

# Introduction to Cloud Computing

## LAB 08

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BS-SE 7B

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

- Search for and select Virtual machines. Click Create.

The screenshot shows the Microsoft Azure portal with the URL [https://portal.azure.com/#create/Microsoft.Web/VMSS](#). The user is on the 'Create a virtual machine' page, specifically the 'Basics' tab. The subscription is set to 'Azure for Students' and the resource group is '(New) az104-rg8'. The virtual machine names are listed as 'az104-vm1, az104-vm2'. The 'Review + create' button is visible at the bottom.

The screenshot shows the Microsoft Azure portal with the URL [https://portal.azure.com/#create/Microsoft.Web/VMSS](#). The user is on the 'Instance details' tab of the 'Create a virtual machine' wizard. Under 'OS disk', the OS disk size is 'Image default' and the OS disk type is 'Premium SSD (locally-redundant storage)'. The 'Delete with VM' checkbox is checked. Under 'Key management', it is set to 'Platform-managed key'. The 'Data disks for az104-vm1' section indicates that the VM also comes with a temporary disk. The 'Review + create' button is visible at the bottom.

**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.

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.

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 (selected), Azure load balancer, Application gateway

[- Previous](#) [Next : Management >](#) [Review + create](#) [Give feedback](#)

**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.

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

**Monitoring** (selected): Configure monitoring options for your VM.

**Alerts**: Enable recommended alert rules:

**Diagnostics**: Boot diagnostics: Disable (selected), Enable with managed storage account (recommended), Enable with custom storage account

**CreateVm-MicrosoftWindowsServer.WindowsServer-202-20260108131902 | Overview**

Deployment succeeded: Deployment 'CreateVm-MicrosoftWindowsServer.WindowsServer-202-20260108131902' to resource group 'az104-rg8' was successful.

**Overview**: Your deployment is complete

Deployment name: CreateVm-MicrosoftWindowsServer.WindowsSe... Start time: 1/8/2026, 2:02:18 PM  
Subscription: Azure for Students Correlation ID: 09a9fce-ce7b-4d70-a229-37e164369eb0

**Deployment details**: Setup auto-shutdown, Monitor VM health, performance and network dependencies, Run a script inside the virtual machine

**Next steps**: Go to resource, Create another VM

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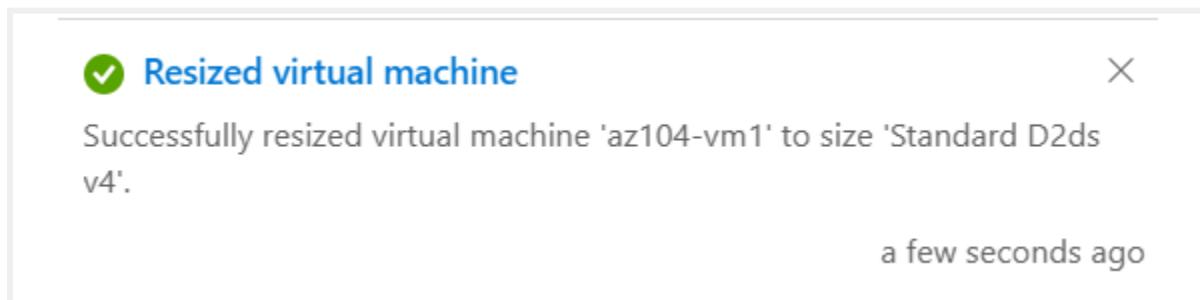
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## Task 2: Manage compute and storage scaling for virtual machines

- On the **az104-vm1** virtual machine, in the **Availability + scale** blade, select **Size**.
- Set the virtual machine size to **D2ds\_v4** and click **Resize**.

