

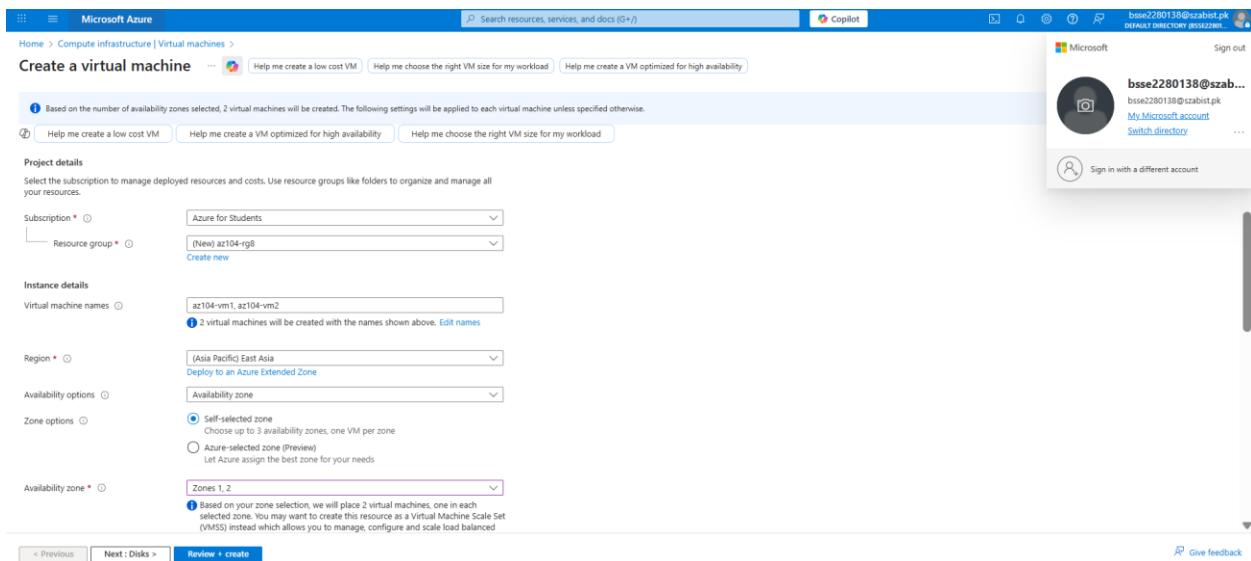
## INTRODUCTION TO CLOUD COMPUTING

### 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

Create a virtual machine

Project details

Subscription: Azure for Students

Resource group: (New) az104-rg8

Virtual machine names: az104-vm1, az104-vm2

Region: (Asia Pacific) East Asia

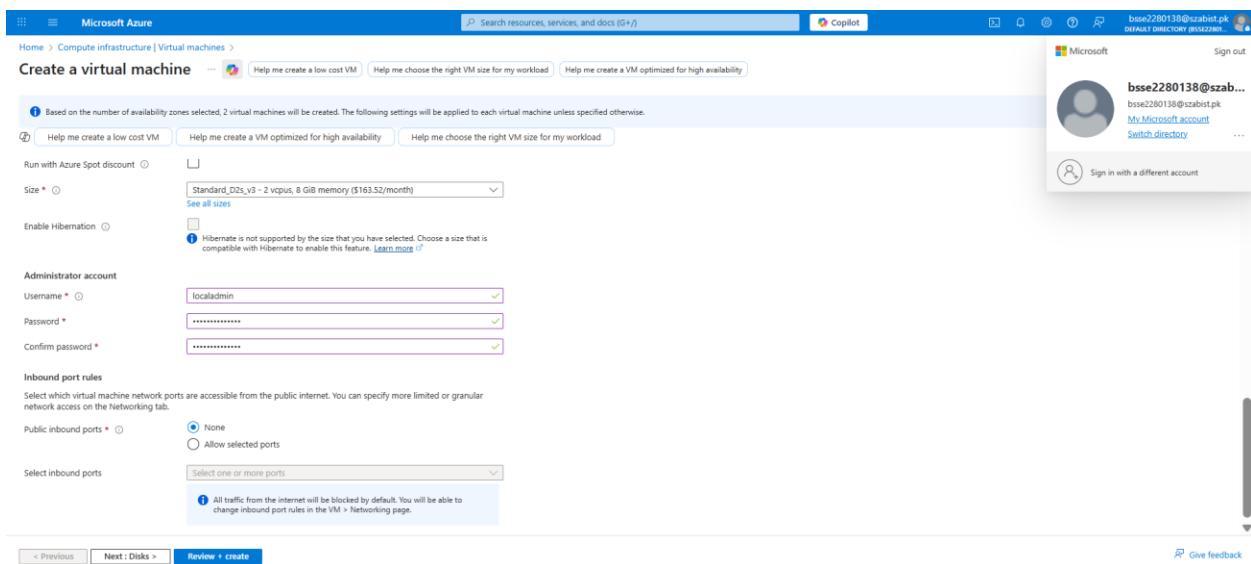
Availability options: Self-selected zone

