

## About Rahul Joshi:

### 22 Years exp, 15<sup>th</sup> year as Microsoft certified trainer & AWS Authorized instructor

- Helping customers add Application Modernization capabilities by Replatforming ASP.NET sites to Azure App Services, Rearchitecting of monolithic applications to microservices or containers.
- Reengineering of legacy applications to cloud-native apps with improved user experience.
- Designing cloud strategy, solution design, cloud adoption frameworks, app modernization and cloud migration.
- Develop Proof of Concept by working closely with Microsoft and Amazon Web Services and design frameworks for cloud adoption and Enterprise Architecture, Cloud Infrastructure/ Migrations.
- Responsible for Migration to Microsoft Azure (Brownfield and Greenfield Projects). In-Premise To Cloud Migration and Storage Migration.
- Perform Application Readiness Assessment, an investigation at application level in preparation for cloud deployment, to look at issues that will either block or detract from the application's abilities to fully utilize the cloud, then act on this report to ensure cloud readiness.
- Designing applications for scalability
- Migrating to PaaS & Container Architecture, Migrating from Traditional .NET Application Web Apps

"Executed more than 580+ Trainings engagements on Microsoft Azure for more than 220+ clients"

Google Drive Link:

[https://drive.google.com/drive/folders/181ebdbVLk5xpLu5ArR\\_BFWeM9b3N2x3?usp=sharing](https://drive.google.com/drive/folders/181ebdbVLk5xpLu5ArR_BFWeM9b3N2x3?usp=sharing)

Recording:

Please Note, Post Session Completes Zoom Recording Link will be shared on WhatsApp, Download it from Zoom Directly. It will not be uploaded on Google Drive

One Note Documentation:

<https://1drv.ms/u/s!Aht-oGFG3XwWgagy2dnZHUXQmk0wkg>

## Load Balancer

Load = Request, People Wanting your access, lot of work, pressure to response

Balancer = Handling the load, by working more time, adding more people

Purpose = NO ONE SHOULD WAIT, EVERY REQUEST THAT COMES, SHOULD NOT WAIT AND HAS TO HANDLED AS QUICK AS POSSIBLE

### Case Study:

The Customer was nicely explained on the concepts of Point to site Connectivity and also NSG Rules, the customer says, they have lot of customers who visit their website and load on the website can increase anytime of the day. Performance is a serious issue, if the website does not open on time or website shows error "Too many requests", then this can lead to customer satisfaction issues. Currently the customer uses 1 Virtual Machine that has IIS Pre-Installed and the Website runs on IIS Web Server (within that 1 Virtual Machine).

If the VM goes down for maintenance, this can also be a worry factor as Availability will be compromised. The customer is confused, now how to get maximum Availability and also Performance can be improved to gain more customer satisfaction. The customer heard about "Load Balancer" but they are confused which load balancer is good for them, clarity is expected.

Last but not least, the customer wants a demonstration of how load balancer can be created quickly using GUI Method and if tomorrow automation has to be done, how the same can be configured using command line interface.

STAR

### Situation = Case Study

#### Task:

1. What is Load Balancer?
2. Types of Load Balancer?
3. Load Balancer SKU?
4. Pricing of Load Balancer
5. Configuration
  - a. GUI Based
  - b. Command Line Based

## Action:

What is the Load Balancer?

<https://docs.microsoft.com/en-us/azure/load-balancer/load-balancer-overview>

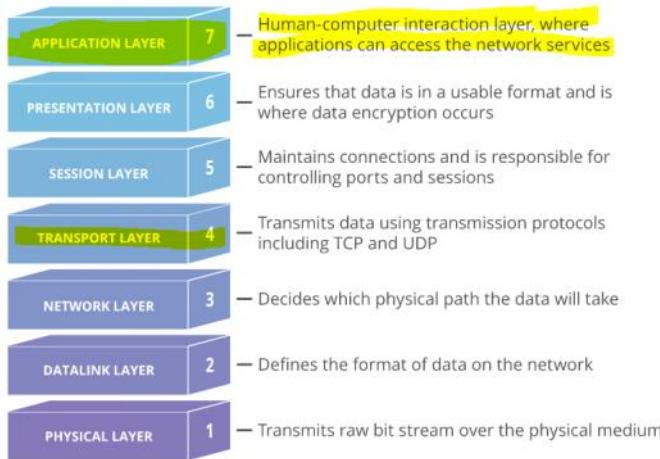
Load balancing refers to **evenly distributing load** (incoming network traffic) across a group of **backend resources** or servers.

**Azure Load Balancer operates at layer 4 of the Open Systems Interconnection (OSI) model.** It's the single point of contact for clients

What is OSI Model?

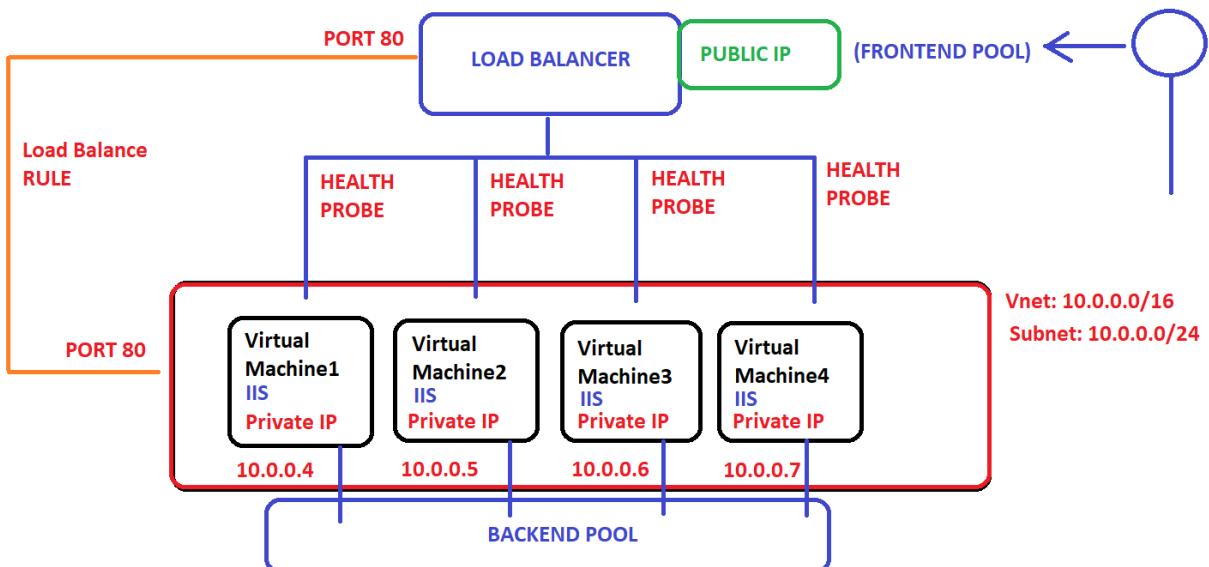
<https://www.cloudflare.com/learning/ddos/glossary/open-systems-interconnection-model-osi/>

The open systems interconnection (OSI) model is a conceptual model created by the International Organization for Standardization which enables diverse communication systems to communicate using standard protocols. In plain English, the OSI provides a standard for different computer systems to be able to communicate with each other.



Load balancer **distributes** inbound flows **that arrive at the load balancer's front end** to **backend pool instances**

These flows are according to configured **load-balancing rules** and **health probes**



Azure Pricing:

<https://azure.microsoft.com/en-us/pricing/details/load-balancer/>

| Standard Load Balancer | Regional Tier Price | Global Tier Price     |
|------------------------|---------------------|-----------------------|
| First 5 rules          | ₹1.998/hour         | ₹1.998/hour           |
| Additional rules       | ₹0.799/rule/hour    | ₹0.799/rule/hour      |
| Inbound NAT rules      | Free                | Free                  |
| Data processed (GB)    | ₹0.400 per GB       | No additional charge* |

### Is Load Balance a Local (Regional) Service or Global Service?

<https://azure.microsoft.com/en-us/explore/global-infrastructure/products-by-region/?regions=non-regional,us-central,central-india,south-india>

Central US - Load Balance Service

East Us - Load Balance Service

OR

THERE IS ONLY 1 LOAD BALANCE SERVICE FOR THE COMPLETE AZURE (GLOBAL)

Regions

4 of 42 selected

- Select all/none
- Compare with Azure Stack Hub
- Non-regional
- Africa
- Asia Pacific
- Australia
- Brazil
- Canada
- China
- Europe
- France
- Germany
- India
- Central India
- South India
- Japan
- Korea
- Norway
- Qatar
- Sweden
- Switzerland
- United Arab Emirates
- United Kingdom
- United States

Sharing: [Share](#) [Stop Share](#)

Products

Browse ▾ Search for a product

| PRODUCT CATEGORIES    | PRODUCTS                 |
|-----------------------|--------------------------|
| Popular               | Virtual Network          |
| AI + machine learning | Application Gateway      |
| Analytics             | Azure ExpressRoute       |
| Compute               | VPN Gateway              |
| Containers            | Network Watcher          |
| Databases             | Azure Firewall           |
| DevOps                | Content Delivery Network |
| Developer tools       | Azure DDoS Protection    |
| Hybrid + multicloud   | Azure DNS                |
| Networking            | Virtual WAN              |

Regions

4 of 42 selected

United States

South India      Central US

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TABLE KEY: Generally Available In Preview In Preview (hover to view expected timeframe) Future availability (hover to view expected timeframe)

|                                     | INDIA        | UNITED STATES                |            |
|-------------------------------------|--------------|------------------------------|------------|
| Products                            | Non-regional | Central India<br>South India | Central US |
| <a href="#">Application Gateway</a> |              |                              |            |
| <a href="#">Load Balancer</a>       |              |                              |            |

Products Regions 

| Products        | Regions          |
|-----------------|------------------|
| Browse  traffic | 4 of 42 selected |
| Traffic Manager |                  |

TABLE KEY: Generally Available In Preview In Preview (hover to view expected timeframe) Future availability (hover to view expected timeframe)

|                                 | INDIA        | UNITED STATES                              |
|---------------------------------|--------------|--|
| Products                        | Non-regional | Central India<br>South India<br>Central US |
| <a href="#">Traffic Manager</a> |              |  |

Release dates, features and requirements are subject to change prior to final commercial release of the products/features/software described herein. This page is for informational purposes only. MICROSOFT MAKES NO WARRANTIES, EXPRESSED, IMPLIED OR OTHERWISE, WITH RESPECT TO THE INFORMATION CONTAINED IN THIS PAGE.

## EXAM question & Interview Questions

As there are many load balances, which load balance we should use in what situation? And how are load balancers categorized?

### Architect Website:

<https://docs.microsoft.com/en-us/azure/architecture/>

### Load Balance Website:

<https://docs.microsoft.com/en-us/azure/architecture/guide/technology-choices/load-balancing-overview>

Azure provides various load balancing services that you can use to distribute your workloads across multiple computing resources - Application Gateway, Front Door, Load Balancer, and Traffic Manager.

