NURTURE
Education Solutions
TOMORROW'S HERE

INFRASTRUCTURE SOLUTIONS OF CLOUD

Module Number: 01

Module Name: Introduction to Microsoft Azure Virtual machines

Introduction to Microsoft Azure Virtual Machines

Syllabus

Introduction to Azure VM, Resource planning with Basic and standard, VM pricing, Difference between basic and standard VM, Creating virtual machines, Choosing the type of VM, Configuring DNS address, Configuring endpoints, Connecting to virtual machine, Implementing the lifecycle of a virtual machine, Uploading and downloading virtual hard disks Attaching an empty hard disk to VM, Creating VM from a custom image Deleting images and disks

Introduction to Microsoft Azure Virtual Machines

Aim:

To equip the students with benefits of Virtual Machine on Azure Platform.

Introduction to Microsoft Azure Virtual Machines

Objectives:

The objectives of this module are:

- Learning Types of Azure Virtual Machine and design principles.
- Understanding the Resource Planning in Azure Platform.
- Evaluating an empty hard disk to Virtual Machine.
- Configuring DNS on Azure Virtual Machine.

Introduction to Microsoft Azure Virtual Machines

Outcomes:

At the end of this module, you are expected to:

- Deploying and Manage Virtual Machine on Azure Platform
- Managing Disk Images on Azure Virtual Machine
- Understanding the basic fundamentals of microsoft azure
- Implementing the techniques understand the methods to detecting the images and disc

Introduction to Microsoft Azure Virtual Machines

Table of Content

Introduction to Azure VM

- Azure Virtual Machines (VM) are becoming more popular among IT infrastructures. Microsoft Azure is one of the leading cloud providers that offer various kinds of cloud-based services to bring an integrated solution platform.

- Azure Virtual Machines are one of the on-demand computing resources that come under Infrastructure as a Service (Iaas) category in Azure.

- Azure services are mainly used to build and develop cloud-based solutions in various organizations.

- Due to the advantages it provides in terms of virtualization technology, Azure VM has grown significantly in popularity among businesses.

Resource Planning with Basic and Standard VM Pricing

Azure VM pricing is based on the following instance properties:

Region
Physical location of the machine. Azure offers 60 regions worldwide, available in 140 countries.

Operating system (OS)
Linux or Windows are available.

Tier
Sets of instances and Its service level.

License Type
OS only or software license attached (BizTalk / SQL server).

Instance Type
The type defines the size of the instance, and Storage attached

Resource Planning with Basic and Standard VM Pricing

Azure VM Tiers

Azure VM sets a service level tier for each instance, affecting the possible resources and services consumed by the instance.

There are two main tiers for compute:

- Standard
- Basic

Resource planning with Basic and standard VM pricing

Basic and Standard pricing tier is about the CPU power, IOPS, etc.
these virtual machine breaks down as followed:

Basic pricing tier: optimized for dev/test, these virtual machines have capabilities similar to the standard tier.

However, they do not support the Azure load balancer or auto-scaling, IOPS is slower than for Standard.

Standard Pricing tier: provide better CPU performance and IOPS than basic tier.

Difference between basic and standard VM

	Standard	Basic
Load Balancing	N/A	Port-level load balancer for free. Application load balancer is available as a separate Azure service
Auto-Scaling	N/A	Supported
IOPS	Up to 300 per data disk	Up to 500 per data disk
Higher Specs	Up to Basic A4 (8 vCPU, 14 GB RAM, <16 data disks)	All higher specs instance types

Source: https://faddom.com/azure-vms-pricing/

Creating Virtual Machines

Azure virtual machines can be Deployed through the Azure portal. This provides a browser-based user interface to create Virtual Machines and their related resources.

We have to create an Azure subscription, create a free account before you begin.

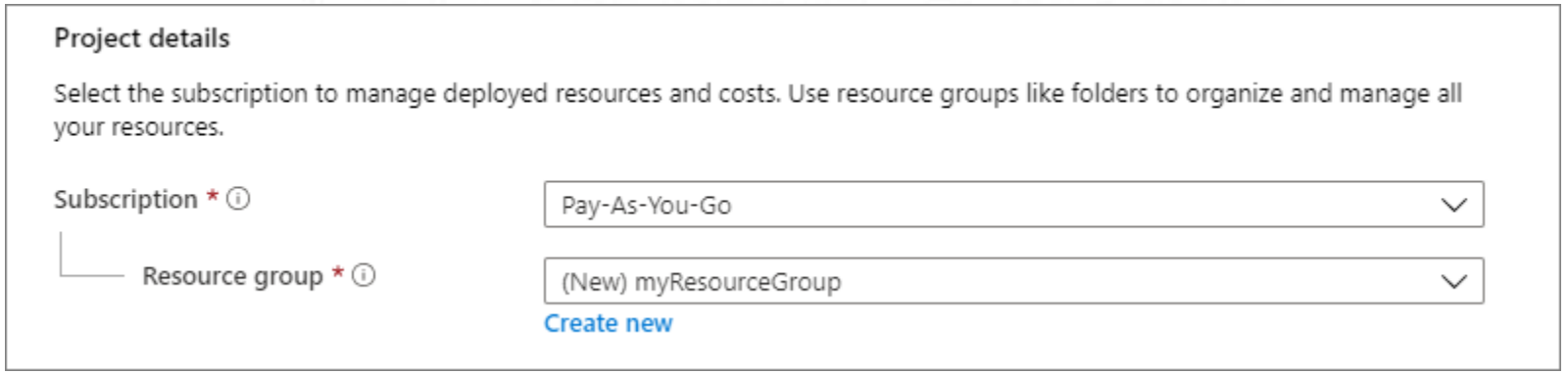
Sign in the Azure Portal

Creating Virtual Machines

Enter virtual machines in the search.
In the Virtual machines page, select Create New and then Virtual machine.

To Create a virtual machine page will opens as shown below .

