

INTRODUCTION TO CLOUD COMPUTING

Lab Task 04 (Manage Virtual Machines)

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

• Creating a new Azure 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.

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

Subscription: Azure for Students
Resource group: (New) az104-rg8
Create new

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
Availability options: Self-selected zone
Zone options: Self-selected zone (Choose up to 3 availability zones, one VM per zone)
Availability zone: Zones 1, 2

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 specified otherwise.

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

Run with Azure Spot discount: Standard_D2s v3 - 2 vcpus, 8 GiB memory (\$163.52/month)
Size: Standard_D2s v3 - 2 vcpus, 8 GiB memory (\$163.52/month)
Enable Hibernation: Hibernate is not supported by the size that you have selected. Choose a size that is compatible with Hibernate to enable this feature. Learn more

Administrator account:
Username: localadmin
Password: *****
Confirm password: *****

Inbound port rules:
Public inbound ports: None
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.

Review + create

INTRODUCTION TO CLOUD COMPUTING

Lab Task 04 (Manage Virtual Machines)

• Configuring Premium SSD for Virtual Machines

The screenshot shows the 'Create a virtual machine' wizard in the Microsoft Azure portal. The current step is 'Data disks'. It displays two sections: 'Data disks for az104-vm1' and 'Data disks for az104-vm2'. Both sections allow adding new disks or attaching existing ones. Under 'Data disks for az104-vm1', there is a table with columns: LUN, Name, Size (GiB), Disk type, Host caching, and Delete with VM. Buttons for 'Create and attach a new disk' and 'Attach an existing disk' are present. A note states: '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.' Below the table, an 'Advanced' section is collapsed. At the bottom, navigation buttons include '< Previous', 'Next : Networking >', and 'Review + create'.

• Default Networking Configuration without Load Balancer

The screenshot shows the 'Create a virtual machine' wizard in the Microsoft Azure portal. The current step is 'Networking'. It includes sections for 'NIC network security group', 'Public inbound ports', 'Select inbound ports', 'Delete public IP and NIC when VM is deleted', 'Enable accelerated networking', and 'Load balancing'. The 'NIC network security group' section has options for None, Basic (selected), and Advanced. The 'Public inbound ports' section has options for None (selected) and Allow selected ports. The 'Select inbound ports' dropdown shows 'Select one or more ports' with a note: 'All traffic from the internet will be blocked by default. You will be able to change inbound port rules in the VM > Networking page.' The 'Delete public IP and NIC when VM is deleted' checkbox is checked. The 'Enable accelerated networking' checkbox is checked. The 'Load balancing' section notes: 'You can place this virtual machine in the backend pool of an existing Azure load balancing solution.' It lists 'Load balancing options': None (selected), Azure load balancer (supports TCP/UDP traffic, port-forwarding, and outbound flows), and Application gateway (Web traffic load balancer for HTTP/HTTPS with URL-based routing, SSL termination, session persistence, and web application firewall). Navigation buttons at the bottom include '< Previous', 'Next : Management >', and 'Review + create'.

INTRODUCTION TO CLOUD COMPUTING

Lab Task 04 (Manage Virtual Machines)

• Disabling Boot Diagnostics

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 Deployment Overview page for a completed deployment. The deployment name is 'CreateVm-MicrosoftWindowsServer.WindowsServer-202-20260108190646'. The status is 'Your deployment is complete' with a green checkmark. Deployment details show a start time of 1/8/2026, 7:15:45 PM, and a correlation ID of 92253b66-0ca3-4682-a6b2-55ec0627f720. Next steps include 'Setup auto-shutdown' (Recommended), 'Monitor VM health, performance and network dependencies' (Recommended), and 'Run a script inside the virtual machine' (Recommended). Navigation links include 'Go to resource' and 'Create another VM'. On 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 Virtual Machine Size selection page for 'az104-vm1'. The user is prompted to 'Resize this virtual machine' from 'Standard_D2ds_v4' to another size. The dialog asks if they want to resize while the VM is running, noting it will be restarted. Buttons for 'Resize' and 'Cancel' are shown. Below the dialog, a table lists various VM sizes with columns for VM Size, Type, vCPUs, RAM (GiB), Data disks, Max IOPS, Local storage (GiB), Premium disk, and Cost/month. A note at the bottom states prices are estimates in USD. Another screenshot below shows the successful resize confirmation.