## Service categorizations

Azure load balancing services can be categorized along two dimensions: global versus regional, and HTTP(S) versus non-HTTP(S).

### Global versus regional

- Global load-balancing services distribute traffic across regional backends, clouds, or hybrid on-premises services. These services route end-user traffic to the closest available backend. They also react to changes in service reliability or performance, in order to maximize availability and performance. You can think of them as systems that load balance between application stamps, endpoints, or scale-units hosted across different regions/geographies.
- Regional load-balancing services distribute traffic within virtual networks across virtual machines (VMs) or zonal and zone-redundant service endpoints within a region. You can think of them as systems that load balance between VMs, containers, or clusters within a region in a virtual network.

## HTTP(S) versus non-HTTP(S)

- HTTP(S) load-balancing services are Layer 7 load balancers that only accept HTTP(S) traffic. They are intended for web applications or other HTTP(S) endpoints. They include features such as SSL offload, web application firewall, path-based load balancing, and session affinity.
- Non-HTTP/S load-balancing services can handle non-HTTP(S) traffic and are recommended for non-web workloads.



The following table summarizes the Azure load balancing services by these categories:

| Service             | Global/regional | Recommended traffic |
|---------------------|-----------------|---------------------|
| Azure Front Door    | Global          | HTTP(S)             |
| Traffic Manager     | Global          | non-HTTP(S)         |
| Application Gateway | Regional        | HTTP(S)             |
| Azure Load Balancer | Regional        | non-HTTP(S)         |

### 100% Exam Question | Common Interview Question

#### Load Balancer SKU - Stock Keeping Units

<https://docs.microsoft.com/en-us/azure/load-balancer/skus?source=recommendations>

Azure Load Balancer has 3 SKUs - Basic, Standard, and Gateway

FrontDoor | Traffic Manager | Application Gateway | **Load Balance (Network Load Balancer)**

Prod

|                                   | Standard Load Balancer  | Basic Load Balancer  |
|-----------------------------------|---|--|
| <b>Scenario</b>                   | Equipped for load-balancing network layer traffic when high performance and ultra-low latency is needed. Routes traffic within and across regions, and to availability zones for high resiliency. | Equipped for small-scale applications that don't need high availability or redundancy. Not compatible with availability zones. |
| <b>Backend type</b>               | IP based, NIC based   | NIC based  |
| <b>Protocol</b>                   | TCP, UDP  | TCP, UDP   |
| <b>Frontend IP Configurations</b> | Supports up to 600 configurations   | Supports up to 200 configurations  |
| <b>Backend pool size</b>          | Supports up to 1000 instances   | Supports up to 300 instances   |
| <b>Backend pool endpoints</b>     | Any virtual machines or virtual machine scale sets in a single virtual network  | Virtual machines in a single availability set or virtual machine scale set   |
| <b>Health probes</b>              | TCP, HTTP, HTTPS  | TCP, HTTP  |
| <b>Health probe down behavior</b> | TCP connections stay alive on an instance probe down and on all probes down.  | TCP connections stay alive on an instance probe down. All TCP connections end when all probes are down.                        |
| <b>Availability Zones</b>         | Zone-redundant and zonal frontends for inbound and outbound traffic   | Not available  |



|                                    |   |   |
|------------------------------------|---|---|
| <b>Diagnostics</b>                 | Azure Monitor multi-dimensional metrics   | Not supported                                     |
| <b>HA Ports</b>                    | Available for Internal Load Balancer  | Not available                                     |
| <b>Secure by default</b>           | Closed to inbound flows unless allowed by a network security group. Internal traffic from the virtual network to the internal load balancer is allowed. | Open by default. Network security group optional. |
| <b>Outbound Rules</b>              | Declarative outbound NAT configuration  | Not available                                     |
| <b>TCP Reset on Idle</b>           | Available on any rule   | Not available                                     |
| <b>Multiple front ends</b>         | Inbound and outbound  | Inbound only                                      |
| <b>Management Operations</b>       | Most operations < 30 seconds  | 60-90+ seconds typical                            |
| <b>SLA</b>                         | 99.99% <sup>a</sup>   | Not available                                     |
| <b>Global VNet Peering Support</b> | Standard ILB is supported via Global VNet Peering   | Not supported                                     |
| <b>NAT Gateway Support</b>         | Both Standard ILB and Standard Public LB are supported via Nat Gateway  | Not supported                                     |
| <b>Private Link Support</b>        | Standard ILB is supported via Private Link  | Not supported                                     |

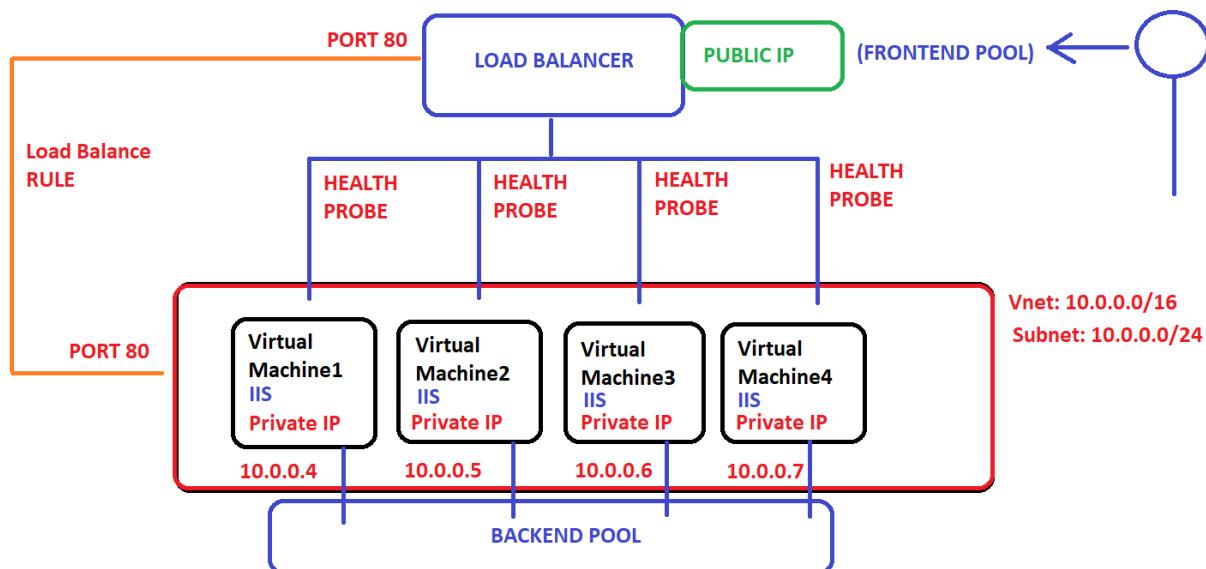


Not available



## Task: Creating Load Balance - GUI

FrontDoor | Traffic Manager | Application Gateway | **Load Balance (Network Load Balancer)**



### 1st Way of doing it

Manual VM Creation

(DO NOT PERFORM THIS, ONLY FOR DEMO)

## Create a virtual machine

your resources.

Subscription \*  MSDN Platforms

Resource group \*  (New) rg-loadbalancer-demo

**Instance details**

Virtual machine name \*  VM01 ✓

Region \*  (US) East US

Availability options  No infrastructure redundancy required

Security type  Standard

Image \*  Windows Server 2016 Datacenter - Gen2

See all images | Configure VM generation

VM architecture  Arm64  x64

Size \*  Standard\_B2ms - 2 vcpus, 8 GiB memory (₹4,375.74/month)

See all sizes

**Administrator account**

Username \*  rahul ✓

Password \*  ✓

Confirm password \*  ✓

**Inbound port rules**

Select which virtual machine network ports are accessible from the public internet. You can specify more limited or granular network access on the Networking tab.

Public inbound ports \*  None  Allow selected ports

Select inbound ports \*  HTTP (80), HTTPS (443), RDP (3389)

**⚠️ This will allow all IP addresses to access your virtual machine.** This is only recommended for testing. Use the Advanced controls in the Networking tab to create rules to limit inbound traffic to known IP addresses.

## Create a virtual machine

Basics **Disks** Networking Management Advanced Tags Review + create

Azure VMs have one operating system disk and a temporary disk for short-term storage. You can attach additional data disks. The size of the VM determines the type of storage you can use and the number of data disks allowed. [Learn more](#)

### Disk options

OS disk type \*  Standard HDD (locally-redundant storage)

The selected VM size supports premium disks. We recommend Premium SSD for high IOPS workloads. Virtual machines with Premium SSD disks qualify for the 99.9% connectivity SLA.

Delete with VM

Enable encryption at host

**ⓘ** Encryption at host is not registered for the selected subscription. [Learn more about enabling this feature](#)

Encryption type \*  (Default) Encryption at-rest with a platform-managed key

Enable Ultra Disk compatibility   
Ultra disk is supported in Availability Zone(s) 1,2,3 for the selected VM size Standard\_B2ms.

### Data disks for VM01

[Review + create](#) [< Previous](#) [Next : Networking >](#)

## Create a virtual machine

Basics Disks Networking Management Advanced Tags Review + create

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](#)

### Network interface

When creating a virtual machine, a network interface will be created for you.

Virtual network \*

Subnet \*

Public IP

NIC network security group  None  Basic  Advanced

Public inbound ports \*  None  Allow selected ports

Select inbound ports \*

**Backend pool**

## Create a virtual machine

Basic  Advanced

Public inbound ports \*  None  Allow selected ports

Select inbound ports \*

**Regime**

**Load balancing**

You can place this virtual machine in the backend pool of an existing Azure load balancing solution. [Learn more](#)

Place this virtual machine behind an existing load balancing solution?

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

### Load balancing settings

- Application Gateway is an HTTP/HTTPS web traffic load balancer with URL-based routing, SSL termination, session persistence, and web application firewall. [Learn more about Application Gateway](#)
- Azure Load Balancer supports all TCP/UDP network traffic, port-forwarding, and outbound flows. [Learn more about Azure Load Balancer](#)

Load balancing options \*

Select a load balancer \*

Create a virtual machine ...

This will show you how to access your virtual machine. This is only recommended for testing. Use the Advanced controls in the Networking tab to create rules to limit inbound traffic to known IP addresses.

Delete NIC when VM is deleted

Enable accelerated networking  The selected VM size does not support accelerated networking.

**Load balancing**

You can place this virtual machine in the backend pool of an existing Azure load balancing solution. [Learn more](#)

Place this virtual machine behind an  existing load balancing solution?

**Load balancing settings**

- Application Gateway is an HTTP/HTTPS web traffic load balancer with URL-based routing, SSL termination, session persistence, and web application firewall. [Learn more about Application Gateway](#)
- Azure Load Balancer supports all TCP/UDP network traffic, port-forwarding, and outbound flows. [Learn more about Azure Load Balancer](#)

Load balancing options \*

Select a load balancer \*

First Create a Load Balance and then Select the Load Balance when you create a virtual Machine. So, if you are planning to create 4 VMs one by one, then for all the VM's you have to manually select this options and add the VM to the load balance. This is called "Manually Adding VM to Load Balancer"

## 2nd Way (Virtual Machine Scale Set)

This feature allows, you to deploy massive scale Virtual Machines without manually creating them one by one.

