



Máster en Ingeniería MultiCloud, DevOps y Seguridad.

AZURE LAB #8

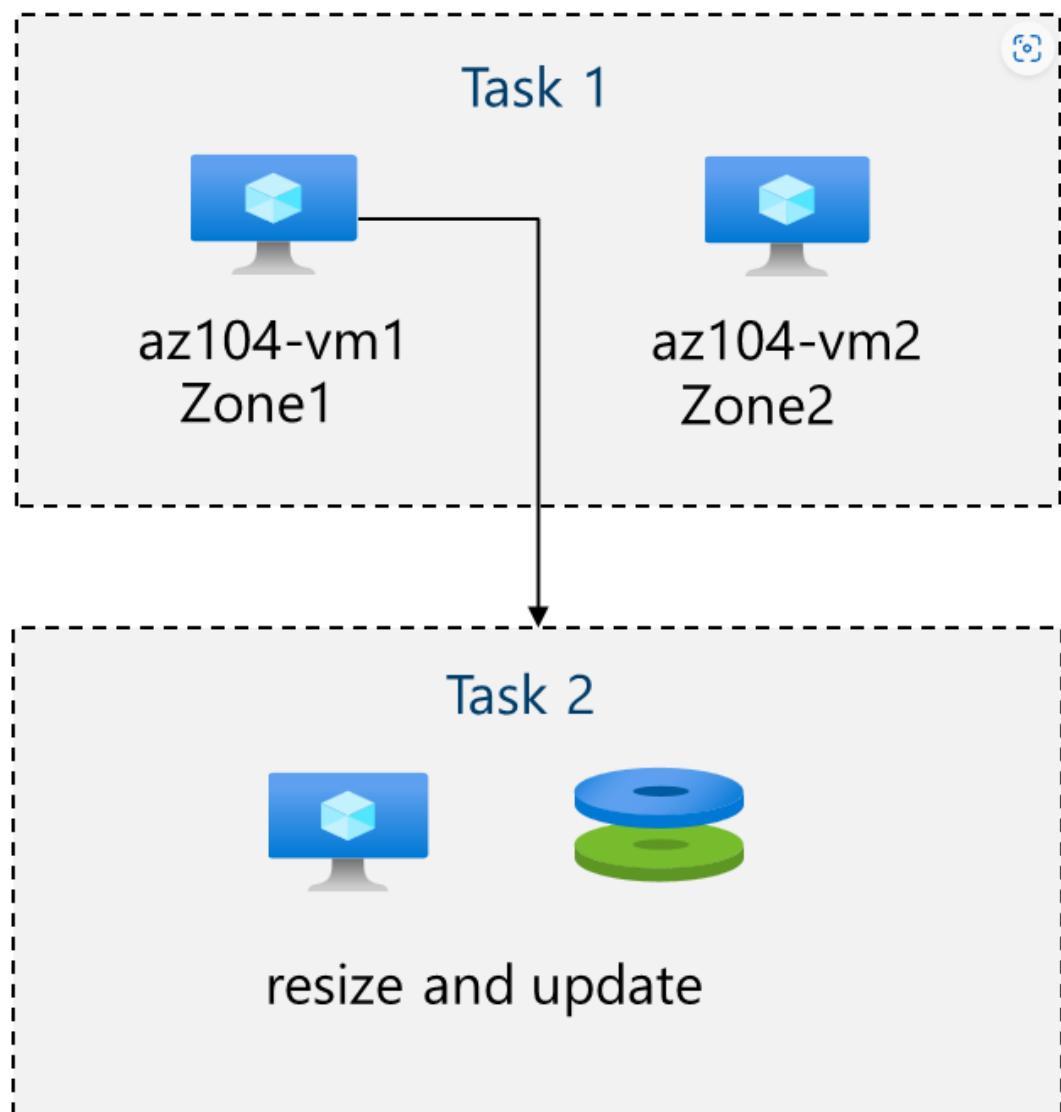
Administración de máquinas virtuales

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Esquema del laboratorio





Implementación de máquinas virtuales de Azure con resistencia de zona mediante Azure Portal.

