

AZ-104 Lab 08: Manage Virtual Machines

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Environment: Azure Portal (Campus Lab)

Security Note: Screenshots only — no screen recordings or exposed credentials.

Lab Overview

This lab explores the deployment and scaling of Azure Virtual Machines (VMs) and Virtual Machine Scale Sets (VMSS).

You'll manually deploy zone-resilient VMs, scale compute and storage resources, and prepare for autoscaling via VMSS.

Task 1: Deploy Zone-Resilient Azure Virtual Machines

Objective:

Deploy two virtual machines across different availability zones to achieve a 99.99% uptime SLA.

Steps Taken:

1. Signed into [Azure Portal](#)
2. Navigated to **Virtual Machines > + Create > Azure Virtual Machine**
3. Selected **Zone 1 and Zone 2** under Availability Zone
4. Configured the following settings:

Setting	Value
Resource Group	az104-rg8
VM Names	az104-vm1, az104-vm2
Region	East US
Image	Windows Server 2019 Datacenter - x64 Gen2
Size	Standard D2s v3
Username	localadmin
Password	[Secure]
Public Inbound Ports	None
OS Disk Type	Premium SSD
NIC & Public IP	Delete on VM deletion
Load Balancer	None
Patch Orchestration	Azure orchestrated
Boot Diagnostics	Disabled

Screenshot Checklist:

1. created a storage account using the cloud shell

Quickstart Center Azure AI Foundry Kubernetes services Virtual machines App Services Storage accounts SQL databases

→ More services

Create storage account

Subscription *
AZ-104T00A CSR 2

Resource group *
az104-rg8-lod54389909
[Create a resource group](#)

Region *
(US) East US

Storage account name *
cloudshell54389909

File share *
shellstorage

Create Previous

✓ VM creation page with both zones selected

Create a virtual machine

Help me create a VM optimized for high availability Help me create a low cost VM

i 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 otherwise.

Basics Disks Networking Management Monitoring Advanced Tags Review + create

Create a virtual machine that runs Linux or Windows. Select an image from Azure marketplace or use your own customized image. Complete the Basics tab then Review + create to provision a virtual machine with default parameters or review each tab for full customization. [Learn more](#)

Project details

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

Subscription * ⓘ
AZ-104T00A CSR 2

Resource group * ⓘ
az104-rg8-lod54389909
[Create new](#)

Instance details

Virtual machine names ⓘ
az104-vm1, az104-vm2

< Previous Next : Disks > Review + create

Region * ⓘ (US) East US 2 [Deploy to an Azure Extended Zone](#)

Availability options ⓘ Availability zone

Zone options ⓘ

- ☒ Self-selected zone
Choose up to 3 availability zones, one VM per zone
- ☐ Azure-selected zone (Preview)
Let Azure assign the best zone for your needs

Availability zone * ⓘ Zones 1, 2

i 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](#)

✓ Disk configuration (Premium SSD)

Home / Compute infrastructure / Virtual machines /

Create a virtual machine



Help me create a VM optimized for high availability

Help me create a low cost VM

i 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 otherwise.

i Encryption at host is not registered for the selected subscription. [Learn more](#)

OS disk

OS disk size ⓘ Image default (127 GiB)

OS disk type * ⓘ Premium SSD (locally-redundant storage)

Delete with VM ⓘ ☒

Key management ⓘ Platform-managed key

Enable Ultra Disk compatibility ⓘ ☐

Data disks for az104-vm1

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

< Previous

Next : Networking >

Review + create

✓ Networking tab showing no load balancer

Create a virtual machine

Help me create a VM optimized for high availability

Help me create a low cost VM

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 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) vnet-eastus2 (az104-rg8-lod54389909)
	Edit virtual network
Subnet * ⓘ	(New) snet-eastus2-1
	Edit subnet 172.16.0.0 - 172.16.0.255 (256 addresses)
Public IP ⓘ	(new) az104-vm1-ip, az104-vm2-ip
	Configure IP address

2 public IPs will be created with the names shown above.