Azure Pass Subscription has 10vCores per Region. So, choose a region you have not used before and select B2ms (2 vCPUs) and choose maximum VM (3) = [3 \* 2 = 6]

Microsoft Azure

All services | Compute

Virtual machine scale sets

| Name ↑↓ | Status | Instances |
|---------|--------|-----------|
|---------|--------|-----------|

## Create a virtual machine scale set ...

Basics Disks Networking Scaling Management Health Advanced Tags Review + create

Azure virtual machine scale sets let you create and manage a group of load balanced VMs. The number of VM instances can automatically increase or decrease in response to demand or a defined schedule. Scale sets provide high availability to your applications, and allow you to centrally manage, configure, and update a large number of VMs.

[Learn more about virtual machine scale sets](#)

### Project details

Select the subscription to manage deployed resources and costs. Use resource groups like folders to organize and manage all your resources.

Subscription \*

Resource group \*  [Create new](#)

### Scale set details

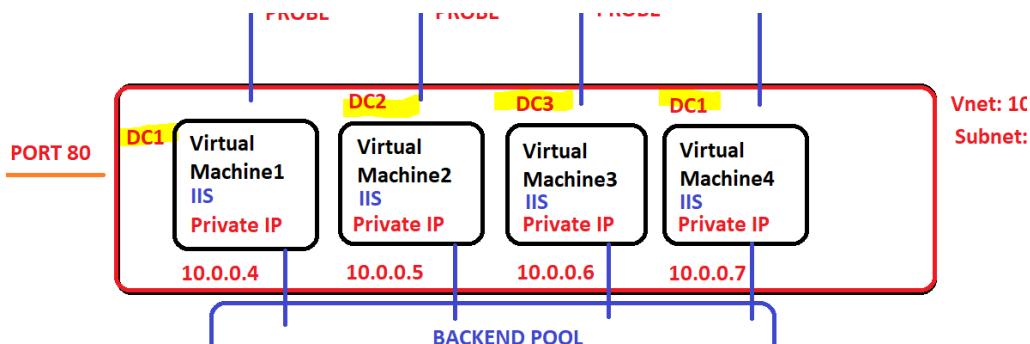
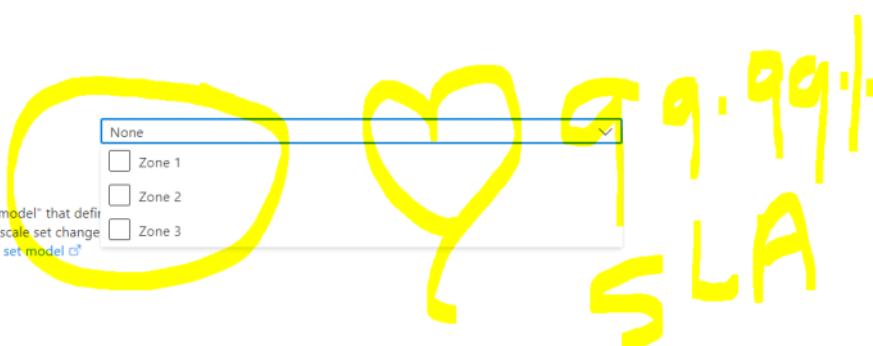
Virtual machine scale set name \*

Region \*

Availability zone

### Orchestration

A scale set has a "scale set model" that defines the number of instances in the scale set changes. Learn more about the scale set model



**For Training, don't choose, because B2ms may not be available in all datacenters for FREE Subscription**

### Orchestration

A scale set has a "scale set model" that defines the attributes of virtual machine instances (size, number of data disks, etc). As the number of instances in the scale set changes, new instances are added based on the scale set model.

[Learn more about the scale set model](#)

Orchestration mode \*  Uniform: optimized for large scale stateless workloads with identical instances  
 Flexible: achieve high availability at scale with identical or multiple virtual machine types

Security type  Standard

### Instance details

Image \*  [See all images](#) | [Configure VM generation](#)

VM architecture  Arm64  x64  
⚠️ Arm64 is not supported with the selected image.

Run with Azure Spot discount

Size \*  Standard\_B2ms - 2 vcpus, 8 GB memory (\$4,375.74/month)  See all sizes

Administrator account

Username \*  rahul

Password \*

Confirm password \*

Licensing

Save up to 49% with a license you already own using Azure Hybrid Benefit. [Learn more](#)

Would you like to use an existing Windows Server license? \*

Review Azure hybrid benefit compliance

**Common  
PWD**

**Review + create** [< Previous](#) [Next : Disks >](#)

## Create a virtual machine scale set ...

Basics **Disks** Networking Scaling Management Health Advanced Tags Review + create

Azure VMs have one operating system disk and a temporary disk for short-term storage. You can attach additional data disks. The size of the VM determines the type of storage you can use and the number of data disks allowed. [Learn more](#)

### Disk options

OS disk type \*  Standard HDD (locally-redundant storage)

The selected VM size supports premium disks. We recommend Premium SSD for high IOPS workloads. Virtual machines with Premium SSD disks qualify for the 99.9% connectivity SLA.

Encryption type \*  (Default) Encryption at-rest with a platform-managed key

Enable encryption at host

**!** Encryption at host is not registered for the selected subscription. [Learn more about enabling this feature](#)

Enable Ultra Disk compatibility

Ultra Disks can be used only with Virtual Machine Scale Sets in an Availability Zone.

### Data disks

You can add and configure additional data disks for your virtual machine scale set or attach existing disks. This VMSS also comes with a temporary disk.

**Review + create**

[< Previous](#)

[Next : Networking >](#)

## Create a virtual machine scale set ...

Basics Disks Networking Scaling Management Health Advanced Tags Review + create

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](#)

### Virtual network configuration

Azure Virtual Network (VNet) enables many types of Azure resources to securely communicate with each other, the internet, and on-premises networks. [Learn more about VNets](#)

Virtual network \* ⓘ

(New) rg-vmssloadbalancer-remove-vnet (recommended)

[Create virtual network](#)



### Network interface

A network interface enables an Azure virtual machine to communicate with internet, Azure, and on-premises resources. A VM can have one or more network interfaces.

+ Create new nic ⌂ Delete

| NAME                     | CREATE PUBLI... | SUBNET                | NETWORK SECURI... | ACCELERATED N... |
|--------------------------|-----------------|-----------------------|-------------------|------------------|
| rg-vmssloadbalancer-r... | No              | default (10.0.0.0/16) | Basic             | Off              |



### Load balancing

**NSG - By Default, RDP would be allowed and HTTP and HTTPS may not be selected, so if these servers are going to WebServer then "Web Traffic" will come and list on port 80 and 443, so you need to enable NSG and allow traffic on 80 and 443**

## Edit network interface ...

### Network interface

Name \*

rg-vmssloadbalancer-remove-vnet-nic01

Virtual network ⓘ

rg-vmssloadbalancer-remove-vnet

Subnet \* ⓘ

default (10.0.0.0/16)

NIC network security group ⓘ

- None
- Basic
- Advanced

Public inbound ports \* ⓘ

- None
- Allow selected ports

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.

**OK**

**Cancel**

\*Select inbound ports

HTTP (80), HTTPS (443)

- HTTP (80)
- HTTPS (443)
- SSH (22)
- RDP (3389)

## Create a virtual machine scale set

inbound and outbound connectivity with security group rules, or place behind an existing load balancing solution.  
Learn more about VMSS networking [\(1\)](#)

### Virtual network configuration

Azure Virtual Network (VNet) enables many types of Azure resources to securely communicate with each other, the internet, and on-premises networks. Learn more about VNs [\(1\)](#)

|                   |   |
|-------------------|---|
| Virtual network * | (New) rg-vmssloadbalancer-remove-vnet (recommended) |
|                   | <a href="#">Create virtual network</a>              |

### Network interface

A network interface enables an Azure virtual machine to communicate with internet, Azure, and on-premises resources. A VM can have one or more network interfaces.

+ Create new nic Delete

| NAME                     | CREATE PUBLI... | SUBNET                | NETWORK SECURI... | ACCELERATED N... |
|--------------------------|-----------------|-----------------------|-------------------|------------------|
| rg-vmssloadbalancer-r... | No              | default (10.0.0.0/16) | Basic             | Off              |

**Load balancing**

You can place this virtual machine scale set in the backend pool of an existing Azure load balancing solution. Learn more [\(1\)](#)

Use a load balancer



### Load balancing settings

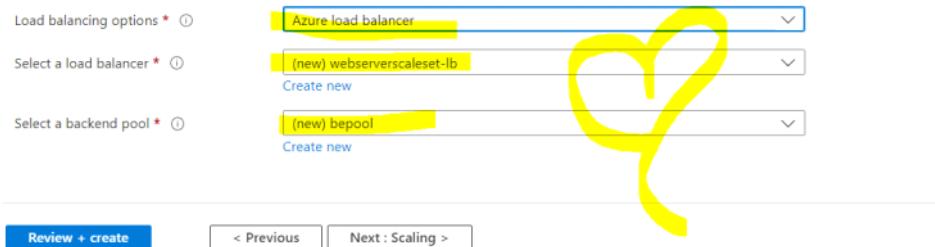
- Application Gateway is an HTTP/HTTPS web traffic load balancer with URL-based routing, SSL termination, session persistence, and web application firewall. Learn more about Application Gateway [\(1\)](#)
- Azure Load Balancer supports all TCP/UDP network traffic, port-forwarding, and outbound flows. Learn more about Azure Load Balancer [\(1\)](#)

Load balancing options \* (1)

|                            |                          |
|----------------------------|--------------------------|
| Azure load balancer        | <input type="checkbox"/> |
| (new) webserverscaleset-lb | <input type="checkbox"/> |
| Create new                 | <input type="checkbox"/> |

Select a load balancer \* (1)

|              |                          |
|--------------|--------------------------|
| (new) bepool | <input type="checkbox"/> |
| Create new   | <input type="checkbox"/> |



[Review + create](#) [< Previous](#) [Next : Scaling >](#)

## Create a virtual machine scale set

Basics Disks Networking **Scaling** Management Health Advanced Tags Review + create

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 [\(1\)](#)

Initial instance count \* (1)  (1)

### Scaling

Scaling policy (1)

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. [\(1\)](#)

Scale-in policy  (1)

**Backend pool**

[Review + create](#) [< Previous](#) [Next : Management >](#)

## Create a virtual machine scale set ...

Basics Disks Networking Scaling Management Health Advanced Tags Review + create

Configure monitoring and management options for your virtual machine scale set instances.

### Microsoft Defender for Cloud

Microsoft Defender for Cloud provides unified security management and advanced threat protection across hybrid cloud workloads. [Learn more](#)

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

### Identity

Enable system assigned managed identity



[Review + create](#) < Previous Next : Health >

## Create a virtual machine scale set ...

Basics Disks Networking Scaling Management **Health** Advanced Tags Review + create

You can configure health monitoring on an application endpoint to update the status of the application on that instance. This instance status is required to enable platform managed upgrades like automatic OS updates and virtual machine instance upgrades. [Learn more about application health monitoring](#)

### Health

Enable application health monitoring

## Create a virtual machine scale set ...

Basics Disks Networking Scaling Management Health **Advanced** Tags Review + create

Add additional configuration, agents, scripts or applications via virtual machine extensions or cloud-init.

