Student Name: **Weight: 3%**

Student ID: **Marks: /10**

Lab: Azure Virtual Machines

Lab Objectives

In this lab you will examine how to create and manage Azure virtual machines. You will:

1. Create a virtual machine.
2. Communicate with a Windows Virtual Machine.
3. Add a data disk to a Windows Virtual Machine.
4. Delete a virtual machine.
5. Create a Scale Set.
6. Create an Availability Set.

Lab Requirements

- Up to date browser
- Azure account

Instructions

1. Working individually, follow the procedure below.
2. Take screenshots, as described in the *Marking Criteria* section.
3. Create a document that includes all screenshots appropriately titled and described, and then upload it to Brightspace, as indicated by your instructor.
4. Be sure to include your name and student ID in the document.

Marking Criteria

Screenshots	Marks
Linux CentOS 7 – x64 Gen1 VM	/3
Windows VM overview screen with data disk	/2
Create and test a Scale Set using the Az CLI	/3
Availability Set with two virtual machines	/2
Total	/10

Note: This icon indicates when a screenshot is required.

Source: Flatiron.com, Freepik, Image: screenshot_983871

Procedure

Part 1: Create a Virtual Machine

There are many things to consider when creating a virtual machine.

- Subscription
- Resource group
- Name
- Region
- Availability
- Security Type
- Image/OS
- Size
- Authentication Type
- Inbound Port Type
- Licensing
- Disks
- Network

To create a virtual machine

☐ Go to the **Virtual machines** page in Azure, select **Create** from the top menu and click **Azure Virtual Machine**.

☐ Select your subscription and one of your resource Groups.

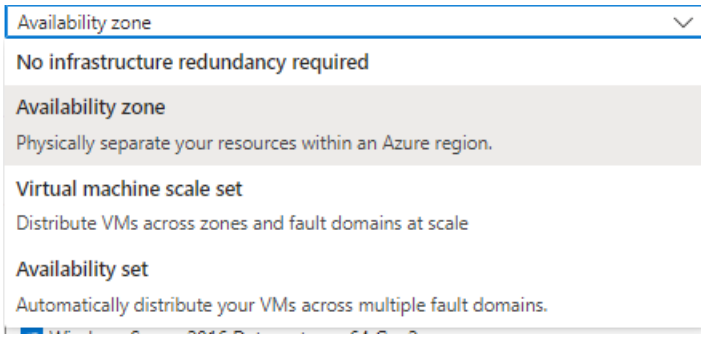
☐ Give your server a name and select the **EastUS** region.

Note: As discussed in Unit 1, a resource doesn't have to be in the same region as the resource group and not all resources are available in all regions.

When a virtual machine is created in the portal:

- The virtual machine name (Azure resource identifier) cannot be changed after the VM is created
- The guest host name can be changed in the usual ways.

Next, you'll see the Availability options. You learned about availability zones in Unit 1 but if you need a reminder, read: What are Azure regions and availability zones? (https://learn.microsoft.com/en-us/azure/reliability/availability-zones-overview).



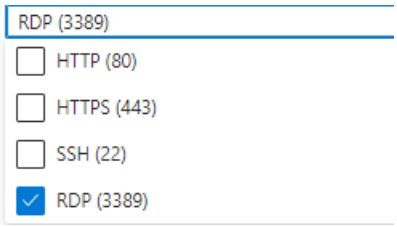
You'll explore scale sets and availability sets later in the lab but remember that your costs will increase with redundancy.

- ☐ Select **No Infrastructure Redundancy Required**. This is the lowest cost option
- ☐ Select **Standard** security.

The next options are the type and size of the virtual machine, which will also affect the cost.

- ☐ Click **See all images** to see all available images. At the bottom of the Windows Server box, click the drop-down arrow and select **Windows Server 2019 Datacenter (Gen 2, X64)**.

  Note: The type of subscription you have may limit your selections.
- ☐ In the **Size** selection, click **See all Sizes** and examine the various sizes and costs.
- ☐ Select the least expensive option (usually B1s).
- ☐ The authentication type depends on the virtual machine type. With Windows, create an administrator account and password as usual.
- ☐ Note that the there are four selections for the inbound port type.



- ☐ Make sure that the **RDP port 3389** is selected so you can communicate with the virtual machine over RDP. This also ensures that the firewall is open to allow RDP communications.
- ☐ Leave the default licensing.
- ☐ Click **Next** to go to the disks page.

- ☐ Click the **Operating System Disk** drop-down menu and select **Standard HDD** for the lowest cost.