< Previous

Next : Management >

Review + create

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 otherwise.

change inbound port rules in the VM > Networking page.

Delete public IP and NIC when VM is deleted ⓘ



Enable accelerated networking ⓘ



Load balancing

You can place this virtual machine in the backend pool of an existing Azure load balancing solution. [Learn more](#)

Load balancing options ⓘ

- ☒ None
- ☐ Azure load balancer
Supports all TCP/UDP network traffic, port-forwarding, and outbound flows.
- ☐ Application gateway
Web traffic load balancer for HTTP/HTTPS with URL-based routing, SSL termination, session persistence, and web application firewall.

< Previous

Next : Management >

Review + create



Management tab with patch orchestration

Login with Microsoft Entra ID ⓘ ☐

Auto-shutdown

Enable auto-shutdown ⓘ ☐

Guest OS updates

Enable periodic assessment ⓘ ☐

Enable hotpatch ⓘ ☐

Patch orchestration options ⓘ

RBAC role assignment of Virtual Machine Administrator Login or Virtual Machine User Login is required when using Microsoft Entra ID login. [Learn more](#)

Hotpatch is not available for this image. [Learn more](#)

Some patch orchestration options are not available for this image. [Learn more](#)

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

✓ Monitoring tab with Boot Diagnostics disabled

Home / Compute infrastructure / Virtual machines /

Create a virtual machine

Help me create a VM optimized for high availability Help me create a low cost VM

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 otherwise.

Basics Disks Networking Management **Monitoring** Advanced Tags Review + create

Configure monitoring options for your VM.

Alerts

Enable recommended alert rules ⓘ ☐

Diagnostics

Boot diagnostics ⓘ ☐ Enable with managed storage account (recommended)
☐ Enable with custom storage account
☒ Disable

Enable OS guest diagnostics ⓘ ☐

Health

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

✓ Final Review + Create screen

✓ Deployment complete notification



CreateVm-MicrosoftWindowsServer.WindowsServer-201-2025090506375

Deployment

» Delete Cancel Redeploy Download Refresh

✓ Your deployment is complete



Deployment name: CreateVm-MicrosoftWindowsServer... Start time: 9/5/2025, 6:45:36 AM
Subscription: [AZ-104T00A CSR 2](#) Correlation ID: 7fb00a5c-2a95-407d-b:
Resource group: [az104-rg8-lod54389909](#)

▼ Deployment details

^ Next steps

[Setup auto-shutdown](#) Recommended

[Monitor VM health, performance and network dependencies](#) Recommended

[Run a script inside the virtual machine](#) Recommended

[Go to resource](#)

[Create another VM](#)

Give feedback

[Tell us about your experience with deployment](#)



Cost Management

Get notified to stay with prevent unexpected ch
[Set up cost alerts >](#)



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Notes:

- VM deployment automatically created NICs, disks, and public IPs as separate resources
- Availability Zones ensure high SLA and fault tolerance

Task 2: Manage Compute and Storage Scaling for Virtual Machines

Objective:

Vertically scale VM compute resources and modify attached disk performance.

Steps Taken:

1. Navigated to az104-vm1 > Availability + scale > Size
2. Changed VM size to D2ds_v4 and confirmed resize
3. Added a new data disk:

Setting	Value
---------	-------

Disk Name	vm1-disk1
-----------	-----------

Storage Type	Standard HDD
--------------	--------------

Size	32 GiB
------	--------

4. Detached the disk

5. Navigated to **Disks > vm1-disk1 > Size + performance**
6. Changed storage type to **Standard SSD**
7. Reattached disk to az104-vm1 and verified SSD upgrade

Screenshot Checklist:

- ✓ VM size change confirmation (D2ds_v4)

az104-vm1 | Size ☆ ...
Virtual machine

» ⓘ If the virtual machine is currently running, changing its size will cause it to be restarted. Stopping the virtual machine may reveal additional sizes:

D2ds_v4 × Display cost: **Monthly** vCPUs: **All** RAM (GiB): **All** + Add filter