### Allocation policy

Enable scaling beyond 100 instances

Spreading algorithm

Max spreading

Fixed spreading (not recommended with zones)

### VM applications

VM applications contain application files that are securely and reliably downloaded on your VM after deployment. In addition to the application files, an install and uninstall script are included in the application. You can easily add or remove applications on your VM after create. [Learn more](#)

Select a VM application to install

### Custom data

Pass a script, configuration file, or other data into the virtual machine **while it is being provisioned**. The data will be saved on the VM in a known location. [Learn more about custom data for VMSS](#)

Custom data

[Review + create](#) < Previous Next : Tags >

## Create a virtual machine scale set

Validation passed

Basics Disks Networking Scaling Management Health Advanced Tags [Review + create](#)

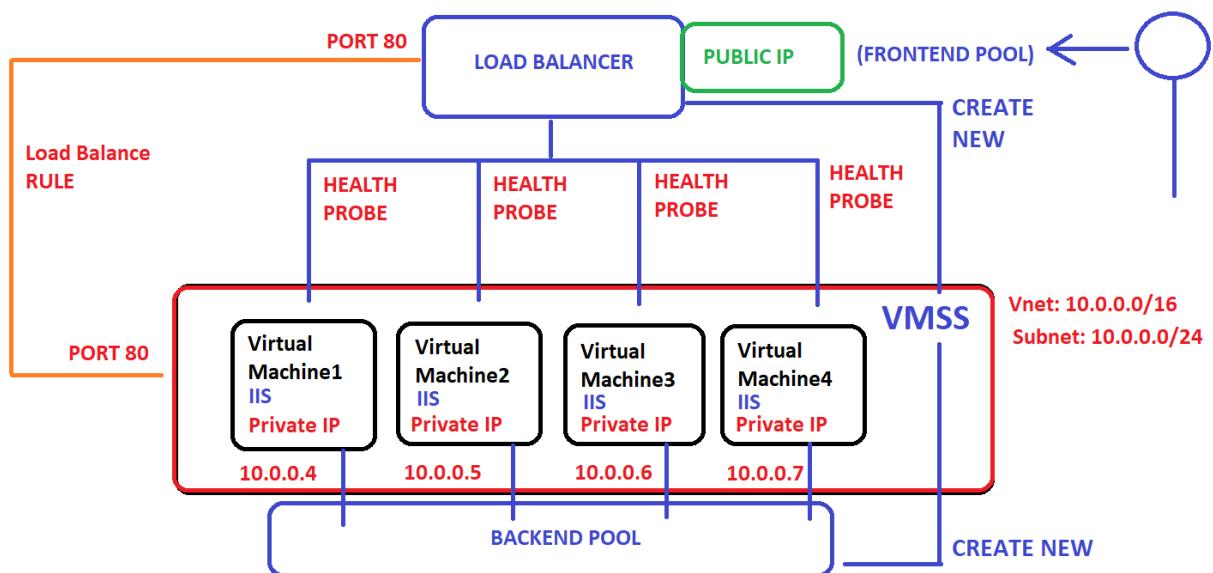
**Basics**

|                                |                                       |
|--------------------------------|---------------------------------------|
| Subscription                   | MSDN Platforms                        |
| Resource group                 | (new) rg-vmssloadbalancer-remove      |
| Virtual machine scale set name | webserverscaleset                     |
| Region                         | East US                               |
| Orchestration mode             | Uniform                               |
| Availability zone              | None                                  |
| Image                          | Windows Server 2016 Datacenter - Gen2 |
| Size                           | Standard B2ms (2 vcpus, 8 GiB memory) |
| Security type                  | Standard                              |
| Username                       | rahul                                 |
| Azure Spot                     | No                                    |

**Instance**

|                                 |    |
|---------------------------------|----|
| Initial instance count          | 3  |
| Already have a Windows license? | No |

[Create](#) [Next >](#) Download a template for automation



**CreateVmss-MicrosoftWindowsServer.WindowsServer-2-2022091115608 | Overview**

Deployment

Search [Delete](#) [Cancel](#) [Redeploy](#) [Download](#) [Refresh](#)

We'd love your feedback! →

Deployment is in progress

Deployment name: CreateVmss-MicrosoftWindowsServer.WindowsServer-2-2022091115608 Start time: 9/11/2022, 12:05:31 PM  
Subscription: MSDN Platforms Correlation ID: 691828f3-56ae-4d0f-a022-91  
Resource group: rg-vmssloadbalancer-remove

Deployment details

| Resource                    | Type                                      | Status  | Operation details                 |
|-----------------------------|---|---------|-----------------------------------|
| webserverscaleset           | Microsoft.Compute/virtualMachineScaleSets | Created | <a href="#">Operation details</a> |
| webserverscaleset-lb        | Microsoft.Network/loadBalancers           | Created | <a href="#">Operation details</a> |
| rg-vmssloadbalancer-remove  | Microsoft.Network/virtualNetworks         | OK      | <a href="#">Operation details</a> |
| basicNsgrg-vmssloadbalancer | Microsoft.Network/networkWatchers         | OK      | <a href="#">Operation details</a> |
| webserverscaleset-ip        | Microsoft.Network/publicIPAddresses       | OK      | <a href="#">Operation details</a> |

## Explore the Options configured

**RAC**

| Name                | Computer name   | Status  | Protection policy | Provisioning state | Health state | Latest model |
|---------------------|-----------------|---------|-------------------|--------------------|--------------|--------------|
| webserverscaleset_0 | webserver000000 | Running |                   | Succeeded          | Yes          |              |
| webserverscaleset_1 | webserver000001 | Running |                   | Succeeded          | Yes          |              |
| webserverscaleset_2 | webserver000002 | Running |                   | Succeeded          | Yes          |              |

**Networking**

| Priority | Name                          | Port | Protocol | Source            | Destination    | Action |
|----------|-------------------------------|------|----------|-------------------|----------------|--------|
| 300      | HTTP                          | 80   | TCP      | Any               | Any            | Allow  |
| 320      | HTTPS                         | 443  | TCP      | Any               | Any            | Allow  |
| 65000    | AllowVnetInBound              | Any  | Any      | VirtualNetwork    | VirtualNetwork | Allow  |
| 65001    | AllowAzureLoadBalancerInBound | Any  | Any      | AzureLoadBalancer | Any            | Allow  |
| 65500    | DenyAllInBound                | Any  | Any      | Any               | Any            | Deny   |

**Public IP**

| Name                 | Type          | Frontend IP address | Frontend DNS address | Backend pool |
|----------------------|---------------|---------------------|----------------------|--------------|
| webserverscaleset-lb | Load balancer | 20.106.131.157      | -                    | bepool       |

## Now, let us Explore Load Balance Configuration

All services > weberversaleset

## weberversaleset | Networking

Virtual machine scale set

Rahul

**rg-vmssloadbalancer-remove-vnet-nic01**

IP configuration: rg-vmssloadbalancer-remove-vnet-nic01

Virtual network/subnet: rg-vmssloadbalancer-remove-vnet/default Accelerated networking: **Disabled**

Inbound port rules Outbound port rules **Load balancing**

Add load balancing

| Name               | Type          | Frontend IP address | Frontend DNS address |
|--------------------|---------------|---------------------|----------------------|
| weberversaleset-lb | Load balancer | 20.106.131.157      | -                    |

Need help?

## weberversaleset-lb

Load balancer

Search

Move Delete Refresh Give feedback

**Essentials**

Resource group (move): rg-vmssloadbalancer-remove

Location: East US

Subscription (move): MSDN Platforms

Subscription ID: ee7bab70-0709-4f4f-9829-790225dc5be4

SKU: Standard

Tags (edit): Click here to add tags

See more

Configure high availability and scalability for your applications

**Not basic**

See, Microsoft is showing us, in the backend pool (there are 3 VMs)

### Dissect 1:1

#### Front End Pool

Always has Public IP, this Public IP is given by Microsoft, All Traffic Listens on this Public IP

## weberversaleset-lb | Frontend IP configuration

Load balancer

Search

Add Refresh Give feedback

Filter by name...

| Name ↑↓              | IP address ↑↓                       | Rules count ↑↓ |
|----------------------|-------------------------------------|----------------|
| LoadBalancerFrontEnd | 20.106.131.157 (weberversaleset-ip) | 4              |

Search  + Add Refresh Give feedback

Overview Activity log Access control (IAM) Tags Diagnose and solve problems Settings Frontend IP configuration

Name ↑ IP ↓

LoadBalancerFrontEnd 20.106.131.157

## LoadBalancerFrontEnd ...

weberversaleset-lb

Type  Public  IP address  IP prefix

IP type  IP address  IP prefix

Public IP address \*

Gateway Load balancer  None

### Used by

The list of load balancing rules, inbound NAT rules, inbound NAT pools, and outbound rules using this IP address.

| Name      | Type                |
|-----------|---------------------|
| LBRule    | Load balancing rule |
| natpool.0 | Inbound NAT rule    |
| natpool.1 | Inbound NAT rule    |
| natpool.2 | Inbound NAT rule    |
| natpool   | Inbound NAT pool    |

In this example, Microsoft has created a Public IP for us, but, if we had Public, we could have selected the same from the drop down list

Public IP address \*

## All resources

Default Directory (talktorahuljoshioutlook.onmicrosoft.com)

+ Create Manage view Refresh Export to CSV Open query Assign tags Delete

| Filter for any field...  | Subscription equals all                    | Resource group equals all | Type equals all            | Location equals all | <input type="button" value="+"/> |
|--|--|---------------------------|----------------------------|---------------------|----------------------------------|
| <input type="checkbox"/> Unsecure resources                            | <input type="checkbox"/> Recommendations   |                           |                            |                     |                                  |
| <input type="checkbox"/> Name ↑  |  | Type ↑↓                   | Resource group ↑↓          | Location            |                                  |
| <input type="checkbox"/> basicNsgrg-vmssloadbalancer-remove-vnet-nic01 |  | Network security group    | rg-vmssloadbalancer-remove | East US             |                                  |
| <input type="checkbox"/> NetworkWatcher_eastus                         |  | Network Watcher           | NetworkWatcherRG           | East US             |                                  |
| <input type="checkbox"/> rg-vmssloadbalancer-remove-vnet               |  | Virtual network           | rg-vmssloadbalancer-remove | East US             |                                  |
| <input type="checkbox"/> weberversaleset                               |  | Virtual machine scale set | rg-vmssloadbalancer-remove | East US             |                                  |
| <input type="checkbox"/> weberversaleset-ip                            | <input type="checkbox"/> Public IP address |                           | rg-vmssloadbalancer-remove | East US             |                                  |
| <input type="checkbox"/> weberversaleset-lb                            |  | Load balancer             | rg-vmssloadbalancer-remove | East US             |                                  |