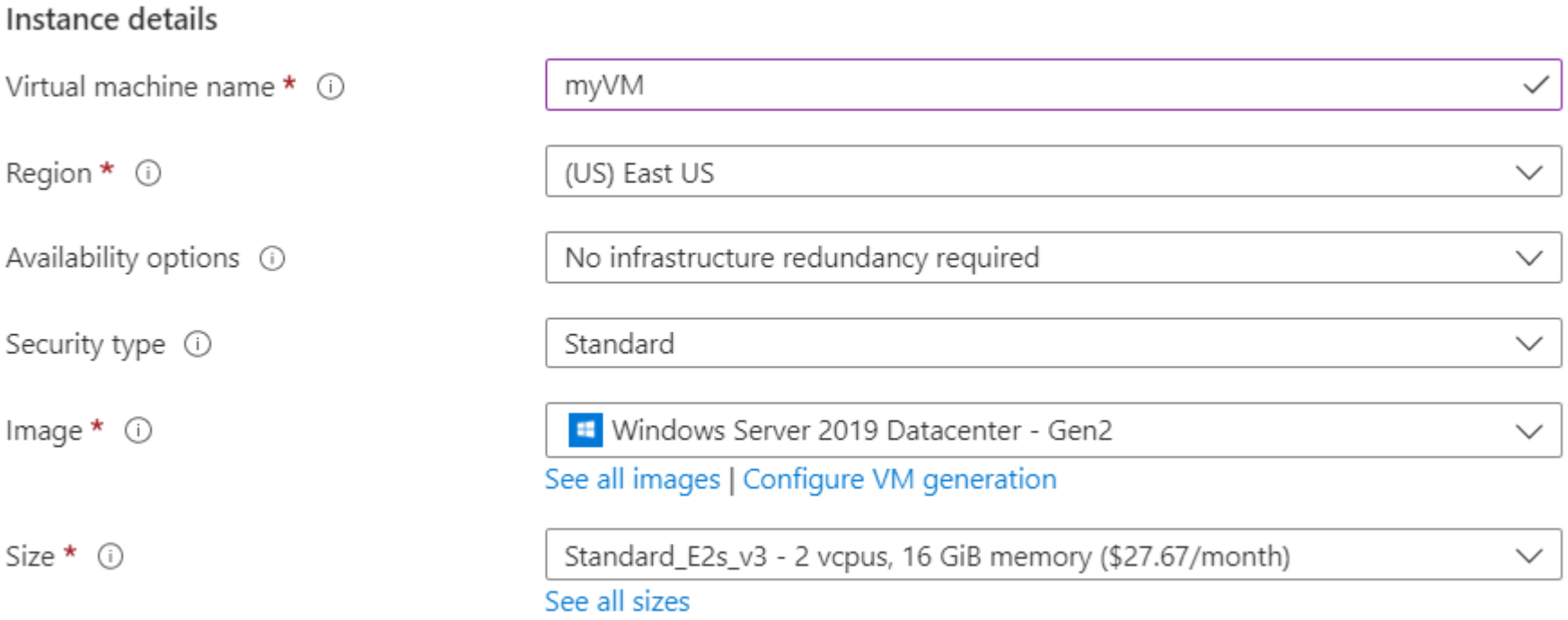
In the Basics tab, under Project details, make sure the correct subscription is selected and then choose to Create new resource group. Enter myResourceGroup for the name.



Source : https://docs.microsoft.com/en-us/azure/virtual-machines/windows/quick-create-portal#create-virtual-machine

Introduction to Microsoft Azure Virtual Machines

Creating Virtual Machines

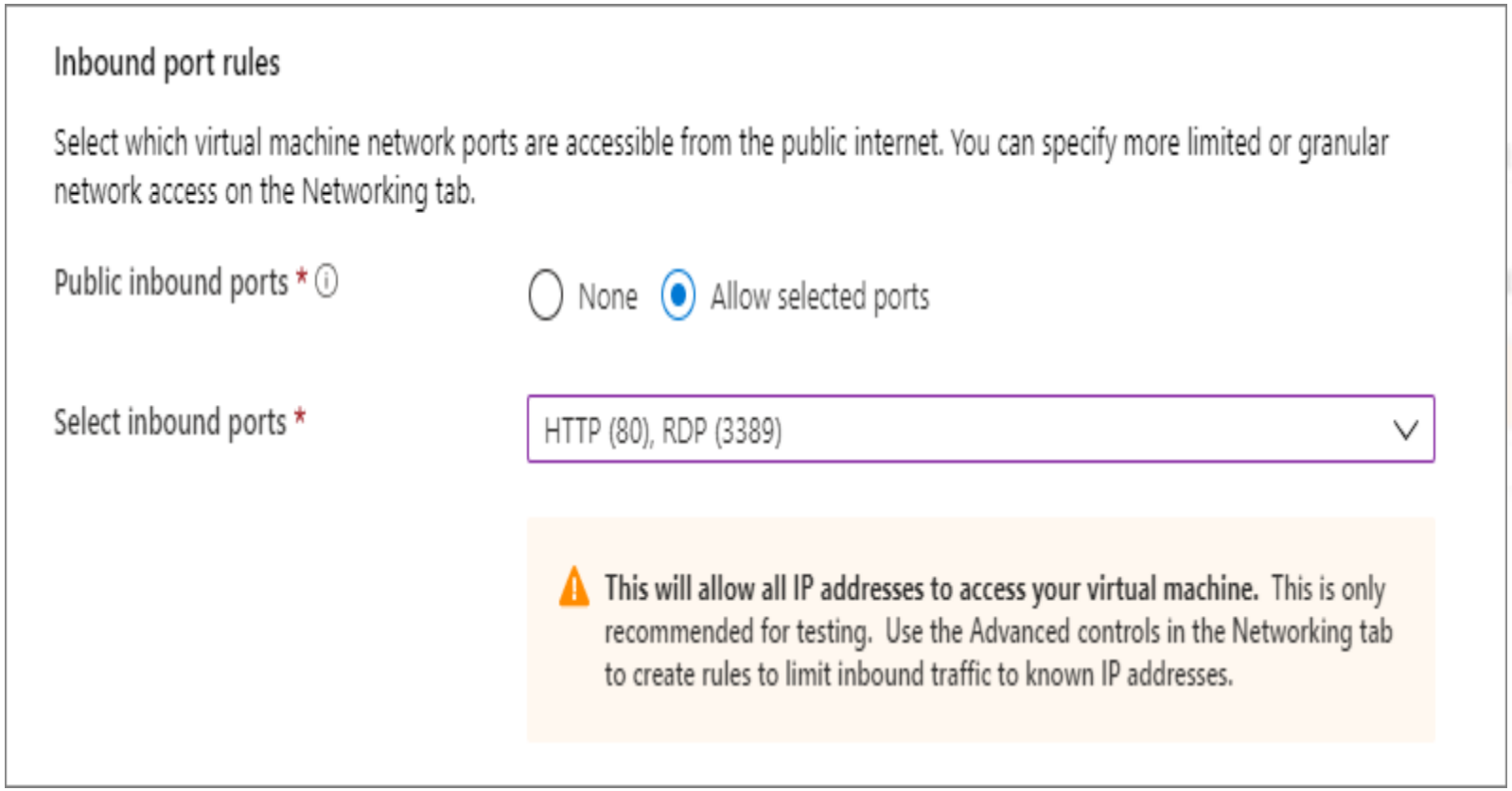


Source : https://docs.microsoft.com/en-us/azure/virtual-machines/windows/quick-create-portal#create-virtual-machine

Introduction to Microsoft Azure Virtual Machines

Creating Virtual Machines

Under Inbound port rules, choose Allow selected ports and then select RDP (3389) and HTTP (80) from the drop-down.

