



Instituto Politécnico Nacional



Escuela Superior de Cómputo

Desarrollo de Sistemas Distribuidos

Tarea 10. Balance de carga en la nube

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Desarrollo

Creación de las máquinas virtuales a partir de la imagen creada en la tarea 6

1. Ingresamos al portal de Azure y vamos a la imagen que creamos en la tarea 6

The screenshot shows the Microsoft Azure portal interface. The main title bar says "T6-2020630205 - Microsoft Azure". The left sidebar has a "Search" input field and several sections: Overview (selected), Activity log, Access control (IAM), Tags, Settings, Properties, Locks, Automation, Tasks (preview), Export template, Support + troubleshooting, and New Support Request. The "Overview" section displays the following details:

Resource group	ESCOM	Operating system	Linux
Location	East US	Source virtual machine	T6-2020630205
Subscription	Azure for Students	VM generation	V2
Subscription ID	6c0fafff-6b04-4b16-866d-c9f342629ddc	Zone resiliency	Disabled
Provisioning state	Succeeded		
Tags	Click here to add tags		

Below this, there is a table for "OS disk" with columns: Operating system, Source blob URI, Storage type, and Caching. The first row shows "Linux" under "Operating system" and "Standard HDD LRS" under "Storage type".

2. Una vez que le damos en Crear Máquina Virtual, configuramos la máquina

Subscription * Resource group *

Virtual machine name * Region

Availability options Security type

Image * VM architecture x64

[Review + create](#) [< Previous](#) [Next : Disks >](#) [Give feedback](#)

3. Creamos un conjunto de disponibilidad

Create availability set

Group two or more VMs in an availability set to ensure that at least one is available during planned or unplanned maintenance events. [Learn more](#)

Name *

Fault domains

Update domains

Use managed disks No (Classic)

Based on your input, you might want to consider creating this resource as a virtual machine scale set, which allows you to manage, configure and scale load balanced virtual machines. [Create as VMSS](#)

[Review + create](#) [< Previous](#) [Next : Disks >](#) [OK](#)

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Home > T6-2020630205 >

Create a virtual machine

OS disk

OS disk type * Standard HDD (locally-redundant storage) The selected VM size supports premium disks. We recommend Premium SSD for high IOPS workloads. Virtual machines with Premium SSD disks qualify for the 99.9% connectivity SLA.

Delete with VM

Key management Platform-managed key

Enable Ultra Disk compatibility Ultra disk is not supported for the selected VM size Standard_DS1_v2 in East US.

Data disks for T10-2020630205-1

You can add and configure additional data disks for your virtual machine or attach existing disks. This VM also comes with a temporary disk.

LUN	Name	Size (GiB)	Disk type	Host caching	Delete with VM
-----	------	------------	-----------	--------------	----------------

[Create and attach a new disk](#) [Attach an existing disk](#)

[Review + create](#) < Previous Next : Networking > Give feedback

4. No le asignamos ninguna JB pública.

The screenshot shows the Microsoft Azure portal interface for creating a new virtual machine. The current step is 'Networking'. The configuration includes:

- Virtual network ***: T6-2020630205-vnet
- Subnet ***: default (10.0.0.0/24)
- Public IP**: None
- NIC network security group**: Basic (selected)
- Public inbound ports ***: Allow selected ports
- Select inbound ports ***: SSH (22)

At the bottom, there are buttons for 'Review + create' and 'Next : Management >'. The status bar at the bottom right shows the date as 17/6/2023.

The screenshot shows the Microsoft Azure portal interface for creating a new virtual machine. The current step is 'Monitoring'. The configuration includes:

- Alerts**: Enable recommended alert rules (checkbox)
- Diagnostics**:
 - Boot diagnostics**: Disable (selected)
 - Enable OS guest diagnostics**: (checkbox)

At the bottom, there are buttons for 'Review + create' and 'Next : Advanced >'. The status bar at the bottom right shows the date as 16/6/2023.

5. Una vez que configuramos procedemos a crearla

The screenshot shows the Microsoft Azure portal with a completed deployment. The main title is "CreateVm-T6-2020630205-20230617063503 | Overview". The deployment status is "Your deployment is complete". Deployment details include: Deployment name: CreateVm-T6-2020630205-202306170..., Start time: 6/17/2023, 7:00:45 AM, Subscription: Azure for Students, Correlation ID: 9ffbd9a7-e569-42c1-9f50-1e701e1ea2..., Resource group: ESCOM. Below the details are sections for "Deployment details" and "Next steps", with a "Go to resource" button. On the right side, there are promotional cards for "Cost management", "Microsoft Defender for Cloud", "Free Microsoft tutorials", and "Work with an expert". The bottom of the screen shows the Windows taskbar with various pinned icons.

6. Realizamos los mismos pasos para crear la máquina virtual 2

The screenshot shows the Microsoft Azure portal with the "Create a virtual machine" wizard. Step 1: Set location. The "Subscription" dropdown is set to "Azure for Students" and the "Resource group" dropdown is set to "ESCOM". Under "Instance details", the "Virtual machine name" is "T10-2020630205-2". The "Region" is "(US) East US" and the "Availability options" is "Availability set". A note at the bottom says: "Based on your input, you might want to consider creating this resource as a virtual machine scale set, which allows you to manage, configure and scale load balanced virtual machines. [Create as VMSS](#)". At the bottom, there are buttons for "Review + create" and "Next : Disks >". The bottom of the screen shows the Windows taskbar with various pinned icons.

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Home > T6-2020630205 >

Create a virtual machine

Learn more

Network interface

When creating a virtual machine, a network interface will be created for you.

Virtual network * T6-2020630205-vnet
Create new

Subnet * default (10.0.0.0/24)
Manage subnet configuration

Public IP None
Create new

NIC network security group None
Basic (selected)
Advanced

Public inbound ports * None
Allow selected ports (selected)

Review + create < Previous Next : Management Give feedback

Validation passed

T6-2020630205 Standard DS1 v2
Image 1 vcpu, 3.5 GB memory

Basics

Subscription	Azure for Students
Resource group	ESCOM
Virtual machine name	T10-2020630205-2
Region	East US
Availability options	Availability set
Availability set	ESCOM
Security type	Standard
Image	T6-2020630205 - Gen2
Size	Standard DS1 v2 (1 vcpu, 3.5 GiB memory)
Authentication type	Password
Username	kubuntu

Create < Previous Next > Download a template for automation Give feedback

Deployment name : CreateVm-T6-2020630205-20230617070225 Start time : 6/17/2023, 7:05:26 AM
Subscription : Azure for Students Correlation ID : 18bbf101-d86c-4a96-a8bc-331ee1031...
Resource group : ESCOM

Deployment details

Next steps

Cost management

Microsoft Defender for Cloud

Free Microsoft tutorials

Work with an expert

7. Podemos ver que ya se han creado ambas máquinas virtuales necesarias

Name	Type	Subscription	Resource group	Location	Status	Operating system	Size	Public IP
T10-2020630205-1	Virtual machine	Azure for Students	ESCOM	East US	Running	Linux	Standard_DS1_v2	-
T10-2020630205-2	Virtual machine	Azure for Students	ESCOM	East US	Running	Linux	Standard_DS1_v2	-

Para poder conectarnos a estas máquinas virtuales sin IP pública, nos conectaremos a ellas desde su IP privada para poder configurar el acceso a la instancia de la base de datos e iniciar el

servidor en Tomcat. Para esto, creamos otra máquina virtual que se encuentre en la misma red virtual que las anteriores.

8. Configuramos la máquina virtual

Select the subscription to manage deployed resources and costs. Use resource groups like folders to organize and manage all your resources.

Subscription *

Resource group * [Create new](#)

Instance details

Virtual machine name *

Region *

Availability options

Security type

Image * [See all images](#) | [Configure VM generation](#)

[Review + create](#) | [< Previous](#) | [Next : Disks >](#) | [Give feedback](#)

VM architecture

Run with Azure Spot discount

Size * [See all sizes](#)

Administrator account

Authentication type

Username *

Password *

Confirm password *

[Review + create](#) | [< Previous](#) | [Next : Disks >](#) | [Give feedback](#)

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portal.azure.com/#create/Microsoft.VirtualMachine-ARM

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klopezs1602@alumno.i... INSTITUTO POLITÉCNICO NACIONAL

Create a virtual machine

VM disk encryption

Azure disk storage encryption automatically encrypts your data stored on Azure managed disks (OS and data disks) at rest by default when persisting it to the cloud.