**webserversaleset-ip**

Public IP address

Search

Associate Dissociate Move Delete Refresh

Overview

Activity log

Access control (IAM)

Tags

Settings

- Configuration
- Properties
- Locks

Monitoring

Insights

Essentials

Resource group (move) rg-vmsloadbalancer-remove

Location East US

Subscription (move) MSDN Platforms

Subscription ID ee7bab70-0709-4f4f-9829-790225dc5be4

SKU Standard

Tier Regional

IP address 20.106.131.157

DNS name -

Associated to webserversaleset-lb

Tags (edit) Click here to add tags

See more

**webserversaleset-ip | Configuration**

Public IP address

Search

Save Discard Refresh

Overview

Activity log

Access control (IAM)

Tags

Settings

Configuration

Properties

Locks

Monitoring

Insights

Alerts

Metrics

Diagnostic settings

Automation

IP address assignment

Static

IP address 20.106.131.157

Idle timeout (minutes) 4

DNS name label (optional) .eastus.cloudapp.azure.com

You can use the IP address as your 'A' DNS record or DNS label as your 'CNAME' record. [Learn more about adding a custom domain to this IP address](#)

Alias record sets

Create an alias record in Azure DNS. [Learn more](#)

+ Create alias record

| Subscription    | DNS zone                  | Name | Type | TTL |
|-----------------|---------------------------|------|------|-----|
| Microsoft Azure | eastus.cloudapp.azure.com |      |      |     |

## EXAM & Interview Point of View

<https://docs.microsoft.com/en-us/azure/virtual-network/ip-services/public-ip-addresses>

## SKU

Public IP addresses are created with one of the following SKUs:

| Public IP address  | Standard   | Basic   |
|--------------------|--|---|
| Allocation method  | Static   | For IPv4: Dynamic or Static; For IPv6: Dynamic.   |
| Idle Timeout       | Have an adjustable inbound originated flow idle timeout of 4-30 minutes, with a default of 4 minutes, and fixed outbound originated flow idle timeout of 4 minutes.  | Have an adjustable inbound originated flow idle timeout of 4-30 minutes, with a default of 4 minutes, and fixed outbound originated flow idle timeout of 4 minutes. |
| Security           | Secure by default model and be closed to inbound traffic when used as a frontend. Allow traffic with network security group (NSG) is required (for example, on the NIC of a virtual machine with a Standard SKU Public IP attached). | Open by default. Network security groups are recommended but optional for restricting inbound or outbound traffic.  |
| Availability zones | Supported. Standard IPs can be non-zonal, zonal, or zone-redundant. Zone redundant IPs can only be created in regions where 3 availability zones are live. IPs created before zones are live won't be zone redundant.                | Not supported.  |
| Routing preference | Supported to enable more granular control of how traffic is routed between Azure and the Internet.   | Not supported.  |
| Global tier        | Supported via cross-region load balancers.   | Not supported.  |

## Back End Pool

| Backend pool | Resource Name                | Resource Status | IP address | Network interface        | Availability zon |
|--------------|------------------------------|-----------------|------------|--------------------------|------------------|
| bepool       | weberversaleset (instance 0) | Running         | 10.0.0.4   | rg-vmssloadbalancer-r... |                  |
| bepool       | weberversaleset (instance 1) | Running         | 10.0.0.5   | rg-vmssloadbalancer-r... |                  |
| bepool       | weberversaleset (instance 2) | Running         | 10.0.0.6   | rg-vmssloadbalancer-r... |                  |

They are Part of the Same Pool

| Resource Name   | Type           | IP configuration          | IP Address | Availability... |
|-----------------|----------------|---------------------------|------------|-----------------|
| weberversaleset | Virtual machin | rg-vmssloadbalancer-re... | -          |                 |

**Creating Problem**

All resources ...

Default Directory (talktorahuljoshioutlook.onmicrosoft.com)

[Create](#) [Manage view](#) [Refresh](#) [Export to CSV](#) [Open query](#) | [Assign tags](#) [Delete](#)

Filter for any field... Subscription equals all Resource group equals all Type equals all Location equals all

[Unsecure resources](#) [Recommendations](#)

| Name ↑                                      | Type ↑↓                   | Resource group ↑↓          | Loc |
|---|---------------------------|----------------------------|-----|
| basicNsg-vmssloadbalancer-remove-vnet-nic01 | Network security group    | rg-vmssloadbalancer-remove | Eas |
| NetworkWatcher_eastus                       | Network Watcher           | NetworkWatcherRG           | Eas |
| rg-vmssloadbalancer-remove-vnet             | Virtual network           | rg-vmssloadbalancer-remove | Eas |
| weberversaleset                             | Virtual machine scale set | rg-vmssloadbalancer-remove | Eas |
| weberversaleset-ip                          | Public IP address         | rg-vmssloadbalancer-remove | Eas |
| weberversaleset-lb                          | Load balancer             | rg-vmssloadbalancer-remove | Eas |

All services > All resources > weberversaleset

weberversaleset | Instances ...

Virtual machine scale set.

[Search](#) [Start](#) [Restart](#) [Stop](#) [Reimage](#) [Delete](#) [Upgrade](#) [Refresh](#) | [Protection Policy](#)

Overview Activity log Access control (IAM) Tags Diagnose and solve problems Settings Instances Networking Scaling Disks Operating system Microsoft Defender for Cloud

Search virtual machine instances

| Name              | Computer name   | Status  | Protection policy | Provisioning state | Health state |
|-------------------|-----------------|---------|-------------------|--------------------|--------------|
| weberversaleset_0 | webserver000000 | Running |                   | Succeeded          |              |
| weberversaleset_1 | webserver000001 | Running |                   | Succeeded          |              |
| weberversaleset_2 | webserver000002 | Running |                   | Succeeded          |              |

All services > All resources > weberversaleset

weberversaleset | Instances ...

Virtual machine scale set.

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Overview Activity log Access control (IAM) Tags Diagnose and solve problems Settings Instances Networking

Search virtual machine instances

| Name              | Computer name   | Status  | Protection policy | Provisioning state | Health state |
|-------------------|-----------------|---------|-------------------|--------------------|--------------|
| weberversaleset_0 | webserver000000 | Running |                   | Succeeded          |              |
| weberversaleset_1 | webserver000001 | Running |                   | Succeeded          |              |
| weberversaleset_2 | webserver000002 | Running |                   | Succeeded          |              |

**Notifications** Rahul V. Joshi

More events in the activity log →

... **Deallocating virtual machine instance** Deallocating virtual machine instance 'weberversaleset\_0'...

**Deployment succeeded** Deployment 'CreateVmss-MicrosoftWindowsServer.WindowsServer20220911115608' to resource group 'rg-vmssloadbalancer-remove' successful.

[Go to resource](#) [Pin to dashboard](#)

weberversaleset | Instances ...

Virtual machine scale set.

[Search](#) [Start](#) [Restart](#) [Stop](#) [Reimage](#) [Delete](#) [Upgrade](#) [Refresh](#) | [Protection Policy](#)

Overview Activity log Access control (IAM) Tags Diagnose and solve problems Settings Instances

Search virtual machine instances

| Name              | Computer name   | Status               | Protection policy | Provisioning state | Health state | Last |
|-------------------|-----------------|----------------------|-------------------|--------------------|--------------|------|
| weberversaleset_0 | webserver000000 | Stopped (deallocate) |                   | Succeeded          | Yes          |      |
| weberversaleset_1 | webserver000001 | Running              |                   | Succeeded          | Yes          |      |
| weberversaleset_2 | webserver000002 | Running              |                   | Succeeded          | Yes          |      |

## Back To Load Balancer - Backend Pool

Search  Add Refresh Give feedback

Overview Activity log Access control (IAM) Tags Diagnose and solve problems

Frontend IP configuration Backend pools Health probes Load balancing rules Inbound NAT rules Outbound rules Properties

| Backend pool | Resource Name                | Resource Status       | IP address | Network interface        | Availability zone |
|--------------|------------------------------|-----------------------|------------|--------------------------|-------------------|
| bepool       | weberversaleset (instance 0) | Stopped (deallocated) | 10.0.0.4   | rg-vmssloadbalancer-r... |                   |
| bepool       | weberversaleset (instance 1) | Running               | 10.0.0.5   | rg-vmssloadbalancer-r... |                   |
| bepool       | weberversaleset (instance 2) | Running               | 10.0.0.6   | rg-vmssloadbalancer-r... |                   |

## Load Balance Rule

Search  Add Refresh Give feedback

Overview Activity log Access control (IAM) Tags Diagnose and solve problems

Frontend IP configuration Backend pools Health probes Load balancing rules Inbound NAT rules

| Name ↑ | Load balancing rule ↑↓ | Backend pool ↑↓ | Health probe ↑↓ |
|--------|------------------------|-----------------|-----------------|
| LBRule | LBRule (TCP/80)        | bepool          | tcpProbe        |

### LBRule

weberversaleset-lb

**Info** A load balancing rule distributes incoming traffic that is sent to a selected IP address and port combination across a group of backend pool instances. Only backend instances that the health probe considers healthy receive new traffic.

Name

IP Version \*  IPv4  IPv6

Frontend IP address \*  **Rahul Joshi - Manager**

Backend pool \*  **Amit Das - Friend**

Protocol \*  TCP  UDP

Port \*  **Rahul Joshi - Talking on 80 / TCP**

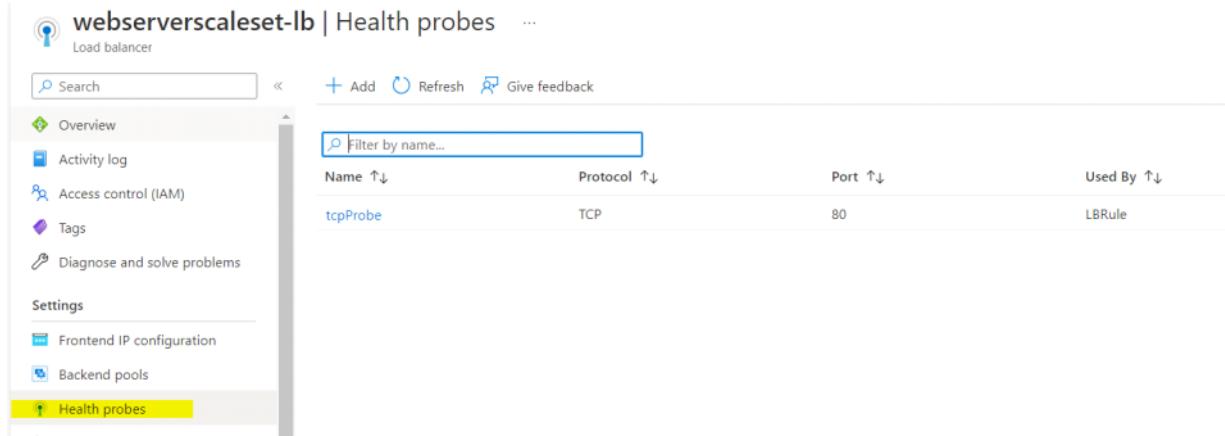
Backend port \*  **Amit Das should listen on same port**