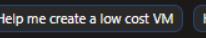
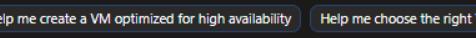
The screenshot shows the 'Create a virtual machine' wizard in the Azure portal. The 'Availability options' section is highlighted with a red box. Key settings visible include:

- Subscription:** Azure for Students
- Resource group:** az104-rg8
- Virtual machine names:** az104-vm1-1, az104-vm1-2
- Region:** (Europe) Norway East
- Availability zone:** Zones 1, 2 (selected)
- Security type:** Standard
- Image:** Windows Server 2019 Datacenter - x64 Gen2

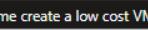
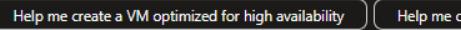
A callout box highlights the 'Availability zone' setting, stating: "Based on your zone selection, we will place 2 virtual machines, one in each selected zone. You may want to create this resource as a Virtual Machine Scale Set (VMSS) instead which allows you to manage, configure and scale load balanced virtual machines. [Create as VMSS](#)".

Se ha elegido "Availability zone" (Zona de disponibilidad), lo que significa que las máquinas se distribuirán en zonas distintas dentro de la región. Las zonas de disponibilidad son centros de datos físicas y lógicamente separados dentro de una región de Azure.

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Create a virtual machine ...   

Based on the number of availability zones selected, 2 virtual machines will be created. The following settings will be applied to each virtual machine unless specified otherwise.

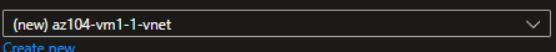
  

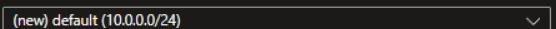
Basics Disks Networking Management Monitoring Advanced Tags Review + create

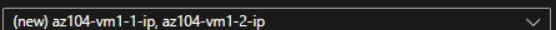
Define network connectivity for your virtual machine by configuring network interface card (NIC) settings. You can control ports, inbound and outbound connectivity with security group rules, or place behind an existing load balancing solution.
[Learn more](#)

Network interface

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

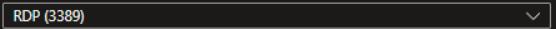
Virtual network *  (new) az104-vm1-1-vnet
[Create new](#)

Subnet *  (new) default (10.0.0.0/24)

Public IP  (new) az104-vm1-1-ip, az104-vm1-2-ip
[Configure IP address](#)
i 2 public IPs will be created with the names shown above.

NIC network security group  None Basic Advanced

Public inbound ports *  None Allow selected ports

Select inbound ports *  RDP (3389)

⚠ This will allow all IP addresses to access your virtual machine. This is only recommended for testing. Use the Advanced controls in the Networking tab to create rules to limit inbound traffic to known IP addresses.

Delete public IP and NIC when VM is deleted

Virtual network y Subnet: Las máquinas virtuales se conectarán a una nueva Red Virtual llamada az104-vm1-1-vnet. Dentro de esta VNet, se asignarán a la subred por defecto, la cual utiliza el rango de direcciones IP 10.0.0.0/24.

Delete public IP and NIC when VM is deleted: Se ha marcado la casilla, asegurando que los recursos de red asociados (la IP pública y la interfaz de red) se eliminen automáticamente cuando se borre la máquina virtual.



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✓ Your deployment is complete

Deployment name: CreateVm-MicrosoftWindowsServer.WindowsSe... Start time: 8/12/2025, 20:34:38
Subscription: Azure for Students Correlation ID: 5b834311-35f1-4fc8-bed7-06bb979c9d12

Deployment details

Resource	Type	Status	Operation details
az104-vm1-1	Microsoft.Compute/virtualMachines	OK	Operation details
az104-vm1-2	Microsoft.Compute/virtualMachines	OK	Operation details
az104-vm1-1977_z1	Microsoft.Network/networkInterfaces	OK	Operation details
az104-vm1-1157_z1	Microsoft.Network/networkInterfaces	OK	Operation details
az104-vm1-1-nsg	Microsoft.Network/networkSecurityGroups	OK	Operation details
az104-vm1-1-vnet	Microsoft.Network/virtualNetworks	OK	Operation details
az104-vm1-1-ip	Microsoft.Network/publicIpAddresses	OK	Operation details
az104-vm1-1-ip	Microsoft.Network/publicIpAddresses	OK	Operation details

Recursos desplegados.

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Administración del escalado del proceso y el almacenamiento para máquinas virtuales

The screenshot shows the Azure portal interface for a virtual machine named 'az104-vm1-1'. In the left sidebar, under 'Settings', the 'Availability + scale' section is expanded, and the 'Size' option is selected. This selection is highlighted with a red box. The main content area displays a table of VM sizes. A second red box highlights the 'D2ds_v4' row, which is described as a 'General purpose' VM size with 2 vCPUs, 8 GB RAM, 4 data disks, 3200 Max IOPS, and 16 GB Local storage (SCSI). Other rows shown include D2as_v4, D4s_v4, D4ds_v4, D2s_v3, E-Series v4, E-Series v3, F-Series v2, and various previous generation sizes.