The screenshot shows the Microsoft Azure portal interface for managing a virtual machine named 'az104-vm1'. The left sidebar has 'Availability + scale' selected under the 'Size' category. The main content area displays a table of VM sizes, filtered by 'D-Series v4'. The table includes columns for VM Size, Type, vCPUs, RAM (GiB), Data disks, Max IOPS, and Local storage (GiB). The 'D2ds\_v4' row is highlighted. At the bottom of the table, there is a 'Resize' button.

VM Size ↑	Type ↑	vCPUs ↑	RAM (GiB) ↑	Data disks ↑	Max IOPS ↑	Local storage (GiB) ↑
D2as_v4	General purpose	2	8	4	3200	16 (SCSI)
<b>D2ds_v4</b>	General purpose	2	8	4	3200	75 (SCSI)
D4as_v4	General purpose	4	16	8	6400	32 (SCSI)
D4ds_v4	General purpose	4	16	8	6400	150 (SCSI)
D-Series v3	The 3rd generation D family sizes for your general purpose needs					
D2s_v3	General purpose	2	8	4	3200	16 (SCSI)
E-Series v4	The 4th generation E family sizes for your high memory needs					
E-Series v3	The 3rd generation E family sizes for your high memory needs					
F-Series v2	Up to 2X performance boost for vector processing workloads					



- In the **Settings** area, select **Disks**.
- Under **Data disks** select **Create and attach a new disk**.

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

- Click **Apply**.
- After the disk has been created, click **Detach**.

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

- Search for and select Disks.
- In the Settings blade, select Size + performance.

The screenshot shows the Azure Storage center interface. On the left, there's a sidebar with 'Overview', 'All storage resources', and a list of services like Object storage, File storage, etc. The main area shows a list of disks: 'az104-vm1\_OsDisk\_1\_2a9fbdc6a8a', 'az104-vm2\_OsDisk\_1\_3c91a4ff5fa8', and 'vm1-disk1'. The 'vm1-disk1' row is selected. A modal window titled 'vm1-disk1 | Size + performance' is open, showing a table of disk configurations. The table includes columns for Size, Disk tier, Provisioned IOPS, Provisioned thro..., and Max S. The 'Size + performance' tab is highlighted. The table data is as follows:

	Size	Disk tier	Provisioned IOPS	Provisioned thro...	Max S
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	
2048 GiB	E40	500	100	5	
4096 GiB	E50	500	100	5	
8192 GiB	E60	2000	400	10	

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

- Search for and select Virtual machine scale sets and, on the Virtual machine scale sets blade, click Create.

The screenshot shows the 'Create a Virtual Machine Scale Set (VMSS)' blade. At the top, there are tabs for Basics, Spot, Disks, Networking, Management, Health, Advanced, Tags, and Review + create. The Basics tab is selected. The page displays project details, scale set details, and availability zone configuration. The 'Subscription' dropdown is set to 'Azure for Students'. The 'Resource group' dropdown is set to 'az104-rg8'. The 'Virtual machine scale set name' is 'vmss1'. The 'Region' is '(Asia Pacific) Central India'. The 'Availability zone' dropdown shows 'Zones 1, 3' with a note: 'Autoscaling can help you respond to an outage by scaling out new instances in another zone.' At the bottom, there are buttons for '< Previous', 'Next : Spot >', 'Review + create', and 'Give feedback'.

- Selecting only zones 1 & 3, as zone coverage is limited in some regions for Azure Student Subscription.