Zone options: Azure will assign the best zone for your needs

Availability zone: Up to 3 availability zones, one VM per zone

Availability zone: 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

Create a virtual machine

Administrator account

Username: localadmin

Password: [REDACTED]

Confirm password: [REDACTED]

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

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.

< Previous Next : Disks > Review + create Give feedback

- Configuring Premium SSD for Virtual Machines

## INTRODUCTION TO CLOUD COMPUTING

### Lab Task 04 (Manage Virtual Machines)

The screenshot shows the 'Create a virtual machine' wizard in Microsoft Azure. The current step is 'Data disks'. It displays two sections for data disks: 'Data disks for az104-vm1' and 'Data disks for az104-vm2'. Both sections allow adding and configuring additional data disks or attaching existing ones. A note indicates that each VM also comes with a temporary disk. Below the sections are buttons for 'Create and attach a new disk' and 'Attach an existing disk'. At the bottom of the section, there is a 'Advanced' link.

#### • Default Networking Configuration without Load Balancer

The screenshot shows the 'Create a virtual machine' wizard in Microsoft Azure. The current step is 'Networking'. It includes settings for the NIC network security group (Basic selected), public inbound ports (None selected), and inbound port rules (a note states all traffic from the internet will be blocked by default). It also includes options for deleting public IP and NIC when VM is deleted, and enabling accelerated networking. Under 'Load balancing', it notes that the VM can be placed in the backend pool of an existing Azure load balancing solution. The 'Load balancing options' section shows 'Azure load balancer' selected, which supports TCP/UDP traffic, port-forwarding, and outbound flows. At the bottom, there are buttons for 'Review + create' and '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

The screenshot shows the Microsoft Azure portal with the URL [CreateVm-MicrosoftWindowsServer.WindowsServer-202-20260108190646 | Overview](#). The main panel displays a green checkmark indicating 'Your deployment is complete'. It shows deployment details: Deployment name: CreateVm-MicrosoftWindowsServer.WindowsSe..., Start time: 1/8/2026, 7:15:45 PM, Subscription: Azure for Students, Correlation ID: 92253b66-0ca3-4682-a6b2-55ec06277f20. Below this, there are sections for 'Deployment details' and 'Next steps'. The 'Next steps' section includes links for 'Setup auto-shutdown' (Recommended), 'Monitor VM health, performance and network dependencies' (Recommended), and 'Run a script inside the virtual machine' (Recommended). At the bottom are 'Go to resource' and 'Create another VM' buttons. To the right, there are promotional cards for 'Cost Management' and 'Microsoft Defender for Cloud'.