Cambiamos el size de la máquina virtual a un tier superior

The screenshot shows the Azure portal interface for the same virtual machine 'az104-vm1-1'. In the left sidebar, the 'Disks' section is selected. The main content area shows the 'OS disk' configuration for the current VM size. It also displays a table for 'Data disks' with one entry: 'vm1-disk1' (Standard HDD, 32 GB, 500 Max IOPS, 60 Max throughput, Platform-managed key, Read-only). A red box highlights the '+ Create and attach a new disk' button in the 'Data disks' section.

Creamos un nuevo disco y lo quitamos de la maquina virtual para usarlo luego.



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Size	Disk tier	Provisioned IOPS	Provisioned throughput	Max Shares	Max burst IOPS	Max burst throughput
4 GiB	E1	500	100	3	600	150
8 GiB	E2	500	100	3	600	150
16 GiB	E3	500	100	3	600	150
32 GiB	E4	500	100	3	600	150
64 GiB	E6	500	100	3	600	150
128 GiB	E10	500	100	3	600	150
256 GiB	E15	500	100	3	600	150
512 GiB	E20	500	100	3	600	150
1024 GiB	E30	500	100	5	1000	250
2048 GiB	E40	500	100	5	-	-
4096 GiB	E50	500	100	5	-	-
8192 GiB	E60	2000	400	10	-	-
16384 GiB	E70	4000	600	10	-	-
32767 GiB	E80	6000	750	10	-	-

Con el disco creado, accedemos a settings – size performance donde voy a modificar el tipo de almacenamiento a STANDARD SSD y lo volveremos a asignar en la máquina virtual.

LUN	Disk name	Storage type	Size (GiB)	Max IOPS	Max throughput (..)	Encryption	Host caching
0	az104-vm1-1_OsDisk_1_f87a9c3c147b4d1	Premium SSD LRS	127	500	100	SSE with PMK	Read/write

Volvemos a la configuración de la máquina virtual donde selecciono la configuración de discos, vamos a añadirle el disco modificado que hemos creado anteriormente.



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The screenshot shows the 'Disks' blade for a virtual machine named 'az104-vm1-1'. The left sidebar includes options like Overview, Activity log, Access control (IAM), Tags, Diagnose and solve problems, Resource visualizer, Connect, Networking, Settings (with 'Disks' selected), Extensions + applications, Operating system, Configuration, Advisor recommendations, Properties, and Locks. The main area has two tabs: 'OS disk' (selected) and 'Data disks'. Under 'OS disk', there is one entry: 'az104-vm1-1_OxDisk_1_f87a9c3c147b4d6' (Premium SSD LRS, 127 GiB, 500 Max IOPS, 100 Max throughput, SSE with PMK, Host caching Read/write). Under 'Data disks', there is one entry: 'vm1-disk1' (Standard SSD LRS, 32 GiB, 500 Max IOPS, 100 Max throughput, SSE with PMK, Host caching None). A red box highlights the 'vm1-disk1' row in the Data disks table.

Disco añadido.

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Creación y configuración de conjuntos de escalado de máquinas virtuales de Azure

Create a Virtual Machine Scale Set (VMSS) ...

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

Subscription * Azure for Students

Resource group * az104-rg8 Create new

Scale set details

Virtual machine scale set name * vmss1

Region * (Europe) Norway East Deploy to an Azure Extended Zone

Availability zone ① Zones 1, 2, 3 ②
 Autoscaling can help you respond to an outage by scaling out new instances in another zone.

Orchestration

A scale set has a "scale set model" that defines the attributes of virtual machine instances (size, number of data disks, etc). As the number of instances in the scale set changes, new instances are added based on the scale set model.
[Learn more about the scale set model](#)

Orchestration mode * ① Flexible: achieve high availability at scale with identical or multiple virtual machine types Uniform: optimized for large scale stateless workloads

Security type ① Standard

Scaling

Scaling mode ① Manually update the capacity: Maintain a fixed amount of instances. Autoscaling: Scaling based on a CPU metric, on any schedule. No scaling profile: manual attach virtual machines after deployment **i** Subscription needs Microsoft.Insights registration to use autoscaling. [Learn more](#)

Instance count * ① 2 Configure scaling options

Creación de un Virtual Machine Scale Set (VMSS), una herramienta que permite desplegar y gestionar un conjunto de máquinas virtuales idénticas.