  Note: For more information about Azure disk types, read: Azure managed disk types (https://learn.microsoft.com/en-us/azure/virtual-machines/disks-types).

- ☐ Click **Review + Create** and note your hourly cost. We will discuss the networking pieces in another module.

- ☐ Create the virtual machine.

It will take a few minutes to create and deploy the virtual machine but you will see several pieces as they are created (like IP address and Network Interface).

- ☐ Click **Go to the Resource**.

- ☐ Review all of the details of the virtual machine, including its size and IP address.

  Notes:

  - The status is *Running* and the menu along the top allows you to stop, restart and delete the virtual machine.
  - A virtual machine continues to accrue charges even if it is stopped.
  - Stopping is the equivalent of shutting down the server but since the resource is still allocated, you are still charged for it.
  - The only way to stop the cost is to deallocate or delete the server, so if you leave the lab at some point, ensure that you delete the virtual machine and any components that accrue costs, and then create it again when you come back.

- ☐ Create a Linux CentOS 7 – x64 Gen1 VM.

Part 2: Communicate with a Windows Virtual Machine

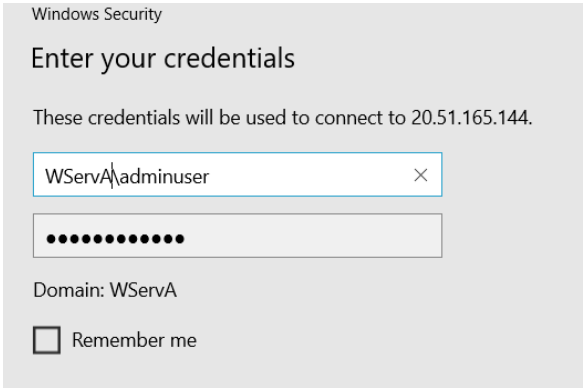
On the virtual machine *Overview* page, you can see that the VM has a public and a private IP address. IP addresses also accrue costs. See the pricing at: IP Addresses pricing (https://azure.microsoft.com/en-ca/pricing/details/ip-addresses/).

Types of IP addresses:

- Private: Other VMs in the same network (virtual or on-prem)
- Public: Internet accessible
- Static: Assigned immediately, Will not change
- Dynamic: Assigned after the VM has started and released when the VM is stopped (can be a different IP every time)

- ☐ Click **Networking** in the blade menu and examine the **Inbound Port Rules**. Notice that the RDP port is enabled.
- ☐ Click **Connect** in the blade menu and select **RDP**.
- ☐ Click **Download RDP File**

  A quick connect file downloads to your computer from the cloud. You can connect using a standard RDP connection but this makes it easier.
- ☐ Find the **`servername`.rdp** file in your downloads folder, double-click it and select **Connect**.
- ☐ Select **Use a Different account** and use the hostname of the server you created and the user you created when you deployed the virtual machine.



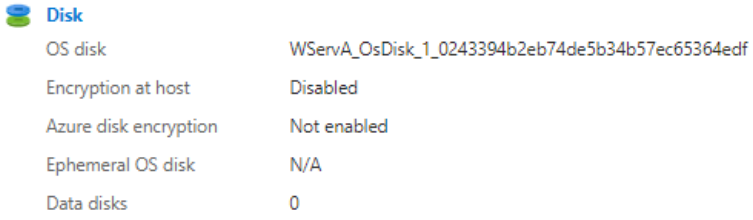
- ☐ Click **Yes** to proceed through the certificate window.

You should now have a remote desktop connection into your server. If you are unable to communicate with the server, there may be a firewall on your local computer or network.

- ☐ Close the RDP window.

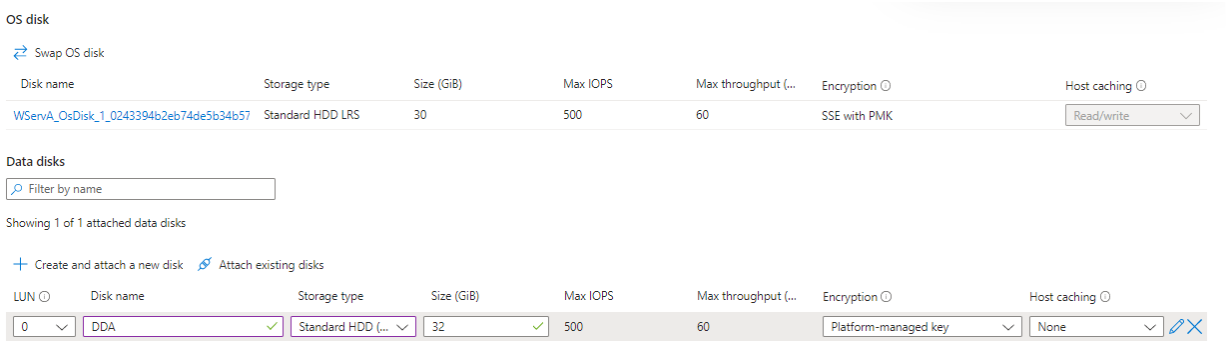
Part 3: Add a Data Disk to a Windows Virtual Machine

- ☐ Go to the **Overview** page for your virtual machine. In the Disk section of the page, note that you have only an operating system disk and no data disks.