Health probe \*  **Create new**

Session persistence

<https://docs.microsoft.com/en-us/azure/load-balancer/manage-rules-how-to>

## Load Balance Health Probe



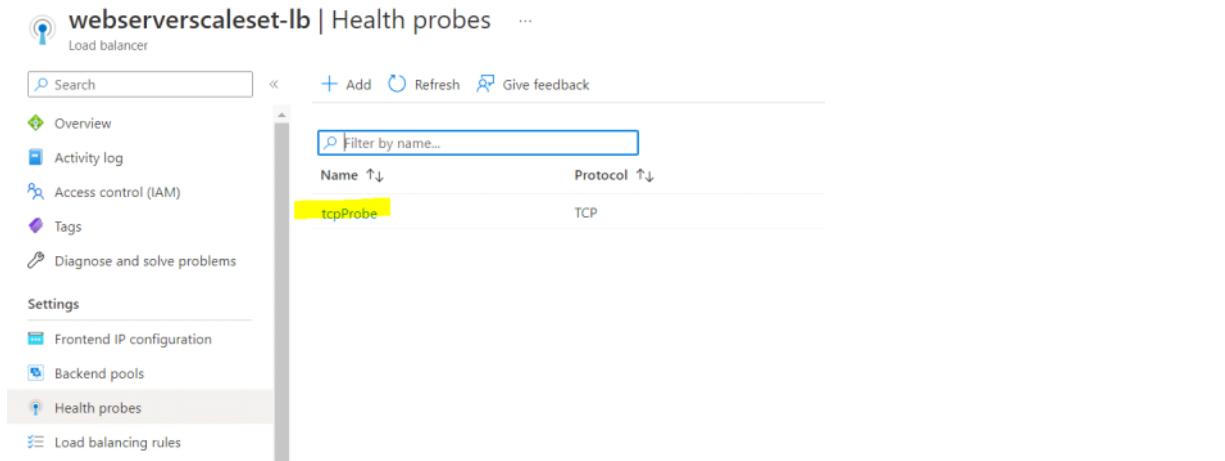
webservercaleset-lb | Health probes

Search + Add Refresh Give feedback

Overview Activity log Access control (IAM) Tags Diagnose and solve problems

Settings Frontend IP configuration Backend pools Health probes

| Name ↑↓  | Protocol ↑↓ | Port ↑↓ | Used By ↑↓ |
|----------|-------------|---------|------------|
| tcpProbe | TCP         | 80      | LBRule     |



webservercaleset-lb | Health probes

Search + Add Refresh Give feedback

Overview Activity log Access control (IAM) Tags Diagnose and solve problems

Settings Frontend IP configuration Backend pools Health probes

| Name ↑↓  | Protocol ↑↓ |
|----------|-------------|
| tcpProbe | TCP         |

### tcpProbe ...

webservercaleset-lb

i Health probes are used to check the status of a backend pool instance. If the health probe fails to get a response from a backend instance then no new connections will be sent to that backend instance until the health probe succeeds again.

! Unhealthy threshold, otherwise known as the property `numberOfProbes`, is not respected. Load Balancer health probes will probe up/ down immediately after 1 probe regardless of the property's configured value. [Learn more](#)

|            |           |
|------------|-----------|
| Name       | tcpProbe  |
| Protocol * | TCP       |
| Port *     | 80        |
| Interval * | 5 seconds |
| Used by    | LBRule    |

<https://docs.microsoft.com/en-us/azure/load-balancer/load-balancer-custom-probe-overview>

Azure Load Balancer rules require a health probe to detect the endpoint status. The configuration of the health probe and probe responses determines which **backend pool instances will receive new connections**. Use health probes to detect the failure of an application

|                     | Standard SKU                             | Basic SKU                              |
|---------------------|--|--|
| Probe types         | TCP, HTTP, HTTPS                         | X                                      |
| Probe down behavior | All probes down, all TCP flows continue. | All probes down, all TCP flows expire. |

**Delete the OLD Resource Group of Load Balancer, so the below example works perfect in case you are**

## using the same Region

### 3d Way - Configuring Load Balance - COMMAND LINE INTERFACE

Using CLI we will configure

1. Resource Group
2. Virtual Network - Subnet
3. NSG - Port Allow
4. Health Probe (LB)
5. Rule (LB)
6. Backend Pool (LB)
7. Front End Public IP (LB)
8. Load Balance - **Use Point 4,5,6,7**
9. Get Credential (rahul / welcome@123456)
10. For Each Loop ( $i=0, i \leq 3, i++$ ) - Create 3 VMs
11. Install IIS Web Server ( $(i=0, i \leq 3, i++)$  - Custom Script Extension - **PowerShell Install IIS**
12. Call the Public - Put this in the Browser - Load Balancer Working, VM1, VM2, VM3, VM1, VM2, VM3

| My Drive > Microsoft Azure Master Batch 3 > Data |       |               |         |
|--|-------|---------------|---------|
| Name   | Owner | Last modified | Actions |
| Point To Site                                    | me    | Sep 10, 2017  |         |
| IP Address Range.xlsx                            | me    | Aug 7, 2017   |         |
| IP Address Range - Web Server and DB Server.xlsx | me    | Sep 3, 2017   |         |
| Load Balancer Script Master.txt                  | me    | Dec 11, 2017  |         |
| Vnet To Vnet.txt                                 | me    | Sep 3, 2017   |         |
| WebApp & Storage With Git.txt                    | me    | Aug 2, 2017   |         |

You have no storage mounted

Azure Cloud Shell requires an Azure file share to persist files. [Learn more](#)

This will create a new storage account for you and this will incur a small monthly cost. [View pricing](#)

\* Subscription

MSDN Platforms

Show advanced settings

Create storage Close

Version **Az PowerShell 8.3.0**

Search

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- > Peer Asn
- > Peering
- > Policy
- > Policy Insights

# New-AzResourceGroup

Reference  
Module: [Az.Resources](#)

Creates an Azure resource group.

## Syntax

```
PowerShell
New-AzResourceGroup
    [-Name] <String>
    [-Location] <String>
    [-Tag <Hashtable>]
    [-Force]
    [-ApiVersion <String>]
    [-Pre]
    [-DefaultProfile <IAzureContextContainer>]
    [-WhatIf]
    [-Confirm]
    [<CommonParameters>]
```



```
PowerShell v | ⌂ ? ⌂ ⌂ ⌂ ⌂ ⌂ ⌂
PS /home/rahul>
```

--Create a resource group with New-AzResourceGroup:  
 New-AzResourceGroup -Name 'rg-dev-alfa' -Location 'eastus'

```
PowerShell v | ⌂ ? ⌂ ⌂ ⌂ ⌂ ⌂ ⌂
PS /home/rahul> New-AzResourceGroup -Name 'rg-dev-alfa' -Location 'eastus'
ResourceGroupName : rg-dev-alfa
Location          : eastus
ProvisioningState : Succeeded
Tags              :
ResourceId        : /subscriptions/ee7bab70-0709-4f4f-9829-790225dc5be4/resourceGroups/rg-dev-alfa

PS /home/rahul>
```

```
$publicip = @{
  Name = 'myPublicIP'
  ResourceGroupName = 'rg-dev-alfa'
  Location = 'eastus'
  Sku = 'Standard'
  AllocationMethod = 'static'
  Zone = 1,2,3
}
New-AzPublicIpAddress @publicip
```

**This is a Zone Redundant Public IP**

```

Name : myPublicIP
ResourceGroupName : rg-dev-alfa
Location : eastus
Id : /subscriptions/ee7bab70-0709-4f4f-9829-790225dc5be4/resourceGroups/rg-dev-alfa/providers/Microsoft.Network/publicIPAddresses/myPublicIP
Etag : W/"5e62c0a9-2b95-4cbf-99b1-7c0014dd71d6"
ResourceGuid : a4165a9b-6d60-48e6-924c-530e7d480e4a
ProvisioningState : Succeeded
Tags :
PublicIpAddressAllocationMethod : Static
IpAddress : 20.120.47.108
PublicIpAddressVersion : IPv4
IdleTimeoutInMinutes : 4
IpConfiguration :
DnsSettings :
Zones : {1, 2, 3}
Sku :
  {
    "Name": "Standard",
    "Tier": "Regional"
  }
IpTags :
ExtendedLocation :

```

\$publicIp = Get-AzPublicIpAddress -Name 'myPublicIP' -ResourceGroupName 'rg-dev-alfa'

```

PowerShell ⓘ ⓘ ⓘ ⓘ ⓘ ⓘ ⓘ ⓘ ⓘ
PS /home/rahul> $publicIp = Get-AzPublicIpAddress -Name 'myPublicIP' -ResourceGroupName 'rg-dev-alfa'
PS /home/rahul> █

```

How to see the contents of the Variable?



```

PS /home/rahul> echo $publicIp

```

```

Name : myPublicIP
ResourceGroupName : rg-dev-alfa
Location : eastus
Id : /subscriptions/ee7bab70-0709-4f4f-9829-790225dc5be4/resourceGroups/rg-dev-alfa/providers/Microsoft.Network/publicIPAddresses/myPublicIP
Etag : W/"5e62c0a9-2b95-4cbf-99b1-7c0014dd71d6"
ResourceGuid : a4165a9b-6d60-48e6-924c-530e7d480e4a
ProvisioningState : Succeeded
Tags :
PublicIpAddressAllocationMethod : Static
IpAddress : 20.120.47.108
PublicIpAddressVersion : IPv4
IdleTimeoutInMinutes : 4
IpConfiguration :
DnsSettings :
Zones : {1, 2, 3}
Sku :
  {
    "Name": "Standard",
    "Tier": "Regional"
  }
IpTags :
ExtendedLocation :

```



Now, we are creating the FrontEnd Pool, and it points to Public IP Address

\$feip = New-AzLoadBalancerFrontendIpConfig -Name 'myFrontEnd' -PublicIpAddress \$publicIp



```

PS /home/rahul> $feip = New-AzLoadBalancerFrontendIpConfig -Name 'myFrontEnd' -PublicIpAddress $publicIp
WARNING: Upcoming breaking changes in the cmdlet 'New-AzLoadBalancerFrontendIpConfig' :
Default behaviour of Zone will be changed
Cmdlet invocation changes :
  Old Way : Sku = Standard means the Standard FrontendIpConfig is zone-redundant.
  New Way : Sku = Standard and Zone = {} means the Standard FrontendIpConfig has no zones. If you want to create a zone
  zones in the region. For example, Zone = ['1', '2', '3'].
  Note : Go to https://aka.ms/azps-changewarnings for steps to suppress this breaking change warning, and other information
PS /home/rahul> █

```

Backend Pool is created, but remember, this is Empty pool, at this moment, VMs are not there in the Pool

\$bepool = New-AzLoadBalancerBackendAddressPoolConfig -Name 'myBackEndPool'

```
PS /home/rahul> $bePool = New-AzLoadBalancerBackendAddressPoolConfig -Name 'myBackendPool'  
PS /home/rahul> █
```