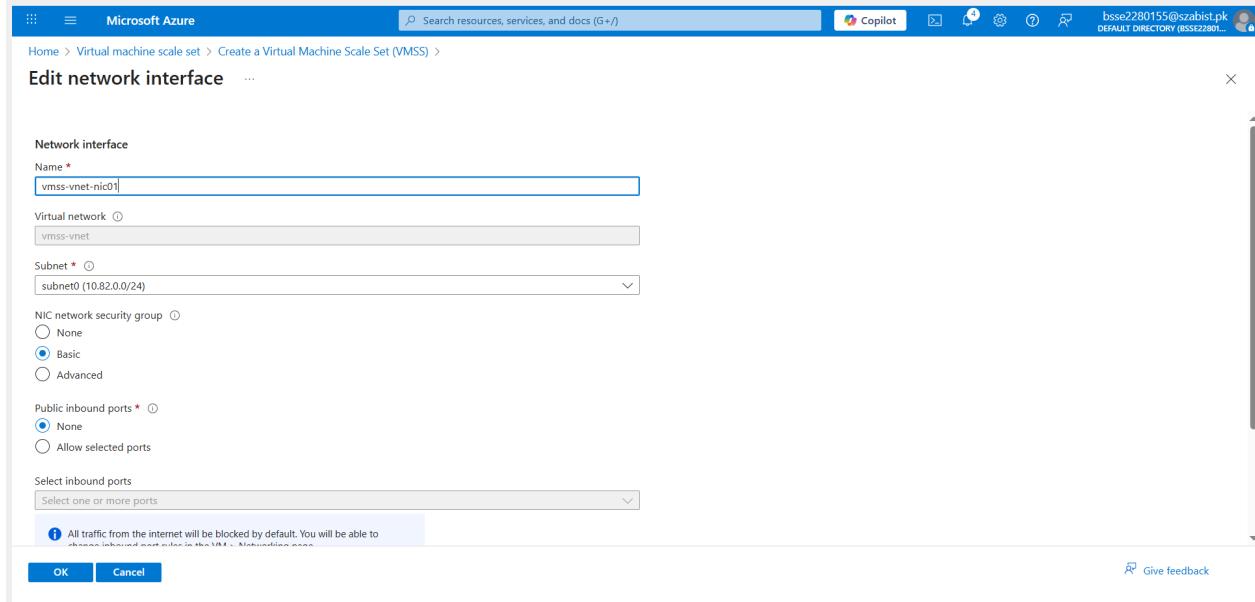
- On the **Networking** page, select **Edit virtual network link**.

The screenshot shows the 'Add a subnet' dialog box in the Microsoft Azure portal. On the left, there's a list of existing address spaces: '10.82.0.0/20' which covers the range '10.82.0.0 - 10.82.15.255' and has '4,096 addresses'. Below this is a table with columns 'Subnets', 'IP address range', 'Size', and 'NAT gateway'. A button 'Add IPv4 address space' is available. A note says 'You must add at least one subnet to the virtual network.' On the right, the 'Add a subnet' form is displayed. It includes fields for 'Subnet purpose' (set to 'Default'), 'Name' (set to 'subnet0'), and 'IPv4' settings. Under 'IPv4', it shows 'Include an IPv4 address space' checked, 'IPv4 address range' set to '10.82.0.0/20', 'Starting address' set to '10.82.0.0', 'Size' set to '/24 (256 addresses)', and 'Subnet address range' set to '10.82.0.0 - 10.82.0.255'. There are also sections for 'IPv6' (unchecked) and 'Private subnet' (unchecked). Buttons for 'Add' and 'Cancel' are at the bottom.

- In the **Networking** tab, click the **Edit network interface**.

The screenshot shows the 'Create a Virtual Machine Scale Set (VMSS)' blade in the Microsoft Azure portal, focusing on the 'Networking' tab. At the top, tabs include 'Basics', 'Spot', 'Disks', 'Networking' (which is selected), 'Management', 'Health', 'Advanced', 'Tags', and 'Review + create'. Below the tabs, a note says '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 about VMSS networking.' The 'Virtual network configuration' section shows 'Virtual network' set to '(New) vmss-vnet (az104-rg8)' and 'Subnet' set to '(New) subnet0'. The 'Network interface' section shows a table with one row for 'vmss-vnet-nic01'. Buttons at the bottom include '< Previous', 'Next : Management >', 'Review + create', and 'Give feedback'.

- Select **Advanced** and then click **Create new** under the **Configure network security group** drop-down list.



