

Lab 08 - Manage Virtual Machines Report

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MICROSOFT AZURE Lab 08

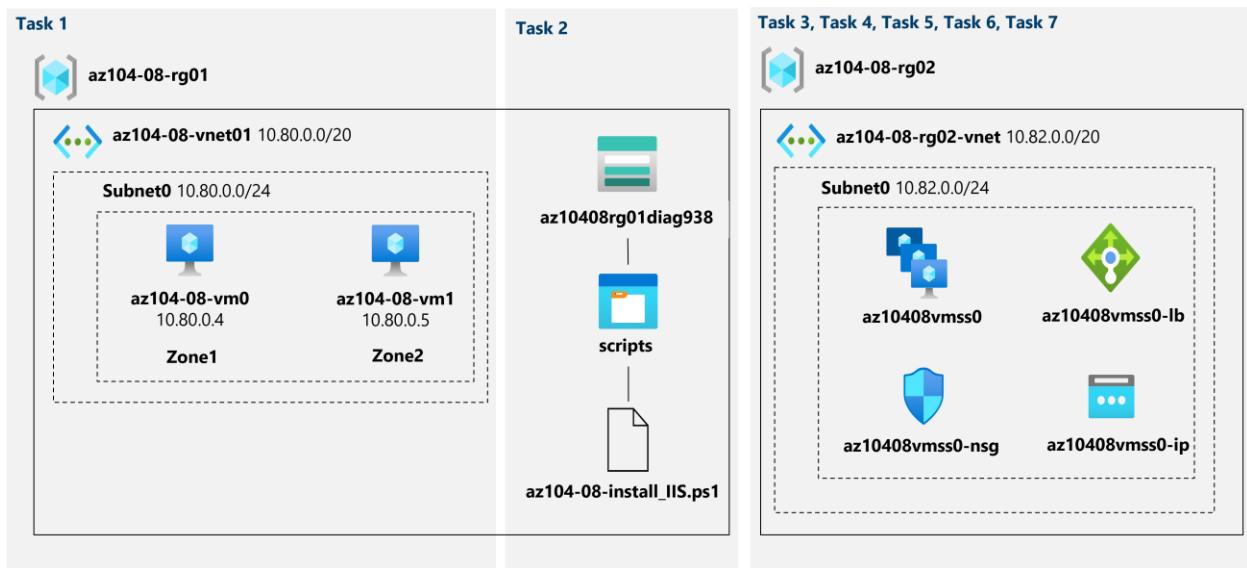
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Introduction

This report presents an overview of the valuable insights and practical knowledge acquired during the completion of Azure Lab 08 - Manage Virtual Machines. The lab focuses on the comprehensive management of virtual machines in the Azure cloud environment, providing a deep understanding of essential concepts and techniques for VM creation, configuration, and optimization. Throughout this report, I will explore the inherent flexibility and scalability offered by Azure Virtual Machines, examine effective strategies for resource management, emphasize the importance of implementing robust security and governance measures, and delve into automation options that streamline VM deployments.

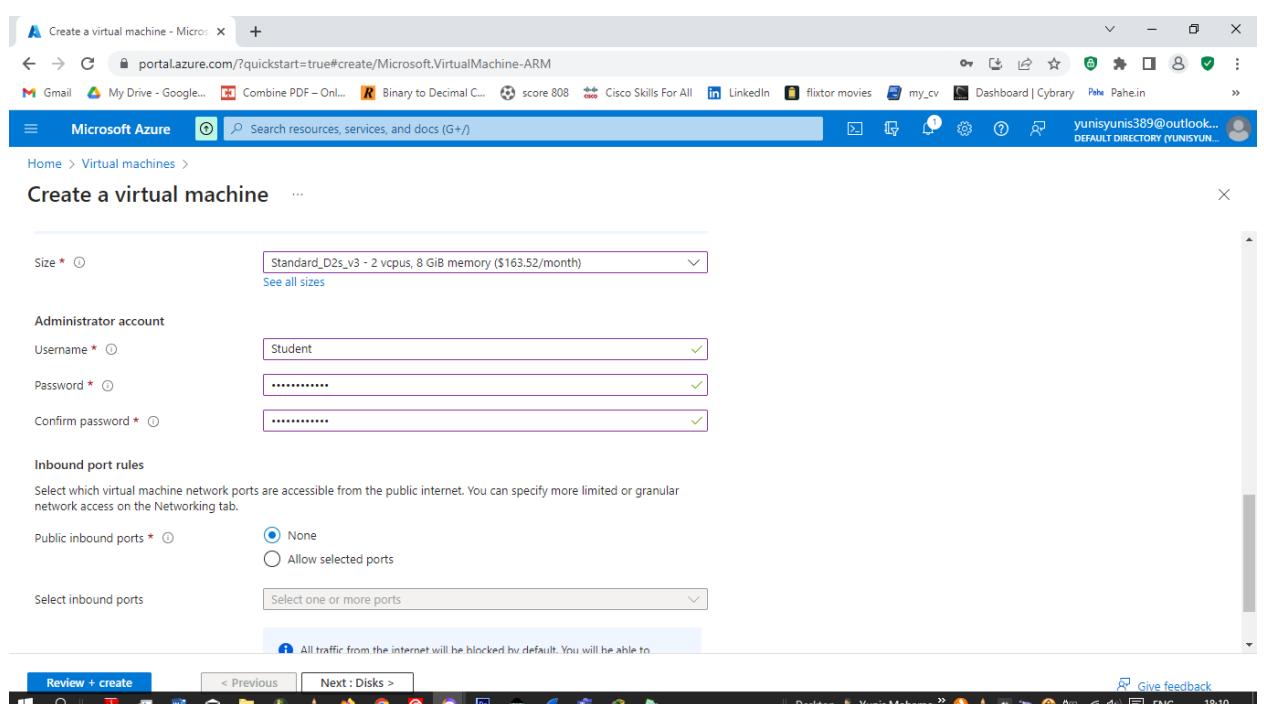
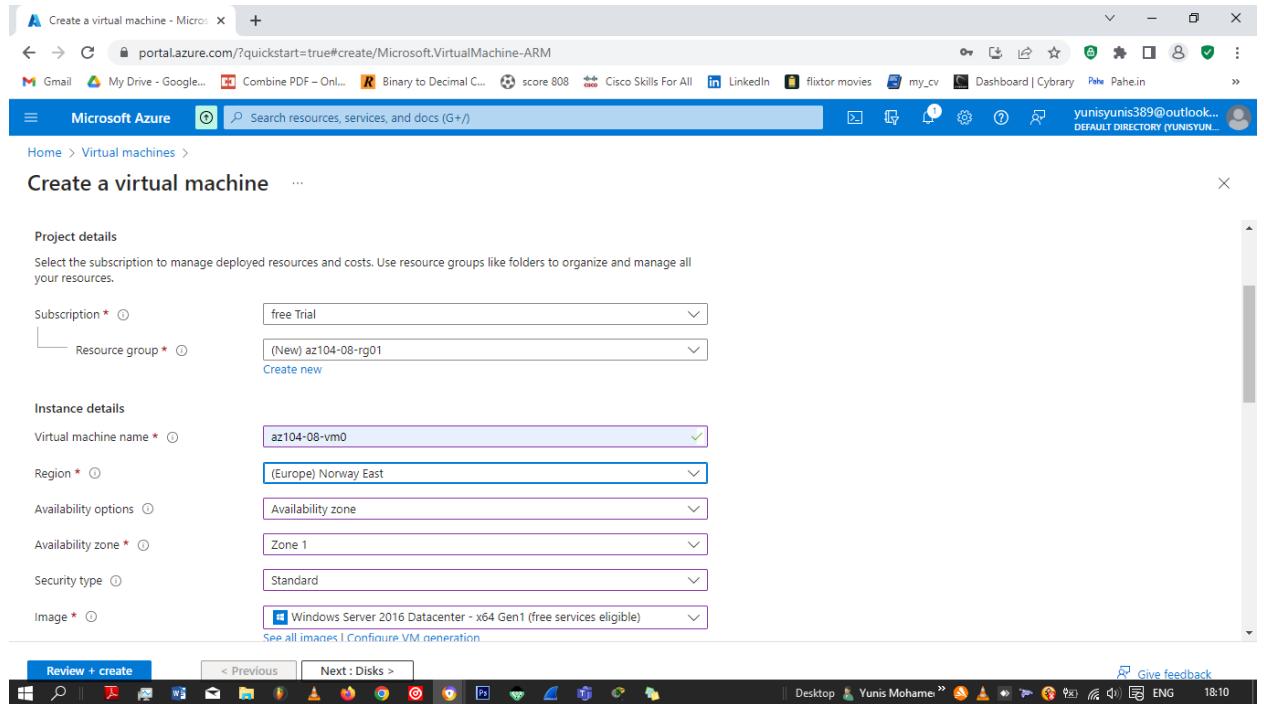
Architecture diagram



Task 1: Deploy zone-resilient Azure virtual machines by using the Azure portal and an Azure Resource Manager template

In this task, you will deploy Azure virtual machines into different availability zones by using the Azure portal and an Azure Resource Manager template.

