

## INTRODUCTION TO CLOUD COMPUTING

### Lab Task 04 (Manage Virtual Machines)

Name: M. Talha Arif

## Task 1: Deploy zone-resilient Azure virtual machines by using the Azure portal

- **Creating a new Azure Virtual Machine**

Microsoft Azure

Home > Compute infrastructure | Virtual machines >

### Create a virtual machine

Help me create a low cost VM Help me choose the right VM size for my workload Help me create a VM optimized for high availability

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.

Help me create a low cost VM Help me create a VM optimized for high availability Help me choose the right VM size for my workload

**Project details**

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 \* (New) az104-rg8

Create new

**Instance details**

Virtual machine names az104-vm1, az104-vm2

2 virtual machines will be created with the names shown above. Edit names

Region \* (Asia Pacific) East Asia

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

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

< Previous Next : Disks > Review + create Give feedback

Microsoft Azure

Home > Compute infrastructure | Virtual machines >

### Create a virtual machine

Help me create a low cost VM Help me choose the right VM size for my workload Help me create a VM optimized for high availability

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.

Help me create a low cost VM Help me create a VM optimized for high availability Help me choose the right VM size for my workload

Run with Azure Spot discount

Size \* Standard\_DS2s\_v3 - 2 vcpus, 8 GiB memory (\$163.52/month)

See all sizes

Enable Hibernation

Hibernate is not supported by the size that you have selected. Choose a size that is compatible with Hibernation to enable this feature. Learn more

**Administrator account**

Username \* localadmin

Password \*

Confirm password \*

**Inbound port rules**

Select which virtual machine network ports are accessible from the public internet. You can specify more limited or granular network access on the Networking tab.

Public inbound ports \* None

Allow selected ports

Select inbound ports

Select one or more ports

All traffic from the internet will be blocked by default. You will be able to change inbound port rules in the VM > Networking page.

< Previous Next : Disks > Review + create Give feedback

- **Configuring Premium SSD for Virtual Machines**

# INTRODUCTION TO CLOUD COMPUTING

## Lab Task 04 (Manage Virtual Machines)

Microsoft Azure

Search resources, services, and docs (G+/)

Copilot

bsse2280138@szabist.pk  
DEFAULT DIRECTORY (BSSE22801...

Home > Compute infrastructure | Virtual machines >

### Create a virtual machine

Help me create a low cost VM Help me choose the right VM size for my workload +1

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.

Help me create a low cost VM Help me create a VM optimized for high availability Help me choose the right VM size for my workload

Key management

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.

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

Create and attach a new disk Attach an existing disk

**Data disks for az104-vm2**

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

Advanced

< Previous Next : Networking > Review + create

Give feedback

### • Default Networking Configuration without Load Balancer

Microsoft Azure

Search resources, services, and docs (G+/)

Copilot

bsse2280138@szabist.pk  
DEFAULT DIRECTORY (BSSE22801...

Home > Compute infrastructure | Virtual machines >

### Create a virtual machine

Help me create a low cost VM Help me choose the right VM size for my workload Help me create a VM optimized for high availability

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.

Help me create a low cost VM Help me create a VM optimized for high availability Help me choose the right VM size for my workload

NIC network security group ☐ None ☒ Basic ☐ Advanced

Public inbound ports ☒ None ☐ Allow selected ports

Select inbound ports

All traffic from the internet will be blocked by default. You will be able to 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

