19128766	Nombre DNS : Sin configurar
Etiquetas (cambiar) : Haga clic aquí para agregar etiquetas.	

Vista JSON

Propiedades Supervisión Funcionalidades (7) Recomendaciones Tutoriales

Máquina virtual

Nombre del equipo	Estado de mantenimiento	Sistema operativo	Publicador	Oferta	Plano
REST2018631591	-	Linux (ubuntu 18.04)	Canonical	UbuntuServer	10.0.1.76

Redes

Dirección IP pública (IPv4)	Dirección IP pública (IPv6)	Dirección IP privada (IPv4)	Dirección IP privada (IPv6)	Red virtual/subred	Nombre DNS
20.80.183.108	-	10.0.0.4	-	ServiceREST-vnet/default	-

Escribe aquí para buscar

Y seleccionamos las siguientes opciones

Nombre * ⓘ UbuntuRESTTomcat

Antes de crear una imagen, use "waagent -deprovision+user" para preparar el SO invitado Linux en la máquina virtual. Si crea una imagen a partir de una máquina virtual que no se ha generalizado, toda máquina virtual creada a partir de esa imagen no se iniciará. [Más información](#)

Revisar y crear < Anterior Siguiente: Etiquetas >

Y listo

Buscar (Ctrl+F)

Eliminar Cancelar Volver a implementar Actualizar

Se completó la implementación

Nombre de implementación: Microsoft.Compute-CaptureVM-2021... Hora de inicio: 19/10/2021 20:24:45
Suscripción: Azure para estudiantes Id. de correlación: 6bbf735d-3856-4aa7-83bd-a4cfb1...

Detalles de implementación (Descargar)

Pasos siguientes

Ir al recurso

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Conclusiones

Esta practica se me hizo bastante interesante, en lo personal nunca había visto un servicio web estilo REST y me pareció interesante la manera de implementarlo, si bien la configuración en la maquina virtual es algo tardada me puse a investigar mas y descubrí maneras mas sencillas de implementar este tipo de servicios directamente desde azure, pero siempre es bueno el saber como configurarlo por tu cuenta.