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

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

The screenshot shows the Microsoft Azure portal with the URL [az104-vm1 | Size](#). The left sidebar shows navigation options like Availability + scale, Security, and Operations. The main area is titled 'Size' and shows a list of VM sizes. A modal dialog box is open over the list, titled 'Resize this virtual machine', asking if the user wants to resize to 'Standard\_D2ds\_v4'. The dialog includes 'Resize' and 'Cancel' buttons. Below the dialog, there is information about the 4th generation D family sizes and a note about premium storage being recommended for most workloads. At the bottom, there is a 'Resize' button and a link to the Azure pricing calculator.

The screenshot shows the Microsoft Azure portal with the URL [CreateVm-MicrosoftWindowsServer.WindowsServer-202-20260108190646 | Overview](#). The main panel shows a green checkmark and the message 'Successfully resized virtual machine "az104-vm1" to size "Standard D2ds v4".' The left sidebar shows the VM name 'az104-vm1 | Size'.

#### • Creating and Attaching a Data Disk

## INTRODUCTION TO CLOUD COMPUTING

### Lab Task 04 (Manage Virtual Machines)

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](#)

LUN	Disk name	Storage type	Size (GiB)	Max IOPS	Max throughput (MBps)	Encryption	Host caching
0	vm1-disk1	Standard HDD (L...	32	500	60	Platform-managed key	Read-only

- Detaching Data Disk from Virtual Machine

Updated virtual machine  
Successfully updated virtual machine 'az104-vm1'.

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

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

- Changing Disk Performance Tier

## INTRODUCTION TO CLOUD COMPUTING

### Lab Task 04 (Manage Virtual Machines)

The screenshot shows the Microsoft Azure Storage center interface for managing disks. The left sidebar lists options like Overview, Activity log, Access control (IAM), Tags, Diagnose and solve problems, Resource visualizer, Settings (Configuration, Size + performance, Encryption, Networking, Disk Export, Properties, Locks), and a search bar. The main area displays the details for 'vm1-disk1'. A success message box is visible at the top right: 'Successfully updated disk' and 'Successfully updated disk 'vm1-disk1''. The 'Size + performance' tab is selected. A table shows storage options: Standard SSD (locally-redundant storage). The table includes columns for Size, Disk tier, Provisioned IOPS, Provisioned throughput, and Max S. The table rows are as follows:

Size	Disk tier	Provisioned IOPS	Provisioned throughput	Max S
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

Buttons for Save and Discard are at the bottom, along with a Give feedback link.

#### • Reattaching Modified Disk to Virtual Machine

The screenshot shows the Microsoft Azure Virtual Machine Disks page for 'az104-vm1'. The left sidebar lists Overview, Activity log, Access control (IAM), Tags, Diagnose and solve problems, Resource visualizer, Connect, Networking, Settings (Disks, Extensions + applications, Operating system, Configuration, Advisor recommendations, Properties, Locks), and a search bar. The main area shows the disk configuration for 'az104-vm1'. A success message box is visible at the top right: 'Updated virtual machine' and 'Successfully updated virtual machine 'az104-vm1''. A warning message box states: '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.' with a 'Learn more' link. The 'Disks' section shows the OS disk and data disks. The OS disk table is as follows:

Disk name	Storage type	Size (GiB)	Max IOPS	Max throughput (MBps)	Encryption
az104-vm1_OsDisk_1_223bb37773	Premium SSD ZRS	127	500	100	SSE with HSM

The Data disks section shows one attached data disk: 'vm1-disk1' (Standard SSD LRS, 256 GiB, 500 Max IOPS, 100 Max throughput). Buttons for Swap OS disk, Create and attach a new disk, and Attach existing disks are available.

#### 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

The screenshot shows two steps of the 'Create a Virtual Machine Scale Set (VMSS)' wizard in the Azure portal.