The screenshot shows the Microsoft Azure Deployment Overview page for 'az104-vm1' after resizing. A success message indicates the virtual machine was successfully resized to 'Standard D2ds v4'. The deployment status is now 'Deployment succeeded'.

INTRODUCTION TO CLOUD COMPUTING

Lab Task 04 (Manage Virtual Machines)

• Creating and Attaching a Data Disk

The screenshot shows the Microsoft Azure portal interface for managing a virtual machine named 'az104-vm1'. In the 'Disks' section, a new data disk is being created. The 'Data disks' table shows one existing disk ('az104-vm1_OsDisk_1') and one new disk ('vm1-disk1') being attached. The new disk has a size of 32 GiB, a storage type of Standard HDD (LSSD), and a max IOPS of 500. A success message indicates the disk was successfully created.

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

• Detaching Data Disk from Virtual Machine

The screenshot shows the Microsoft Azure portal interface for managing a virtual machine named 'az104-vm1'. In the 'Disks' section, the 'Data disks' table now shows 'No data disks attached', indicating the disk has been successfully detached.

LUN	Disk name	Storage type	Size (GiB)	Max IOPS	Max throughput (MBps)	Encryption	Host caching

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

The screenshot shows the Microsoft Azure Storage center interface for managing Azure Disks. The 'Resources' tab is selected, displaying a list of storage resources. One entry for the detached disk 'vm1-disk1' is visible, showing its details: Name (az104-vm1_OsDisk_1), Storage type (Premium SSD ZRS), Size (127 GiB), Owner (az104-vm1), Resource Group (AZ104-RG8), and Location (East Asia).

Name	Storage type	Size (GiB)	Owner	Resource Group	Location
az104-vm1_OsDisk_1	Premium SSD ZRS	127	az104-vm1	AZ104-RG8	East Asia
az104-vm2_OsDisk_1	Premium SSD ZRS	127	az104-vm2	AZ104-RG8	East Asia
vm1-disk1	Standard HDD (LSSD)	32	-	AZ104-RG8	East Asia

INTRODUCTION TO CLOUD COMPUTING

Lab Task 04 (Manage Virtual Machines)

- **Changing Disk Performance Tier**

Successfully updated disk
Successfully updated disk 'vm1-disk1'.

Size	Disk tier	Provisioned IOPS	Provisioned thro...	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

- **Reattaching Modified Disk to Virtual Machine**

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

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	LUN	Disk name	Storage type	Size (GiB)	Max IOPS	Max throughput (...)
vm1-disk1	0	vm1-disk1	Standard SSD LRS	256	500	100

INTRODUCTION TO CLOUD COMPUTING

Lab Task 04 (Manage Virtual Machines)

Task 3: Create and configure Azure Virtual Machine Scale Sets

• Creating a Virtual Machine Scale Set

This screenshot shows the first step of creating a Virtual Machine Scale Set (VMSS) in the Microsoft Azure portal. The page title is "Create a Virtual Machine Scale Set (VMSS)". The "Project details" section includes fields for "Subscription" (set to "Azure for Students") and "Resource group" (set to "az104-rgb"). Below these, the "Scale set details" section shows "Virtual machine scale set name" as "vmss1", "Region" as "(Asia Pacific) East Asia", and "Availability zone" as "Zones 1, 2". A note about autoscaling is present. The "Orchestration mode" is set to "Flexible". At the bottom, there are navigation buttons: "< Previous", "Next : Spot >", and a blue "Review + create" button.

This screenshot shows the second step of creating a VMSS, focusing on "Instance details". It lists the selected "Image" as "Windows Server 2025 Datacenter - x64 Gen2", "VM architecture" as "x64", and "Size" as "Standard_D2s_v3 - 2 vcpus, 8 GiB memory (\$163.52/month)". Other fields include "Enable Hibernation" (unchecked), "Administrator account" (username "localadmin", password masked), and "Confirm password" (also masked). Navigation buttons at the bottom are "< Previous", "Next : Spot >", and "Review + create".