Give feedback

### • Disabling Boot Diagnostics

# INTRODUCTION TO CLOUD COMPUTING

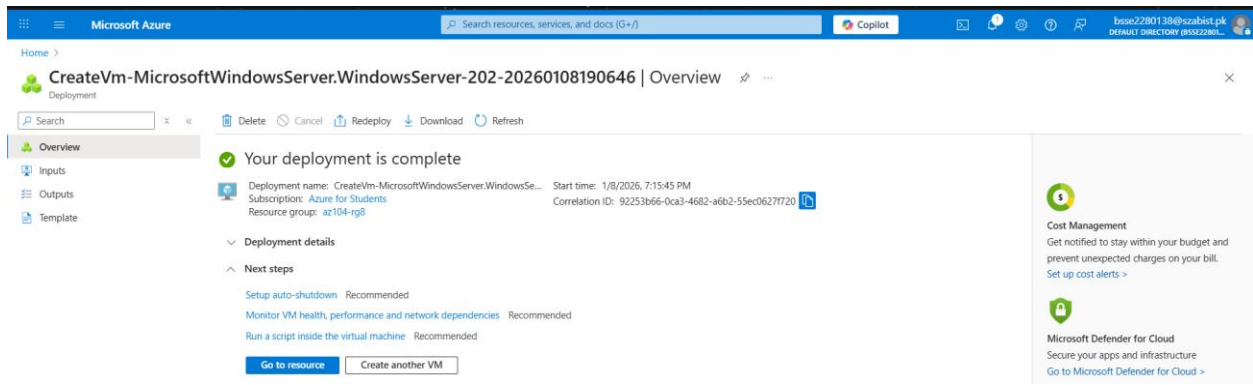
## Lab Task 04 (Manage Virtual Machines)

### Diagnostics

#### Boot diagnostics ⓘ

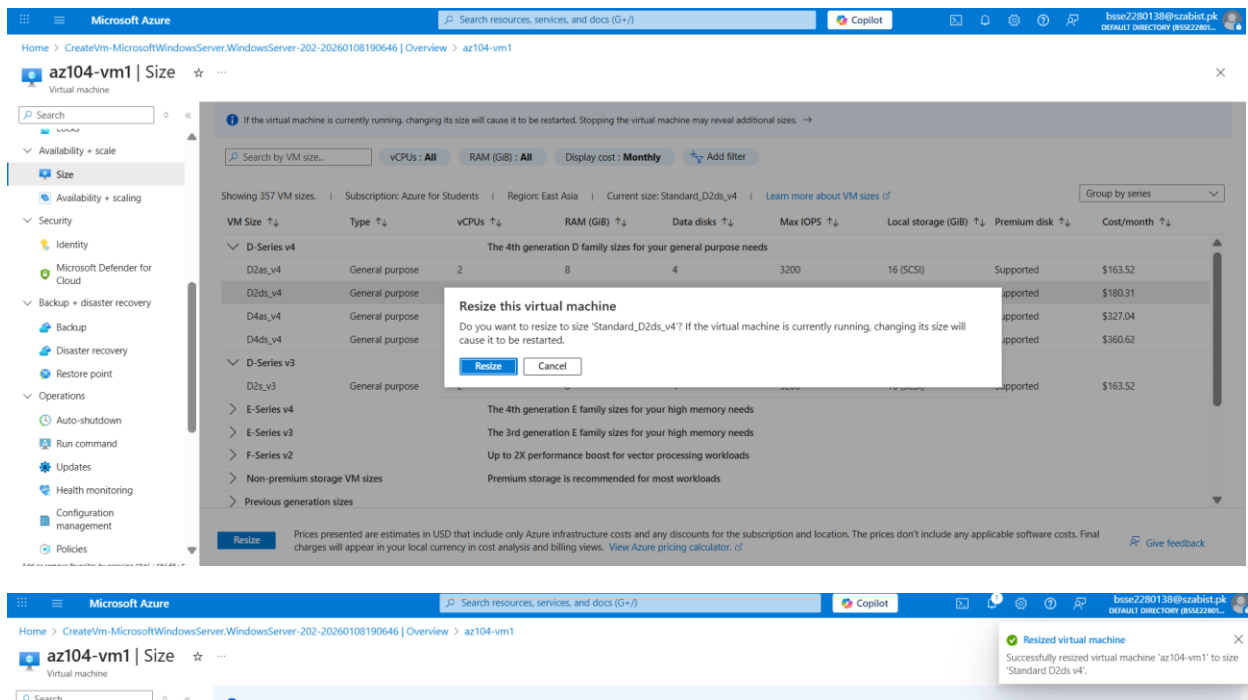
- ☐ Enable with managed storage account (recommended)
- ☐ Enable with custom storage account
- ☒ Disable