1. Sign in to the [Azure portal](#).
2. In the Azure portal, search for and select **Virtual machines** and, on the **Virtual machines** blade, click **+ Create**, click **+ Azure virtual machine**.
3. On the **Basics** tab of the **Create a virtual machine** blade, specify the following settings (leave others with their default values):



Click Next: Disks > and, on the Disks tab of the Create a virtual machine blade, specify the following settings (leave others with their default values):

Setting	Value
OS disk type	Premium SSD

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

Enable Ultra Disk compatibility **Unchecked**

- Click **Next: Networking >** and, on the **Networking** tab of the **Create a virtual machine** blade, click **Create new** below the **Virtual network** textbox.
- On the **Create virtual network** blade, specify the following settings (leave others with their default values):

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

Name **az104-08-rg01-vnet**

Address range **10.80.0.0/20**

Subnet name **subnet0**

Subnet range **10.80.0.0/24**

Create virtual network

Name * az104-08-rg01-vnet

Address space

Address range: 10.80.0.0/20 (4096 addresses)

Subnets

Subnet name: subnet0, Address range: 10.80.0.0/24 (256 addresses)

OK

Click **OK** and, back on the **Networking** tab of the **Create a virtual machine** blade, specify the following settings (leave others with their default values):

Setting	Value
Subnet	subnet0
Public IP	default
NIC network security group	basic
Public inbound Ports	None
Accelerated networking	Off
Place this virtual machine behind an existing load balancing solution?	Unchecked

6. Click **Next: Management >** and, on the **Management** tab of the **Create a virtual machine** blade, specify the following settings (leave others with their default values):

Setting	Value
Patch orchestration options	Manual updates

7. Click **Next: Monitoring >** and, on the **Monitoring** tab of the **Create a virtual machine** blade, specify the following settings (leave others with their default values):

Setting	Value
Boot diagnostics	Enable with custom storage account
Diagnostics storage account	accept the default value

8. Note: If necessary, select an existing storage account in the dropdown list or create a new storage account. Record the name of the storage account. You will use it in the next task.
9. Click **Next: Advanced >**, on the **Advanced** tab of the **Create a virtual machine** blade, review the available settings without modifying any of them, and click **Review + Create**.
10. On the **Review + Create** blade, click **Create**.
11. On the deployment blade, click **Template**.
12. Review the template representing the deployment in progress and click **Deploy**.

Note: You will use this option to deploy the second virtual machine with matching configuration except for the availability zone.

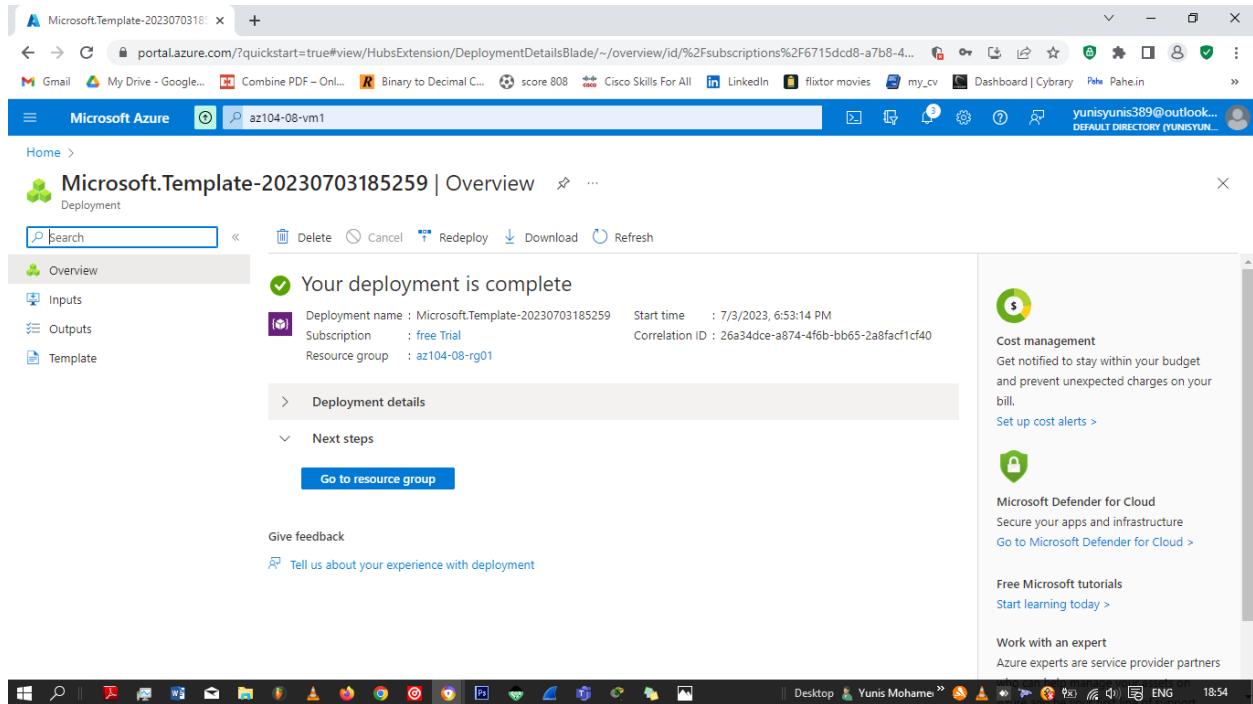
13. On the **Custom deployment** blade, specify the following settings (leave others with their default values):

Setting	Value
Resource Group	az104-08-rg01
Network Interface Name	az104-08-vm1-nic1
Public IP Address Name	az104-08-vm1-ip
Virtual Machine Name, Virtual Machine Name1, Virtual Machine Computer Name	az104-08-vm1
Virtual Machine RG	az104-08-rg01
Admin Username	Student
Admin Password	Provide a secure password
Enable Hotpatching	False

14. Note: You need to modify parameters corresponding to the properties of the distinct resources you are deploying by using the template, including the virtual machine and its network interface.

15. Click **Review + Create**, on the **Review + Create** blade, click **Create**.

Note: Wait for both deployments to complete before you proceed to the next task. This might take about 5 minutes.



Task 2: Configure Azure virtual machines by using virtual machine extensions

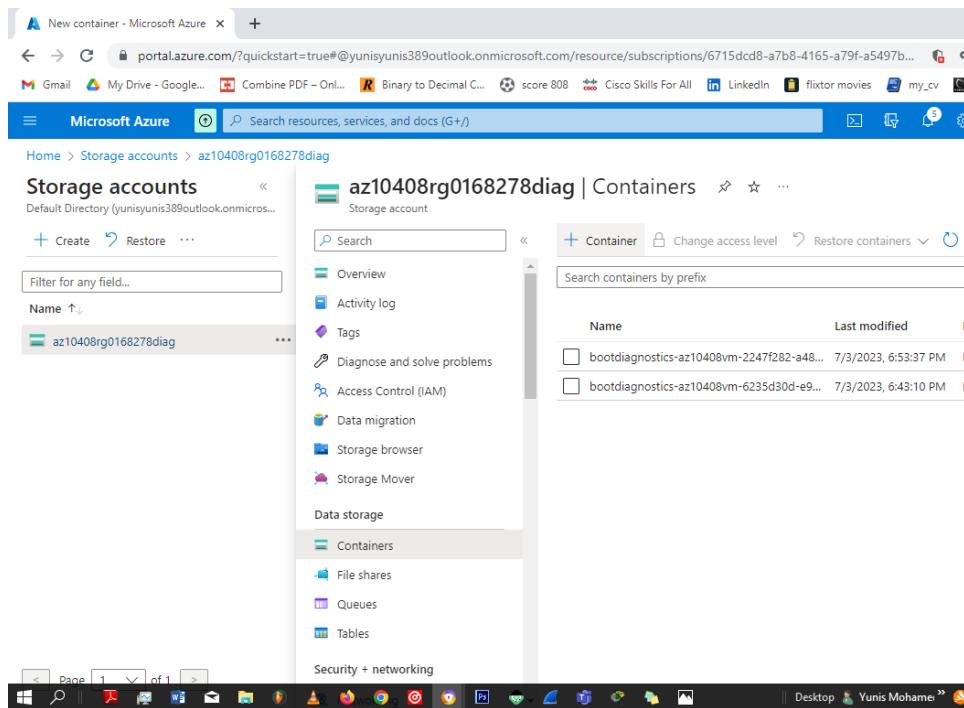
In this task, you will install Windows Server Web Server role on the two Azure virtual machines you deployed in the previous task by using the Custom Script virtual machine extension.

1. In the Azure portal, search for and select **Storage accounts** and, on the **Storage accounts** blade, click the entry representing the diagnostics storage account you created in the previous task.
2. On the storage account blade, in the **Data Storage** section, click **Containers** and then click **+ Container**.
3. On the **New container** blade, specify the following settings (leave others with their default values) and click **Create**:

Setting	Value
Name	scripts
Public access level	Private (no anonym ous access)