**Step 1: Basics**

- Subscription:** Azure for Students
- Resource group:** az104-rg8
- Virtual machine scale set name:** vmss1
- Region:** (Asia Pacific) East Asia
- Availability zone:** Zones 1, 2
- Orchestration mode:** Flexible

**Step 2: Instance details**

- Instance count:** 1
- Image:** Windows Server 2025 Datacenter - x64 Gen2
- Size:** Standard\_D2s\_v3 - 2 vcpus, 8 GiB memory (\$163.52/month)
- Administrator account:** Username: localadmin, Password: (redacted), Confirm password: (redacted)

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

## INTRODUCTION TO CLOUD COMPUTING

### Lab Task 04 (Manage Virtual Machines)

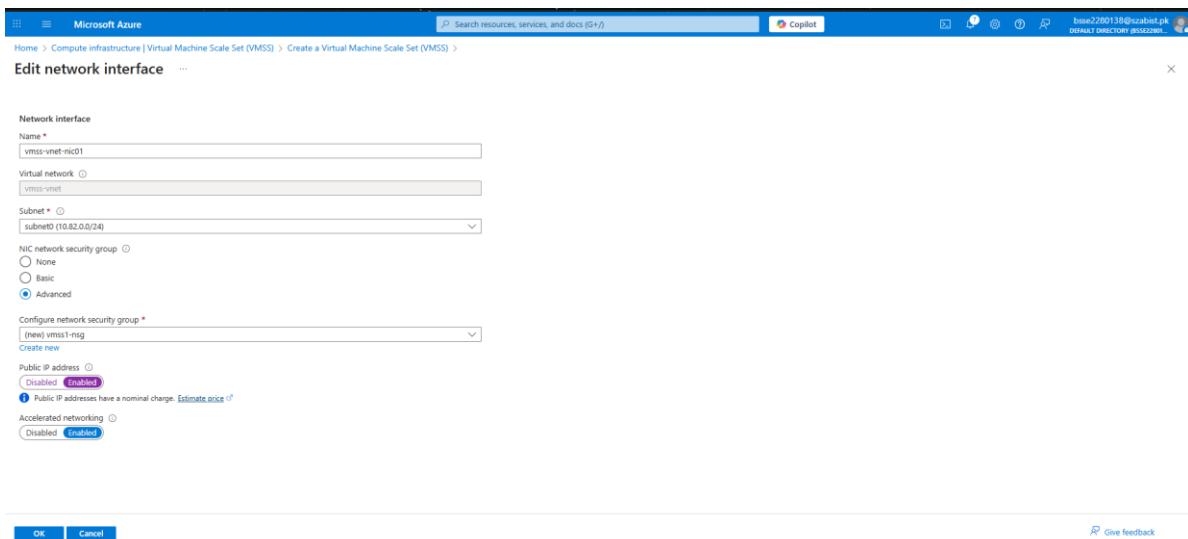
The screenshot shows the Microsoft Azure portal interface for creating a Virtual Machine Scale Set (VMSS). On the left, the main page displays a 'vnet-eastasia' network. A modal window titled 'Add a subnet' is open on the right, prompting for subnet configuration. The 'IPv4' section is active, showing an IP address range of 10.82.0.0/20 with 4,096 addresses. A note indicates that at least one subnet must be added. At the bottom of the modal are 'Save' and 'Cancel' buttons.

## • Configuring Network Security Group with HTTP Rule

The screenshot shows the Microsoft Azure portal interface for creating a Network Security Group (NSG). A modal window titled 'Add inbound security rule' is open, detailing the configuration of a new rule. The 'Service' dropdown is set to 'HTTP'. Other settings include 'Source' as 'Any', 'Destination' as 'Any', and 'Action' as 'Allow'. The rule is named 'allow-http' and has a priority of 1010. At the bottom of the modal are 'Add' and 'Cancel' buttons.