Showing 1 of 398 VM sizes. | Subscription: AZ-104T00A CSR 2 | Region: East US 2 | Current size: Standard_D2ds_v4 | Group by size

[Learn more about VM sizes](#)

VM Size ↑↓	Type ↑↓	vCPUs ↑↓	RAM (GiB) ↑↓	Data disks ↑↓
▼ D-Series v4	The 4th generation D family sizes for your general purpose needs			
D2ds_v4	General purpose	2	8	4

Resize

Prices presented are estimates in USD that include only Azure infrastructure costs and any discounts for the subscription and location. The prices don't include any applicable software costs. Final charges will appear in your local currency in cost analysis and billing views. [View Azure pricing calculator](#). ⓘ If you purchased Azure services through a reseller, contact your reseller for full pricing details.

- ✓ Disk creation screen with Standard HDD

» [Refresh](#) | [Additional settings](#) [Feedback](#) [Troubleshoot](#)

OS disk
[↻ Swap OS disk](#)

Disk name	Storage type	Size (GiB)	Max IOPS	Max throughput (...)
az104-vm1_disk1_946eb70ca8ea4eb9	Premium SSD LRS	127	500	100

Data disks

Showing 1 of 1 attached data disks
[+ Create and attach a new disk](#) [Attach existing disks](#)

LUN ⓘ	Disk name	Storage type	Size (GiB)	Max IOPS	Max thr
0 ▾	vm1-disk1 ✓	Standard HDD (... ▾	32 ✓	500	60

[Apply](#) [Discard changes](#)

✓ Disk performance blade showing SSD upgrade

[Home](#) > [Disks](#) > [vm1-disk1](#)

vm1-disk1 | Size + performance ☆ ... [Why is my disk running slow?](#)

» [Explore ways to boost disk performance](#)

Storage type ⓘ

Standard SSD (locally-redundant storage) ▾

 Why are some options disabled? ⓘ

Size	Disk tier	Provisioned IOPS	Provisioned thro...	Max Shares ⓘ	Max bur
4 GiB	E1	500	100	3	600
8 GiB	E2	500	100	3	600
16 GiB	E3	500	100	3	600
32 GiB	E4	500	100	3	600
64 GiB	E6	500	100	3	600
128 GiB	E10	500	100	3	600
256 GiB	E15	500	100	3	600
512 GiB	E20	500	100	3	600
1024 GiB	E30	500	100	5	1000

✓ Disk reattachment screen

Virtual machine

» [Refresh](#) | [Additional settings](#) [Feedback](#) [Troubleshoot](#)

The configuration of this virtual machine and its attached disk(s) may not allow for the disk(s) to utilize their full throughput performance. The current virtual machine size supports 48 MBps. The total for disk(s) attached to virtual machine 'az104-vm1' is 200 MBps. You can change the virtual machine size to support additional disk(s) throughput. [Learn more](#)

OS disk

↺ Swap OS disk

Disk name	Storage type	Size (GiB)	Max IOPS	Max throughput (...)
az104-vm1_disk1_946eb70ca8ea4eb9	Premium SSD LRS	127	500	100

Data disks

Filter by name

Showing 1 of 1 attached data disks

Create and attach a new disk

Attach existing disks

LUN ⓘ	Disk name	Storage type	Size (GiB)	Max IOPS	Max thr...
-------	-----------	--------------	------------	----------	------------