El Orchestration mode (Modo de Orquestación) se establece en Uniform. Este modo está optimizado para grandes cargas de trabajo sin estado (stateless workloads) y asegura que todas las instancias VM tengan una configuración idéntica basada en un modelo único.



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The screenshot shows the Azure portal interface for creating a VMSS. It's on the 'Add a subnet' step. A subnet named '10.82.0.0/20' is being created with an IP address range of '10.82.0.0 - 10.82.15.255'. The 'Subnets' table shows one entry with 4096 addresses. On the right, there are sections for 'IPv4' and 'IPv6' subnet configuration, 'Private subnet' (selected), and 'Security' (NAT gateway set to 'None'). A note at the bottom says 'You must add at least one subnet to the virtual network.'

Creo una nuevo espacio de red y una subred virtual para el scale set.

The screenshot shows the 'Create network security group' page. A new inbound security rule is being configured with the following details: Source: Any, Destination port range: SSH (TCP/22), Service: HTTP, Destination port range: 80, Protocol: TCP, Action: Allow, Priority: 1010, Name: 'allow-https'. The 'Source port range' field is currently empty.

Dentro de la configuración de red, creo un nuevo grupo de seguridad y añado una regla de tráfico entrante para permitir conexiones HTTP.

The screenshot shows the 'Load balancing options' section. 'Azure load balancer' is selected, with a note explaining it supports all TCP/UDP traffic. 'Application gateway' is also listed. Below this, a warning message states: 'To allow traffic from your load balancing product, please update the appropriate port configuration on your network security group associated with your network interface.' In the 'Select a load balancer' dropdown, '(new) vmss-lb' is chosen.

Creo un balanceador de carga con las configuraciones por defecto de azure.



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✓ Your deployment is complete

Deployment name : CreateVmss-MicrosoftWindowsServer;WindowsServer-2-20251208211232
Subscription : Azure for Students
Resource group : az104-rg8

Start time : 8/12/2025, 21:17:43
Correlation ID : dc90e53c-7581-4e75-9bc5-46641e4a8ac1

Deployment details

Resource	Type	Status	Operation details
vmss1	Virtual machine scale set	OK	Operation details
vmss-lb	Load balancer	Created	Operation details
network-interface-associated-virtual-network-20251208211744	Deployment	OK	Operation details
vmss1-nsg	Network security group	OK	Operation details
vmss-lb-publicip	Public IP address	OK	Operation details

El scale set desplegado.

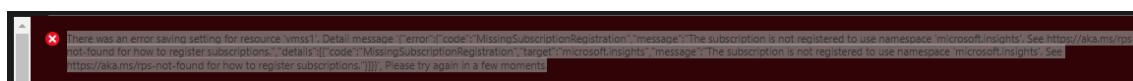
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Escalado de los Conjuntos de escalado de las máquinas virtuales de Azure

The screenshot shows the Azure portal interface for managing a Virtual Machine Scale Set (vmss1). The left sidebar navigation includes 'Overview', 'Activity log', 'Tags', 'Diagnose and solve problems', 'Instances', 'Resource visualizer', 'Networking', 'Settings', 'Availability + scale', and 'Scaling'. The 'Scaling' section is currently selected. The main content area displays two scaling options: 'Manual scale' (selected) and 'Custom autoscale'. Under 'Custom autoscale', the 'Autoscale setting name' is 'Virtual Machine Host', 'Resource group' is 'az104-rg8', and 'Predictive autoscale' mode is 'Disabled'. A warning message states: 'The very last or default recurrence rule cannot be deleted. Instead, you must edit it to change its recurrence.' Below this, the 'Default' scale condition is defined with a metric trigger: 'Scale based on a metric' (selected), 'Metric threshold to trigger scale action' is 'Greater than 70%', 'Duration (minutes)' is 10, 'Time grain (minutes)' is 1, 'Time grain statistic' is 'Average', 'Time aggregation' is 'Average', and 'Action' is 'Increase percent by 50%'. A note at the bottom says: 'This scale condition is executed when none of the other scale conditions are met.'

La condición para activar el escalado es cuando el promedio del porcentaje de CPU es Greater than 70% (Mayor que 70%).