### • Successful Deployment of Zone-Resilient Virtual Machines



## Task 2: Manage compute and storage scaling for virtual machines

### • Resizing Virtual Machine SKU (Vertical Scaling)



### • Creating and Attaching a Data Disk

# INTRODUCTION TO CLOUD COMPUTING

## Lab Task 04 (Manage Virtual Machines)

Microsoft Azure

Home > CreateVm-MicrosoftWindowsServer.WindowsServer-202-20260108190646 | Overview > az104-vm1

az104-vm1 | Disks

Virtual machine

Search

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 160 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 (...)	Encryption	Host caching
az104-vm1_OsDisk_1_223bb377738e42b29d0494	Premium SSD ZRS	127	500	100	SSE with PMK	Read/write

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 throughput (...)	Encryption	Host caching
0	vm1-disk1	Standard HDD (L...)	32	500	60	Platform-managed key	Read-only

- Detaching Data Disk from Virtual Machine

Microsoft Azure

Home > CreateVm-MicrosoftWindowsServer.WindowsServer-202-20260108190646 | Overview > az104-vm1

az104-vm1 | Disks

Virtual machine

Search

Refresh Additional settings Feedback Troubleshoot

OS disk

Swap OS disk

Disk name	Storage type	Size (GiB)	Max IOPS	Max throughput (...)	Encryption	Host caching
az104-vm1_OsDisk_1_223bb377738e42b29d0494	Premium SSD ZRS	127	500	100	SSE with PMK	Read/write

Data disks

Filter by name

Showing 0 of 0 attached data disks

Create and attach a new disk Attach existing disks

LUN	Disk name	Storage type	Size (GiB)	Max IOPS	Max throughput (...)	Encryption	Host caching
No data disks attached							

- Viewing the detached data disk (vm1-disk1) from the Azure Disks service:

Microsoft Azure

Home > Storage center

Storage center | Azure Disks

Default Directory (bsse2280138@szabist.onmicrosoft.com)

Search

Summary Resources

Create Manage view Refresh Export to CSV Open query Assign tags Group by none

You are viewing a new version of Browse experience. [Click here to access the old experience.](#)

Filter for any field...

Subscription equals all Resource Group equals all Location equals all Add filter

Name	Storage type	Size (GiB)	Owner	Resource Group	Location
az104-vm1_OsDisk_1_223bb377	Premium SSD Z...	127	az104-vm1	AZ104-RG8	East Asia
az104-vm2_OsDisk_1_11fbfa73d	Premium SSD Z...	127	az104-vm2	AZ104-RG8	East Asia
vm1-disk1	Standard HDD ...	32	-	az104-rg8	East Asia

- Changing Disk Performance Tier

## INTRODUCTION TO CLOUD COMPUTING

### Lab Task 04 (Manage Virtual Machines)

Home > Storage center | Azure Disks > vm1-disk1

vm1-disk1 | Size + performance

Storage type: Standard SSD (locally-redundant storage)

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

Save Discard

Successfully updated disk 'vm1-disk1'.

#### • Reattaching Modified Disk to Virtual Machine

Home > az104-vm1

az104-vm1 | Disks

Updated virtual machine 'az104-vm1'.

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 (...)	Encrypti
az104-vm1_OsDisk_1_223bb37773	Premium SSD ZRS	127	500	100	SSE with

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 throughput (...)
0	vm1-disk1	Standard SSD LRS	256	500	100

### Task 3: Create and configure Azure Virtual Machine Scale Sets

# INTRODUCTION TO CLOUD COMPUTING

## Lab Task 04 (Manage Virtual Machines)

### • Creating a Virtual Machine Scale Set

Microsoft Azure

Search resources, services, and docs (Ctrl+J)

Copilot

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

Create a Virtual Machine Scale Set (VMSS)

BasicsSpotDisksNetworkingManagementHealthAdvancedTagsReview + create

At no added cost, a VMSS offers automatic scaling and performance optimization, infrastructure flexibility, and options to mix VM sizes, zones, and fault domains—all with simple, centralized group VM management. Already have VMs? Just create a new flexible VMSS, and attach existing VMs to your new scale set to get enhanced availability, resiliency, and capacity and cost optimization. [Learn more about VMSS](#)