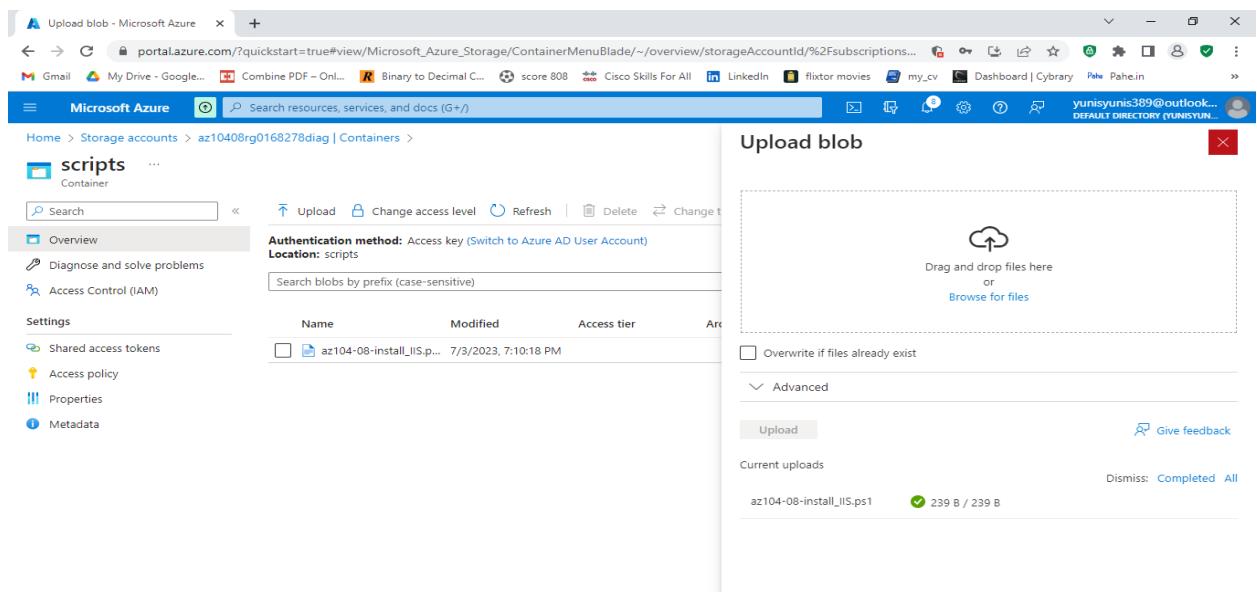
Setting

Value



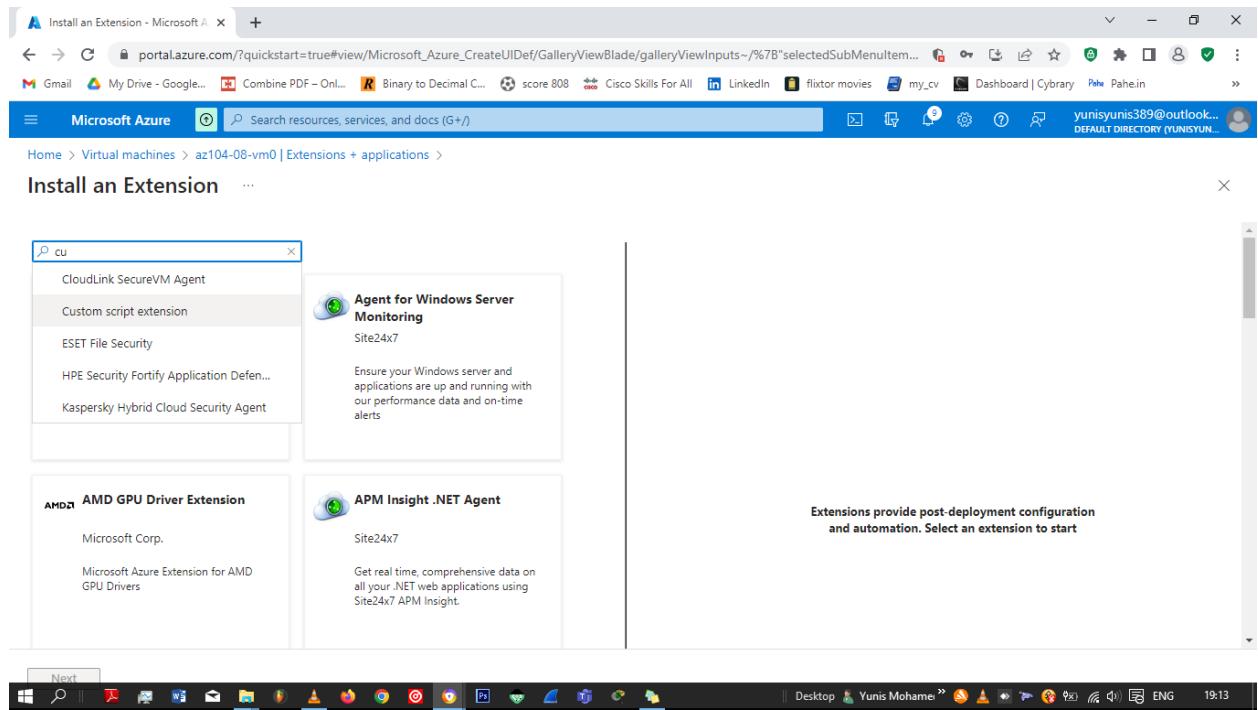
The screenshot shows the Microsoft Azure Storage accounts blade. On the left, there's a sidebar with options like Overview, Activity log, Tags, Diagnose and solve problems, Access Control (IAM), Data migration, Storage browser, and Storage Mover. The main area is titled "az10408rg0168278diag | Containers" and shows a list of containers. There are two containers listed: "bootdiagnostics-az10408vm-2247f282-a48..." and "bootdiagnostics-az10408vm-6235d30d-e9...". The "Containers" option is selected in the sidebar.

4. Back on the storage account blade displaying the list of containers, click **scripts**.
5. On the **scripts** blade, click **Upload**.
6. On the **Upload blob** blade, click the folder icon, in the **Open** dialog box, navigate to the **\Allfiles\Labs\08** folder, select **az104-08-install_IIS.ps1**, click **Open**, and back on the **Upload blob** blade, click **Upload**.

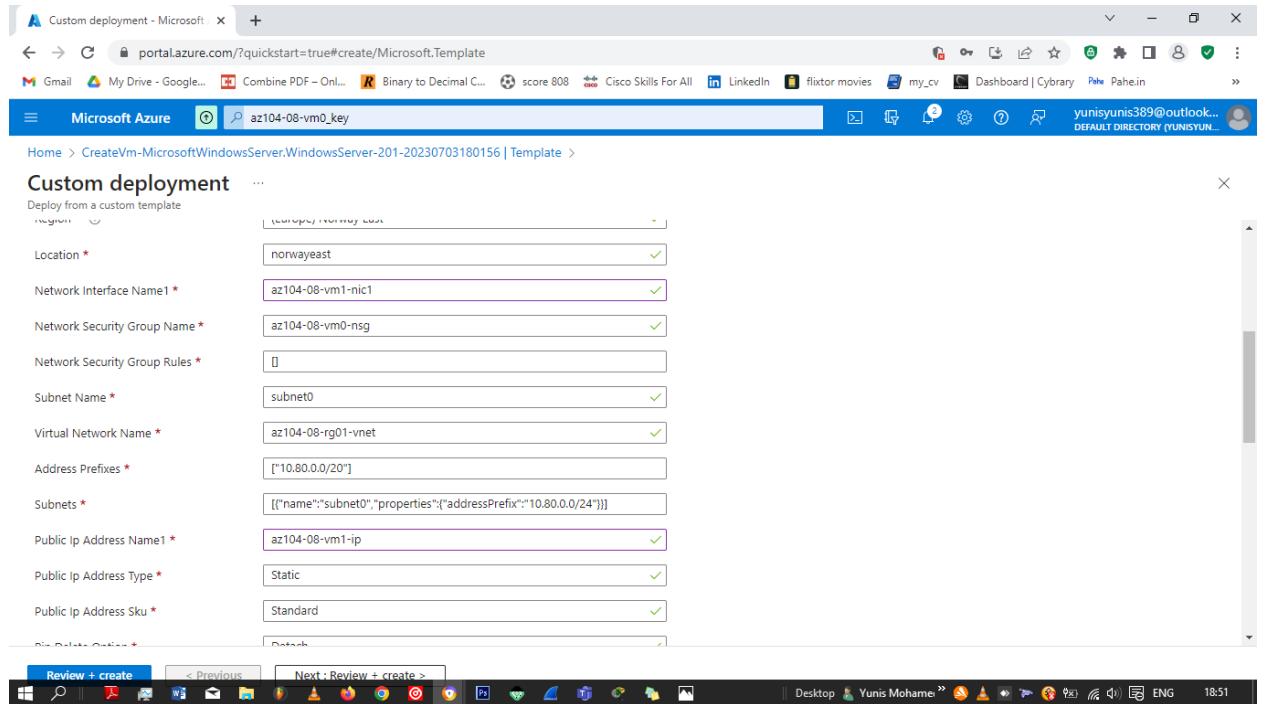


The screenshot shows the Microsoft Azure Storage accounts blade with the "scripts" container selected. On the right, there's an "Upload blob" interface. It has a large dashed box for dragging files or a "Browse for files" button. Below it, there's a checkbox for "Overwrite if files already exist" and an "Advanced" section. At the bottom, there's an "Upload" button and a "Give feedback" link. Under "Current uploads", it shows a file named "az104-08-install_IIS.ps1" with a size of "239 B / 239 B" and a green checkmark indicating it's completed. The status bar at the bottom shows "Dismiss: Completed All".

7. In the Azure portal, search for and select **Virtual machines** and, on the **Virtual machines** blade, click **az104-08-vm0**.
8. On the **az104-08-vm0** virtual machine blade, in the **Settings** section, click **Extensions + applications**, and then click **+ Add**.
9. On the **Install an Extension** blade, click **Custom Script Extension** and then click **Next**.
10. From the **Configure Custom Script Extension** blade, click **Browse**.
11. On the **Storage accounts** blade, click the name of the storage account into which you uploaded the **az104-08-install_IIS.ps1** script, on the **Containers** blade, click **scripts**, on the **scripts** blade, click **az104-08-install_IIS.ps1**, and then click **Select**.
12. Back on the **Install extension** blade, click **Review + create** and, on the **Review + create** blade click **Create**.



13. In the Azure portal, search for and select **Virtual machines** and, on the **Virtual machines** blade, click **az104-08-vm1**.
14. On the **az104-08-vm1** blade, in the **Automation** section, click **Export template**.
15. On the **az104-08-vm1 - Export template** blade, click **Deploy**.
16. On the **Custom deployment** blade, click **Edit template**.



Note: Disregard the message stating **The resource group is in a location that is not supported by one or more resources in the template. Please choose a different resource group.** This is expected and can be ignored in this case.

- On the **Edit template** blade, in the section displaying the content of the template, insert the following code starting with line 20 (directly underneath the "resources": [line):

Note: If you are using a tool that pastes the code in line by line intellisense may add extra brackets causing validation errors. You may want to paste the code into notepad first and then paste it into line 20.

```
{
  "type": "Microsoft.Compute/virtualMachines/extensions",
  "name": "az104-08-vm1/customScriptExtension",
  "apiVersion": "2018-06-01",
  "location": "[resourceGroup().location]",
  "dependsOn": [
    "az104-08-vm1"
  ],
  "properties": {
    "publisher": "Microsoft.Compute",
    "type": "CustomScriptExtension",
    "typeHandlerVersion": "1.0",
    "autoRun": true,
    "fileUris": [
      "https://raw.githubusercontent.com/YunisMohamed/WindowsServer/main/CustomScript.ps1"
    ],
    "commandToExecute": "powershell.exe -ExecutionPolicy Unrestricted -File $env:temp\CustomScript.ps1"
  }
}
```

```

    "type": "CustomScriptExtension",
    "typeHandlerVersion": "1.7",
    "autoUpgradeMinorVersion": true,
    "settings": {
        "commandToExecute": "powershell.exe Install-WindowsFeature -name Web-Server -IncludeManagementTools && powershell.exe remove-item 'C:\\inetpub\\wwwroot\\iisstart.htm' && powershell.exe Add-Content -Path 'C:\\inetpub\\wwwroot\\iisstart.htm' -Value $($('Hello World from ' + $env:computername))"
    }
},
},
},

```

Note: This section of the template defines the same Azure virtual machine custom script extension that you deployed earlier to the first virtual machine via Azure PowerShell.