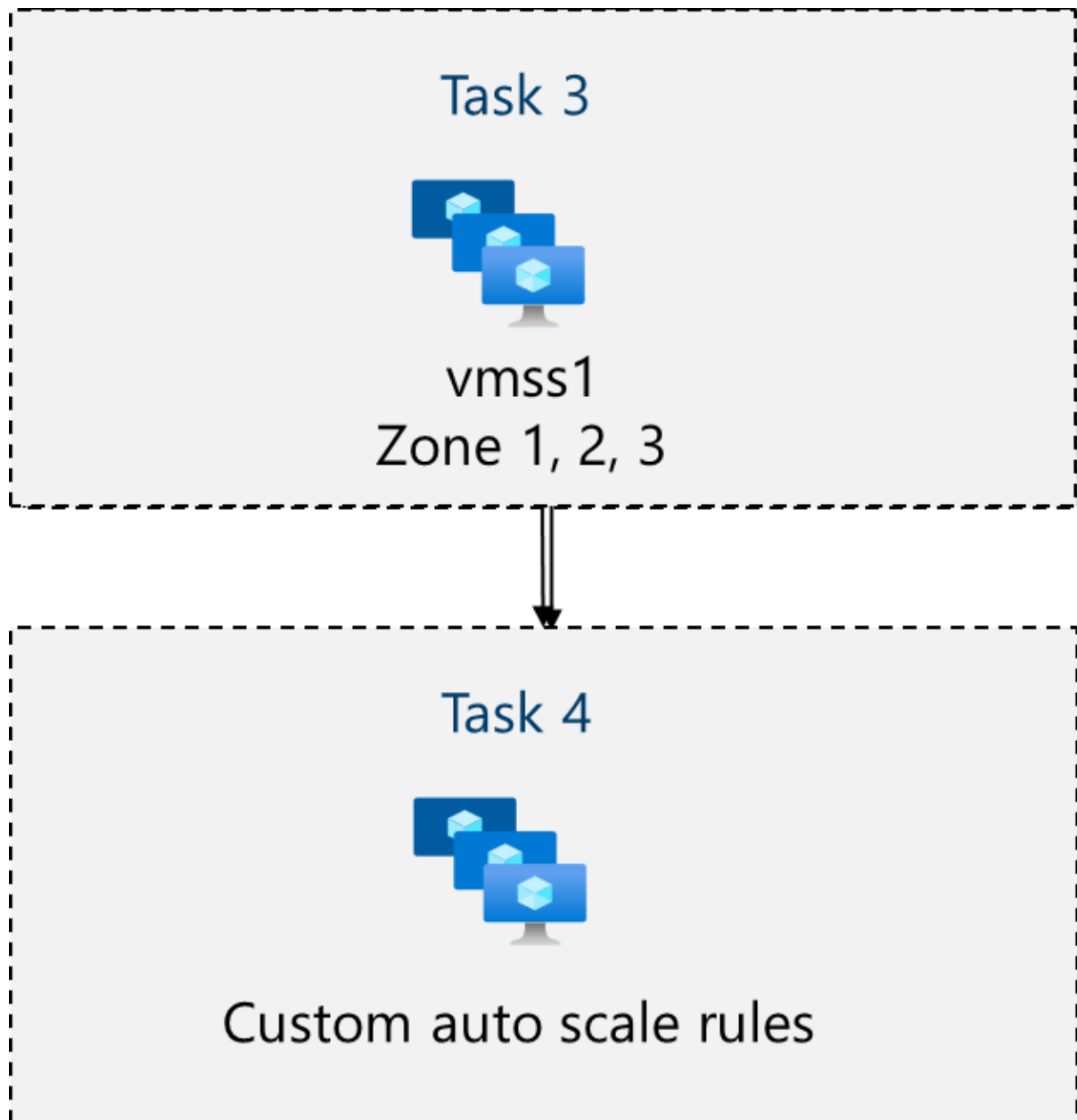
Apply

Discard changes

Notes:

- Resizing VM is vertical scaling — useful for performance tuning
- Disk detachment preserves data for reuse
- SSD upgrade improves IOPS and latency

Task 3: Create and Configure Azure Virtual Machine Scale Sets



Objective:

Deploy a VM Scale Set across multiple availability zones with networking, NSG, and load balancing.