Project details

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

Scale set details

Virtual machine scale set name \* vmss1

Region \* (Asia Pacific) East Asia

Availability zone Zones 1, 2

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 \* Flexible: achieve high availability at scale with identical or multiple virtual

< PreviousNext: Spot >Review + create

Microsoft Azure

Search resources, services, and docs (Ctrl+J)

Copilot

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

Create a Virtual Machine Scale Set (VMSS)

Autoscaling: scaling based on a CPU metric, on any schedule.

No scaling profile: manual attach virtual machines after deployment

Subscription needs Microsoft Insights registration to use autoscaling. [Learn more](#)

Instance count \* 1

Instance details

Image \* Windows Server 2025 Datacenter - x64 Gen2

VM architecture \* x64

Size \* Standard\_D2s\_v3 - 2 vcpus, 8 GiB memory (\$163.52/month)

Enable Hibernation

Administrator account

Username \* localadmin

Password \*

Confirm password \*

< PreviousNext: Spot >Review + create

### • Custom Virtual Network Configuration for VM Scale Set

# INTRODUCTION TO CLOUD COMPUTING

## Lab Task 04 (Manage Virtual Machines)

The screenshot shows the Microsoft Azure portal interface. The main page displays the 'vnet-eastasia' virtual network configuration. A sidebar on the right is open to the 'Add a subnet' dialog. The dialog prompts the user to select an address space and configure the subnet. The 'Subnet purpose' is set to 'Default'. The 'Name' is 'subnet0'. Under the 'IPv4' section, 'Include an IPv4 address space' is checked. The 'IPv4 address range' is '10.82.0.0/20', which translates to the '10.82.0.0 - 10.82.15.255' range, providing '4,096 addresses'. The 'Starting address' is '10.82.0.0', and the 'Size' is '/24 (256 addresses)'. The 'Subnet address range' is '10.82.0.0 - 10.82.0.255'. Under the 'IPv6' section, 'Include an IPv6 address space' is unchecked, with a note: 'This virtual network has no IPv6 address ranges.' A 'Private subnet' section explains that private subnets enhance security by not providing default outbound access. At the bottom of the dialog are 'Add' and 'Cancel' buttons, and a 'Give feedback' link.

Microsoft Azure

Search resources, services, and docs (G+J)

Copilot

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

vnet-eastasia

Name \* vmss-vnet

Define the address space of your virtual network with one or more IPv4 or IPv6 address ranges. Create subnets to segment the 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 Delete address space

10.82.0.0 /20 4,096 addresses

10.82.0.0 - 10.82.15.255

Subnets IP address range Size NAT gateway

Add IPv4 address space

You must add at least one subnet to the virtual network.

Save Cancel

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 ☒

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

IPv6

Include an IPv6 address space ☐ This virtual network has no IPv6 address ranges.

Private subnet

Private subnets enhance security by not providing default outbound access. To enable outbound connectivity for virtual machines to access the internet, it is necessary to explicitly grant outbound access. A NAT gateway is the recommended way to provide outbound connectivity for virtual machines in the subnet. [Learn more](#)

Add Cancel Give feedback

### • Configuring Network Security Group with HTTP Rule

The screenshot shows the Microsoft Azure portal interface. The main page displays the 'Create network security group' page for a group named 'vmss1-nsg'. The 'Inbound rules' section shows a list of rules: '1000: default-allow-ssh', 'Any', and 'SSH (TCP/22)'. There is a link to 'Add an inbound rule'. The 'Outbound rules' section shows 'No results' and a link to 'Add an outbound rule'. A sidebar on the right is open to the 'Add inbound security rule' dialog for the 'vmss1-nsg' group. The 'Source' is 'Any'. The 'Source port ranges' is '\*'. The 'Destination' is 'Any'. The 'Service' is 'HTTP'. The 'Destination port ranges' is '80'. The 'Protocol' is 'TCP'. The 'Action' is 'Allow'. The 'Priority' is '1010'. The 'Name' is 'allow-http'. At the bottom of the dialog are 'Add' and 'Cancel' buttons, and a 'Give feedback' link.