18. Click **Save** and, back on the **Custom template** blade, click **Review + Create** and, on the **Review + Create** blade, click **Create**

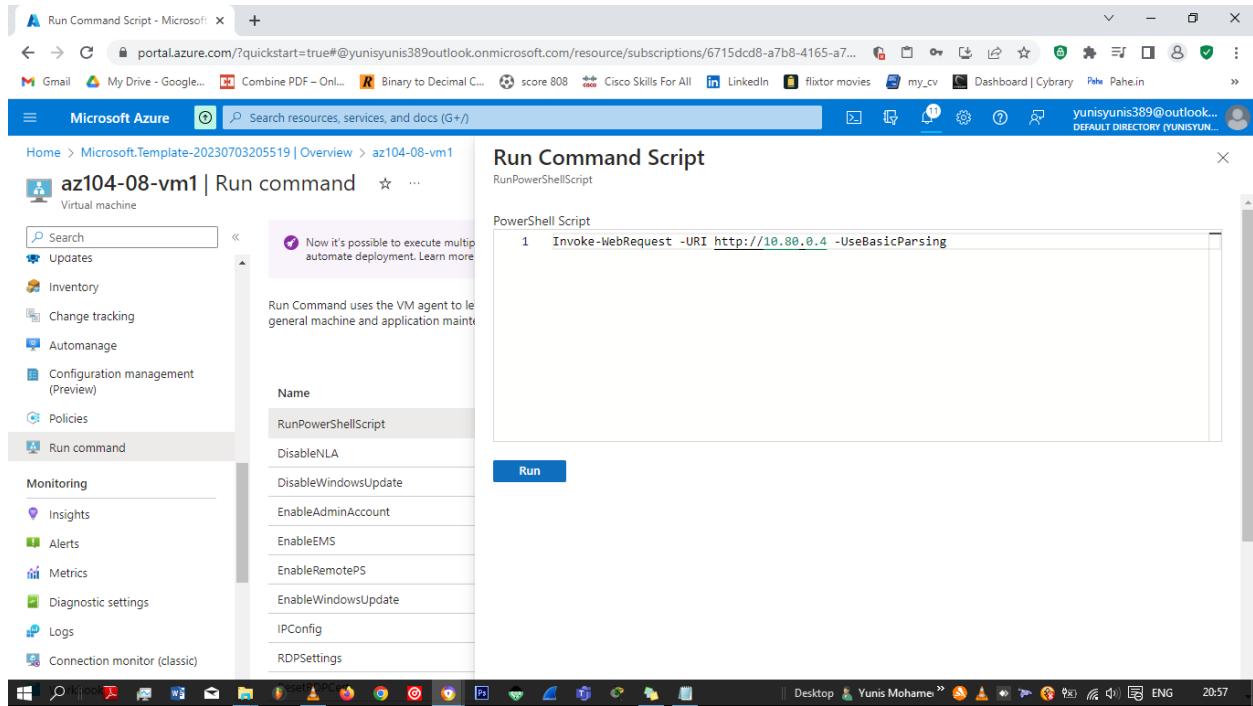
Note: Wait for the template deployment to complete. You can monitor its progress from the **Extensions** blade of the **az104-08-vm0** and **az104-08-vm1** virtual machines. This should take no more than 3 minutes.

19. To verify that the Custom Script extension-based configuration was successful, navigate back on the **az104-08-vm1** blade, in the **Operations** section, click **Run command**, and, in the list of commands, click **RunPowerShellScript**.
20. On the **Run Command Script** blade, type the following and click **Run** to access the web site hosted on **az104-08-vm0**:

```
Invoke-WebRequest -URI http://10.80.0.4 -UseBasicParsing
```

Note: The **-UseBasicParsing** parameter is necessary to eliminate dependency on Internet Explorer to complete execution of the cmdlet

Note: You can also connect to **az104-08-vm0** and run `Invoke-WebRequest -URI http://10.80.0.5 -UseBasicParsing` to access the web site hosted on **az104-08-vm1**.



Task 3: Scale compute and storage for Azure virtual machines

In this task you will scale compute for Azure virtual machines by changing their size and scale their storage by attaching and configuring their data disks.

1. In the Azure portal, search for and select **Virtual machines** and, on the **Virtual machines** blade, click **az104-08-vm0**.
2. On the **az104-08-vm0** virtual machine blade, click **Size** and set the virtual machine size to **Standard DS1_v2** and click **Resize**

Note: Choose another size if **Standard DS1_v2** is not available.

3. On the **az104-08-vm0** virtual machine blade, click **Disks**, Under **Data disks** click **+ Create and attach a new disk**.
4. Create a managed disk with the following settings (leave others with their default values):

Setting	Value
Disk name	az104-08-vm0-datadisk-0
Storage type	Premium SSD

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

Size (GiB) **1024**

5. Back on the **az104-08-vm0 - Disks** blade, Under **Data disks** click + **Create and attach a new disk**.
6. Create a managed disk with the following settings (leave others with their default values) and Save changes:

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

Disk name **az104-08-vm0-datadisk-1**

Storage type **Premium SSD**

Size (GiB) **1024 GiB**

7. Back on the **az104-08-vm0 - Disks** blade, click **Save**.
8. On the **az104-08-vm0** blade, in the **Operations** section, click **Run command**, and, in the list of commands, click **RunPowerShellScript**.
9. On the **Run Command Script** blade, type the following and click **Run** to create a drive Z: consisting of the two newly attached disks with the simple layout and fixed provisioning:

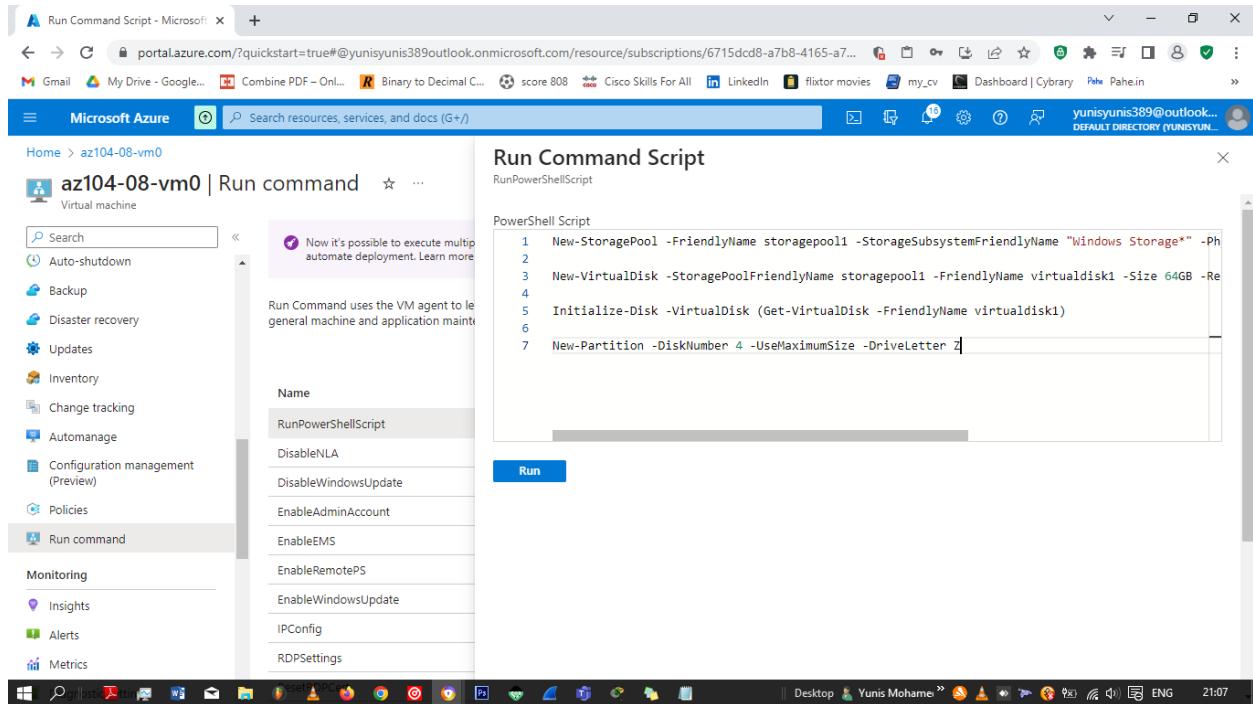
```
New-StoragePool -FriendlyName storagepool1 -StorageSubsystemFriendlyName "Windows Storage*" -PhysicalDisks (Get-PhysicalDisk -CanPool $true)
```

```
New-VirtualDisk -StoragePoolFriendlyName storagepool1 -FriendlyName virtualdisk1 -Size 64GB -ResiliencySettingName Simple -ProvisioningType Fixed
```

```
Initialize-Disk -VirtualDisk (Get-VirtualDisk -FriendlyName virtualdisk1)
```

```
New-Partition -DiskNumber 4 -UseMaximumSize -DriveLetter Z
```

Note: Wait for the confirmation that the commands completed successfully.