INTRODUCTION TO CLOUD COMPUTING

Lab Task 04 (Manage Virtual Machines)

• Custom Virtual Network Configuration for VM Scale Set

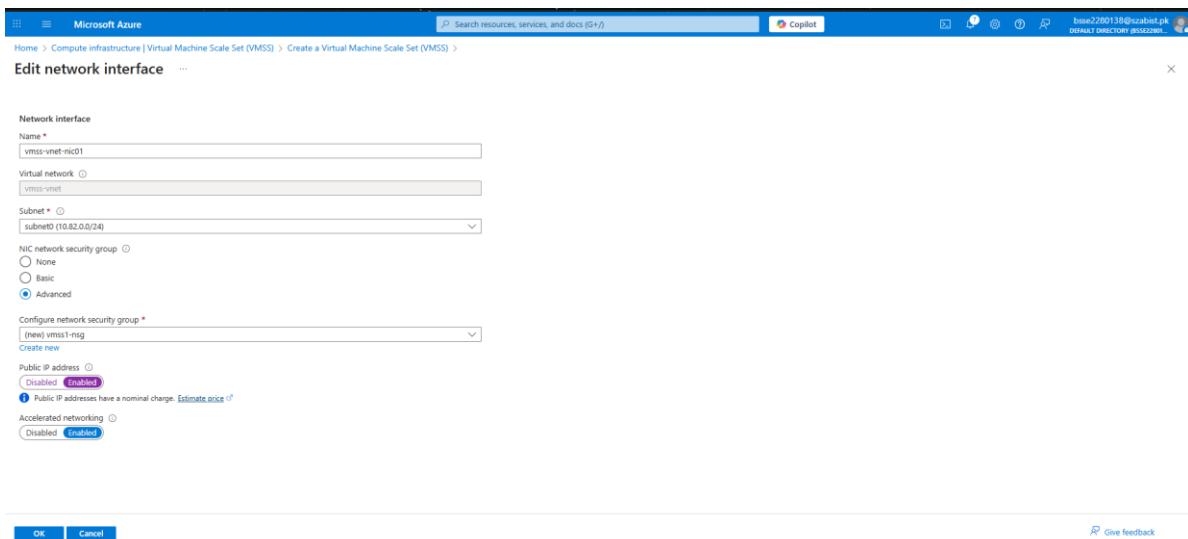
The screenshot shows the Microsoft Azure portal interface for creating a Virtual Machine Scale Set (VMSS). The top navigation bar includes 'Microsoft Azure', 'Search resources, services, and docs (G+)', 'Copilot', and user information. The main page title is 'Compute infrastructure | Virtual Machine Scale Set (VMSS) > Create a Virtual Machine Scale Set (VMSS) > vnet-eastasia'. The left sidebar shows 'vnet-eastasia' and other options like 'Add a subnet'. The main content area is titled 'Add a subnet' with a sub-section 'IPv4'. It shows an address space configuration for '10.82.0.0/20' with a range from '10.82.0.0' to '10.82.15.255' and 4,096 addresses. A note says 'You must add at least one subnet to the virtual network.' At the bottom 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). The top navigation bar includes 'Microsoft Azure', 'Search resources, services, and docs (G+)', 'Copilot', and user information. The main page title is 'Compute infrastructure | Virtual Machine Scale Set (VMSS) > Create a Virtual Machine Scale Set (VMSS) > Create network security group > vms1-msg'. The left sidebar shows 'Create network security group' and 'Add an inbound rule'. The main content area is titled 'Add inbound security rule' for 'vms1-msg'. It shows a configuration for an 'HTTP' rule: Source 'Any', Destination 'Any', Service 'HTTP', Destination port ranges '80', Action 'Allow', Priority '1010', and Name 'allow-http'. At the bottom 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