Steps Taken:

1. Navigated to **Virtual Machine Scale Sets > + Create**
2. Configured the following on the Basics tab:

Setting	Value
Resource Group	az104-rg8
Scale Set Name	vmss1
Region	East US

Setting	Value
Availability Zones	1, 2, 3
Orchestration Mode	Uniform
Image	Windows Server 2019 Datacenter
Size	Standard D2s_v3
Username	localadmin
Password	[Secure]

3. Accepted defaults on Spot and Disks tabs
4. Edited virtual network:

Setting	Value
VNet Name	vmss-vnet
Address Range	10.82.0.0/20
Subnet Name	subnet0
Subnet Range	10.82.0.0/24

5. Created NSG vmss1-nsg with inbound HTTP rule
6. Enabled Public IP
7. Created Load Balancer vmss-lb
8. Disabled Boot Diagnostics
9. Validated and deployed

Screenshot Checklist:

- ☒ VMSS creation page with zones selected

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

your resources.

Subscription *

AZ-104T00A CSR 2

Resource group *

az104-rg8-lod54389909

[Create new](#)

Scale set details

Virtual machine scale set name *

vmss1


Region *

(US) East US 2

[Deploy to an Azure Extended Zone](#)


Availability zone ⓘ

Zones 1, 2, 3

 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](#) 

✓ VNet and subnet configuration

vmss-vnet ...

virtual network address space into smaller ranges for use by your applications. When you deploy resources into a subnet, Azure assigns the resource an IP address from the subnet. [Learn more](#) 

 Add a subnet

10.82.0.0/20

10.82.0.0/20

/20

10.82.0.0 - 10.82.15.2554,096 addresses

Delete address space

Subnets	IP address range	Size	NAT gateway
---------	------------------	------	-------------

Add IPv4 address space | 

Add a subnet



Select an address space and configure your subnet. You can customize a default subnet or select from subnet templates if you plan to add select services later. [Learn more](#)

Subnet purpose ⓘ	Default
Name * ⓘ	subnet0
IPv4	
Include an IPv4 address space	<input checked="" type="checkbox"/>
IPv4 address range ⓘ	10.82.0.0/20 10.82.0.0 - 10.82.15.255
Starting address * ⓘ	10.82.0.0
Size ⓘ	/24 (256 addresses)
Subnet address range ⓘ	10.82.0.0 - 10.82.0.255

✓ NSG creation with HTTP rule

Home > Compute infrastructure | Virtual Machine Scale Set (VMSS)

Create network security group

Name *
vmss1-nsg

Inbound rules ⓘ
1000: default-allow-ssh
Any
SSH (TCP/22)
[+ Add an inbound rule](#)

Outbound rules ⓘ
No results.
[+ Add an outbound rule](#)

Add inbound security rule

vmss1-nsg

Source ⓘ
Any

Source port ranges * ⓘ
*

Destination ⓘ
Any

Service ⓘ
HTTP

Destination port ranges ⓘ
80

Protocol
☐ Any
☒ TCP

✓ Load balancer setup

✓ Final Review + Create screen

- ✓ Deployment complete confirmation

☒ VMSS resource overview

Notes:

- VMSS simplifies horizontal scaling
- NSG and load balancer setup ensures secure, scalable access

Task 4: Scale Azure Virtual Machine Scale Sets

Objective:

Configure autoscaling rules based on CPU metrics to scale VM instances dynamically.

Steps Taken:

1. Navigated to vmss1 > Availability + Scale > Scaling
2. Selected **Custom autoscale** > **Scale based on metric**
3. Created scale-out rule:

Setting	Value
Metric	Percentage CPU
Operator	Greater than

Setting	Value
---------	-------

Threshold	70
-----------	----

Duration	10 min
----------	--------

Operation	Increase by 50%
-----------	-----------------

Cooldown	5 min
----------	-------

4. Created scale-in rule:

Setting	Value
---------	-------

Operator	Less than
----------	-----------

Threshold	30
-----------	----

Operation	Decrease by 50%
-----------	-----------------

5. Set instance limits:

Setting	Value
---------	-------

Minimum	2
---------	---

Maximum	10
---------	----

Default	2
---------	---

6. Saved all changes

7. Monitored instance count via **Instances** tab

Screenshot Checklist:

☒ Scaling rules page with CPU metric

vmss1 | Scaling ☆ ...