Encryption at host Encryption at host is not registered for the selected subscription. Learn more about enabling this feature

OS disk

OS disk type * Standard HDD (locally-redundant storage) The selected VM size supports premium disks. We recommend Premium SSD for high IOPS workloads. Virtual machines with Premium SSD disks qualify for the 99.9% connectivity SLA.

Delete with VM

Key management Platform-managed key

Enable Ultra Disk compatibility

Review + create < Previous Next : Networking > Give feedback

19:33 17/6/2023

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portal.azure.com/#create/Microsoft.VirtualMachine-ARM

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Create a virtual machine

Define network connectivity for your virtual machine by configuring network interface card (NIC) settings. You can control ports, inbound and outbound connectivity with security group rules, or place behind an existing load balancing solution. [Learn more](#)

Network interface

When creating a virtual machine, a network interface will be created for you.

Virtual network * T6-2020630205-vnet Create new

Subnet * default (10.0.0.0/24) Manage subnet configuration

Public IP (new) T10-2020630205-3-ip Create new

NIC network security group None Basic Advanced

Review + create < Previous Next : Management > Give feedback

19:33 17/6/2023

The screenshot shows the Microsoft Azure portal interface. At the top, there are several tabs and a search bar. Below the header, the main content area displays a deployment named "CreateVm-canonical.0001-com-ubuntu-server-focal-2-20230617193131". A prominent message says "Your deployment is complete". It provides deployment details: name (CreateVm-canonical.0001-com-ubuntu-server-focal-2-20230617193131), subscription (Azure for Students), start time (6/17/2023, 7:34:20 PM), and correlation ID (887d7c66-fa65-4d75-b8cc-9d12). Below this, sections for "Deployment details" and "Next steps" are shown, each with a "Recommended" link. At the bottom of the main content are "Go to resource" and "Create another VM" buttons. To the right, there are promotional cards for "Cost Management", "Microsoft Defender for Cloud", and "Free Microsoft tutorials". The bottom of the screen shows the Windows taskbar with various pinned icons.

9. Nos conectamos por ssh con su ip pública

The terminal window displays the following output:

```
* Documentation: https://help.ubuntu.com
* Management: https://landscape.canonical.com
* Support: https://ubuntu.com/advantage

System information as of Sun Jun 18 01:41:31 UTC 2023

System load: 0.0          Processes:      101
Usage of /: 5.2% of 28.89GB   Users logged in:  0
Memory usage: 15%
Swap usage:  0%

Expanded Security Maintenance for Applications is not enabled.

0 updates can be applied immediately.

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status

The list of available updates is more than a week old.
To check for new updates run: sudo apt update

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

kubuntu@T10-2020630205-3:~$
```

10. Y en esa máquina nos conectamos a las que estarán en el balanceador de carga mediante su ip privada

```
kubuntu@T10-2020630205-1: ~ kubuntu@T10-2020630205-1: ~ + | x

The authenticity of host '10.0.0.4 (10.0.0.4)' can't be established.
ECDSA key fingerprint is SHA256:vdoZihkp1Eg5bEoh4Tpms4Xj92G5e513xuIHYcqL5Nk.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '10.0.0.4' (ECDSA) to the list of known hosts.
kubuntu@10.0.0.4's password:
Welcome to Ubuntu 20.04.6 LTS (GNU/Linux 5.15.0-1037-azure x86_64)

 * Documentation: https://help.ubuntu.com
 * Management: https://landscape.canonical.com
 * Support: https://ubuntu.com/advantage

System information as of Sun Jun 18 01:43:16 UTC 2023

System load: 0.11      Processes:          103
Usage of /: 9.3% of 28.89GB Users logged in:   0
Memory usage: 21%      IPv4 address for eth0: 10.0.0.4
Swap usage:  0%

Expanded Security Maintenance for Applications is not enabled.

0 updates can be applied immediately.

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status

The list of available updates is more than a week old.
To check for new updates run: sudo apt update
New release '22.04.2 LTS' available.
Run 'do-release-upgrade' to upgrade to it.

Last login: Sun Jun 18 01:12:44 2023 from 10.0.0.6
kubuntu@T10-2020630205-1: ~

ESP LAA 19:43 17/6/2023
```

```
kubuntu@T10-2020630205-1: ~ kubuntu@T10-2020630205-2: ~ + | x

kubuntu@10.0.0.5's password:
Welcome to Ubuntu 20.04.6 LTS (GNU/Linux 5.15.0-1037-azure x86_64)

 * Documentation: https://help.ubuntu.com
 * Management: https://landscape.canonical.com
 * Support: https://ubuntu.com/advantage

System information as of Sun Jun 18 01:44:51 UTC 2023

System load: 0.17      Processes:          102
Usage of /: 9.3% of 28.89GB Users logged in:   0
Memory usage: 22%      IPv4 address for eth0: 10.0.0.5
Swap usage:  0%

* Strictly confined Kubernetes makes edge and IoT secure. Learn how MicroK8s
just raised the bar for easy, resilient and secure K8s cluster deployment.

https://ubuntu.com/engage/secure-kubernetes-at-the-edge

Expanded Security Maintenance for Applications is not enabled.

0 updates can be applied immediately.

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status

The list of available updates is more than a week old.
To check for new updates run: sudo apt update
New release '22.04.2 LTS' available.
Run 'do-release-upgrade' to upgrade to it.

Last login: Sun Jun 18 01:20:10 2023 from 10.0.0.6
kubuntu@T10-2020630205-2: ~

ESP LAA 19:44 17/6/2023
```

Creación de la instancia de MySQL al nivel de PaaS

Ahora debemos crear una instancia de MySQL en Azure Database for MySQL para que se conecten los servicios web de las máquinas virtuales creadas.

11. Nos vamos al apartado de Azure Database for MySQL Servers y damos clic en crear

The screenshot shows the Azure portal interface with the URL portal.azure.com/#view/HubsExtension/BrowseResource/resourceType/Microsoft.DBforMySQL%2Fservers. The page title is "Azure Database for MySQL servers". A message at the top states: "Azure Database for MySQL Single Server is on the retirement path and the create experience in the Azure portal has been retired. You can use Azure CLI to create a new MySQL Single server instance if need be." Below this, there is a table header with columns: Name, Resource type, Status, High availability, Resource group, and Location. A large message in the center says "No Azure Database for MySQL servers to display" and "Try changing or clearing your filters." At the bottom right, there is a "Give feedback" link.

12. Damos clic en crear en el servidor flexible

The screenshot shows the Azure portal interface with the URL portal.azure.com/#create/Microsoft.MySQLServer. The page title is "Select Azure Database for MySQL deployment option". It features two main sections: "Flexible server" and "Wordpress + MySQL Flexible server". Each section includes a brief description, a "Create" button, and a "Learn More" link. The browser address bar shows the URL <https://go.microsoft.com/fwlink/?linkid=2220695>.

13. Configuramos el servidor

The screenshot shows the Azure portal interface for creating a MySQL server. On the left, there's a sidebar with 'Aplicaciones', 'Google Académico', 'Seguridad', 'https://s2.mexside...', 'm4gm-learning', 'Dashboard | Tinker...', 'Library Genesis', 'RegExr: Learn, Build...', and 'Generador de refer...'. The main area has a blue header bar with 'Microsoft Azure' and a search bar. Below the header, the URL is 'portal.azure.com/#create/Microsoft.MySQLServer'. The main content area is titled 'Flexible server' and shows the following configuration:

- Subscription:** Azure for Students
- Resource group:** ESCOM (selected)
- Server details:**
 - Server name:** t10-2020630205-server
 - Region:** East US
 - MySQL version:** 8.0
 - Workload type:** For small or medium size databases
- Estimated costs:**
 - Compute Sku:** USD 6.21/month (Standard_B1s (1 vCore))
 - Storage:** USD 2.30/month (Storage selected 20 GiB (USD 0.12 per GiB))
 - Backup Retention:** Backup retention is billed based on additional storage used for retaining backups.