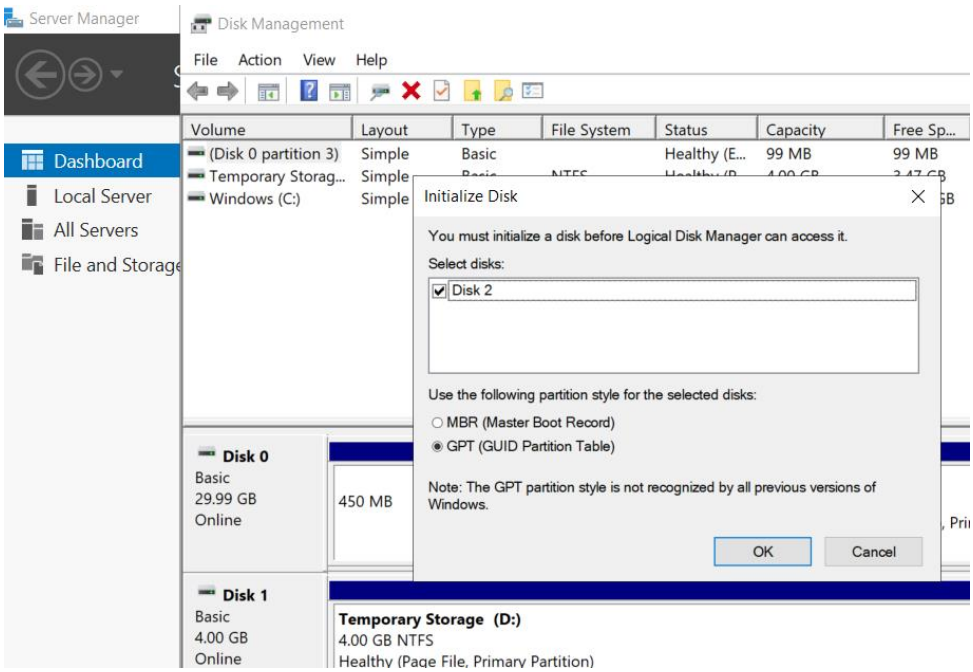
☐ Click **Disks** in the blade menu and select **Create and Attach a new Disk**.

☐ Give your new disk a name, storage type and size (think about costs), and then click **Save**.



☐ RDP back into your virtual machine and open the **Disk Management** tool.

You should see your new disk available to the operating system and be able to format it and use it as you would any standard disk.



☐ Go to the **Overview** page for your virtual machine and note the new disk.

Part 4: Delete a Virtual Machine

- ☐ From the **Overview** page for your virtual machine, select **Stop** from the top menu.
- ☐ Select **Delete** from the top menu.
- ☐ Select the components to delete (all of the ones that can be selected), select **Force Delete**, agree to the warning, and then delete the virtual machine.

  This may take several minutes.
- ☐ When you see the notification that your virtual machine has been deleted, go to the Overview page for the resource group that contained the virtual machine and make sure there are no components left (you may have to refresh the screen).

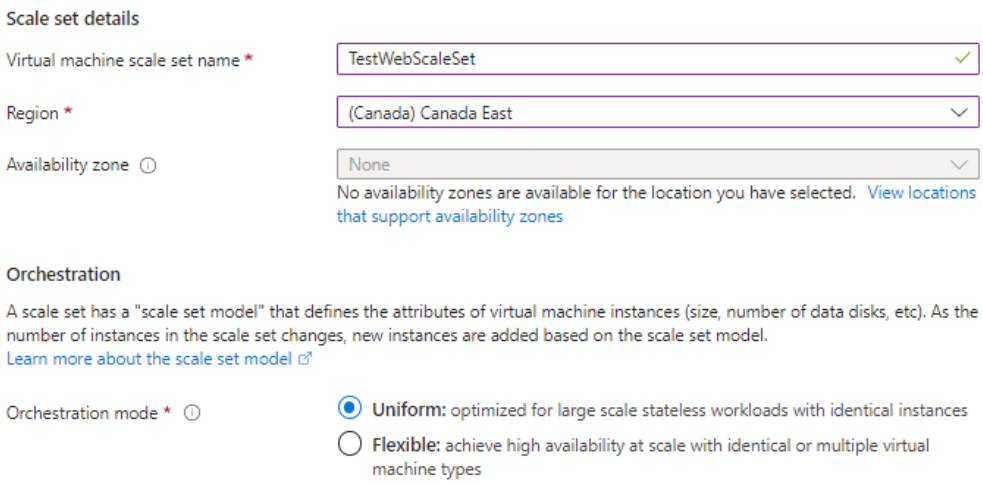
  Notes:

  - If you have remaining components, you may accrue continuous costs.
  - Sometimes it can take quite a bit of time before things appear correctly in the portal.

Section 5: Create a Scale Set

An Az VM scale set allows you to save money and improve an application's performance by automatically increasing or decreasing the number of identical VMs based on a schedule or a change in the load. For example, if you sell products via a website, and traffic to the website increases in the evenings and decreases overnight, your website runs on an Az VM.

- ☐ Navigate to the **Virtual Machine Scale Set** page in the Azure Portal and click the **Create** button.
- ☐ Fill out the VM information as you did in Part 1 of this lab, with the addition of the following information:



☐ Hover over the information icon next to Orchestration mode to learn the difference between the two types of orchestration.

To learn more, read: Orchestration modes for Virtual Machine Scale Sets in Azure (https://learn.microsoft.com/en-us/azure/virtual-machine-scale-sets/virtual-machine-scale-sets-orchestration-modes).

☐ Click **Next** and read the Spot options.

☐ Click **Next** and select the least expensive disk option.

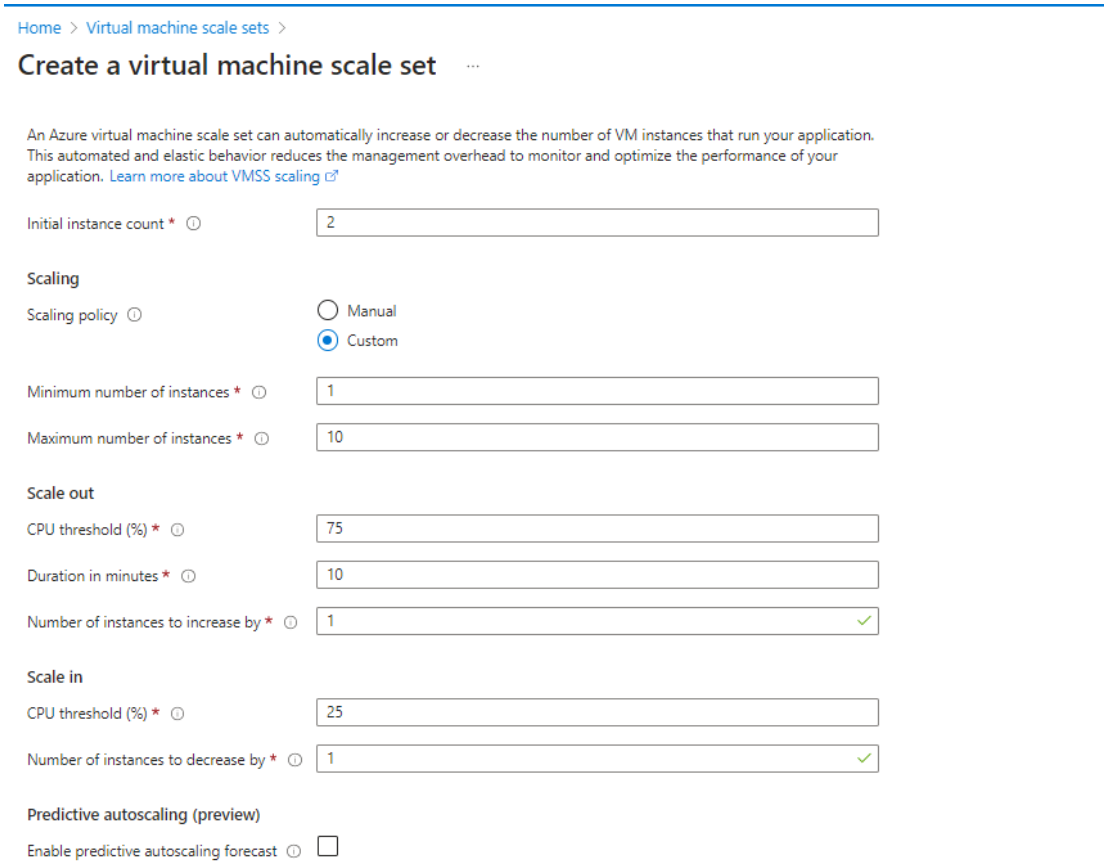
☐ Click **Next** and read the network configuration.