- Click **Add an inbound rule** and add an inbound security rule.

- Click **Add** and, back on the **Create network security group** blade, click **OK**.

- In the **Edit network interface** blade, in the **Public IP address** section, click **Enabled**.

Network interface

Name \*: vmss-vnet-nic01

Virtual network: vmss-vnet

Subnet \*: subnet0 (10.82.0.0/24)

NIC network security group: Advanced

Configure network security group: (new) vmss1-nsg

Public IP address: Enabled

Accelerated networking: Enabled

OK Cancel

- In the \*\*Networking\*\* tab, Create a load balancer.

Create a Virtual Machine Scale Set (VMSS)

Load balancing: Azure load balancer

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

Create a load balancer

Load balancer name: vmss-lb

Type: Public

Protocol: TCP

Rules: Load balancer rule, Inbound NAT rule

Create Cancel

- On the **Review + create** tab, ensure that the validation passed and click **Create**.

**Microsoft Defender for Cloud**  
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**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

Enable notifications for instance termination

Enable notifications for OS image upgrades or re-image

**Identity**  
There are two types of managed identity: system-assigned and user-assigned. System-assigned identities are directly linked to a

< Previous Next : Health > Review + create Give feedback

**Deployment**

**Overview**

**Your deployment is complete**

Deployment name : CreateVmss-MicrosoftWindowsServer.WindowsServer-2-20260108160526 | Overview

Subscription : Azure for Students Start time : 1/8/2026, 4:28:27 PM Correlation ID : b417dd18-2c25-4162-b8d9-02fa88d2a2eb

Resource group : az104-rg8

**Deployment details**

**Next steps**

Go to resource

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## Task 4: Scale Azure Virtual Machine Scale Sets

- Select **Go to resource** or search for and select the **vmss1** scale set.
- Choose **Availability + Scale** from the left side menu, then choose **Scaling**.

The screenshot shows the Azure portal interface for scaling a VMSS. The left sidebar has 'Availability + scale' expanded, with 'Scaling' selected. The main area shows the 'Choose how to scale your resource' section with 'Manual scale' selected (radio button is checked). Below it, 'Override condition' and 'Instance count' (set to 1) are displayed. The 'Custom autoscale' option is also visible but not selected.

- Select **Add a rule**.

The screenshot shows the 'Scale rule' configuration for the 'vmss1' scale set. The 'Default' scale condition is being edited. On the right, a graph shows 'Percentage CPU (Average)' over time, with a blue line and a red dashed horizontal line at 70%. The 'Action' section is configured to 'Increase percent by 5%' when the metric crosses the threshold. Other settings include 'Duration (minutes)': 10, 'Time grain (minutes)': 1, 'Time grain statistic': Average, and 'Time aggregation': Average.

- Create a rule that decreases the number of VM instances in a scale set. Select **Add a rule**.

The screenshot shows the Azure portal interface for managing a Virtual Machine Scale Set (VMSS). The left sidebar has 'Scaling' selected under the 'Instances' category. The main area shows the 'vmss1 | Scaling' blade with a 'Default' scale condition. This condition triggers when the average Percentage CPU is greater than 70, increasing the instance count by 50%. Below this, there's a 'Scale in' condition triggered when the average Percentage CPU is less than 30, decreasing the instance count by 50%. The 'Instance limits' section shows a minimum of 2, maximum of 10, and a default of 2. A 'Schedule' section is also present.

- Set the instance limits

This screenshot shows the 'Scaling' blade for the 'vmss1' VMSS. The 'Rules' section is highlighted. It contains two scale conditions: one for scaling out (when Average Percentage CPU > 70, increase percent by 50%) and one for scaling in (when Average Percentage CPU < 30, decrease percent by 50%). The 'Instance limits' section shows a minimum of 2, maximum of 10, and a default of 2. A note at the bottom states: 'This scale condition is executed when none of the other scale condition(s) match'.

- Save your changes.