Virtual machine scale set


 Save  Discard  Refresh  Logs  Feedback

Predictive autoscale


Mode Disabled 

Pre-launch setup of instances (minutes) 

 Enable Forecast only or Predictive autoscale. [Learn more about Predictive autoscale.](#)

Default * Auto created default scale condition 


Delete warning

 The very last or default recurrence rule cannot be deleted. Instead, you can disable autoscale to turn off autoscale.

Scale mode


☒ Scale based on a metric ☐ Scale to a specific instance count

Rules

 Scale is based on metric trigger rules but no rule(s) is defined; click [Add a rule](#) to create a rule. For example: 'Add a rule that increases instance count by 1 when CPU Percentage is above 70%'. If no rules is defined, the resource will be set to default instance count.

Instance limits

Minimum * 

Maximum * 

Default * 







Schedule

This scale condition is executed when none of the other scale condition(s) match

[+ Add a scale condition](#)

☒ Scale-out rule config

Scale rule



Percentage CPU (Average)

35.77 %

☐ Enable metric divide by instance count ⓘ

Operator *

Greater than



Metric threshold to trigger scale action * ⓘ

70

%

Duration (minutes) * ⓘ

10

Time grain (minutes) ⓘ

1

Time grain statistic * ⓘ

Average



Time aggregation * ⓘ

Average



 Action

Operation *

Increase count by



Cool down (minutes) * ⓘ

5

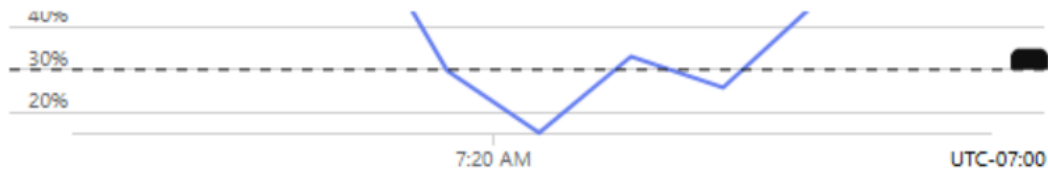
instance count *

1



☒ Scale-in rule config

Scale rule



Percentage CPU (Average)

35.95 %

☐ 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 count by

Cool down (minutes) * ⓘ

5

instance count *

1

☒ Instance limits section

+ Add a rule

Minimum * ⓘ

2

Maximum * ⓘ

10

Default * ⓘ

2

This scale condition is executed when none of the other scale condition(s) match

Notes:

- Autoscaling based on CPU ensures cost-efficiency and performance
- Instance limits prevent over-scaling or under-provisioning

Task 5: Create a VM Using Azure PowerShell

Objective:

Deploy and manage a VM using PowerShell in Cloud Shell.

Steps Taken:

1. Launched Cloud Shell and selected PowerShell
2. Ran VM creation command:

```
New-AzVm `
-ResourceGroupName 'az104-rg8' `
-Name 'myPSVM' `
-Location 'East US' `
-Image 'Win2019Datacenter' `
-Zone '1' `
-Size 'Standard_D2s_v3' `
-Credential (Get-Credential)
```

3. Verified VM status:

```
Get-AzVM `
-ResourceGroupName 'az104-rg8' `
-Status
```

4. Deallocated VM:

```
Stop-AzVM `
-ResourceGroupName 'az104-rg8' `
-Name 'myPSVM'
```

5. Verified deallocation:

```
Get-AzVM `
-ResourceGroupName 'az104-rg8' `
-Status
```

Screenshot Checklist:

- ✓ Cloud Shell with New-AzVM command
- ✓ VM status showing "Running"
- ✓ Stop-AzVM confirmation
- ✓ VM status showing "Deallocated"

Notes:

- PowerShell offers full control over VM lifecycle

- Deallocation stops billing for compute resources

Let me know when you're ready to drop Task 6 — I'll slot it in and then help you wrap the doc with a clean summary and GitHub notes. We can also build a README template that explains your lab structure, screenshot policy, and reuse strategy. This is shaping up to be a killer portfolio piece.