Microsoft Azure

Search resources, services, and docs (G+J)

Copilot

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

UDP

ICMPv4

ICMPv6

Action

Allow

Deny

Priority \* 1010

Name \* allow-http

Add Cancel Give feedback

# INTRODUCTION TO CLOUD COMPUTING

## Lab Task 04 (Manage Virtual Machines)

Microsoft Azure

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

### Edit network interface

Network interface

Name \*  
vmss-vnet-nic01

Virtual network  
vmss-vnet

Subnet \*  
subnet0 (10.82.0.0/24)

NIC network security group  
☐ None  
☐ Basic  
☒ Advanced

Configure network security group \*  
(new) vmss1-nsg  
[Create new](#)

Public IP address  
☐ Disabled ☒ Enabled  
Public IP addresses have a nominal charge. [Estimate cost](#)

Accelerated networking  
☐ Disabled ☒ Enabled

[OK](#) [Cancel](#)

[Give feedback](#)

## • Configuring Azure Load Balancer for VM Scale Set

Microsoft Azure

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

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

Subnet \*  
(New) subnet0  
[Edit subnet](#) 10.82.0.0 - 10.82.0.255 (256 addresses)

Network interface

A network interface enables an Azure virtual machine to communicate with internet, Azure, and on-premises resources. A VM can have one or more network interfaces.

[+ Create new nic](#) [Delete](#)

NAME	CREATE PUBLIC	SUBNET	NETWORK SECURITY GROUP	ACCELERATED NETWORKING
vmss-vnet-nic01	Yes	subnet0 (10.82.0.0/24)	Advanced	On

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.

**Warning:** To allow traffic from your load balancing product, please update the appropriate port configuration on your network security group associated with your network interface.

Select a load balancer \*  
No existing load balancers in current subscription and location.  
[Create a load balancer](#)

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

### Create a load balancer

Details such as subscription and resource group will be inherited from the virtual machine that you're creating. A default IP, backend pool, and load balancer rule will be created on your behalf, though certain configurations can be changed if desired.

Load balancer name \*  
vmss-lb

Type  
☒ Public  
Provides outbound connections for virtual machines inside your virtual network using public load balancers.  
☐ Internal  
Used to load balance traffic inside a virtual network. A load balancer frontend can be accessed from an on-premises network in a hybrid scenario.

Protocol  
☒ TCP  
☐ UDP

Rules

Rules  
☒ Load balancer rule  
☒ Inbound NAT rule

Load balancer rule

A load balancing rule distributes incoming traffic that is sent to a selected IP address and port combination across a group of backend pool instances. Only backend instances that the health probe considers healthy receive new traffic.

[Create](#) [Cancel](#)

## • Disable Boot diagnostics

Microsoft Azure

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

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

Basics Spot Disks Networking **Management** Health Advanced Tags Review + create

Configure monitoring and management options for your virtual machine scale set instances.

Microsoft Defender for Cloud

Microsoft Defender for Cloud provides unified security management and advanced threat protection across hybrid cloud workloads. [Learn more](#)

☒ Your subscription is protected by Foundational Cloud Security Posture Management Free Plan.