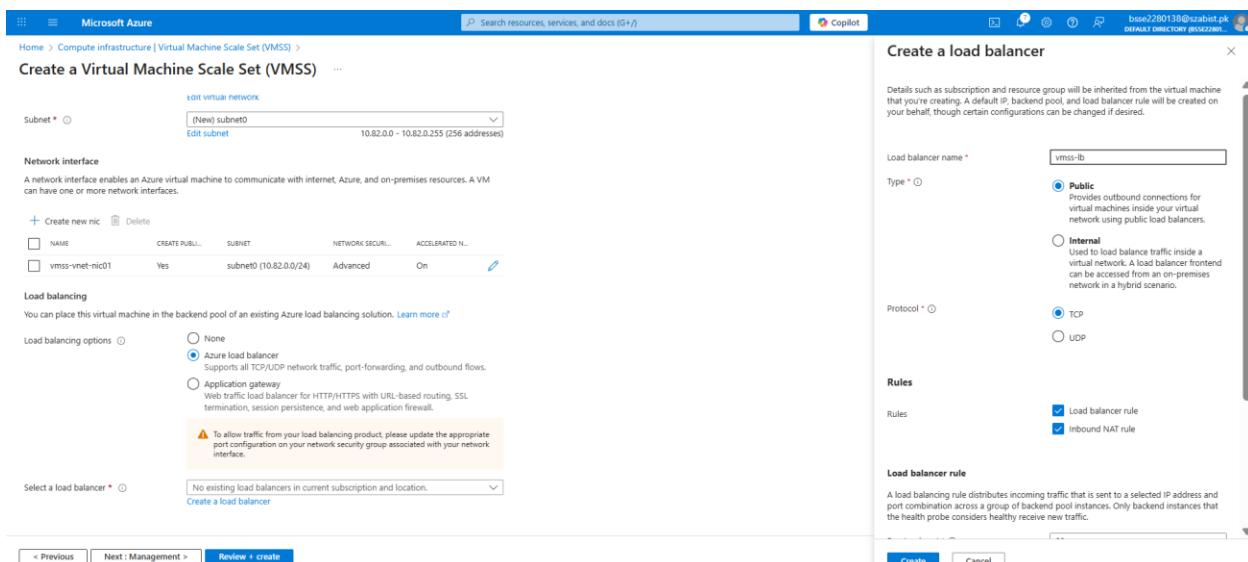
Create new

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

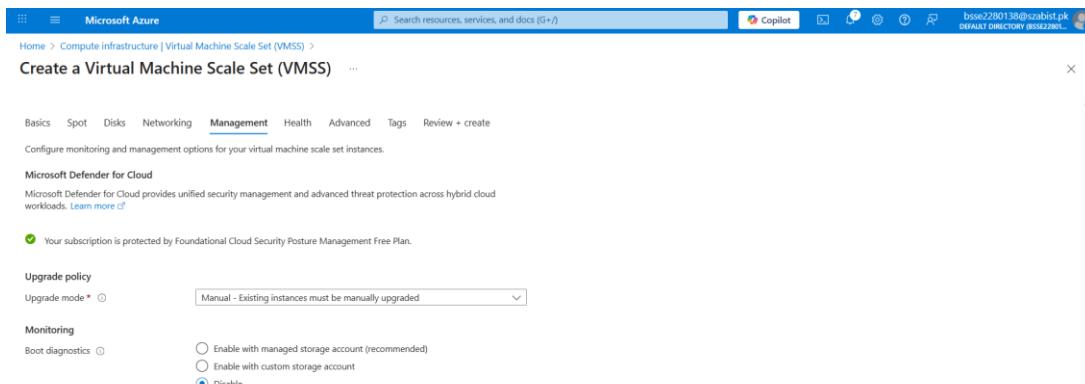
Inbound NAT rule

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 Enable with managed storage account (recommended) Enable with custom storage account

< 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://portal.azure.com/#blade/HubsBlade/resourceType/microsoft.compute/virtualMachineScaleSets/CreateVmss-MicrosoftWindowsServer.WindowsServer-2-20260108203528/Overview](#). The deployment status is shown as 'Deployment succeeded' with a green checkmark. The deployment name is 'CreateVmss-MicrosoftWindowsServer.WindowsServer-2-20260108203528'. The start time was 1/8/2026, 11:37:39 PM. The subscription is 'Azure for Students', resource group is 'az104-rgb', and correlation ID is ad1c6c64-4db7-4d3f-ab97-6dd387f3faf3.

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://portal.azure.com/#blade/HubsBlade/resourceType/microsoft.compute/virtualMachineScaleSets/vmss1/Scaling](#). The 'Scale rule' section is open, showing a graph of CPU usage over time. A rule is defined to trigger when the average CPU is greater than 70% for 10 minutes, increasing the instance count 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://portal.azure.com/#blade/HubsBlade/resourceType/microsoft.compute/virtualMachineScaleSets/vmss1/Scaling](#). The 'Scale rule' section is open, showing a graph of CPU usage over time. A rule is defined to trigger when the average CPU is less than 30% for 10 minutes, decreasing the instance count 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 *

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

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

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 *

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

- Monitoring VM Scale Set Instances

Instances

Start Restart Stop Hibernate Reimage Delete Upgrade Refresh Protection

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
```