## INTRODUCTION TO CLOUD COMPUTING

### Lab Task 04 (Manage Virtual Machines)



Network interface

Name \*  
vmss-vnet-nic01

Virtual network  
vmss-vnet

Subnet \*  
subnet0 (10.82.0.0/24)

NIC network security group \*  
(new) vmss1-msg

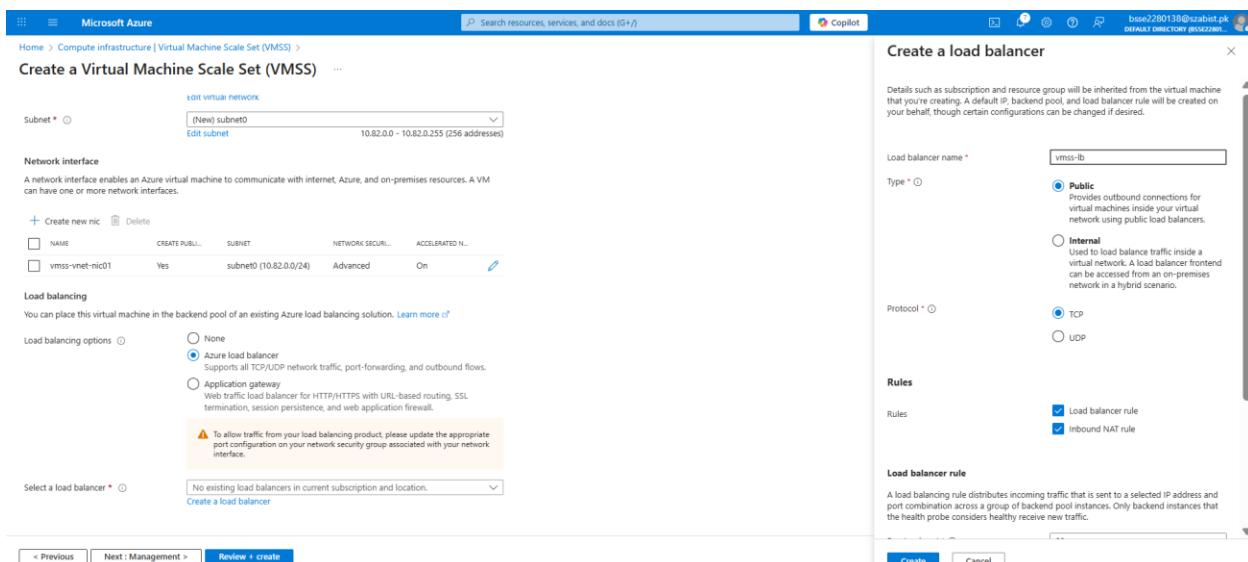
Create new

Public IP address  
 Enabled  Disabled

Accelerated networking  
 Enabled  Disabled

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) ...

Create a load balancer

Subnet \*  
(New) subnet0

Network interface

Load balancer name \*  
vmss-lb

Type \*  
 Public

Protocol \*  
 TCP  UDP

Rules

Load balancer rule

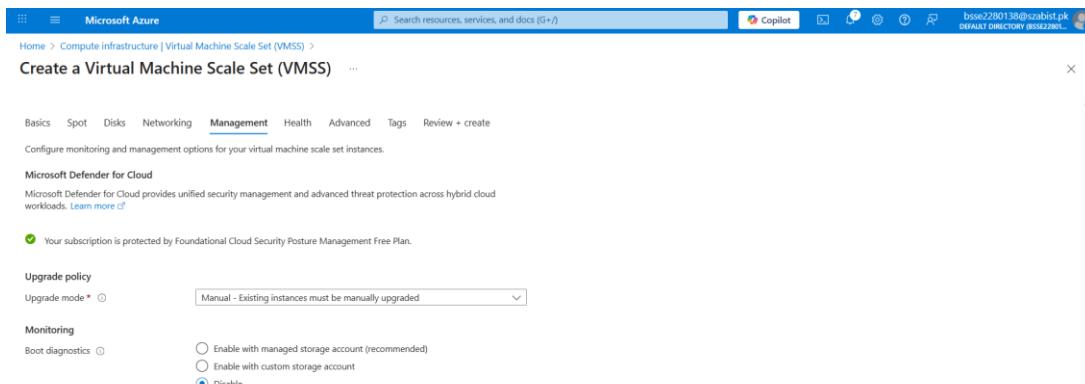
Inbound NAT rule

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.