Upgrade policy

Upgrade mode \*  
Manual - Existing instances must be manually upgraded

Monitoring

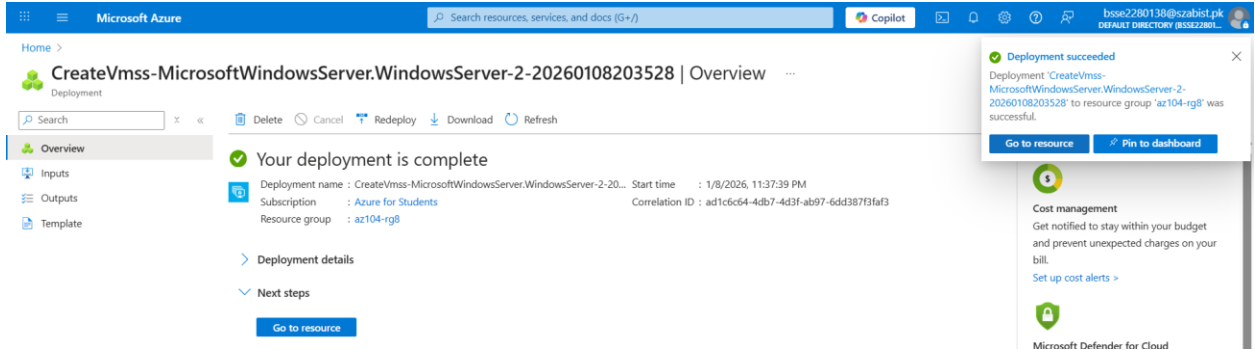
Boot diagnostics  
☐ Enable with managed storage account (recommended)  
☐ Enable with custom storage account  
☒ Disable



# INTRODUCTION TO CLOUD COMPUTING

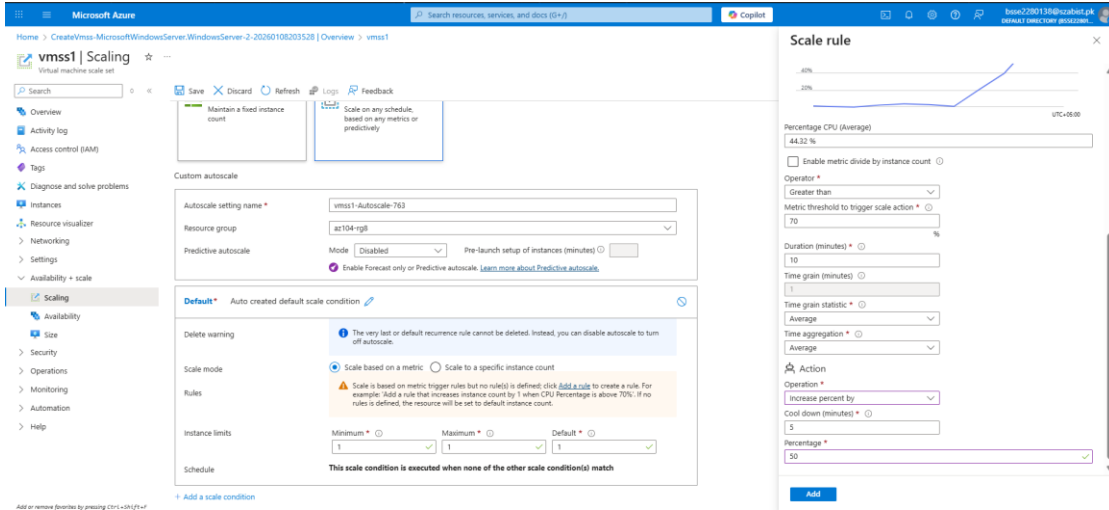
## Lab Task 04 (Manage Virtual Machines)