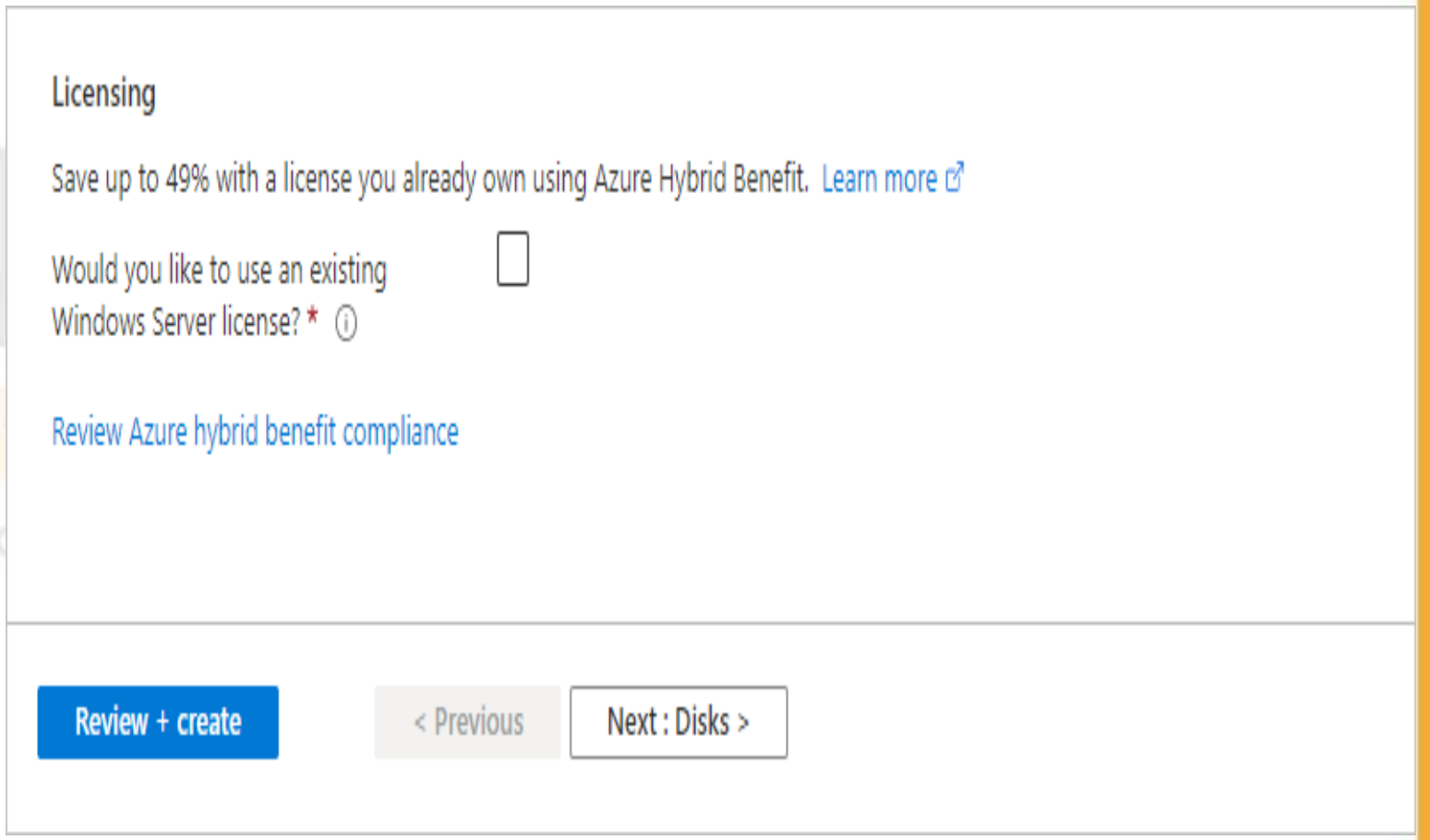


Source : https://docs.microsoft.com/en-us/azure/virtual-machines/windows/quick-create-portal#create-virtual-machine

Introduction to Microsoft Azure Virtual Machines

- Leave the remaining defaults and then select the Review + create button at the bottom of the page.
- Screenshot showing the Review and create button at the bottom of the page
- After validation runs, select the Create button at the bottom of the page.
- After deployment is complete, select Go to resource.

Choosing the type of VM



Source: https://docs.microsoft.com/en-us/azure/virtual-machines/windows/quick-create-portal#create-virtual-machine

Introduction to Microsoft Azure Virtual Machines

Choosing the type of VM

	General Purpose	Compute Optimized	Memory Optimized	Storage Optimized	GPU	High Performance Compute
Type	DC, Av2, Dv2, Dv3, B, Dsv3	Fsv2, F	M, Dv2, G, DSv2, GS, Ev3	Ls	NC, NCv2, ND, BV, NVv2	H
Description	Balanced CPU and memory	High ratio of compute to memory	High ratio of memory to compute	High disk throughput and IO	Specialized with single or multiple NVIDIA GPUs	High memory and compute power – fastest and most powerful
Uses	Testing and dev, small-med databases, low traffic web servers	Medium traffic web servers, network appliances, batch processing, app servers	Relational database services, analytics, and larger caches	Big Data, SQL, NoSQL databases	Compute intensive, graphics-intensive, and visualization workloads	Batch processing, analytics, molecular modeling, and fluid dynamics, low latency RDMA networking