< Previous Next : Management > Review + create Create Cancel

### • Disable Boot diagnostics



Microsoft Azure

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

Management

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

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 \*  
 Disable

< Previous Next : Management > Review + create Create

## INTRODUCTION TO CLOUD COMPUTING

### Lab Task 04 (Manage Virtual Machines)

- Successful Deployment of Virtual Machine Scale Set

The screenshot shows the Microsoft Azure portal with the URL [https://az104-rg8.b2b.aztest.io/#/resourceGroups/az104-rg8/providers/Microsoft.Compute/virtualMachineScaleSets/CreateVmss-MicrosoftWindowsServer.WindowsServer-2-20260108203528](#). The page title is "CreateVmss-MicrosoftWindowsServer.WindowsServer-2-20260108203528 | Overview". A green checkmark icon indicates "Your deployment is complete". Deployment details show the name "CreateVmss-MicrosoftWindowsServer.WindowsServer-2-20260108203528", start time "1/8/2026, 11:37:39 PM", subscription "Azure for Students", correlation ID "ad1c6c64-4db7-4d3f-ab97-6dd387f3faf3", and resource group "az104-rg8". A success message on the right says "Deployment succeeded" for the deployment to resource group "az104-rg8". Other sections include "Cost management" and "Microsoft Defender for Cloud".

## 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%.

The screenshot shows the Azure portal with the URL [https://az104-rg8.b2b.aztest.io/#/resourceGroups/az104-rg8/providers/Microsoft.Compute/virtualMachineScaleSets/vmss1](#). The left sidebar shows "Scaling" selected under "Availability + scale". The main area shows the "Scale rule" configuration for "vmss1-Autoscale-763". It includes a graph showing CPU usage over time, a table for "Percentage CPU (Average)" (44.32 %), and a rule definition: "Operator: Greater than, Metric threshold: 70 %, Duration: 10 minutes, Time grain: 1 minute, Time grain statistic: Average, Time aggregation: Average". The action section shows "Increase percent by 50 %".

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

The screenshot shows the Azure portal with the URL [https://az104-rg8.b2b.aztest.io/#/resourceGroups/az104-rg8/providers/Microsoft.Compute/virtualMachineScaleSets/vmss1](#). The left sidebar shows "Scaling" selected under "Availability + scale". The main area shows the "Scale rule" configuration for "vmss1-Autoscale-763". It includes a graph showing CPU usage over time, a table for "Percentage CPU (Average)" (25.59 %), and a rule definition: "Operator: Less than, Metric threshold: 30 %, Duration: 10 minutes, Time grain: 1 minute, Time grain statistic: Average, Time aggregation: Average". The action section shows "Decrease percent by 50 %".

## INTRODUCTION TO CLOUD COMPUTING

### Lab Task 04 (Manage Virtual Machines)

Scaling

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 out When vmss1 (Average) Percentage CPU > 70 Increase percent by 50

Scale in When vmss1 (Average) Percentage CPU < 30 Decrease percent by 50

+ Add a rule

Instance limits Minimum \*  Maximum \*  Default \*  1 1 1

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

+

Add a scale condition

Resource 'vmss1' updated Successfully updated configuration for 'vmss1'

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

Scaling

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 out When vmss1 (Average) Percentage CPU > 70 Increase percent by 50

Scale in When vmss1 (Average) Percentage CPU < 30 Decrease percent by 50

+ Add a rule

Instance limits Minimum \*  2 Maximum \*  10 Default \*  2

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

+

Add a scale condition

Resource 'vmss1' updated Successfully updated configuration for 'vmss1'

- Monitoring VM Scale Set Instances

Instances

Start Restart Stop Hibernate Reimage Delete Upgrade Refresh Protection

Search virtual machine instances

Instance	Computer name	Status	Protection policy	Provisioning sta...	Health state	Latest model
vmss1_0	vmss17b3u000000	Running		Succeeded	Yes	

## 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
```