Now, we create the Probe, this will use HTTP to access the Local Root Directory using Port 80, if the Root folder is accessed then success, if not, then failure.

```
$probe = @{  
    Name = 'myHealthProbe'  
    Protocol = 'http'  
    Port = '80'  
    IntervalInSeconds = '360'  
    ProbeCount = '5'  
    RequestPath = '/'  
}  
$healthprobe = New-AzLoadBalancerProbeConfig @probe
```

```
PS /home/rahul> $probe = @{  
    >>     Name = 'myHealthProbe'  
    >>     Protocol = 'http'  
    >>     Port = '80'  
    >>     IntervalInSeconds = '360'  
    >>     ProbeCount = '5'  
    >>     RequestPath = '/'  
    >> }  
PS /home/rahul> $healthprobe = New-AzLoadBalancerProbeConfig @probe  
PS /home/rahul> █
```

Now, we create Rule, Both Front end and Back end listens on Port 80

```
$lbrule = @{  
    Name = 'myHTTPRule'  
    Protocol = 'tcp'  
    FrontendPort = '80'  
    BackendPort = '80'  
    IdleTimeoutInMinutes = '15'  
    FrontendIpConfiguration = $feip  
    BackendAddressPool = $bePool  
}  
$rule = New-AzLoadBalancerRuleConfig @lbrule -EnableTcpReset -DisableOutboundSNAT
```

```
PS /home/rahul> $lbrule = @{  
    >>     Name = 'myHTTPRule'  
    >>     Protocol = 'tcp'  
    >>     FrontendPort = '80'  
    >>     BackendPort = '80'  
    >>     IdleTimeoutInMinutes = '15'  
    >>     FrontendIpConfiguration = $feip  
    >>     BackendAddressPool = $bePool  
    >> }  
PS /home/rahul> $rule = New-AzLoadBalancerRuleConfig @lbrule -EnableTcpReset -DisableOutboundSNAT  
PS /home/rahul> █
```

Now, finally we create Load Balancer and all the answer required for Load Balance are in the Variable defined.

```
$loadbalancer = @{  
    ResourceGroupName = 'rg-dev-alfa'  
    Name = 'myLoadBalancer'  
    Location = 'eastus'  
    Sku = 'Standard'  
    FrontendIpConfiguration = $feip  
    BackendAddressPool = $bePool  
    LoadBalancingRule = $rule  
    Probe = $healthprobe  
}  
New-AzLoadBalancer @loadbalancer
```

```

PS /home/rahul> $loadbalancer = @{
    >>   ResourceGroupName = 'rg-dev-alfa'
    >>   Name = 'myLoadBalancer'
    >>   Location = 'eastus'
    >>   Sku = 'Standard'
    >>   FrontendIpConfiguration = $feip
    >>   BackendAddressPool = $bePool
    >>   LoadBalancingRule = $rule
    >>   Probe = $healthprobe
    >> }
PS /home/rahul> New-AzLoadBalancer @loadbalancer
WARNING: Upcoming breaking changes in the cmdlet 'New-AzLoadBalancer' :
It is recommended to use parameter '-Sku Standard' to create new IP address. Please note that it will become the default behavior for
Note : Go to https://aka.ms/azps-changewarnings for steps to suppress this breaking change warning, and other information on breaking

Name          : myLoadBalancer
ResourceGroupName : rg-dev-alfa
Location       : eastus
Id            : /subscriptions/ee7bab70-0709-4f4f-9829-790225dc5be4/resourceGroups/rg-dev-alfa/providers/Microsoft.Network/
Etag          : W/"796654fe-90bc-43fc-9436-5de583df4577"
ResourceGuid   : f698d3c4-16b8-4baf-8f2f-8de3ad5c0e91
ProvisioningState : Succeeded
Tags          :
FrontendIpConfigurations : [

```

Now, we start the part of Vnet, Subnet, Bastion, NSG, and finally Virtual Machines

```

$subnet = @{
    Name = 'myBackendSubnet'
    AddressPrefix = '10.1.0.0/24'
}
$subnetConfig = New-AzVirtualNetworkSubnetConfig @subnet

$bastsubnet = @{
    Name = 'AzureBastionSubnet'
    AddressPrefix = '10.1.1.0/24'
}
$bastsubnetConfig = New-AzVirtualNetworkSubnetConfig @bastsubnet

```

**Why Bastion, because the backend VM have Private IP, if we want to connect to the Backend VM we will use Bastion Host.**



```

PS /home/rahul> $subnet = @{
    >>   Name = 'myBackendSubnet'
    >>   AddressPrefix = '10.1.0.0/24'
    >> }
PS /home/rahul> $subnetConfig = New-AzVirtualNetworkSubnetConfig @subnet
WARNING: Upcoming breaking changes in the cmdlet 'New-AzVirtualNetworkSubnetConfig' :
Update Property Name
Cmdlet invocation changes :
    Old Way : -ResourceId
    New Way : -NatGatewayId
Update Property Name
Cmdlet invocation changes :
    Old Way : -InputObject
    New Way : -NatGateway
Note : Go to https://aka.ms/azps-changewarnings for steps to suppress this breaking change warning
PS /home/rahul> $bastsubnet = @{
    >>   Name = 'AzureBastionSubnet'
    >>   AddressPrefix = '10.1.1.0/24'
    >> }
PS /home/rahul> $bastsubnetConfig = New-AzVirtualNetworkSubnetConfig @bastsubnet
WARNING: Upcoming breaking changes in the cmdlet 'New-AzVirtualNetworkSubnetConfig' :
Update Property Name
Cmdlet invocation changes :
    Old Way : -ResourceId
    New Way : -NatGatewayId
Update Property Name
Cmdlet invocation changes :
    Old Way : -InputObject
    New Way : -NatGateway
Note : Go to https://aka.ms/azps-changewarnings for steps to suppress this breaking change warning
PS /home/rahul>

```

Virtual Network been created

```

$net = @{
    Name = 'myVNet'
    ResourceGroupName = 'rg-dev-alfa'
    Location = 'eastus'
    AddressPrefix = '10.1.0.0/16'
    Subnet = $subnetConfig,$bastsubnetConfig
}

```

```
$vnet = New-AzVirtualNetwork @net
```

```
PS /home/rahul> $net = @{
>>   Name = 'myVNet'
>>   ResourceGroupName = 'rg-dev-alfa'
>>   Location = 'eastus'
>>   AddressPrefix = '10.1.0.0/16'
>>   Subnet = $subnetConfig,$bastsubnetConfig
>> }
PS /home/rahul> $vnet = New-AzVirtualNetwork @net
PS /home/rahul> █
```

Now, we add Public IP which will be used by Bastion Host

```
$ip = @{
  Name = 'myBastionIP'
  ResourceGroupName = 'rg-dev-alfa'
  Location = 'eastus'
  Sku = 'Standard'
  AllocationMethod = 'Static'
}
$publicip = New-AzPublicIpAddress @ip
```

```
PS /home/rahul> $ip = @{
>>   Name = 'myBastionIP'
>>   ResourceGroupName = 'rg-dev-alfa'
>>   Location = 'eastus'
>>   Sku = 'Standard'
>>   AllocationMethod = 'Static'
>> }
PS /home/rahul> $publicip = New-AzPublicIpAddress @ip
WARNING: Upcoming breaking changes in the cmdlet 'New-AzPublicIpAddress'
Default behaviour of Zone will be changed
Cmdlet invocation changes :
  Old Way : Sku = Standard means the Standard Public IP is zone-redundant
  New Way : Sku = Standard and Zone = {} means the Standard Public IP
  is in the region. For example, Zone = ['1', '2', '3'].
It is recommended to use parameter '-Sku Standard' to create new IP address
Note : Go to https://aka.ms/azps-changewarnings for steps to suppress t
PS /home/rahul> █
```

Now, we create the Bastion Host, which can be used to connect to the Backend VM, this process takes 3-4 minutes, **AsJob** means, do this process in the background and give the "Prompt" back, so next commands can be run.

```
## Create bastion host ##
$bastion = @{
  ResourceGroupName = 'rg-dev-alfa'
  Name = 'myBastion'
  PublicIpAddress = $publicip
  VirtualNetwork = $vnet
}
New-AzBastion @bastion -AsJob
```

```
PS /home/rahul> ## Create bastion host ##
PS /home/rahul> $bastion = @{
>>   ResourceGroupName = 'rg-dev-alfa'
>>   Name = 'myBastion'
>>   PublicIpAddress = $publicip
>>   VirtualNetwork = $vnet
>> }
PS /home/rahul> New-AzBastion @bastion -AsJob
```

| ID | Name         | PSJobTypeName        | State   | HasMoreData | Location  | Command       |
|----|--------------|----------------------|---------|-------------|-----------|---------------|
| 2  | Long Running | ... AzureLongRunn... | Running | True        | localhost | New-AzBastion |

```
PS /home/rahul> █
```

Now, All NSG Part - Allow Port, Priority

If anyone contacts the server and is waiting for the website page, this is called "Incoming Request" on Port 80. 80 is where Web Server is running. First Rule is Created, then NSG is created and Rule details are passed.

```
$nsgrule = @{
  Name = 'myNSGRuleHTTP'
  Description = 'Allow HTTP'
  Protocol = '*'
```

```

SourcePortRange = '*'
DestinationPortRange = '80'
SourceAddressPrefix = 'Internet'
DestinationAddressPrefix = '*'
Access = 'Allow'
Priority = '2000'
Direction = 'Inbound'
}
$rule1 = New-AzNetworkSecurityRuleConfig @nsgrule

```

```

PS /home/rahul> $nsgrule = @{
    >>     Name = 'myNSGRuleHTTP'
    >>     Description = 'Allow HTTP'
    >>     Protocol = '*'
    >>     SourcePortRange = '*'
    >>     DestinationPortRange = '80'
    >>     SourceAddressPrefix = 'Internet'
    >>     DestinationAddressPrefix = '*'
    >>     Access = 'Allow'
    >>     Priority = '2000'
    >>     Direction = 'Inbound'
    >> }
PS /home/rahul> $rule1 = New-AzNetworkSecurityRuleConfig @nsgrule
PS /home/rahul>

```

```

$nsg = @{
    Name = 'myNSG'
    ResourceGroupName = 'rg-dev-alfa'
    Location = 'eastus'
    SecurityRules = $rule1
}
New-AzNetworkSecurityGroup @nsg

```

```

PS /home/rahul> $nsg = @{
    >>     Name = 'myNSG'
    >>     ResourceGroupName = 'rg-dev-alfa'
    >>     Location = 'eastus'
    >>     SecurityRules = $rule1
    >> }
PS /home/rahul> New-AzNetworkSecurityGroup @nsg

Name          : myNSG
ResourceGroupName : rg-dev-alfa
Location       : eastus
Id            : /subscriptions/ee7bab70-0709-4f4f-9829-790225dc5be4/resourceGroups/rg-dev-alfa/providers/Microsoft.Network/networkSecurityGroups/myNSG
Etag          : W/"80e38a2a-da43-4f38-8643-57efd5e02505"
ResourceGuid   : 80901b81-c822-4e13-b8f6-d53414c52be8
ProvisioningState : Succeeded
Tags          :
SecurityRules  : [
    {
        "Name": "Allow - myNSGRule1 - HTTP"
    }
]