At the bottom, there are 'Review + create' and 'Next : Networking >' buttons. The status bar at the bottom right shows 'ESP LAA' and the date '16/6/2023'.

14. Configuramos el cómputo y almacenamiento y damos clic en guardar

The screenshot shows the 'Compute + storage' configuration page for the previously created MySQL server. The left sidebar and header are identical to the previous screenshot. The main content area is titled 'Compute + storage' and shows the following configuration:

- Compute:**
 - Compute tier:** Burstable (1-20 vCores) - Best for workloads that don't need the full CPU continuously
 - Compute size:** Standard_B1s (1 vCore, 1 GiB memory, 400 max iops)
- Storage:**
 - The storage you provision is the amount of storage capacity available to your flexible server and is billed GiB/month.
 - Note that storage cannot be scaled down once the server is created.**
 - Storage size (in GiB):** A slider set to 20 GiB.
- Estimated costs:**
 - Compute Sku:** USD 6.21/month (Standard_B1s (1 vCore))
 - Storage:** USD 2.30/month (Storage selected 20 GiB (USD 0.12 per GiB))
 - Backup Retention:** Backup retention is billed based on additional storage used for retaining backups. [Learn more](#)

At the bottom, there is a 'Save' button. The status bar at the bottom right shows 'ESP LAA' and the date '16/6/2023'.

Storage

The storage you provision is the amount of storage capacity available to your flexible server and is billed GiB/month. **Note that storage cannot be scaled down once the server is created.**

Storage size (in GiB) 20 32 64 128 256 512 1024 2048 4096 8192 16384

IOPS Auto scale IOPS (preview) Pre-provisioned IOPS 360 400

Storage Auto-growth

High availability

Same zone and zone redundant high availability provide additional server resilience in the event of a failure.

Enable high availability

Backup Retention

Backup retention is billed based on additional storage used for retaining backups. [Learn more](#)

Bandwidth

For outbound data transfer across services in different regions will incur additional charges. Any inbound data transfer is free. [Learn more](#)

Estimated total **USD 8.50/month**

Charges will apply if you use above the free monthly limits. Please check [your usage](#) of free services. Final charges will appear in your local currency.

Save

15. Configuramos el método de autenticación, usuario y contraseña

Flexible server

Select the authentication methods you would like to support for accessing this MySQL server. MySQL password authentication allows you to create and use a ROLEs (username) and use a password to authenticate. Enabling Azure Active Directory authentication allows you to create ROLEs based on your Azure Active Directory accounts and generate an authentication token with which to authenticate. [Learn more](#)

Authentication method MySQL authentication only Azure Active Directory authentication only MySQL and Azure Active Directory authentication

Admin username *

Password *

Confirm password *

Backup Retention

Backup retention is billed based on additional storage used for retaining backups. [Learn more](#)

Bandwidth

For outbound data transfer across services in different regions will incur additional charges. Any inbound data transfer is free. [Learn more](#)

Estimated total **USD 8.50/month**

Charges will apply if you use above the free monthly limits. Please check [your usage](#) of free services. Final charges will appear in your local currency.

16. Configuramos el networking, agregamos una regla de firewall para que cualquier computadora se pueda conectar

Flexible server

Network connectivity

You can connect to your server by specifying a public IP address specified below or from within a selected virtual network.

Connectivity method Public access (allowed IP addresses) Private access (VNet Integration)

Firewall rules

Inbound connections from the IP addresses specified below will be allowed to port 3306 on this server. [Learn more](#)

Allow public access from any Azure service within Azure to this server

Estimated costs

Compute Sku	USD 6.21/month
Free upto 750 hours	
Standard_B1s (1 vCore)	6.21
Storage	USD 2.30/month
Free upto 32 GB	
Storage selected 20 GiB (USD 0.12 per GiB)	20 x 0.12
Backup Retention	
Backup retention is billed based on additional storage used for retaining	

[Review + create](#) [< Previous](#) [Next : Security >](#)

Flexible server

Firewall rules

Inbound connections from the IP addresses specified below will be allowed to port 3306 on this server. [Learn more](#)

Allow public access from any Azure service within Azure to this server

+ Add current client IP address (187.188.8.27) + Add 0.0.0 - 255.255.255.255

Firewall rule name	Start IP address	End IP address
AllAllowAll_2023-6-16-10-59-17	0.0.0	255.255.255.255
Firewall rule name	Start IP address	End IP address

Encrypted connections

This server supports encrypted connections using Transport Layer Security (TLS 1.2). For information on downloading the certificate, refer to connecting with TLS/SSL. [Learn more](#)

Estimated total **USD 8.50/month**

Charges will apply if you use above the free monthly limits. Please check [your usage](#) of free services. Final charges will appear in

[Review + create](#) [< Previous](#) [Next : Security >](#)

17. Procedemos a crear la instancia de MySQL

The screenshot shows the Microsoft Azure MySQL Flexible Server Overview page. The deployment status is "Deployment is in progress". Deployment details include:

- Deployment name: MySQLFlexibleServer_bf3081244f31456c8c6ef92e72b7bc90
- Subscription: Azure for Students
- Resource group: ESCOM
- Start time: 6/16/2023, 11:02:07 AM
- Correlation ID: 380b84b3-3885-432e-afcc-8d5116d95

The "Deployment details" table shows one resource entry:

Resource	Type	Status	Operation details
t10-2020630205-server	Microsoft.DBforMySQL/fle...	Accepted	Operation details

On the right side, there are promotional links for MySQL Flexible Server, Microsoft tutorials, and Azure experts.

The screenshot shows the Microsoft Azure MySQL Flexible Server Overview page after deployment completion. The status is "Deployment succeeded". Deployment details are identical to the previous screenshot. A success message states: "'MySQLFlexibleServer_bf3081244f31456c8c6ef92e72b7bc90' to resource group 'ESCOM' was successful." There are two buttons at the top right: "Go to resource" and "Go to resource group".

The "Deployment details" table shows one resource entry:

Resource	Type	Status	Operation details
t10-2020630205-server	Microsoft.DBforMySQL/fle...	Accepted	Operation details

On the right side, there are promotional links for MySQL Flexible Server, Microsoft tutorials, and Azure experts.

18. Ahora para probar la conectividad nos conectamos al servidor de MySQL desde una de las máquinas virtuales creadas.

```
kubuntu@T10-2020630205-1: ~ + - ×
kubuntu@T10-2020630205-1:~$ mysql -h t10-2020630205-server.mysql.database.azure.com -u administrador -p --ssl-mode=REQUIRED
Enter password:
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 19
Server version: 8.0.32 Source distribution

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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> _
```

```
kubuntu@T10-2020630205-1: ~ + - ×
kubuntu@T10-2020630205-1:~$ mysql -h t10-2020630205-server.mysql.database.azure.com -u administrador -p --ssl-mode=REQUIRED
Enter password:
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 19
Server version: 8.0.32 Source distribution

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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> show databases;
+-----+
| Database      |
+-----+
| information_schema |
| mysql          |
| performance_schema |
| sys            |
+-----+
4 rows in set (0.00 sec)

mysql> _
```