- **Successful Deployment of Virtual Machine Scale Set**

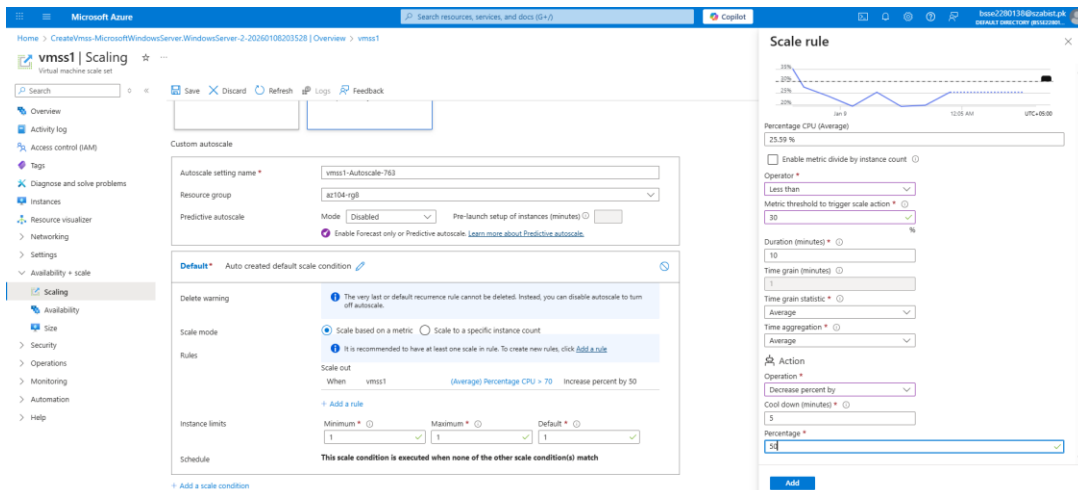


## Task 4: Scale Azure Virtual Machine Scale Sets

- **Creating Scale Out Rule. Add scale-out rule screen. Rule triggers when CPU > 70% for 10 minutes, increases VM instances by 50%.**

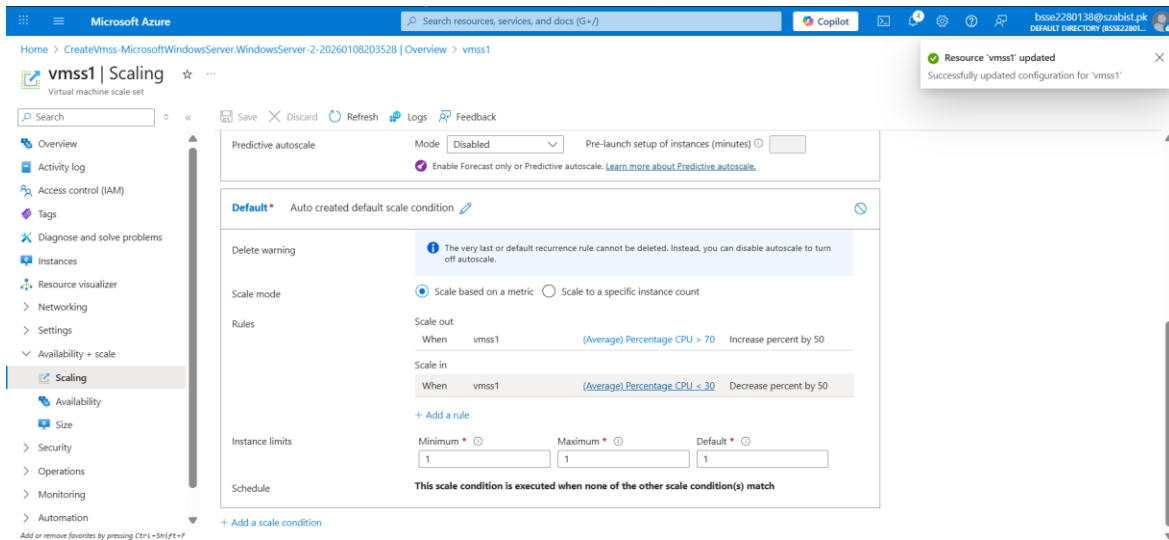


- **Creating Scale-In Rule. Rule triggers when CPU < 30% for 10 minutes, decreases VM instances by 50%**