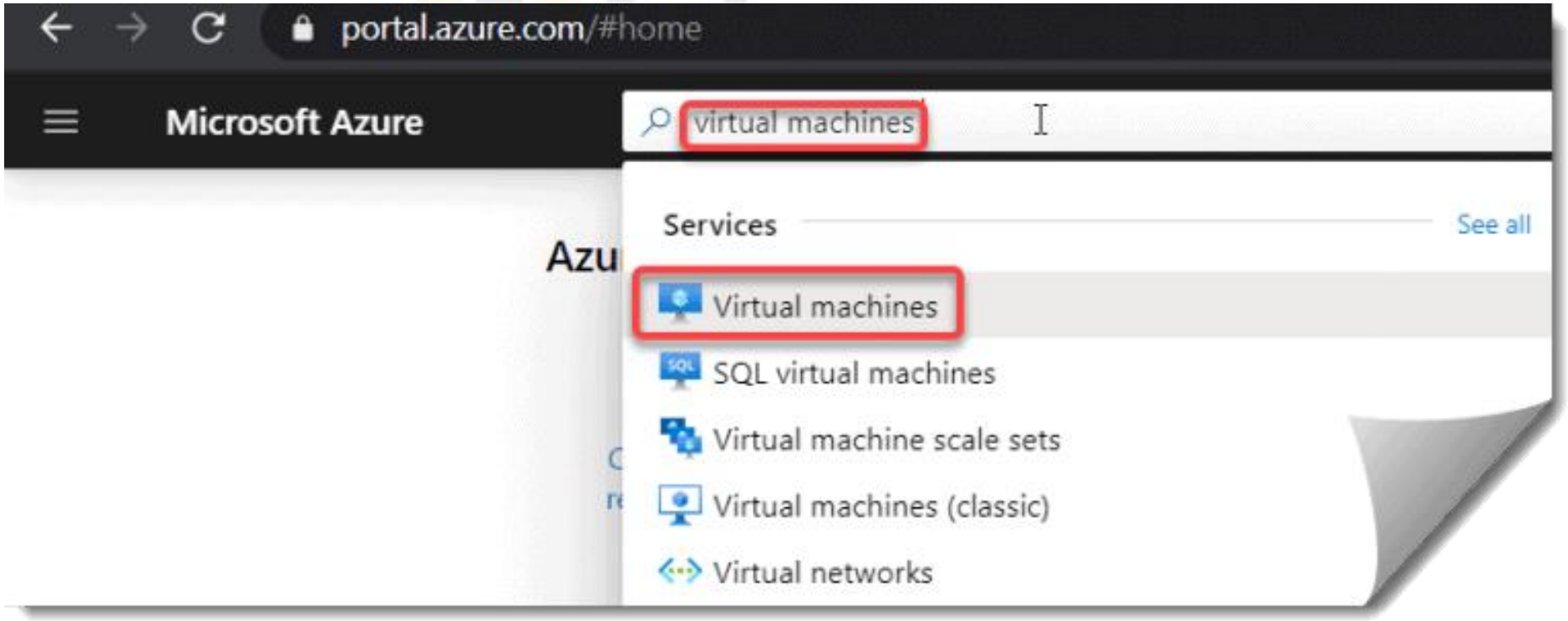
Source : https://jaychapel.medium.com/microsoft-azure-vm-types-comparison-e7d031b4b588

Introduction to Microsoft Azure Virtual Machines

Configuring DNS Address

Step- 1: Login to https://portal.azure.com/

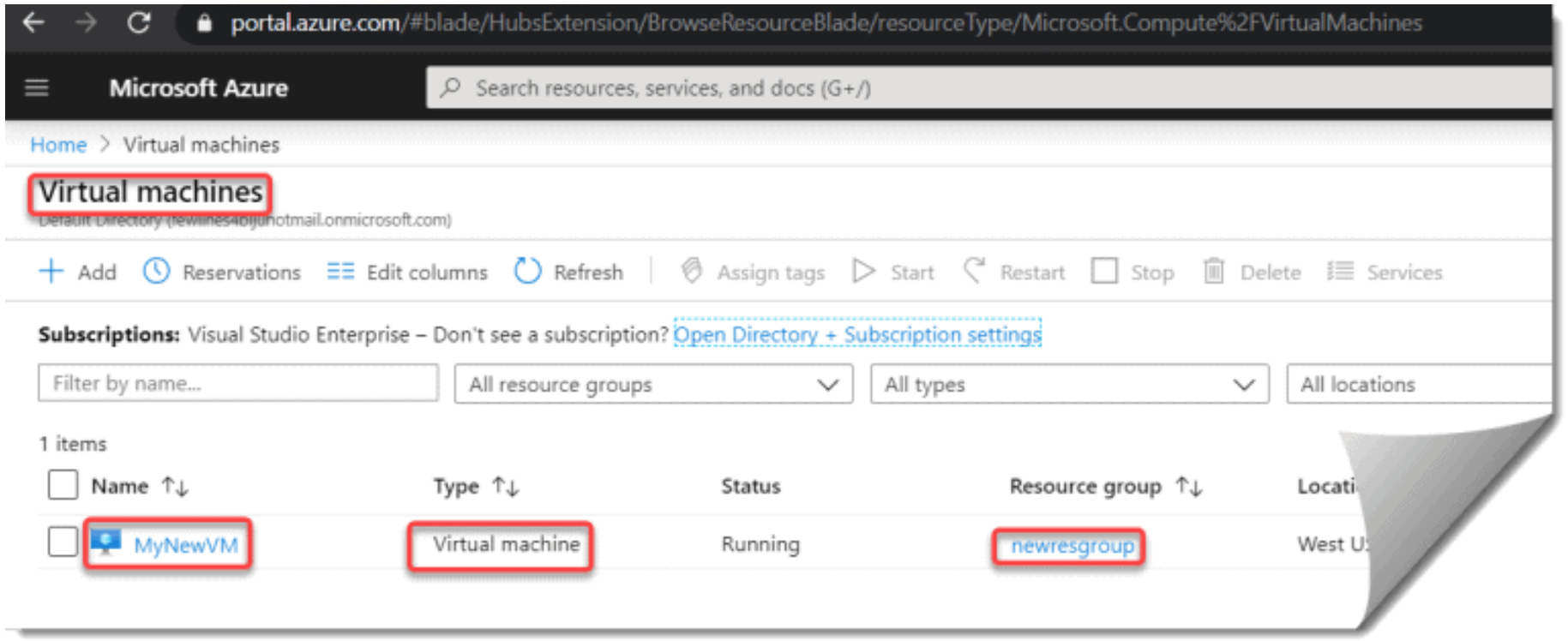
Step- 2: Search for Virtual machines there.