19. Exportamos la base de datos a la instancia en MySQL

```
kubuntu@T10-2020630205-1:~$ mysqldump -u kevin -p servicio_web > /home/kubuntu/
.bash_history          .profile           Tarea6/
.bash_logout            .ssh/              apache-tomcat-8.5.88.zip
.bashrc                .sudo_as_admin_successful   gson-2.3.1.jar
.cache/                .viminfo           jaxrs-ri-2.24.zip
.mysql_history         Servicio.zip       mysql-connector-j-8.0.33.zip
kubuntu@T10-2020630205-1:~$ mysqldump -u kevin -p servicio_web > /home/kubuntu/
-bash: /home/kubuntu: Is a directory
kubuntu@T10-2020630205-1:~$ mysqldump -u kevin -p servicio_web > /home/kubuntu/servicio_web.sql
Enter password:
mysqldump: Error: 'Access denied; you need (at least one of) the PROCESS privilege(s) for this operation' when trying to dump tablespaces
kubuntu@T10-2020630205-1:~$ mysqldump -u root -p servicio_web > /home/kubuntu/servicio_web.sql
Enter password:
kubuntu@T10-2020630205-1:~$ ls
Servicio.zip  apache-tomcat-8.5.88.zip  jaxrs-ri-2.24.zip      servicio_web.sql
Tarea6        gson-2.3.1.jar          mysql-connector-j-8.0.33.zip
kubuntu@T10-2020630205-1:~$ exit
logout
Connection to 13.82.173.100 closed.

C:\Users\kevin>ssh kubuntu@13.82.173.100
kubuntu@13.82.173.100's password:
Welcome to Ubuntu 20.04.6 LTS (GNU/Linux 5.15.0-1037-azure x86_64)

 * Documentation: https://help.ubuntu.com
 * Management:   https://landscape.canonical.com
 * Support:      https://ubuntu.com/advantage

 System information as of Fri Jun 16 22:41:01 UTC 2023

 System load:  0.0          Processes:           102
 Usage of /:   9.3% of 28.89GB   Users logged in:    0
 Memory usage: 22%            IPv4 address for eth0: 10.0.0.4
 Swap usage:   0%

kubuntu@T10-2020630205-1:~
```

```
kubuntu@T10-2020630205-1:~$ mysql -h t10-2020630205-server.mysql.database.azure.com -u administrador -p --ssl_mode=REQUIRED servicio_web < /home/kubuntu/servicio_web.sql
Enter password:
kubuntu@T10-2020630205-1:~$ mysql -h t10-2020630205-server.mysql.database.azure.com -u administrador -p --ssl_mode=REQUIRED
Enter password:
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 29
Server version: 8.0.32 Source distribution

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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> show databases;
+-----+
| Database |
+-----+
| information_schema |
| mysql |
| performance_schema |
| servicio_web |
| sys |
+-----+
5 rows in set (0.01 sec)

mysql> use servicio_web;
Reading table information for completion of table and column names
You can turn off this feature to get a quicker startup with -A

Database changed
mysql> show tables;
```

20. Conectamos los servicios web de ambas máquinas virtuales a la instancia de MySQL editando el url en el archivo context.xml: jdbc: mysql://t10-2020630205-server.mysql.database.azure.com:3306/servicio_web

```
GNU nano 4.8 META-INF/context.xml
<Context>
    <Resource name="jdbc/datasource_Servicio" auth="Container" type="javax.sql.DataSource"
        maxActive="100" maxIdle="30" maxWait="10000"
        username="administrador" password="irEqVC92BAwTrkX"
        driverClassName="com.mysql.cj.jdbc.Driver"
        url="jdbc:mysql://t10-2020630205-server.mysql.database.azure.com:3306/servicio_web"/>
</Context>
```

The screenshot shows a terminal window with two tabs open. The active tab displays the contents of a file named 'META-INF/context.xml'. The XML configuration defines a database resource named 'jdbc/datasource_Servicio' using the 'Container' authentication type. It specifies connection parameters such as a maximum of 100 active connections, a maximum idle of 30, and a maximum wait time of 10000 milliseconds. The database connection uses the 'com.mysql.cj.jdbc.Driver' and connects to a MySQL server at 't10-2020630205-server.mysql.database.azure.com' on port 3306, with the database name 'servicio_web'. The terminal interface includes a menu bar with options like 'Get Help', 'Write Out', 'Where Is', 'Cut Text', 'Paste Text', 'Justify To Spell', 'Cur Pos', 'Go To Line', 'Undo', 'Redo', 'Mark Text', 'Copy Text', and 'To Bracket'. The bottom status bar shows system information including language ('ESP LAA'), battery level ('06:15'), and the date ('17/6/2023').

Creación del balanceador de carga

21. Primero vamos al apartado de equilibradores de carga de Azure y damos clic en crear

The screenshot shows the 'Load balancing' blade in the Microsoft Azure portal. The left sidebar lists 'Load Balancing Services', 'Application Gateway', 'Front Door and CDN profiles', 'Load Balancer' (which is selected), and 'Traffic Manager'. The main area has a search bar and various filtering options. A message at the top states 'Showing 0 to 0 of 0 records.' Below it is a large icon of a load balancer and the text 'No load balancers to display'. A descriptive paragraph explains that built-in load balancing for cloud services and virtual machines allows creating highly-available and scalable applications in minutes, supporting protocols like HTTP, HTTPS, and SMTP. At the bottom right is a 'Create load balancer' button.

22. Procedemos a realizar la configuración

The screenshot shows the Microsoft Azure portal interface for creating a load balancer. The top navigation bar has tabs for 'SISDIS-4CV12: Tarea 10. Balance', 'Curso: Desarrollo de Sistemas Di...', and 'Create load balancer - Microsoft'. The main content area is titled 'Create load balancer'. The 'Instance details' section contains the following fields:

- Subscription ***: Azure for Students
- Resource group ***: ESCOM
- Name ***: T10-2020630205-BC
- Region ***: East US
- SKU ***: Basic (selected)
- Type ***: Public (selected)

A note below the SKU field states: "Microsoft recommends Standard SKU load balancer for production workloads; Basic SKU will be retired on September 30, 2025. [Learn more](#)".

At the bottom of the page are buttons for 'Review + create', '< Previous', 'Next : Frontend IP configuration >', 'Download a template for automation', and 'Give feedback'. The status bar at the bottom right shows '07:13 17/6/2023'.

This screenshot is identical to the one above, showing the 'Create load balancer' wizard step 1: Instance details. It displays the same form fields and note about SKU deprecation. The status bar at the bottom right shows '07:13 17/6/2023'.

23. Agregamos una configuración de IP de frontend y creamos una IP pública

Add frontend IP configuration

Name * T10-2020630205-CIPFE

IP version IPv4

Public IP address * Choose public IP address

Add a public IP address

Name * T10-2020630205-IP

SKU Standard Basic

Tier Regional Global

Assignment * Dynamic Static

OK Cancel

Review + create < Previous Next : Backend pools > Download a template for automation Give feedback

24. Procedemos a crear el balanceador de carga

Create load balancer

Validation passed

Basics

Subscription	Azure for Students
Resource group	ESCOM
Name	T10-2020630205-BC
Region	East US
SKU	Basic
Tier	Regional
Type	Public

Frontend IP configuration

Frontend IP configuration name	T10-2020630205-CIPFE
Frontend IP configuration IP address	To be created

Create < Previous Next > Download a template for automation Give feedback

Microsoft.LoadBalancer-20230617071158 | Overview

Your deployment is complete

Deployment name : Microsoft.LoadBalancer-20230617071158 Start time : 6/17/2023, 7:18:31 AM

Subscription : Azure for Students Correlation ID : 932a1378-541f-4c92-b6b6-eafada656a...

Resource group : ESCOM

Deployment details

Next steps

Go to resource

Give feedback

Tell us about your experience with deployment

Cost management

Get notified to stay within your budget and prevent unexpected charges on your bill.

Set up cost alerts >

Microsoft Defender for Cloud

Secure your apps and infrastructure

Go to Microsoft Defender for Cloud >

Free Microsoft tutorials

Start learning today >

Work with an expert

25. Ahora agregaremos las máquinas virtuales al grupo de backend del balanceador de carga

Add backend pool

T10-2020630205-BC

Name * T10-2020630205-GBE

Virtual network T6-2020630205-vnet (ESCOM)