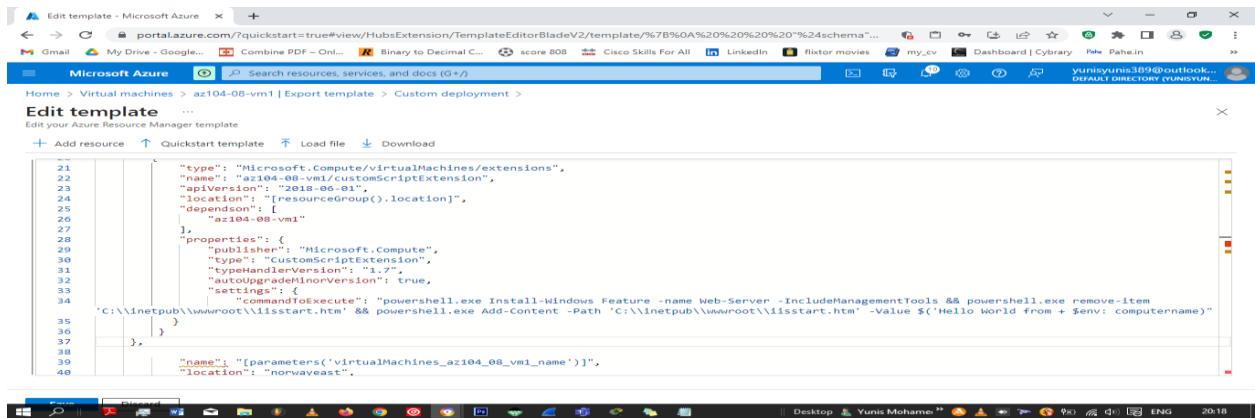


10. In the Azure portal, search for and select **Virtual machines** and, on the **Virtual machines** blade, click **az104-08-vm1**.
11. On the **az104-08-vm1** blade, in the **Automation** section, click **Export template**.
12. On the **az104-08-vm1 - Export template** blade, click **Deploy**.
13. On the **Custom deployment** blade, click **Edit template**.

Note: Disregard the message stating **The resource group is in a location that is not supported by one or more resources in the template. Please choose a different resource group.** This is expected and can be ignored in this case.

14. On the **Edit template** blade, in the section displaying the content of the template, replace the line **30 "vmSize": "Standard_D2s_v3"** with the following line:

"vmSize": "Standard_DS1_v2"



Note: This section of the template defines the same Azure virtual machine size as the one you specified for the first virtual machine via the Azure portal.

15. On the **Edit template** blade, in the section displaying the content of the template, replace line ("dataDisks": [] line) with the following code :

```
16.         "dataDisks": [
17.             {
18.                 "lun": 0,
19.                 "name": "az104-08-vm1-disk0",
20.                 "diskSizeGB": "1024",
21.                 "caching": "ReadOnly",
22.                 "createOption": "Empty"
23.             },
24.             {
25.                 "lun": 1,
26.                 "name": "az104-08-vm1-disk1",
27.                 "diskSizeGB": "1024",
28.                 "caching": "ReadOnly",
29.                 "createOption": "Empty"
30.             }
]
]
```

Note: If you are using a tool that pastes the code in line by line intellisense may add extra brackets causing validation errors. You may want to paste the code into notepad first and then paste it into line 49.

Note: This section of the template creates two managed disks and attaches them to **az104-08-vm1**, similarly to the storage configuration of the first virtual machine via the Azure portal.

31. Click **Save** and, back on the **Custom deployment** blade, click **Review + Create** and, on the **Review + Create** blade, click **Create**.

Note: Wait for the template deployment to complete. You can monitor its progress from the **Disks** blade of the **az104-08-vm1** virtual machine. This should take no more than 3 minutes.

Back on the **az104-08-vm1** blade, in the **Operations** section, click **Run command**, and, in the list of commands, click **RunPowerShellScript**.

On the **Run Command Script** blade, type the following and click **Run** to create a drive Z: consisting of the two newly attached disks with the simple layout and fixed provisioning:

```
New-StoragePool -FriendlyName storagepool1 -StorageSubsystemFriendlyName "Windows Storage*" -PhysicalDisks (Get-PhysicalDisk -CanPool $true)
```

```
New-VirtualDisk -StoragePoolFriendlyName storagepool1 -FriendlyName virtualdisk1 -Size 2046GB -ResiliencySettingName Simple -ProvisioningType Fixed
```

```
Initialize-Disk -VirtualDisk (Get-VirtualDisk -FriendlyName virtualdisk1)
```

```
New-Partition -DiskNumber 4 -UseMaximumSize -DriveLetter Z
```

Note: Wait for the confirmation that the commands completed successfully.

The screenshot shows the Microsoft Azure portal interface. On the left, the navigation menu is open, showing options like Bastion, Auto-shutdown, Backup, Disaster recovery, Updates, Inventory, Change tracking, Automanage, Configuration management (Preview), Policies, Run command, Monitoring, Insights, and Alerts. The 'Run command' option is selected. In the center, the 'Run Command Script' blade is displayed for a VM named 'az104-08-vm1'. The blade has a title bar 'Run Command Script' and a sub-header 'RunPowerShellScript'. It shows a message 'Script execution complete' and a PowerShell script block containing seven commands. Below the script is a 'Run' button. At the bottom is an 'Output' pane showing the results of the command execution, including disk details like DiskNumber: 4, DriveLetter: Z, and GUID: {ebd0a0a2-b9e5-4433-87c0-68b6b72699c7}. The status bar at the bottom right indicates the session is 'Desktop' and the time is '21:21'.

Task 4: Register the Microsoft.Insights and Microsoft.AlertsManagement resource providers

1. In the Azure portal, open the **Azure Cloud Shell** by clicking on the icon in the top right of the Azure Portal.
2. If prompted to select either **Bash** or **PowerShell**, select **PowerShell**.

Note: If this is the first time you are starting **Cloud Shell** and you are presented with the **You have no storage mounted** message, select the subscription you are using in this lab, and click **Create storage**.

From the Cloud Shell pane, run the following to register the Microsoft.Insights and Microsoft.AlertsManagement resource providers.

```
Register-AzResourceProvider -ProviderNamespace Microsoft.Insights
```

```
Register-AzResourceProvider -ProviderNamespace Microsoft.AlertsManagement
```

Task 5: Deploy zone-resilient Azure virtual machine scale sets by using the Azure portal

In this task, you will deploy Azure virtual machine scale set across availability zones by using the Azure portal.

1. In the Azure portal, search for and select **Virtual machine scale sets** and, on the **Virtual machine scale sets** blade, click **+ Add** (or **+ Create**).
2. On the **Basics** tab of the **Create a virtual machine scale set** blade, specify the following settings (leave others with their default values) and click **Next : Disks >**:

Setting	Value
Subscription	the name of the Azure subscription you are using in this lab
Resource group	the name of a new resource group az1-04-08-rg02
Virtual machine scale set name	az10408v-mss0
Region	select one of the

Setting	Value
	regions that support availabilit y zones and where you can provision Azure virtual machines different from the one you used to deploy virtual machines earlier in this lab
Availability zone	Zones 1, 2, 3
Orchestration mode	Uniform
Image	Windows Server 2019 Datacente r - Gen2
Run with Azure Spot discount	No
Size	Standard D2s_v3
Username	Student

Setting	Value
Password	Provide a secure password

Already have a Windows Server license?

The screenshot shows the 'Create a virtual machine scale set' blade in the Azure portal. Under 'Orchestration mode', 'Uniform' is selected. In the 'Image' section, 'Windows Server 2019 Datacenter - x64 Gen2 (free services eligible)' is chosen. The 'VM architecture' section shows 'x64' selected. A note below states: 'Arm64 is not supported with the selected image.' At the bottom, there are 'Review + create' and 'Next : Spot >' buttons.

3. Note: For the list of Azure regions which support deployment of Windows virtual machines to availability zones, refer to [What are Availability Zones in Azure?](#)
4. On the **Disks** tab of the **Create a virtual machine scale set** blade, accept the default values and click **Next : Networking >**.
5. On the **Networking** tab of the **Create a virtual machine scale set** blade, click the **Create virtual network** link below the **Virtual network** textbox and create a new virtual network with the following settings (leave others with their default values).

Setting	Value
Name	az104-08-rg02-vnet

Setting	Value
Address range	10.82.0. 0/20
Subnet name	subnet0
Subnet range	10.82.0. 0/24

The screenshot shows the 'Create virtual network' blade in the Azure portal. Key details from the blade:

- Resource group:** (New) az104-08-rg02_group
- Address space:** 10.82.0.0/20 (selected)
- Subnets:**
 - Subnet name: subnet0
 - Address range: 10.82.0.0/24 (selected)

6. Note: Once you create a new virtual network and return to the **Networking** tab of the **Create a virtual machine scale set** blade, the **Virtual network** value will be automatically set to **az104-08-rg02-vnet**.
7. Back on the **Networking** tab of the **Create a virtual machine scale set** blade, click the **Edit network interface** icon to the right of the network interface entry.
8. On the **Edit network interface** blade, in the **NIC network security group** section, click **Advanced** and click **Create new** under the **Configure network security group** drop-down list.
9. On the **Create network security group** blade, specify the following settings (leave others with their default values):

Setting Value

Name **az10408vmss0-nsg**

10. Click **Add an inbound rule** and add an inbound security rule with the following settings (leave others with their default values):

Setting Value

Source **Any**

Source port ranges *****

Destination **Any**

Destination port ranges **80**

Protocol **TCP**

Action **Allow**

Priority **1010**

Name **custom-allow-http**

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

The screenshot shows the Microsoft Azure portal interface. In the top navigation bar, there are several tabs: 'CS-CNS: Assignment 1: M...', 'AZ-104 Exam Guide - Mic...', 'Add inbound security rule', 'AZ-104-MicrosoftAzureA...', and '(1) AZ 104 Lab 08 Manag...'. Below the tabs, the URL is 'portal.azure.com/#view/Microsoft_Azure_Compute/AddNewNetworkInterfaceBladeV2/virtualMachineName/az104-08-rg02/location...'. The main content area shows the 'Create network security group' blade. On the left, there's a sidebar with 'Name' set to 'az10408vmss0-nsg'. Under 'Inbound rules', it lists '1000: default-allow-ssh' and 'Any SSH (TCP/22)'. There's also a link '+ Add an inbound rule'. Under 'Outbound rules', it says 'No results' with a link '+ Add an outbound rule'. On the right, an 'Add inbound security rule' dialog box is open. It has fields for 'Name' (set to 'custom-allow-http'), 'Protocol' (radio button for 'TCP' is selected), 'Action' (radio button for 'Allow' is selected), 'Priority' (set to '1010'), and 'Description' (empty). At the bottom of the dialog are 'Add' and 'Cancel' buttons. The overall interface is a light blue and white design typical of the Azure portal.

11. Back on the **Edit network interface** blade, in the **Public IP address** section, click **Enabled** and click **OK**.