El número de instancias se incrementará en un 50% de la capacidad actual. Si el recuento actual de instancias es 2 (como se configuró en otra captura), esto añadiría 1 instancia más (50% de 2).



```
raul_casado [ ~ ]$ az provider register --namespace Microsoft.Insights
Registering is still on-going. You can monitor using 'az provider show -n Microsoft.Insights'
```

Este error significa que la suscripción de Azure que estás utilizando no tiene registrado el proveedor de recursos microsoft.insights.

Para resolver este problema y permitir que la configuración de escalado se guarde, debo registrar el proveedor de recursos microsoft.insights en mi suscripción.

Para ello he utilizado el comando de azure cli az provider register --namespace Microsoft.Insights



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Scale rule

Resource type: Virtual machine scale sets Resource: vmss1

Criteria

Metric namespace: Virtual Machine Host Metric name: Percentage CPU Time grain: 1 minute

Dimension Name	Operator	Dimension Values	Add
VMName	=	All values	+

If you select multiple values for a dimension, autoscale will aggregate the metric across the selected values, not evaluate the metric for each values individually.

Percentage CPU (Average)
18,82 %

Enable metric divide by instance count

Operator: Less than Metric threshold to trigger scale action: 30 %

Duration (minutes): 10 Time grain (minutes): 1

Time grain statistic: Average Time aggregation: Average

Action

Operation: Decrease percent by Cool down (minutes): 5

Percentage: 50

Creo una regla para disminuir las máquinas del escalado en caso de que la cpu esté por debajo del 30%



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The screenshot shows the Azure portal interface for managing a Virtual Machine Scale Set named 'vmss1'. The left sidebar contains navigation links: Overview, Activity log, Access control (IAM), Tags, Diagnose and solve problems, and Instances. The 'Instances' link is highlighted with a red box. The main content area displays a table titled 'Search virtual machine instances' with columns: Instance, Computer name, Status, Protection policy, Provisioning state, Health state, and Latest model. Two rows are present: 'vmss1_0' and 'vmss1_1', both showing 'Running' status, 'Succeeded' protection policy, and 'Yes' for both Health state and Latest model.

Instance	Computer name	Status	Protection policy	Provisioning state	Health state	Latest model
vmss1_0	vmss10odg000000	Running	Succeeded	Succeeded	Yes	
vmss1_1	vmss10odg000001	Running	Succeeded	Succeeded	Yes	

Aquí visualizo las instancias de las máquinas virtuales del scale set.

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Creación de una máquina virtual mediante Azure PowerShell

```
PS /home/raul_casado> New-AzVM  
>>> -ResourceGroupName 'az169-rgb'  
>>> -Name 'mySVN'  
>>> -Location 'Norway East'  
>>> -Image 'Win2019Datacenter'  
>>> -Zone '1'  
>>> -Size 'Standard D2s v3'  
>>> -Credential (Get-Credential)  
  
PowerShell credential request  
Enter your credentials.  
User: localadmin  
Password for user localadmin: *****  
  
WARNING: Upcoming breaking changes in the cmdlet 'New-AzVM' :  
The default VM size will change from 'Standard D2s v3' to 'Standard D2s v5'.  
- This change will take effect on '11/1/2025'  
- The change is expected to take effect in Az version : '15.0.0'  
- The change is expected to take effect in Az.Compute version : '11.0.0'  
Note : Go to https://aka.ms/azps-changewarnings for steps to suppress this breaking change warning, and other information on breaking changes in Azure PowerShell.  
You can reference https://aka.ms/findimagePS on how to find VM Images using PowerShell.  
Creating Azure resources [8%]
```

New-AzVm ^

```
-ResourceGroupName 'az104-rg8'`  
-Name 'myPSVM'`  
-Location 'Norway EAST'`  
-Image 'Win2019Datacenter'`  
-Zone '1'`  
-Size 'Standard_D2s_v3'`  
-Credential (Get-Credential)
```

Comando utilizado para la creación de la vm

```
PS /home/raul_casado> Get-AzVM
>> -StatusesGroupName "az104-rg8"
>>
ResourceGroupName   Name    Location        VmSize  OsType     NIC Provisioning Zone PowerState MaintenanceAllowed
az104-rg8          myPSVM norwayeast Standard_D2s_v3 Windows mySVM   Succeeded   1 VM running
```

Uso Get-AzVM para mostrar una lista de las máquinas virtuales del grupo de recursos.

```
PS /home/raul_casado> Remove-AzResourceGroup -name az104-rg8
```

```
Remove-AzResourceGroup -name az104-rg8
```

Para borrar el grupo de recursos donde he ido haciendo el laboratorio.