Source: https://azurelessons.com/azure-virtual-machine-dns/

Configuring DNS Address

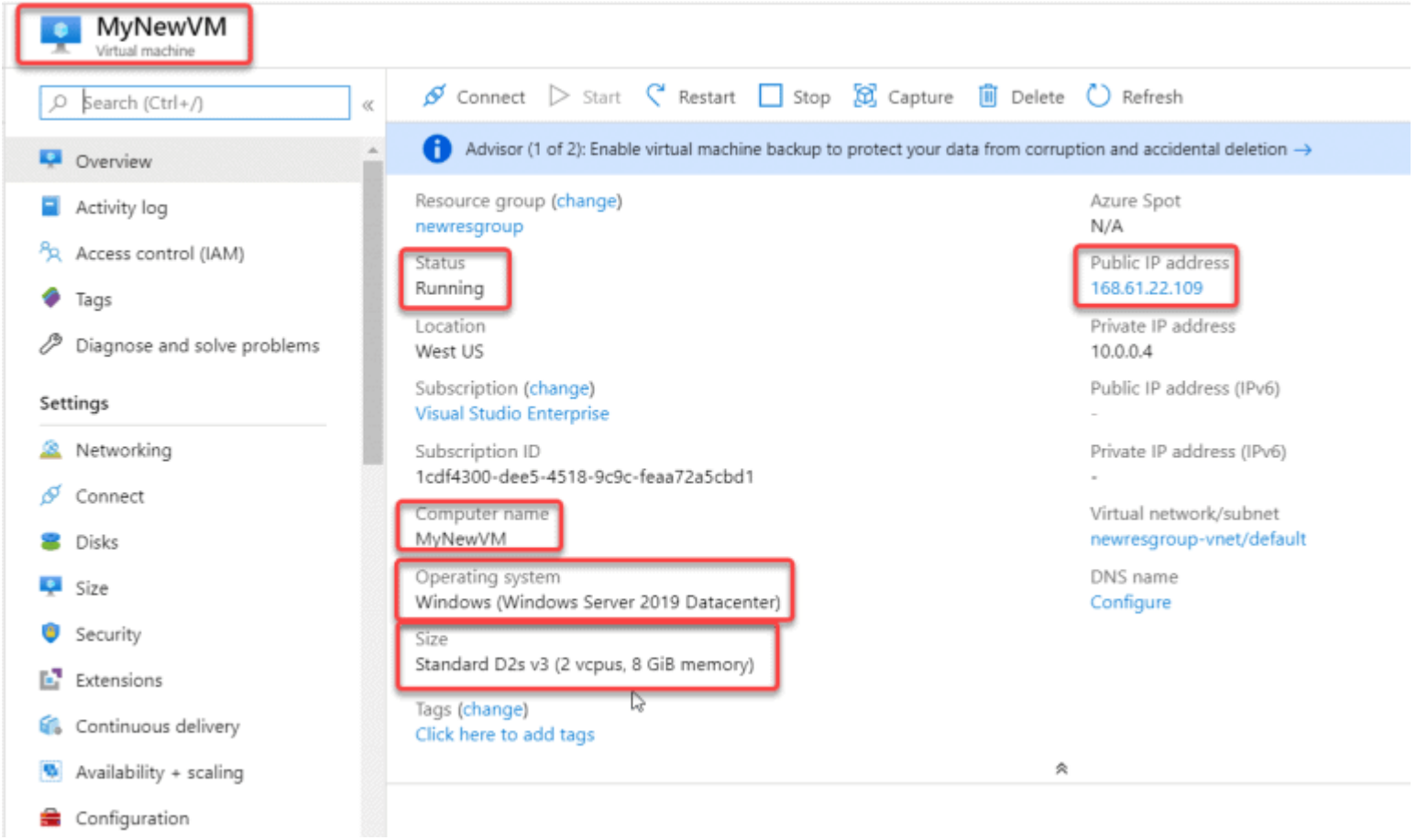
Step- 3: You will see the list of VM created in your Azure subscription. It will show the VM name, Type, Status, Resource Group, Location, etc.



Source: https://azurelessons.com/azure-virtual-machine-dns/

Introduction to Microsoft Azure Virtual Machines

Step- 4: Now click on the VM name. “MyNewVM” in my case. You can able to see the details of your virtual machine like Public IP address, status, Computer name, Operating system, Size etc.



Source: https://azurelessons.com/azure-virtual-machine-dns/

Configuring DNS Address

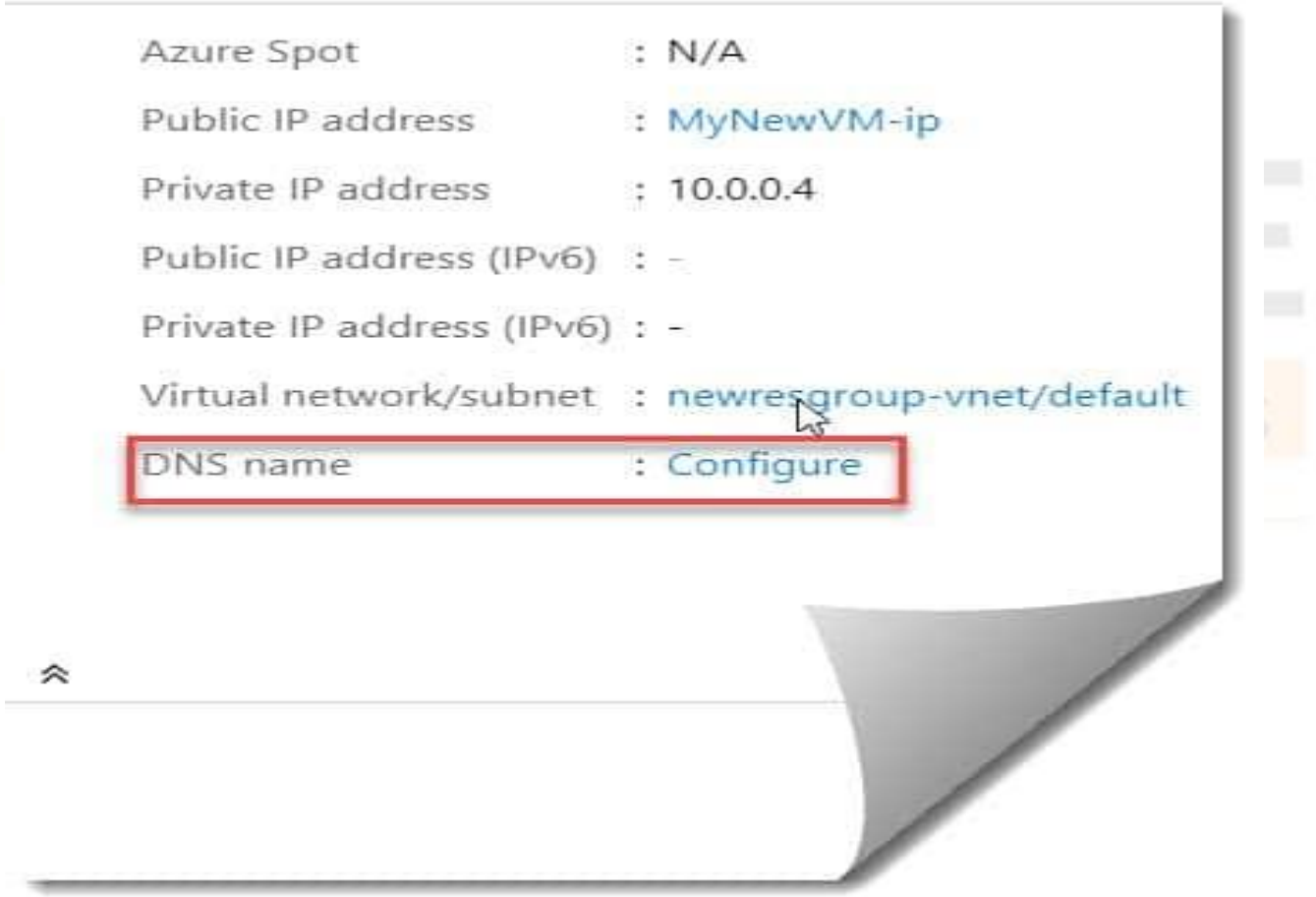
Step- 5: You can also see the DNS name here. Click on the configure link.