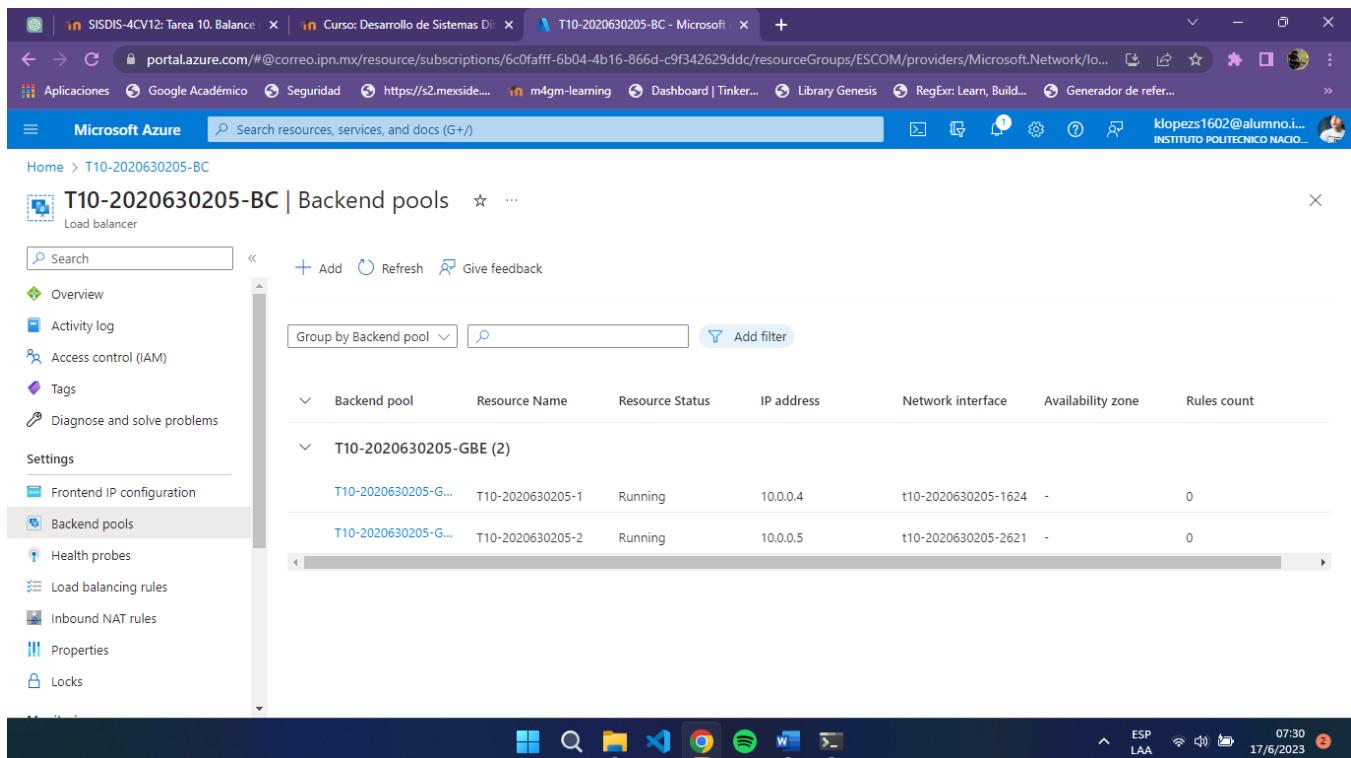
IP configurations

IP configurations associated to virtual machines and virtual machine scale sets must be in same location as the load balancer and be in the same virtual network.

+ Add | Remove

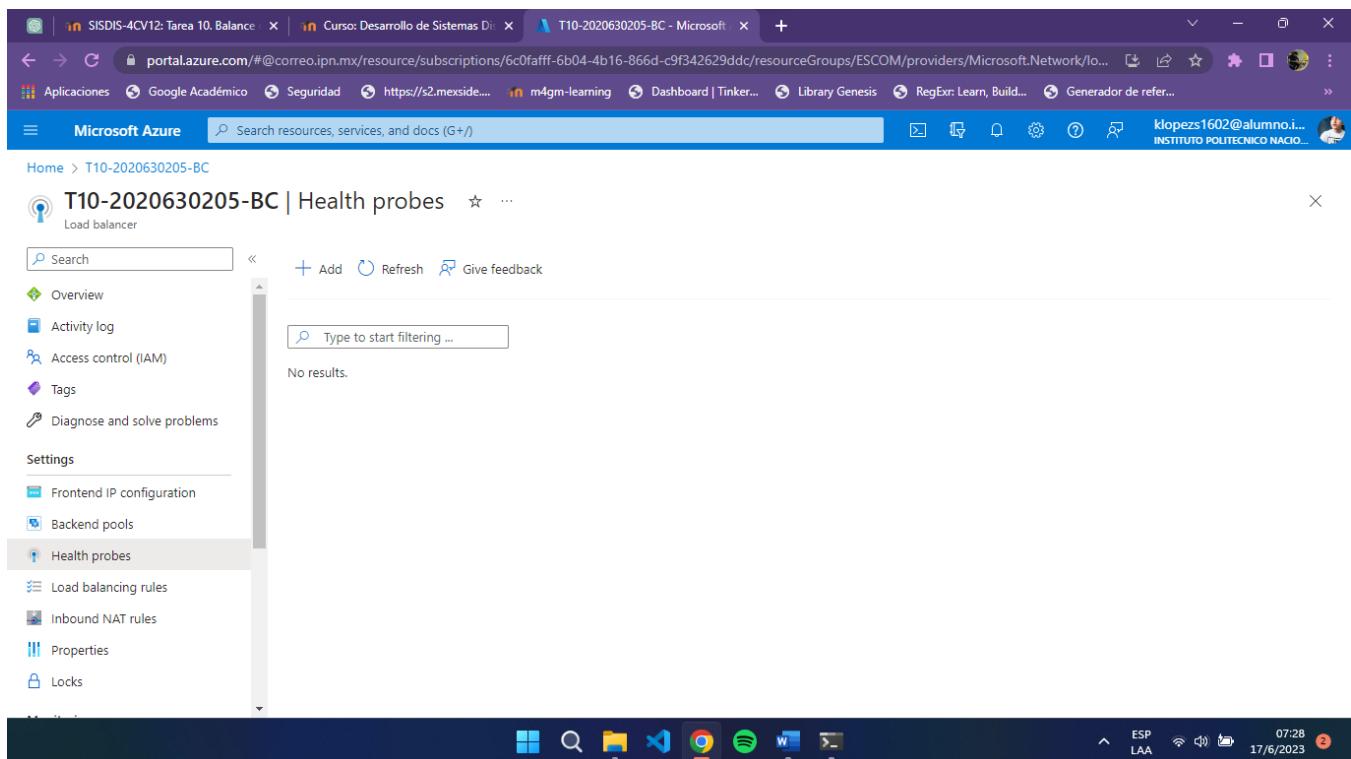
Resource Name	Resource group	Type	IP configuration	IP Address	Availability
T10-2020630205-1	ESCOM	Virtual machine	ipconfig1	10.0.0.4	ESCOM
T10-2020630205-2	ESCOM	Virtual machine	ipconfig1	10.0.0.5	ESCOM

Save Cancel Give feedback



The screenshot shows the Microsoft Azure portal interface. The left sidebar navigation bar is visible, showing various service links like 'Aplicaciones', 'Google Académico', 'Seguridad', etc., and the current selected item is 'Backend pools'. The main content area displays a table titled 'T10-2020630205-BC | Backend pools'. The table has columns: Backend pool, Resource Name, Resource Status, IP address, Network interface, Availability zone, and Rules count. There are two entries under 'Backend pool': 'T10-2020630205-GBE (2)' which contains two resources: 'T10-2020630205-1' and 'T10-2020630205-2', both of which are 'Running' and have an IP address of '10.0.0.4' and '10.0.0.5' respectively. The network interface is 't10-2020630205-1624' and 't10-2020630205-2621'. The availability zone is '-' and the rules count is '0'. At the bottom right of the table, there is a small red circle with the number '2'.

26. Ahora agregaremos un sondeo de estado



The screenshot shows the Microsoft Azure portal interface. The left sidebar navigation bar is visible, showing various service links like 'Aplicaciones', 'Google Académico', 'Seguridad', etc., and the current selected item is 'Health probes'. The main content area displays a table titled 'T10-2020630205-BC | Health probes'. The table has a single column labeled 'Type to start filtering ...'. Below the table, it says 'No results.' The status bar at the bottom right shows '07:28' and '17/6/2023'.