☐ Click **Next** to get to the Scaling page, and then select **Custom**.

This page allows you to select the conditions for creating or deleting the VMs. In the example below, the following information is set:

- Initial Count = 2 – when you create from this tool, two virtual machines of the selected type and size are created.
- Minimum and maximum number of instances created = 1 and 10 – there will never be less than 1 VM running and never more than 10.
- CPU threshold = 75, duration = 10, and number of instances to increase by = 1 – if the CPU % for the set stays over 75% for more than 10 minutes, one VM of the same type, size and configuration will be created in the set.
- The scale in section works the same way as the scale out section, except it reduces the number of VMs in the set when the CPU % is below 25%

To learn more, read: Use custom scale-in policies with Azure Virtual Machine Scale Sets (https://learn.microsoft.com/en-us/azure/virtual-machine-scale-sets/virtual-machine-scale-sets-scale-in-policy).



- ☐ Cancel the scale set.
- ☐ Follow the steps at: [Exercise - Deploy a scale set in the Azure portal](https://learn.microsoft.com/en-us/training/modules/build-app-with-scale-sets/3-exercise-deploy-scale-set-azure-portal) (https://learn.microsoft.com/en-us/training/modules/build-app-with-scale-sets/3-exercise-deploy-scale-set-azure-portal) to create and test a Web Server Scale set using the Az CLI.

Part 6: Create an Availability Set

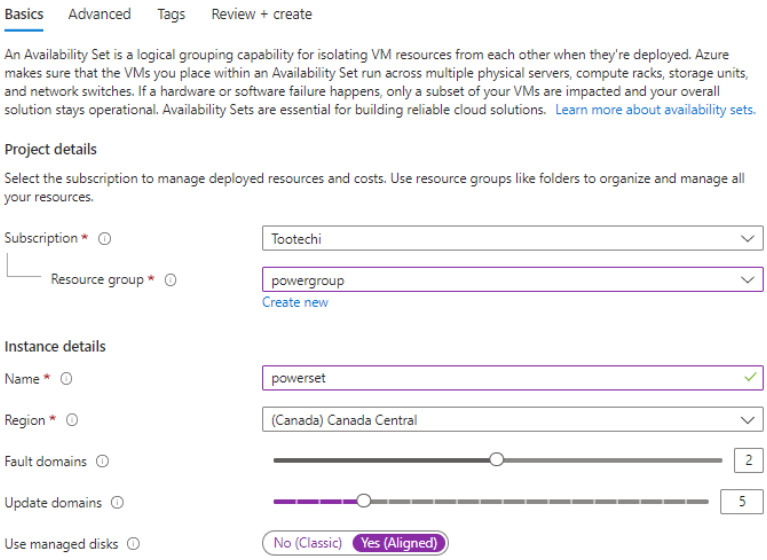
☐ Review Az Availability Sets by reading the article: Availability sets overview (https://learn.microsoft.com/en-us/azure/virtual-machines/availability-set-overview).

In the previous section, you saw how scale sets can help you increase and decrease your virtual machine count or size to improve your application performance and lower your costs. This is often confused with availability sets, which are designed to improve your virtual machine fault tolerance. When you create a virtual machine, the files for that machine exist on a server, in a rack, in a datacenter. If the hardware on that server fails (e.g., disk, motherboard, network interface, memory chip, power) you lose that virtual machine. If a server must be updated, changed or rebooted, the virtual machine will be rebooted. Each availability set can be configured with up to three fault domains and twenty update domains.

☐ Navigate to the **Availability Set** page in the Az portal and click the **Create** button.

☐ Give your set a resource group, name and region, and then select your Fault and Update domains.

☐ Select **Yes (Aligned)** in the *Use managed disks* box.



☐ Review and create your availability set.

☐ When the deployment has completed, go to the resource and review your settings.

☐ A virtual machine can only be added to an availability set when it is created and it must be in the same resource group. Go to the **Virtual Machines** page and click the **Create** button.

- ☐ Fill out the information on the Basics page as you did in the first section of this lab. However, in the *Availability Options* box select **Availability Set** and select your availability set.
- ☐ Review and create the virtual machine.
- ☐ Return to the **Availability Set** page. You should be able to see your virtual machine within the set.
- ☐ Create an availability set with two Fault Domains, three Update Domains, and one Linux and one Windows VM.