Source: https://azurelessons.com/azure-virtual-machine-dns/

Introduction to Microsoft Azure Virtual Machines

Configuring DNS Address

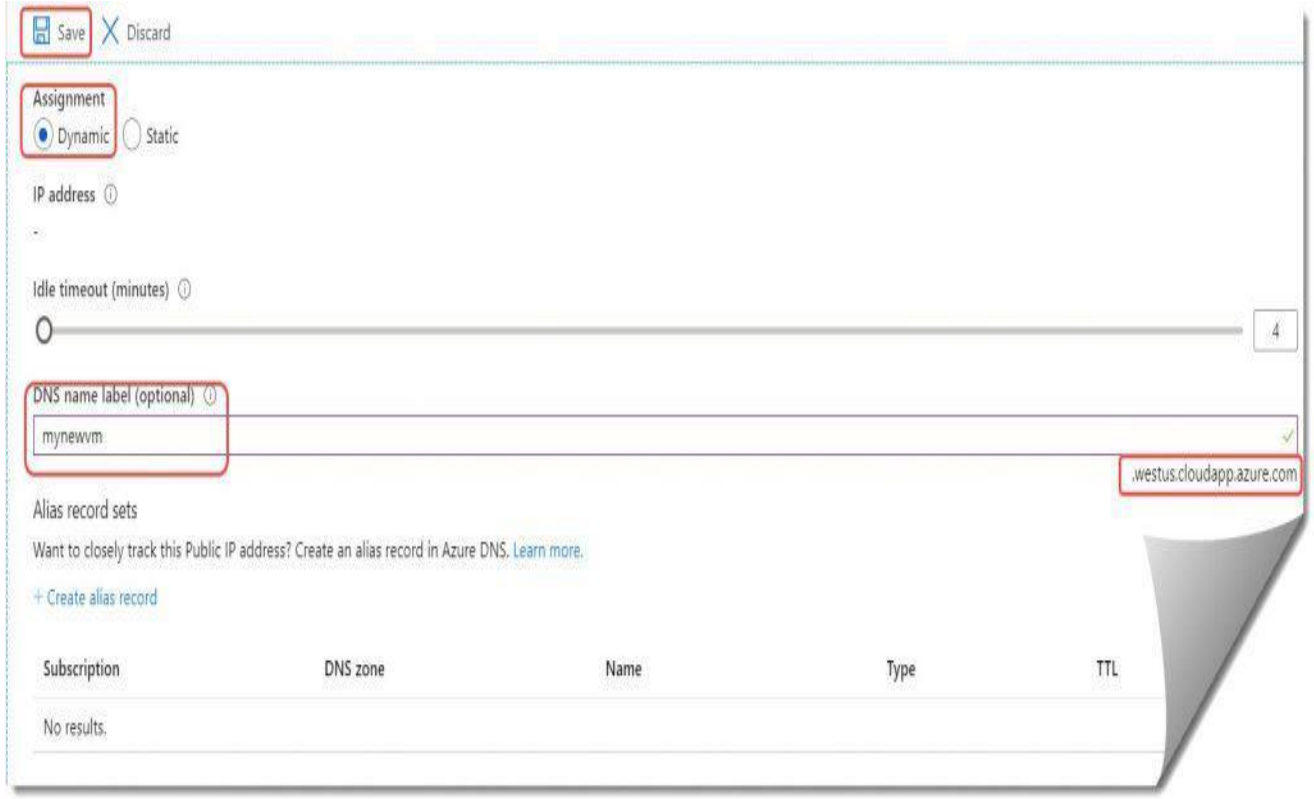
Step- 5: You can also see the DNS name here. Click on the configure link.

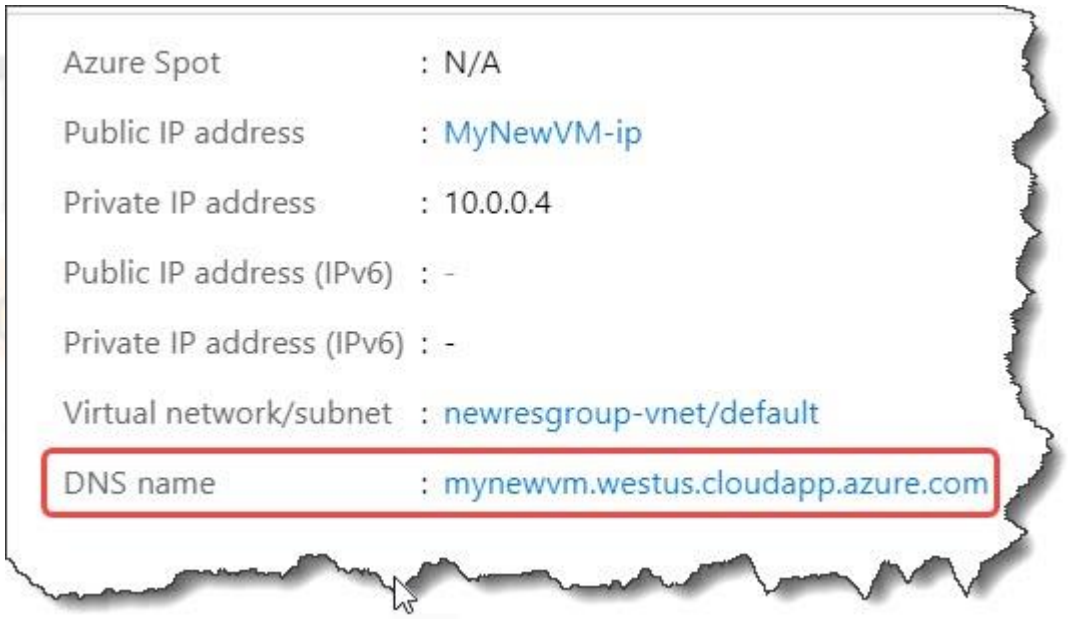


Source: https://azurelessons.com/azure-virtual-machine-dns/

Introduction to Microsoft Azure Virtual Machines

Step- 6: Select the Assignment as Dynamic, Provide a name for the DNS in the DNS name label field. Then click on the Save button.