T10-2020630205-SE

Name * T10-2020630205-SE

Protocol * TCP

Port * 8080

Interval (seconds) * 10

Used by * T10-2020630205-REC

Save Cancel Give feedback

T10-2020630205-BC | Health probes

Name	Protocol	Port	Path	Used By
T10-2020630205-SE	Tcp	8080	-	T10-2020630205-REC

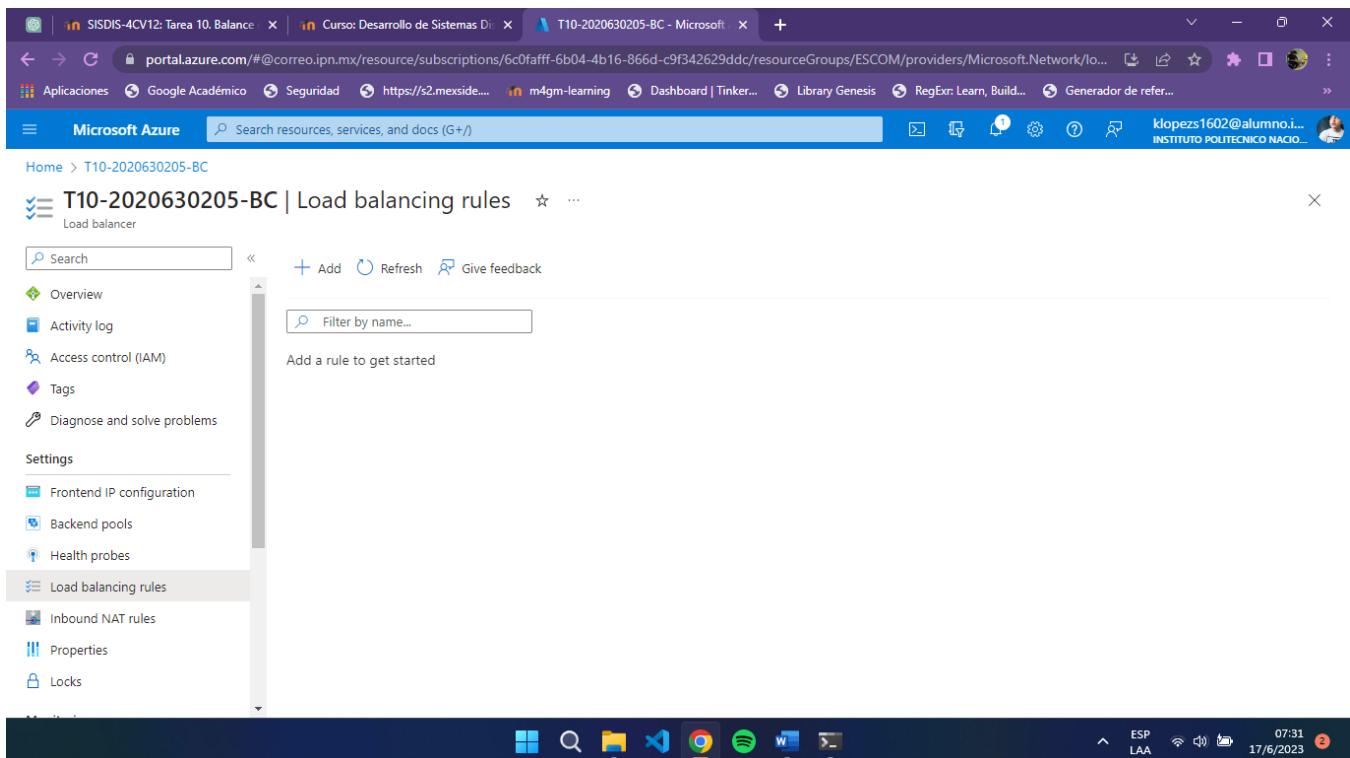
Search Add Refresh Give feedback

Overview Activity log Access control (IAM) Tags Diagnose and solve problems

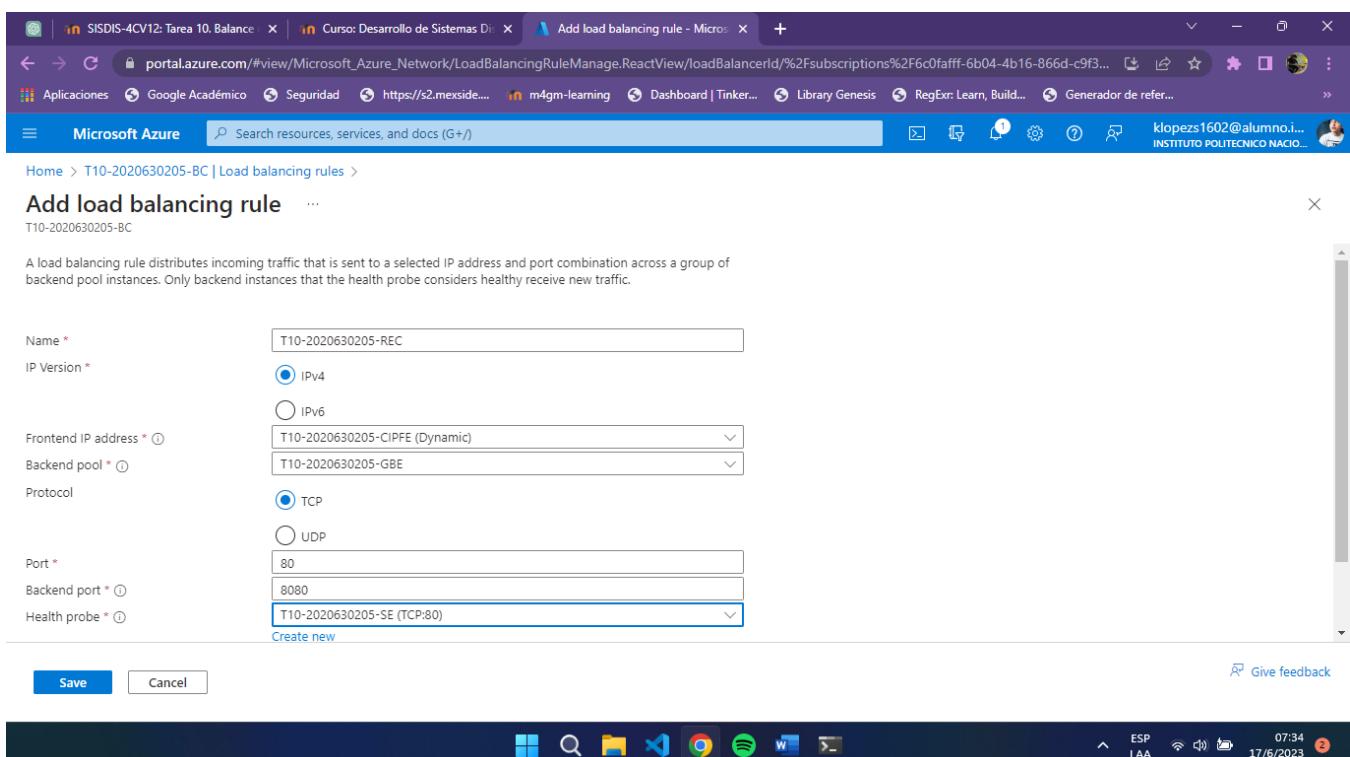
Frontend IP configuration Backend pools **Health probes** Load balancing rules Inbound NAT rules Properties Locks

ESLAA 23:09 18/6/2023

27. Ahora agregaremos una regla de equilibrio de carga



The screenshot shows the Microsoft Azure portal interface. The left sidebar is titled "T10-2020630205-BC | Load balancing rules". It includes sections for Overview, Activity log, Access control (IAM), Tags, Diagnose and solve problems, Settings (Frontend IP configuration, Backend pools, Health probes, Load balancing rules, Inbound NAT rules, Properties, Locks), and a search bar. The "Load balancing rules" section is currently selected. The main content area displays a message: "Add a rule to get started". A "Filter by name..." search bar is present. The top navigation bar shows multiple tabs and the user's profile information: "klopezs1602@alumno.i... INSTITUTO POLITECNICO NACIONAL". The bottom taskbar includes icons for File Explorer, Task View, Start, Search, Taskbar settings, and a clock showing 07:31.