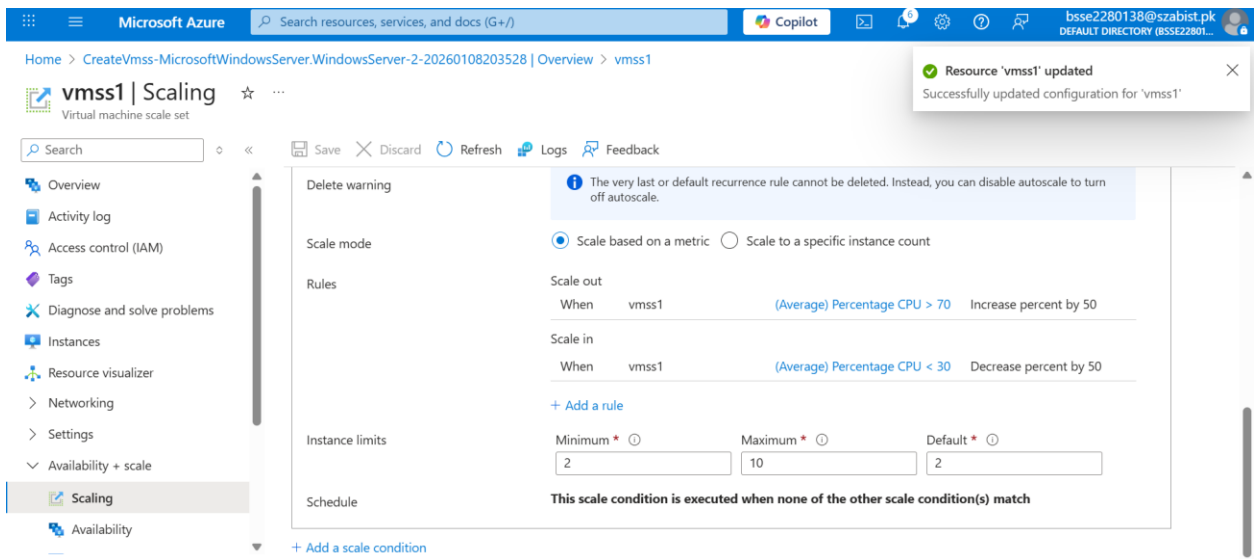


# INTRODUCTION TO CLOUD COMPUTING

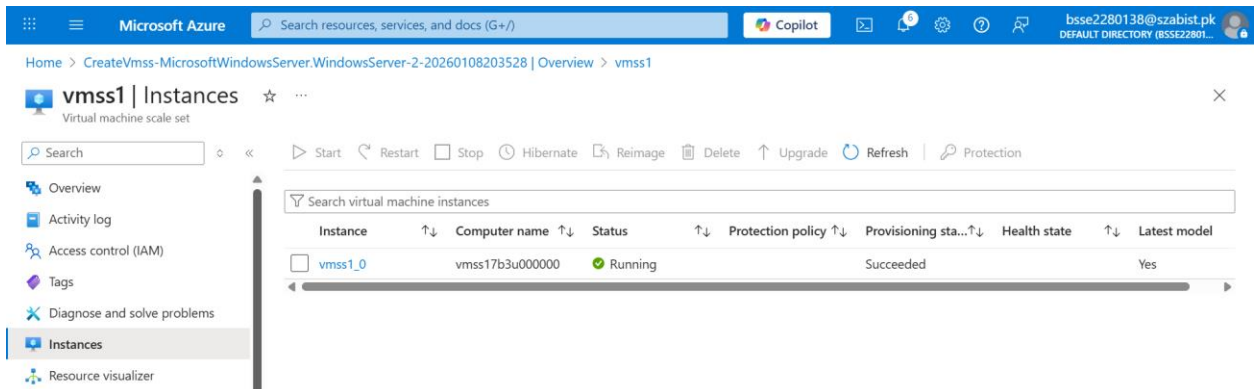
## Lab Task 04 (Manage Virtual Machines)



- **Setting VMSS Instance Limits by showing Minimum = 2, Maximum = 10, Default = 2 under the Scaling page.**



- **Monitoring VM Scale Set Instances**



## INTRODUCTION TO CLOUD COMPUTING

### Lab Task 04 (Manage Virtual Machines)

#### **Task 5: Create a virtual machine using Azure PowerShell (optional 1)**

```
PS /home/ariha> # Use stored credentials
PS /home/ariha> $cred = Get-Credential # Enter username: localadmin and your password

PowerShell credential request
Enter your credentials.
User: localadmin
Password for user localadmin: *****

PS /home/ariha>
PS /home/ariha> # Create VM
PS /home/ariha> New-AzVm `
>> -ResourceGroupName 'az104-rg8' `
>> -Name 'myPSVM' `
>> -Location 'eastasia' `
>> -Image 'MicrosoftWindowsServer:WindowsServer:2025-datacenter-g2:latest' `
>> -Size 'Standard_D2ds_v4' `
>> -Zone '1' `
>> -Credential $cred
```