So now if you can see my DNS name is “mynewvm.westus.cloudapp.azure.com“. You can see it here on the Overview tab.

Source: https://azurelessons.com/azure-virtual-machine-dns/

Configuring Endpoints

There is a section Azur Platform where endpoints can be set up when constructing a virtual machine.

PowerShell and Remote Desktop are the two default endpoints that are enabled when building a virtual machine.

What does an endpoint actually mean?

- Virtual machines in the same cloud can automatically communicate with one another. But if we want them to talk to our own computer, we'll need an endpoint that is set up for that.

- In essence, it involves opening a port to access the virtual computer. Remote access to services operating on virtual machines is made possible by an endpoint.

- When building an endpoint, the public and private ports must be specified. In addition, turning on Access Control Lists enables secure access to an endpoint (ACL).

Configuring Endpoints

Step 1
Login to your Azure subscription and create a virtual machine.

Step 2
Click on the virtual machine in the Grid view. Now, you will be in the Virtual machine properties blade Window. Select the option “Network Interfaces”. Under the essentials section, find the public IP address parameter and click on IP address.

Step 3
You will be redirected to IP configuration blade of the virtual machine. In this Window, click Configurations option under settings section.

Configuring Endpoints

Step 4

In the opened view ,add desired DNS name in DNS name label(Optional). The important information to be noted here is the entered name should be available, else an error message will be thrown, as shown in the screenshot given below. Once the proper name is provided, save the current settings.

Steps 5

After the successful creation of DNS name, navigate to the main virtual machine grid view and click on the virtual machine. In properties Window, select Network Interfaces option under settings section. In the new blade, click on the Network security group and click Security group in the next Window.

Configuring Endpoints

Step 6
In the new blade, click Network security group option and select the corresponding Security group in the Grid View.

Step 7
In the new blade, select the option Inbound security rules and click add button in the blade.

Configuring Endpoints

Step 8
Provide the desired name and click save button. After saving it successfully, the endpoint can be viewed in the rules Grid View.

Step 9
Navigate to the virtual machines Grid View and click on the resource group with which the virtual machine is associated with.

Step 10
In the resource group property Window, select the “virtual machine ip” in the Grid View section. You can find DNS name of the virtual machine in the properties Window.

Introduction to Microsoft Azure Virtual Machines

Connecting to Virtual Machine in Azure

1. Select the virtual machine from the list.
2. At the beginning of the virtual machine page, select Connect.
3. Go to the Azure portal to connect to a VM. Search for and select Virtual machines.
4. On the Connect to virtual machine page, select RDP, and then select the appropriate IP address and Port number. In most cases, the default IP address and port should be used. Select Download RDP File. If the VM has a just-in-time policy set, you first need to select the Request access button to request access before you can download the RDP file. For more information about the just-in-time policy, see Manage virtual machine access using the just in time policy.

1. Open the downloaded RDP file and select Connect when prompted. You will get a warning that the .rdp file is from an unknown publisher. This is expected. In the Remote Desktop

6. Use a different account by clicking More options in the Windows Security dialogue. Select OK after entering the account's login information for the virtual computer.

Local account: When you created the virtual machine, you typically gave a local account user name and password. In this instance, the virtual machine's name, which is entered as vm name username, is the domain.

Domain joined VM: Enter the user name in the format Domain Username if the VM is part of a domain. Additionally, the account must either belong to the Administrators group or have been given permission to access the virtual machine remotely.
Domain controller: Enter the user name and password for a domain administrator account for that domain if the VM is a domain controller.

7. Select Yes to verify the identity of the virtual machine and finish logging on.

Implementing the lifecycle of a Virtual Machine

- The term "virtual machine lifecycle management" (VMLM) refers to a group of procedures that administrators can use to control the creation, delivery, use, and upkeep of virtual machines (VMs) over the course of their use.

- An operating system (OS) or programme can be installed and run in a virtual machine (VM), which is a software implementation of a computing environment.

- The virtual machine (VM) simulates a physical computer environment, but resource requests are handled by a virtualization layer that translates them to the underlying hardware.

Implementing the lifecycle of a Virtual Machine

A virtual machine (VM) may frequently outlive repeated hardware upgrades, resulting in an allegedly "immortal VM.“

Although the hypervisor is upgraded, the VM continues to run without taking into account changes in the hardware.

As long as there is no urgent need for new hardware, the VM continues to function mostly in the same way. However, after time, support becomes cumbersome and pointlessly expensive.

An enterprise may have virtual machines (VMs) running on a variety of major OS releases, necessitating the use of several antivirus, security, asset management, monitoring, and other tools as well as personnel.

Uploading and downloading Virtual Hard Disks

The virtual hard disc must be ready before you transfer a Windows virtual machine (VM) from on-premises to Azure (VHD or VHDX).

Generation 1 and Generation 2 VMs with fixed-size discs and VHD file format are both supported by Azure. On a generation 1 VM, the OS VHD can have a maximum size of 2 TB.

Source: https://claytonshieldsjr.medium.com/add-and-size-disks-in-azure-virtual-machines-576d8da969f5

Attaching an empty hard disk to VM

How to use the Azure PowerShell module to copy a managed disc to a different region or upload a VHD from your local computer to an Azure managed disc.

You can upload a VHD up to 32 TiB in size straight into a managed drive using the upload managed disc procedure, commonly known as direct upload.

At the moment, normal HDD, standard SSD, and premium SSDs can all be directly uploaded. As of right now, ultra discs are not supported.

To restore client backups to managed discs while offering a backup solution for IaaS VMs in Azure, use direct upload.

The speed at which you can upload a VHD from an external source to Azure depends on your local bandwidth. When copying from or uploading to an Azure VM.

Creating VM from a Custom Image

- A managed VM image contains the information necessary to create a VM, including the OS and data disks.
- The virtual hard disks (VHDs) that make up the image, including both the OS disks and any data disks, are stored as managed disks.
- Before creating a new VM, you'll need to create a managed VM image to use as the source image and grant read access on the image to any user who should have access to the image.
- One managed image supports up to 20 simultaneous deployments. Attempting to create more than 20 VMs concurrently, from the same managed image, may result in provisioning timeouts due to the storage performance limitations of a single VHD.