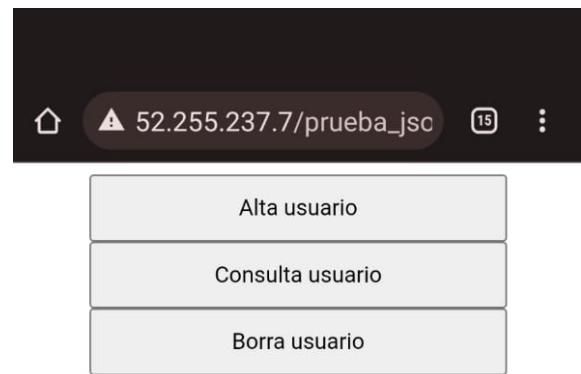
The screenshot shows the "Add load balancing rule" dialog box. The title is "Add load balancing rule" under "T10-2020630205-BC | Load balancing rules". The dialog contains the following fields:

- Name: T10-2020630205-REC
- IP Version: IPv4 (radio button selected)
- Frontend IP address: T10-2020630205-CIPFE (Dynamic)
- Backend pool: T10-2020630205-GBE
- Protocol: TCP (radio button selected)
- Port: 80
- Backend port: 8080
- Health probe: T10-2020630205-SE (TCP:80) (selected dropdown item)

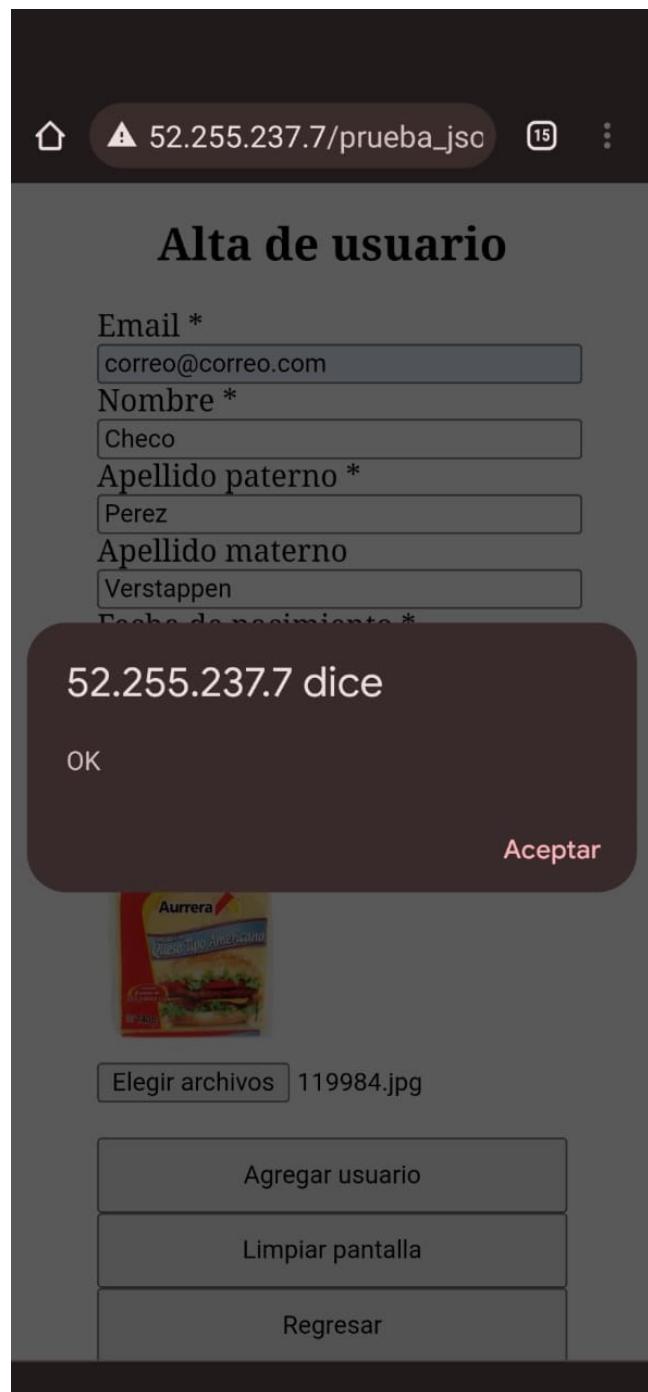
At the bottom, there are "Save" and "Cancel" buttons, and a "Give feedback" link. The bottom taskbar is identical to the one in the previous screenshot, showing the same icons and time (07:34).

The screenshot shows the Microsoft Azure portal interface. The user is navigating through the 'Load balancer' section of a resource group named 'T10-2020630205-BC'. On the left sidebar, under 'Load balancing rules', the 'Load balancing rules' option is selected. The main content area displays a table of load balancing rules. A success message box is visible in the top right corner, stating 'Saved load balancer rule' and 'Successfully saved load balancer rule 'T10-2020630205-REC''. The table has columns for Name, Load balancing rule, Backend pool, and Health One row is shown: 'T10-2020630205-REC' with 'T10-2020630205-REC (TCP/80 to TCP/8080)' under 'Load balancing rule' and 'T10-2020630205-GBE' under 'Backend pool'. The URL in the browser bar is <https://portal.azure.com/#@correo.ipn.mx/resource/subscriptions/6c0ffff-6b04-4b16-866d-c9f342629ddc/resourceGroups/ESCOM/providers/Microsoft.Network/loadBalancers/T10-2020630205-BC/loadBalancingRules>.

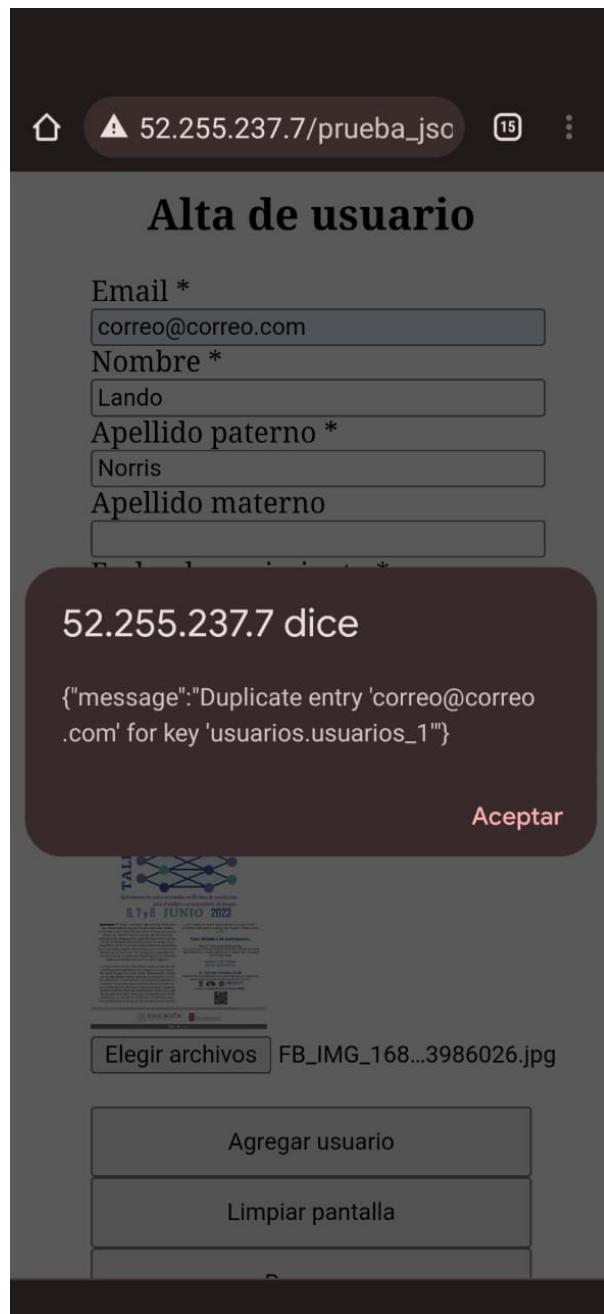
28. Una vez que todo está configurado y hemos iniciado tomcat y actualizado el archivo context.xml en ambas máquinas virtuales, ingresamos al servidor mediante la IP del balanceador de carga y probamos su funcionamiento.