12. Back on the **Networking** tab of the **Create a virtual machine scale set** blade, under the **Load balancing** section, specify the following (leave others with their default values).

Setting	Value
Load balancing options	Azure load balancer
Select a load balancer	Create a load balancer

13. On the **Create a load balancer** page, specify the load balancer name and take the defaults. Click **Create** when you are done then **Next : Scaling >**.

The screenshot shows the Microsoft Azure portal with the URL portal.azure.com/#create/Microsoft.VMSS. The page is titled "Create a load balancer". The "Load balancer name" field contains "az10408vmss0-lb". The "Type" dropdown is set to "Public". The "Protocol" dropdown is set to "TCP". At the bottom, there are "Create" and "Cancel" buttons.

14. On the **Scaling** tab of the **Create a virtual machine scale set** blade, specify the following settings (leave others with their default values) and click **Next : Management >**:

Setting	Value
Initial instance count	2
Scaling policy	Manual

An Azure virtual machine scale set can automatically increase or decrease the number of VM instances that run your application. This automated and elastic behavior reduces the management overhead to monitor and optimize the performance of your application. [Learn more about VMSS scaling](#)

Initial instance count *

Scaling policy Manual Custom

Scale-In policy
Configure the order in which virtual machines are selected for deletion during a scale-in operation. [Learn more about scale-in policies](#)

Review + create **< Previous** **Next : Management >**

15. On the **Management** tab of the **Create a virtual machine scale set** blade, specify the following settings (leave others with their default values):

Setting	Value
Boot diagnostics	Enable with custom storage account
Diagnostics storage account	accept the default value

16. Note: You will need the name of this storage account in the next task.

Your subscription is protected by Microsoft Defender for Cloud basic 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

Diagnostics storage account *

Review + create **< Previous** **Next : Health >**

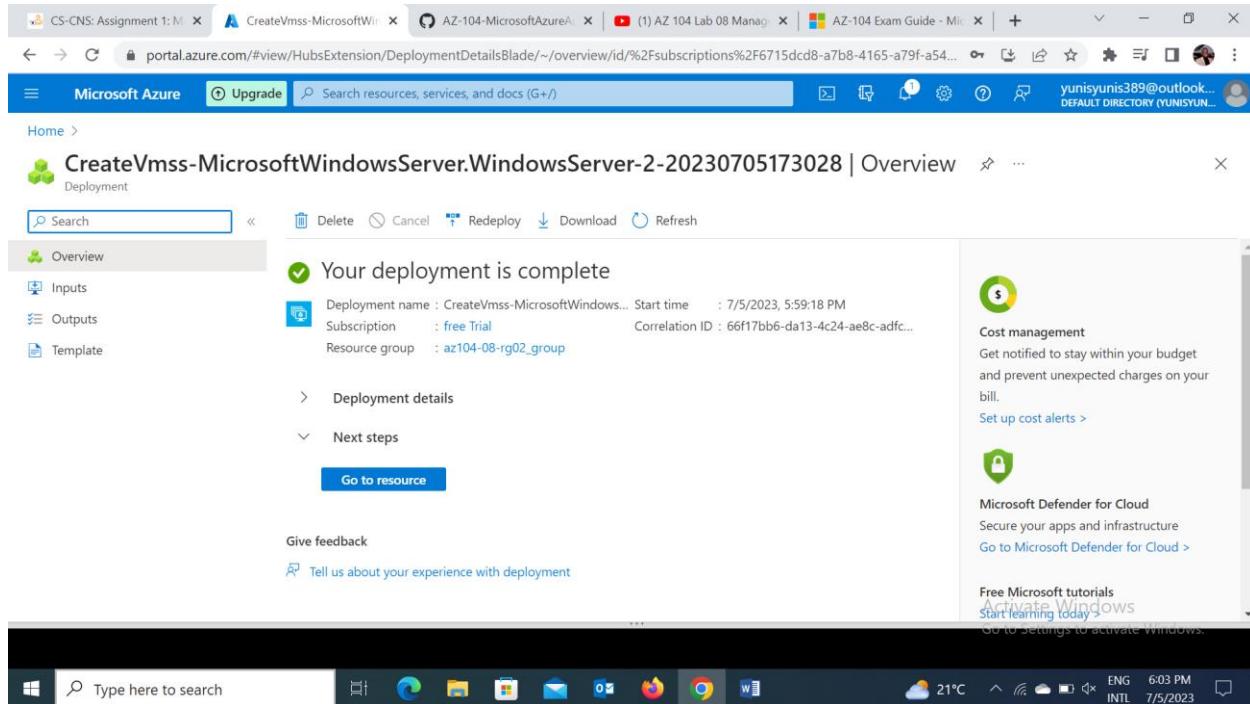
17. Click **Next : Health >**
18. On the **Health** tab of the **Create a virtual machine scale set** blade, review the default settings without making any changes and click **Next : Advanced >**.
19. On the **Advanced** tab of the **Create a virtual machine scale set** blade, specify the following settings (leave others with their default values) and click **Review + create**.

Setting	Value
Spreading algorithm	Fixed spreading (not recommended with zones)

The screenshot shows the 'Create a virtual machine scale set' blade in the Azure portal. Under 'Allocation policy', 'Enable scaling beyond 100 instances' is checked. Under 'Spreading algorithm', 'Fixed spreading (not recommended with zones)' is selected. The 'Fault domain count' is set to 5. In the 'Extensions' section, it says 'Extensions provide post-deployment configuration and automation.' and 'Select an extension to install'. At the bottom, there are buttons for 'Review + create', '< Previous', and 'Next : Tags >'.

20. Note: The **Max spreading** setting is currently not functional.
21. On the **Review + create** tab of the **Create a virtual machine scale set** blade, ensure that the validation passed and click **Create**.

Note: Wait for the virtual machine scale set deployment to complete. This should take about 5 minutes.



Task 6: Configure Azure virtual machine scale sets by using virtual machine extensions

In this task, you will install Windows Server Web Server role on the instances of the Azure virtual machine scale set you deployed in the previous task by using the Custom Script virtual machine extension.

1. In the Azure portal, search for and select **Storage accounts** and, on the **Storage accounts** blade, click the entry representing the diagnostics storage account you created in the previous task.
2. On the storage account blade, in the **Data Storage** section, click **Containers** and then click **+ Container**.
3. On the **New container** blade, specify the following settings (leave others with their default values) and click **Create**:

Setting	Value
Name	scripts
Public access level	Private (no anonymous)

Setting	Value
	ous access)

The screenshot shows the Microsoft Azure Storage accounts blade. The left sidebar lists storage accounts: 'az10408rg0168278diag', 'az10408rg02groupdiag227' (selected), and 'csb10032002b66f80a1'. The main area displays the 'az10408rg02groupdiag227 | Containers' blade. It includes a search bar, a 'Container' button, and a 'Change access level' button. A sidebar on the left provides links to Overview, Activity log, Tags, Diagnose and solve problems, Access Control (IAM), Data migration, Storage browser, and Storage Mover. Another sidebar on the right lists 'Data storage' options: Containers, File shares, and Queues. The status bar at the bottom indicates a Windows 10 desktop environment.

4. Back on the storage account blade displaying the list of containers, click **scripts**.
5. On the **scripts** blade, click **Upload**.
6. On the **Upload blob** blade, click the folder icon, in the **Open** dialog box, navigate to the **\Allfiles\Labs\08** folder, select **az104-08-install_IIS.ps1**, click **Open**, and back on the **Upload blob** blade, click **Upload**.

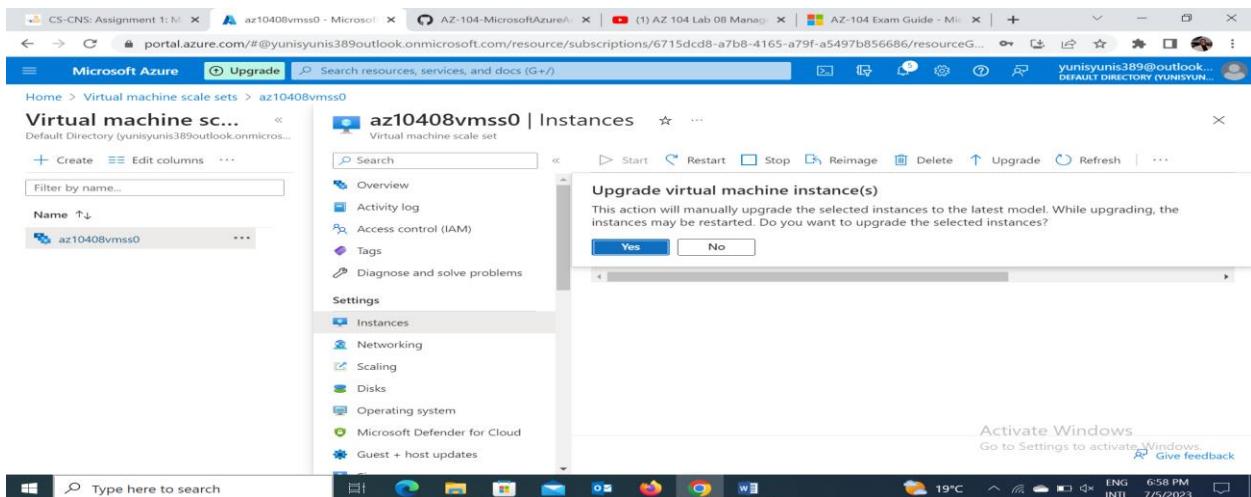
The screenshot shows the Microsoft Azure Storage accounts blade with the 'scripts' container selected. The left sidebar shows 'Overview', 'Diagnose and solve problems', 'Access Control (IAM)', 'Settings' (with 'Shared access tokens', 'Access policy', 'Properties', and 'Metadata' options), and a 'Container' section. The main area shows a list of blobs: 'az104-08-install_IIS.ps1'. An 'Upload blob' dialog box is overlaid on the page. It has a 'Drag and drop files here or Browse for files' input field, a checkbox for 'Overwrite if files already exist', an 'Advanced' dropdown, and a large 'Upload' button. Below the dialog, a 'Current uploads' section shows 'az104-08-install_IIS.ps1' with a progress bar at 239 B / 239 B. The status bar at the bottom indicates a Windows 10 desktop environment.