🔗 Task 6: Create a Virtual Machine Using the Azure CLI

Objective:

Deploy and manage a Linux VM using Bash in Azure Cloud Shell.

Steps Taken:

1. Launched Cloud Shell and selected **Bash**
2. Ran VM creation command:

```
az vm create \ --name myCLIVM \ --resource-group az104-rg8 \ --image Ubuntu2204 \ --admin-username localadmin \ --generate-ssh-keys
```

1. Verified VM status:

```
az vm show \ --name myCLIVM \ --resource-group az104-rg8 \ --show-details
```

1. Deallocated VM:

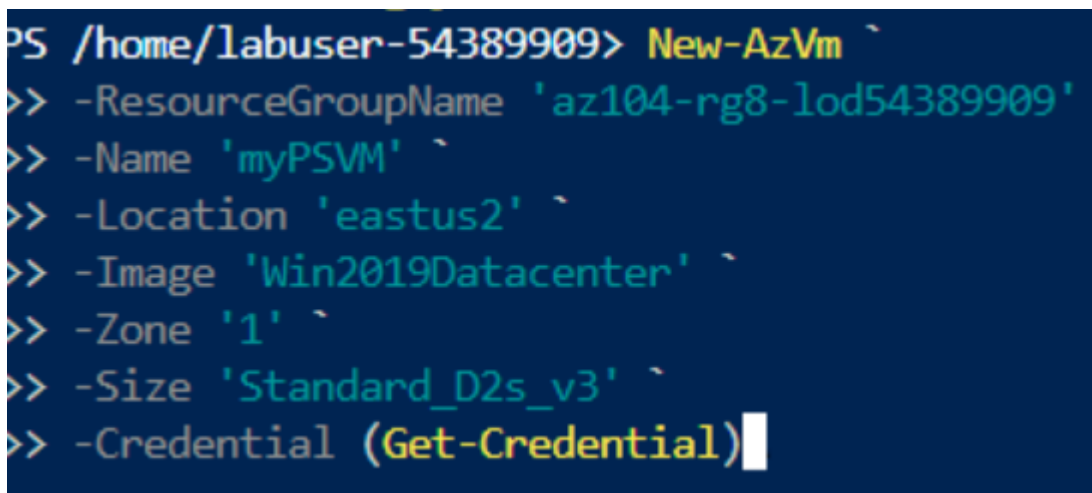
```
az vm deallocate \ --resource-group az104-rg8 \ --name myCLIVM
```

1. Confirmed deallocation:

```
az vm show \ --name myCLIVM \ --resource-group az104-rg8 \ --show-details
```

Screenshot Checklist:

- ✓ Cloud Shell with az vm create command



```
PS /home/labuser-54389909> New-AzVm `
>> -ResourceGroupName 'az104-rg8-lod54389909'
>> -Name 'myPSVM' `
>> -Location 'eastus2' `
>> -Image 'Win2019Datacenter' `
>> -Zone '1' `
>> -Size 'Standard_D2s_v3' `
>> -Credential (Get-Credential)
```

- ✓ VM status showing VM Running

ResourceGroupName	Name	Location	VmSize	OsType	NIC	Provisioning	Zone	Power
az104-rg8-lod54389909	az104-vm1	eastus2	Standard_D2ds_v4	Windows	az104-vm1368_z1	Succeeded	1	VM running
az104-rg8-lod54389909	az104-vm2	eastus2	Standard_D2s_v3	Windows	az104-vm1772_z2	Succeeded	2	VM running

NIC	Provisioning	Zone	PowerState	MaintenanceA
az104-vm1368_z1	Succeeded	1	VM running	Allowed
az104-vm1772_z2	Succeeded	2	VM running	Allowed

Notes:

- CLI offers fast, scriptable VM deployment
- Deallocation stops billing and releases non-static public IPs
- Ideal for automation and DevOps workflow