Creating VM from a Custom Image

Use the portal

1. Go to the Azure portal to find a managed image. Search for and select Images.
2. Select the image you want to use from the list. The image Overview page opens.
3. Select Create VM from the menu.
4. Enter the virtual machine information. The user name and password entered here will be used to log in to the virtual machine. When complete, select OK. You can create the new VM in an existing resource group, or choose Create new to create a new resource group to store the VM.
5. Select a size for the VM. To see more sizes, select View all or change the Supported disk type filter.
6. Under Settings, make changes as necessary and select OK.
7. On the summary page, you should see your image name listed as a Private image. Select Ok to start the virtual machine deployment.

Deleting Images and Disks

The networking and disc resources may not be deleted when you delete a virtual machine (VM), depending on how you do it. When you delete a VM, what additional resources are automatically deleted can be changed from the default settings.

1. Open the portal.
2. Select + Create a resource.
3. On the Create a resource page, under Virtual machines, select Create.
4. Make your choices on the Basics, then select Next : Disks >. The Disks tab will open.
5. Under Disk options, by default the OS disk is set to Delete with VM. If you don't want to delete the OS disk, clear the checkbox. If you're using an existing OS disk, the default is to detach the OS disk when the VM is deleted.

Deleting Images and Disks

From Azure portal, browse to the storage container that contains unmanaged disks. Click on the disk to view the properties.

Ensure that the lease status is “unlocked” and that the lease state is “Available.” This indicates that the disk is not attached to any VMs. Click on Delete to remove the disks.

- You can utilize Azure Advisor to find the unused virtual machines in your subscription.
- The advanced evaluation model in Azure Advisor analyses metrics like CPU, memory, and network usage of VMs and finds underused VMs that can be terminated or eliminated.

- The discs and those VMs can be deleted together to reduce your cloud storage costs.

Introduction to Microsoft Azure Virtual Machines

Summary

- Virtual machines, also known as just VMs, are much like any other real computers, such as laptops, smartphones, and servers. It is equipped with a CPU, RAM, discs for file storage, and an internet connection in case that is required. VMs are frequently considered to be virtual computers or software-defined computers inside of real servers, although the components that make up your computer (referred to as hardware) are actual, physical, and exist solely as code.
- Virtualization is the process of building a software-based or "virtual" version of a computer with dedicated resources from a physical host machine, like your desktop computer, and/or a distant server, such a server in a cloud provider's datacenter.
- To ensure that the discs of VMs in an availability set are sufficiently isolated from one another to prevent a single point of failure, managed discs are integrated with availability sets. Disks are automatically inserted into various scale storage devices (stamps). Only the VM instances with discs on those stamps fail when a stamp fails due to hardware or software failure.

Self Assessment (Quiz)

Q1. In which year was Azure launched?

A. 2009

B. 2010

C. 2011

D. 2012

Answer: B

Introduction to Microsoft Azure Virtual Machines

Q2. Which of the following is the storage services provided by Azure?

A. Blob

B. Queue

C. Both A and B

D. Azure does not support storage services at all

Answer: C

Q3. Which one of these is not a service provided by Azure?

A. compute

B. store

C. management

D. None of the above

Answer: D

Q4. Which of the following element is a non-relational storage system for large-scale storage?

A. Application

B. Compute

C. Storage

D. None of the above

Answer: C

Q5. Which of the following element allows you to create and manage virtual machines that serve either in a Web role and a Worker role?

A. Compute

B. Application

C. Storage

D. None of the mentioned

Answer: C

Q6. Azure Storage plays the same role in Azure that _____ plays in Amazon Web Services.

A. EC3

B. S3

C. EC2

D. None of the mentioned

Answer: B

Introduction to Microsoft Azure Virtual Machines

Q7. Which of the following role in Microsoft Azure?

A. VM Role

B. Web Role

C. Worker Role

D. All of the above

Answer- D

Q8. Are data disks provide support within scale sets?

A. Yes

B. No

Answer: A

Introduction to Microsoft Azure Virtual Machines

Q9. Which of the following application of Microsoft Azure?

A. Web Applications

B. Infrastructure Services

C. Media Services

D. All of the above

Answer: D

Q10. A _____ role is a virtual machine instance running Microsoft IIS Web server that can accept and respond to HTTP or HTTPS requests.

A. Worker

B. Server

C. Web

D. Client

Answer: C

Activity

Activity Type: Offline **Duration: 60 Minutes**

Description: Comparison study of Virtual machine in different Cloud Service Providers
A Case Study

Subjective Assessment

1) Explain different cloud service roles provided by Azure.
2) VM creation is possible using Azure Resource Manager in a Virtual Network which was created by means of classic deployment. Explain
3) What would be the best feature recommended by Azure for having a common file sharing system between multiple virtual machines?

External Resources

1. SQL Server on Azure Virtual Machines: A hands-on guide to provisioning Microsoft SQL by Joey D'Antoni (Author), Louis Davidson (Author), Allan Hirt (Author), John Martin (Author)
2. https://courses.edx.org/asset-v1:Microsoft+AZURE202x+4T2017+type@asset+block@Azure_Virtual_Machines_Practical_Exercises.pdf

Introduction to Microsoft Azure Virtual Machines

Document Links

Topics	URL	Notes
Azure VM	https://courses.edx.org/asset-v1:Microsoft+AZURE202x+4T2017+type@asset+block@Azure_Virtual_Machines_Practical_Exercises.pdf	This link explain Azure VM
Virtual DISK in Azure Platform	https://azure.microsoft.com/en-in/services/storage/disks/	This link explains Virtual DISK in Azure Platform

Introduction to Microsoft Azure Virtual Machines

Video Links

Topics	URL	Notes
Azure VM	https://www.youtube.com/watch?v=fnqCSQ3WGTw	This video explains Azure VM
Types Of VM In Azure	https://www.youtube.com/watch?v=ppRV5zr3oWY	You will learn Types Of VM In Azure
Virtual Disk	https://www.youtube.com/watch?v=bZ41WVF58xg	This video explains Virtual Disk
VM And Virtual Disk	https://www.youtube.com/watch?v=wkRiJ2pDgsI	This video explains VM And Virtual Disk

Introduction to Microsoft Azure Virtual Machines

E-Book Links

Topics	URL	Page Number
Microsoft Azure Essentials	https://download.microsoft.com/download/6/6/2/662DD05E-BAD7-46EF-9431-135F9BAE6332/9781509302963_Microsoft%20Azure%20Essentials%20Fundamentals%20of%20Azure%202nd%20ed%20pdf.pdf	All pages