7. In the Azure portal, navigate back to the **Virtual machine scale sets** blade and click **az10408vmss0**.
8. On the **az10408vmss0** blade, in the **Settings** section, click **Extensions and applications**, and then click **+ Add**.
9. On the **New resource** blade, click **Custom Script Extension** and then click **Next**.
10. From the **Install extension** blade, **Browse to** and **Select** the **az104-08-install_IIS.ps1** script that was uploaded to the **scripts** container in the storage account earlier in this task, and then click **Create**.

Note: Wait for the installation of the extension to complete before proceeding to the next step.

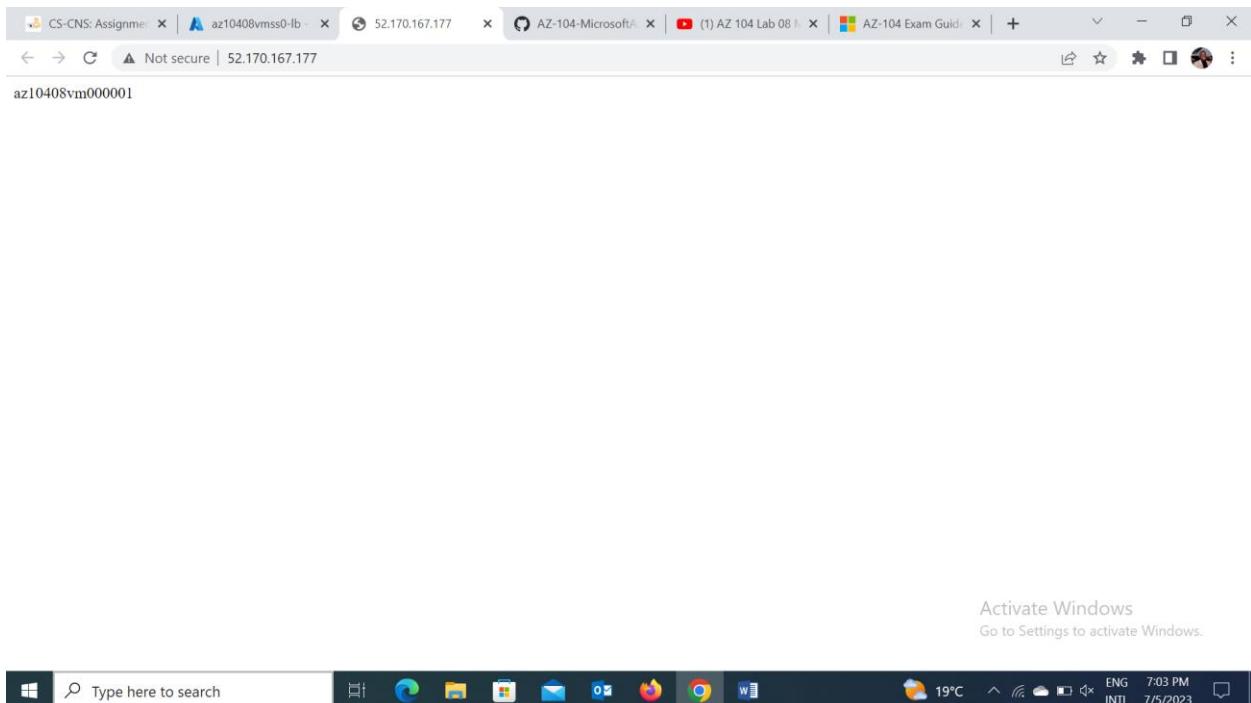
11. In the **Settings** section of the **az10408vmss0** blade, click **Instances**, select the checkboxes next to the two instances of the virtual machine scale set, click **Upgrade**, and then, when prompted for confirmation, click **Yes**.

Note: Wait for the upgrade to complete before proceeding to the next step.



12. In the Azure portal, search for and select **Load balancers** and, in the list of load balancers, click **az10408vmss0-lb**.
13. On the **az10408vmss0-lb** blade, note the value of the **Public IP address** assigned to the frontend of the load balancer, open a new browser tab, and navigate to that IP address.

Note: Verify that the browser page displays the name of one of the instances of the Azure virtual machine scale set **az10408vmss0**.



Task 7: Scale compute and storage for Azure virtual machine scale sets

In this task, you will change the size of virtual machine scale set instances, configure their autoscaling settings, and attach disks to them.

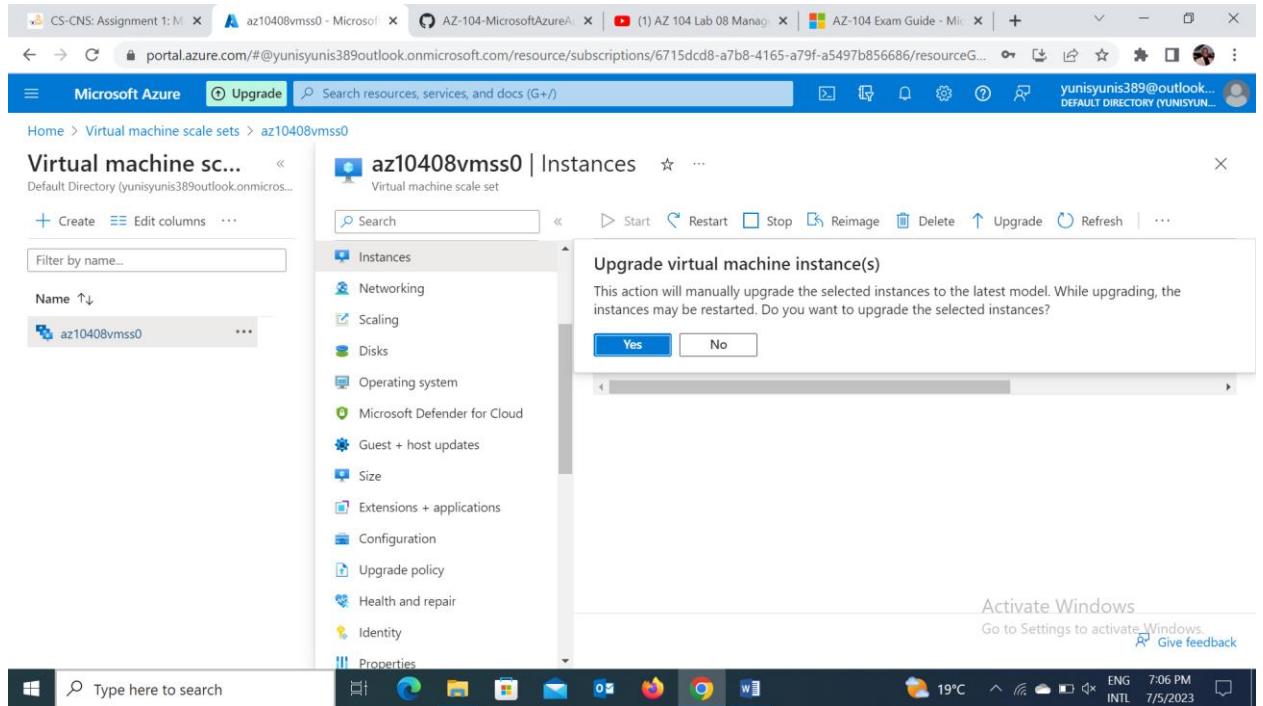
1. In the Azure portal, search for and select **Virtual machine scale sets** and select the **az10408vmss0** scale set
2. In the **az10408vmss0** blade, in the **Settings** section, click **Size**.
3. In the list of available sizes, select **Standard DS1_v2** and click **Resize**.

The screenshot shows the Azure portal interface for managing a virtual machine scale set named 'az10408vmss0'. The 'Size' section is currently selected. A table lists several VM sizes, with 'DS1_v2' highlighted. The table includes columns for VM Size, Type, vCPUs, RAM (GiB), and Data. Below the table, a note about pricing and a 'Resize' button are visible.

VM Size	Type	vCPUs	RAM (GiB)	Data
DS1_v2	General purpose	1	3.5	4
D2s_v3	General purpose	2	8	4
D2as_v4	General purpose	2	8	4

Prices presented are estimates in USD that include only Azure infrastructure costs and any discounts for the subscription and location. The price does not include Microsoft Applicability software costs. Final charges will appear in your local currency in cost analysis and billing views. Go to Settings to activate Windows. View Azure pricing calculator.

4. In the **Settings** section, click **Instances**, select the checkboxes next to the two instances of the virtual machine scale set, click **Upgrade**, and then, when prompted for confirmation, click **Yes**.
5. In the list of instances, click the entry representing the first instance and, on the scale set instance blade, note its **Location** (it should be one of the zones in the target Azure region into which you deployed the Azure virtual machine scale set).
6. Return to the **az10408vmss0 - Instances** blade, click the entry representing the second instance and, on the scale set instance blade, note its **Location** (it should be one of the other two zones in the target Azure region into which you deployed the Azure virtual machine scale set).



7. Return to the **az10408vmss0 - Instances** blade, and in the **Settings** section, click **Scaling**.
8. On the **az10408vmss0 - Scaling** blade, select the **Custom autoscale** option and configure autoscale with the following settings (leave others with their default values):

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

Scale mode	Scale based on a metric
------------	--------------------------------

9. Click the **+ Add a rule** link and, on the **Scale rule** blade, specify the following settings (leave others with their default values):

Setting	Value
Metric source	Current resource (az10408vmss0)
Time aggregation	Average
Metric namespace	Virtual Machine Host

Setting	Value
Metric name	Network In Total
Operator	Greater than
Metric threshold to trigger scale action	10
Duration (in minutes)	1
Time grain statistic	Average
Operation	Increase count by
Instance count	1
Cool down (minutes)	5

The screenshot shows the Azure portal interface for managing a Virtual Machine Scale Set. The main page displays the scale set 'az10408vmss0'. On the right, a detailed view of a 'Scale rule' is shown. The rule is triggered by the metric 'Network In Total (Average)' exceeding 35.65 kB. The 'Operator' is set to 'Greater than'. The 'Duration (minutes)' is 10. The 'Time grain statistic' is 'Average'. The 'Action' section shows an 'Operation' of 'Increase count by' with a value of 1. The Azure search bar and taskbar are visible at the bottom.