29. Registramos un usuario



30. Intentamos registrar un usuario con el mismo correo antes registrado.



31. Consultamos el usuario antes registrado.



▲ 52.255.237.7/prueba_jsc 15 :

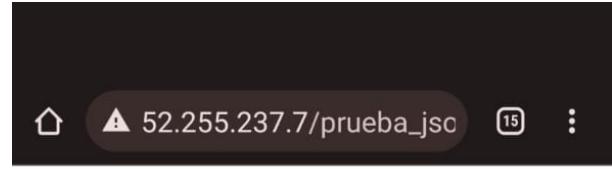
Consulta usuario

Email *

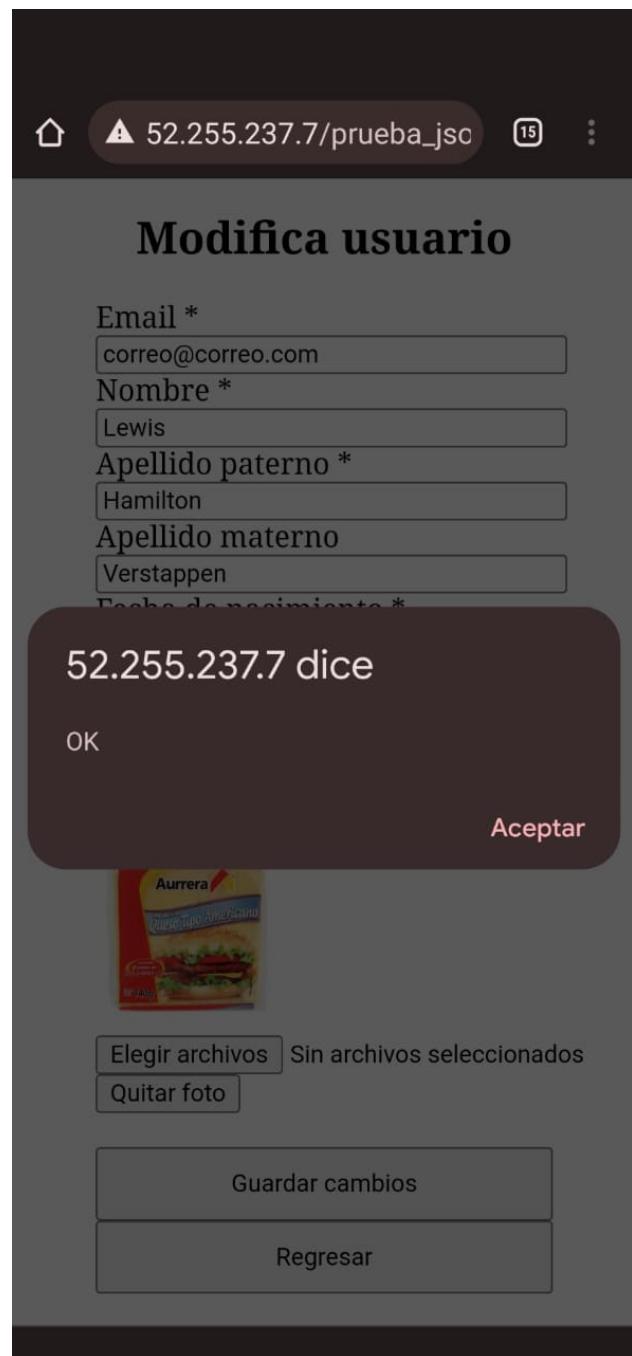
correo@correo.com

Buscar usuario

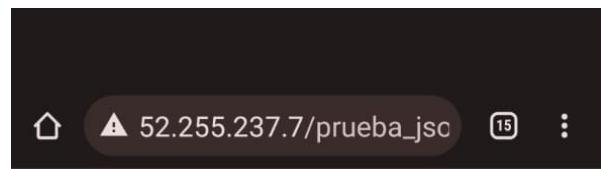
Regresar



32. Modificamos el nombre y apellido, y verificamos que se haya modificado



33. Verificamos que los cambios se hayan guardado consultando de nuevo el usuario



Email *

correo@correo.com

Nombre *

Lewis

Apellido paterno *

Hamilton

Apellido materno

Verstappen

Fecha de nacimiento *

12/06/2011, 23:26

Teléfono

1234567890

Genero

Masculino



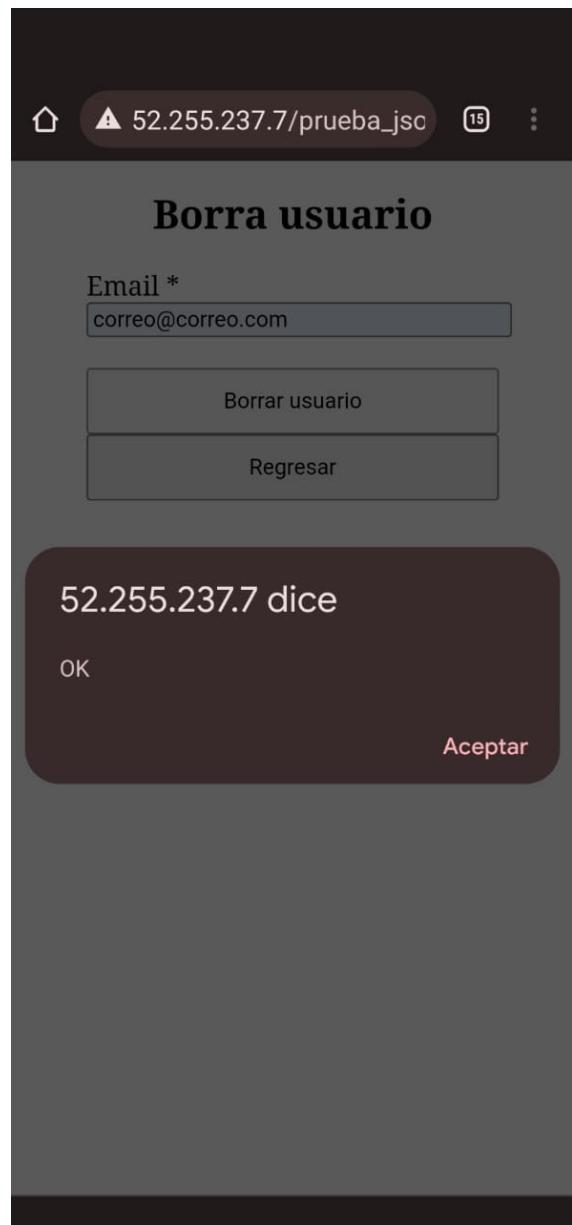
Elegir archivos Sin archivos seleccionados

Quitar foto

Guardar cambios

Regresar

34. Eliminamos el usuario y verificamos que se haya eliminado correctamente



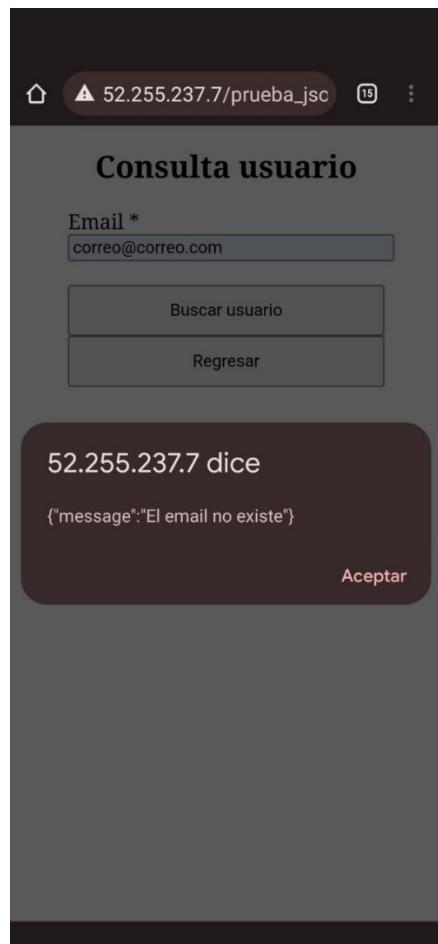
Borrar usuario

Regresar

52.255.237.7 dice

OK

Aceptar



Conclusiones

En la presente tarea, se utilizó una instancia de MySQL en PaaS, lo que proporciona una base de datos administrada de forma centralizada y reduce la carga operativa de administración. Esto permite centrarse en el desarrollo de la aplicación en lugar de preocuparse por la administración del servidor de base de datos.

Además, se configuró un balanceador de carga en Azure para distribuir el tráfico de manera equitativa y mejorar la escalabilidad y la disponibilidad del servidor web en Tomcat. El balanceador de carga permite manejar la carga de trabajo y distribuir las solicitudes entre las máquinas virtuales de manera eficiente.