10. Note: Obviously these values do not represent a realistic configuration, since their purpose is to trigger autoscaling as soon as possible, without extended wait period.

11. Click **Add** and, back on the **az10408vmss0 - Scaling** blade, specify the following settings (leave others with their default values):

Setting	Value
Instance limits Minimum	1
Instance limits Maximum	3
Instance limits Default	1

12. Click **Save**.

13. In the Azure portal, open the **Azure Cloud Shell** by clicking on the icon in the top right of the Azure Portal.

14. If prompted to select either **Bash** or **PowerShell**, select **PowerShell**.

15. From the Cloud Shell pane, run the following to identify the public IP address of the load balancer in front of the Azure virtual machine scale set **az10408vmss0**.

```
$rgName = 'az104-08-rg02'
```

```
$lbpipName = 'az10408vmss0-ip'
```

```
$pip = (Get-AzPublicIpAddress -ResourceGroupName $rgName -Name $lbpipName).IpAddress
```

16. From the Cloud Shell pane, run the following to start an infinite loop that sends the HTTP requests to the web sites hosted on the instances of Azure virtual machine scale set **az10408vmss0**.

```
while ($true) { Invoke-WebRequest -Uri "http://$pip" }
```

17. Minimize the Cloud Shell pane but do not close it, switch back to the **az10408vmss0 - Instances** blade and monitor the number of instances.

Note: You might need to wait a couple of minutes and click **Refresh**.

18. Once the third instance is provisioned, navigate to its blade to determine its **Location** (it should be different than the first two zones you identified earlier in this task).

19. Close Cloud Shell pane.

20. On the **az10408vmss0** blade, in the **Settings** section, click **Disks**, click + **Create and attach a new disk**, and attach a new managed disk with the following settings (leave others with their default values):

Setting	Value
LUN	0
Storage type	Standard HDD
Size (GiB)	32

21. Save the change, in the **Settings** section of the **az10408vmss0** blade, click **Instances**, select the checkboxes next to the instances of the virtual machine scale set, click **Upgrade**, and then, when prompted for confirmation, click **Yes**.

Note: The disk attached in the previous step is a raw disk. Before it can be used, it is necessary to create a partition, create a filesystem, and mount it. To accomplish this, you will use Azure virtual machine Custom Script extension. First, you will need to remove the existing Custom Script Extension.

22. In the **Settings** section of the **az10408vmss0** blade, click **Extensions and applications**, click **CustomScriptExtension**, and then click **Uninstall**.

The screenshot shows the Microsoft Azure portal interface. In the center, there's a detailed view of an extension named 'az10408vmss0' for a 'Virtual machine scale set'. The extension type is listed as 'CustomScriptExtension'. Other details shown include the version (1.9), publisher (Microsoft.Compute), and a note stating that automatic extension upgrade is not supported. The portal has a standard header with tabs like 'CS-CNS: Assignment 1: M...', 'Extensions - Microsoft Az...', 'AZ-104-MicrosoftAzureA...', '(1) AZ 104 Lab 08 Manag...', 'AZ-104 Exam Guide', and a search bar. The bottom of the screen shows a taskbar with various icons and system information.

Note: Wait for uninstallation to complete.

23. In the Azure portal, open the **Azure Cloud Shell** by clicking on the icon in the top right of the Azure Portal.
24. If prompted to select either **Bash** or **PowerShell**, select **PowerShell**.
25. In the toolbar of the Cloud Shell pane, click the **Upload/Download files** icon, in the drop-down menu, click **Upload** and upload the file **\Allfiles\Labs\08\az104-08-configure_VMSS_disks.ps1** into the Cloud Shell home directory.
26. From the Cloud Shell pane, run the following to display the content of the script:
27. Set-Location -Path \$HOME
- 28.

```
Get-Content -Path ./az104-08-configure_VMSS_disks.ps1
```

```

PS /home/yunis> Set-Location -Path $HOME
PS /home/yunis>
PS /home/yunis> Get-Content -Path ./az104-08-configure_VMSS_disks.ps1
$rgName = 'az104-08-rg02'
$vmssName = 'az10408vmss0'
$vmss = Get-AzVmss `

    -ResourceGroupName $rgName `

    -VMScaleSetName $vmssName

$publicSettings = @{
    "fileUris" = (,"https://raw.githubusercontent.com/Azure-Samples/compute-automation-configurations/master/prepare_vm_disks.ps1");
    "commandToExecute" = "powershell -ExecutionPolicy Unrestricted -File prepare_vm_disks.ps1"
}

Add-AzVmssExtension -VirtualMachineScaleSet $vmss `

    -Name "CustomScript" `

    -Publisher "Microsoft.Compute" `

    -Type "CustomScriptExtension" `

    -TypeHandlerVersion 1.8 `

    -Setting $publicSettings

# Update the scale set and apply the Custom Script Extension to the VM instances
Update-AzVmss `

    -ResourceGroupName $rgName `

    -Name $vmssName `

    -VirtualMachineScaleSet $vmss
PS /home/yunis>

```

Note: The script installs a custom script extension that configures the attached disk.

- From the Cloud Shell pane, run the following to execute the script and configure disks of Azure virtual machine scale set:

`./az104-08-configure_VMSS_disks.ps1`

```

Requesting a Cloud Shell.Succeeded.
Connecting terminal...

MOTD: SqlServer has been updated to Version 22!

VERBOSE: Authenticating to Azure ...
VERBOSE: Building your Azure drive ...
PS /home/yunis> ./az104-08-configure_VMSS_disks.ps1

ResourceGroupName          : az104-08-rg02
Sku                         :
Name                        :
Tier                        : Standard
Capacity                    : 2
UpgradePolicy               :
Mode                        : Manual
ProvisioningState           : Succeeded
Overprovision                :
DoNotRunExtensionsOnOverprovisionedVMs   :
UniqueId                    : 7f707134-60ca-439c-8bb7-35a490e665d8
SinglePlacementGroup         :
ZoneBalance                 :
PlatformFaultDomainCount    : 5
ScaleInPolicy               :
Rules[0]                     : Default

```

- Close the Cloud Shell pane.

- In the **Settings** section of the **az10408vmss0** blade, click **Instances**, select the checkboxes next to the instances of the virtual machine scale set, click **Upgrade**, and then, when prompted for confirmation, click **Yes**.

Clean up resources

Note: Remember to remove any newly created Azure resources that you no longer use. Removing unused resources ensures you will not see unexpected charges.

Note: Don't worry if the lab resources cannot be immediately removed. Sometimes resources have dependencies and take a longer time to delete. It is a common Administrator task to monitor resource usage, so just periodically review your resources in the Portal to see how the cleanup is going.

1. In the Azure portal, open the **PowerShell** session within the **Cloud Shell** pane.
2. Remove az104-08-configure_VMSS_disks.ps1 by running the following command:

```
rm ~\az104-08*
```

3. List all resource groups created throughout the labs of this module by running the following command:

```
Get-AzResourceGroup -Name 'az104-08*'
```

4. Delete all resource groups you created throughout the labs of this module by running the following command:

```
Get-AzResourceGroup -Name 'az104-08*' | Remove-AzResourceGroup -Force -AsJob
```

Note: The command executes asynchronously (as determined by the `-AsJob` parameter), so while you will be able to run another PowerShell command immediately afterwards within the same PowerShell session, it will take a few minutes before the resource groups are actually removed.

The screenshot shows a Microsoft Azure Cloud Shell window. The browser tab bar includes 'CS-CNS: Assignment 1: M', 'Home - Microsoft Azure', 'AZ-104-MicrosoftAzureA...', '(1) AZ 104 Lab 08 Manag...', 'AZ-104 Exam Guide - Mic...', and several other tabs. The Cloud Shell interface has a header with 'Microsoft Azure' and a search bar. Below is a PowerShell session window.

```
VERBOSE: Authenticating to Azure ...
VERBOSE: Building your Azure drive ...
PS /home/yunis> rm ~\az104-08*
PS /home/yunis> Get-AzResourceGroup -Name 'az104-08*'

ResourceGroupName : az104-08-rg01
Location         : norwayeast
ProvisioningState : Succeeded
Tags             :
ResourceId       : /subscriptions/6715dc8-a7b8-4165-a79f-a5497b856686/resourceGroups/az104-08-rg01

ResourceGroupName : az104-08-rg02
Location         : eastus
ProvisioningState : Succeeded
Tags             :
ResourceId       : /subscriptions/6715dc8-a7b8-4165-a79f-a5497b856686/resourceGroups/az104-08-rg02

PS /home/yunis> Get-AzResourceGroup -Name 'az104-08*' | Remove-AzResourceGroup -Force -AsJob

Id      Name          PSJobTypeName   State    HasMoreData  Location        Command
--      --          --          --      --          --          --
2      Long Running 0.. AzureLongRunni... Running  True        localhost      Remove-AzResourceGroup
3      Long Running 0.. AzureLongRunni... Running  True        localhost      Remove-AzResourceGroup

PS /home/yunis>
```

The PowerShell session shows the removal of two resource groups: 'az104-08-rg01' and 'az104-08-rg02'. The last command, 'Get-AzResourceGroup -Name 'az104-08*' | Remove-AzResourceGroup -Force -AsJob', is shown as a long-running job with ID 2 and 3. The status is 'Running'. The command 'Remove-AzResourceGroup' is listed twice in the command history. The bottom status bar indicates 'Activate Windows' and 'Go to Settings to activate Windows.'

Conclusion

This lab has offered me a comprehensive understanding of virtual machine management in Azure. The lab covers essential concepts and practical techniques for creating, configuring, and managing virtual machines. Key takeaways include the flexibility and scalability of Azure Virtual Machines, which allow for tailored provisioning and optimization of infrastructure. Effective management of virtual machine resources is emphasized, including performance monitoring, scaling strategies, and implementing high availability. Security measures such as network security groups and data encryption are highlighted, as well as automation and orchestration options for streamlined management. This lab has equipped me with valuable skills to leverage cloud computing benefits and build and secure robust infrastructures in Azure.