```

Now, we are going to create the Virtual Machines

```
$cred = Get-Credential
```

```

PS /home/rahul> $cred = Get-Credential
PowerShell credential request
Enter your credentials.
User: rahul
Password for user rahul: *****
PS /home/rahul>

```



```
PS /home/rahul> $cred  
UserName          Password  
-----  
rahul  [System.Security.SecureString]  
PS /home/rahul> ■
```

We are getting all details of Vnet and Subnet and storing them Variable

```
$vnet = Get-AzVirtualNetwork -Name 'myVNet' -ResourceGroupName 'rg-dev-alfa'
```

```
PS /home/rahul> $vnet = Get-AzVirtualNetwork -Name 'myVNet' -ResourceGroupName 'rg-dev-alfa'  
PS /home/rahul> $vnet  
  
Name          : myVNet  
ResourceGroupName : rg-dev-alfa  
Location       : eastus  
Id            : /subscriptions/ee7bab70-0709-4f4f-9829-790225dc5be4/resourceGroups/rg-dev-alfa  
Etag          : W/"00a7c67b-dceb-489f-a7f4-c259998118bd"  
ResourceGuid   : 24d84168-16ca-406a-b487-17dd485231c8  
ProvisioningState : Succeeded  
Tags          :  
AddressSpace    : {  
    "AddressPrefixes": [  
        "10.1.0.0/16"  
    ]  
}  
DhcpOptions    : {}  
FlowTimeoutInMinutes : null  
Subnets        : [  
    {  
        "Name": "mySubnet",  
        "AddressPrefix": "10.1.0.0/24",  
        "VirtualNetwork": $vnet  
    }  
]
```



We are also storing the Load Balancer and Backend Pool in the Variable

```
$lb = @{  
    Name = 'myLoadBalancer'  
    ResourceGroupName = 'rg-dev-alfa'  
}
```

```
PS /home/rahul> $lb = @{  
>>     Name = 'myLoadBalancer'  
>>     ResourceGroupName = 'rg-dev-alfa'  
>> }  
PS /home/rahul> ■
```

```
$bepool = Get-AzLoadBalancer @lb | Get-AzLoadBalancerBackendAddressPoolConfig
```

```
PS /home/rahul> $bepool = Get-AzLoadBalancer @lb | Get-AzLoadBalancerBackendAddressPoolConfig  
PS /home/rahul> ■
```

```
$nsg = Get-AzNetworkSecurityGroup -Name 'myNSG' -ResourceGroupName 'rg-dev-alfa'
```

```
PS /home/rahul> $nsg = Get-AzNetworkSecurityGroup -Name 'myNSG' -ResourceGroupName 'rg-dev-alfa'  
PS /home/rahul> ■
```

The is the Big Script to create the Virtual Machine with each VM having 1 NIC (LAN Card)

```
for ($i=1; $i -le 3; $i++)  
{  
    $nic = @{  
        Name = "myNicVM$i"  
        ResourceGroupName = 'rg-dev-alfa'  
        Location = 'eastus'  
        Subnet = $vnet.Subnets[0]  
        NetworkSecurityGroup = $nsg  
        LoadBalancerBackendAddressPool = $bepool  
    }  
    $nicVM = New-AzNetworkInterface @nic
```

```
## Create a virtual machine configuration for VMs ##
```

```
$vmsz = @{
    VMName = "myVM$1"
    VMSize = 'Standard_DS1_v2'
}

$vmos = @{
    ComputerName = "myVM$1"
    Credential = $cred
}

$vmimage = @{
    PublisherName = 'MicrosoftWindowsServer'
    Offer = 'WindowsServer'
    Skus = '2019-Datacenter'
    Version = 'latest'
}

$vmConfig = New-AzVMConfig @vmsz `| Set-AzVMOperatingSystem @vmos -Windows `| Set-AzVMSourceImage @vmimage `| Add-AzVMNetworkInterface -Id $nicVM.Id

## Create the virtual machine for VMs ##
$vm = @{
    ResourceGroupName = 'rg-dev-alfa'
    Location = 'eastus'
    VM = $vmConfig
    Zone = "$1"
}

New-AzVM @vm -AsJob
```

1

# Job

| ID | Name                                | PSJobTypeName | State | HasMoreData | Location  | Command  |
|----|-------------------------------------|---------------|-------|-------------|-----------|----------|
| 3  | Long Running O... AzureLongRunni... | Running       | True  |             | localhost | New-AzVM |
| 4  | Long Running O... AzureLongRunni... | Running       | True  |             | localhost | New-AzVM |
| 5  | Long Running O... AzureLongRunni... | Running       | True  |             | localhost | New-AzVM |

WARNING: Upcoming breaking changes in the cmdlet 'New-AzVM' : Starting on 10/12/2022 the "New-AzVM" cmdlet will deploy with the Trusted Launch configuration by default. To know more about osoft.com/en-us/azure/virtual-machines/trusted-launch It is recommended to use parameter "-PublicIpSku Standard" in order to create a new VM with a Standard public IP.Specifying zo sult in a Standard public IP.If "-Zone" and "-PublicIpSku" are not specified, the VM will be created with a Basic public IP in ll become the default behavior for VM creation in the future Note : Go to https://aka.ms/azps-changewarnings for steps to suppress this breaking change warning, and other information on b 4 Long Running O... AzureLongRunni... Running True localhost New-AzVM WARNING: Upcoming breaking changes in the cmdlet 'New-AzVM' : Starting on 10/12/2022 the "New-AzVM" cmdlet will deploy with the Trusted Launch configuration by default. To know more about osoft.com/en-us/azure/virtual-machines/trusted-launch It is recommended to use parameter "-PublicIpSku Standard" in order to create a new VM with a Standard public IP.Specifying zo sult in a Standard public IP.If "-Zone" and "-PublicIpSku" are not specified, the VM will be created with a Basic public IP in ll become the default behavior for VM creation in the future Note : Go to https://aka.ms/azps-changewarnings for steps to suppress this breaking change warning, and other information on b 5 Long Running O... AzureLongRunni... Running True localhost New-AzVM

PS /home/rahul> |

To Know, how is your Job running?

Get-Job

| ID | Name                                | PSJobTypeName | State   | HasMoreData | Location  | Command       |
|----|-------------------------------------|---------------|---------|-------------|-----------|---------------|
| 1  | PowerShell.OnI...                   |               | Stopped | False       |           | ...           |
| 2  | Long Running O... AzureLongRunni... | Completed     | True    |             | localhost | New-AzBastion |
| 3  | Long Running O... AzureLongRunni... | Running       | True    |             | localhost | New-AzVM      |
| 4  | Long Running O... AzureLongRunni... | Running       | True    |             | localhost | New-AzVM      |
| 5  | Long Running O... AzureLongRunni... | Running       | True    |             | localhost | New-AzVM      |

| Name  | Type            | Subscription   | Resource group | Location | Status  | Operating system |
|-------|-----------------|----------------|----------------|----------|---------|------------------|
| myVM1 | Virtual machine | MSDN Platforms | RG-DEV-ALFA    | East US  | Running | Windows          |
| myVM2 | Virtual machine | MSDN Platforms | RG-DEV-ALFA    | East US  | Running | Windows          |
| myVM3 | Virtual machine | MSDN Platforms | RG-DEV-ALFA    | East US  | Running | Windows          |

```
PowerShell | 
? ? 
PS /home/rahul> 

```

| ID | Name              | PSJobTypeName     | State     | HasMoreData | Location  | Command       |
|----|-------------------|-------------------|-----------|-------------|-----------|---------------|
| 1  | PowerShell.OnI... |                   | Stopped   | False       |           | ...           |
| 2  | Long Running O... | AzureLongRunni... | Completed | True        | localhost | New-AzBastion |
| 3  | Long Running O... | AzureLongRunni... | Running   | True        | localhost | New-AzVM      |
| 4  | Long Running O... | AzureLongRunni... | Running   | True        | localhost | New-AzVM      |
| 5  | Long Running O... | AzureLongRunni... | Running   | True        | localhost | New-AzVM      |

PS /home/rahul>

This Part is completely Optional (You can Skip this part) as Outbound NSG or communication is optional

Create outbound rule configuration

```
$publicipout = @{
    Name = 'myPublicIPOutbound'
    ResourceGroupName = 'rg-dev-alfa'
    Location = 'eastus'
    Sku = 'Standard'
    AllocationMethod = 'static'
    Zone = 1,2,3
}
New-AzPublicIpAddress @publicipout
```

```
PS /home/rahul> $publicipout = @{
>>     Name = 'myPublicIPOutbound'
>>     ResourceGroupName = 'rg-dev-alfa'
>>     Location = 'eastus'
>>     Sku = 'Standard'
>>     AllocationMethod = 'static'
>>     Zone = 1,2,3
>> }
PS /home/rahul> New-AzPublicIpAddress @publicipout
WARNING: Upcoming breaking changes in the cmdlet 'New-AzPublicIpAddress' :
Default behaviour of Zone will be changed
Cmdlet invocation changes :
    Old Way : Sku = Standard means the Standard Public IP is zone-redundant.
    New Way : Sku = Standard and Zone = {} means the Standard Public IP has no zones. If you want
in the region. For example, Zone = ['1', '2', '3'].
It is recommended to use parameter '-Sku Standard' to create new IP address. Please note that it w
Note : Go to https://aka.ms/azps-changewarnings for steps to suppress this breaking change warning

Name          : myPublicIPOutbound
ResourceGroupName : rg-dev-alfa
Location       : eastus
Id            : /subscriptions/ee7bab70-0709-4f4f-9829-790225dc5be4/resourceGroups/rg-d
Etag          : W/"a5b178ca-2d0-49ed-80b4-bc9cb431d577"
ResourceGuid   : ec83bcf9-be1b-4afa-b016-b4fbbae732b79
ProvisioningState : Succeeded
Tags          : 
PublicIpAllocationMethod : Static
IpAddress      : 20.121.93.151
PublicIpAddressVersion : IPv4
IdleTimeoutInMinutes : 4
```

```
$pubip = @{
    Name = 'myPublicIPOutbound'
    ResourceGroupName = 'rg-dev-alfa'
}
$publicip = Get-AzPublicIpAddress @pubip
```

```

## Get the load balancer configuration ##
$lb = @{
    ResourceGroupName = 'rg-dev-alfa'
    Name = 'myLoadBalancer'
}
$lb = Get-AzLoadBalancer @lb

## Create the frontend configuration ##
$fe = @{
    Name = 'myFrontEndOutbound'
    PublicIPAddress = $publicIP
}
$lb | Add-AzLoadBalancerFrontendIPConfig @fe | Set-AzLoadBalancer

```

```

PS /home/rahul> $pubip = @{
    >>     Name = 'myPublicIPOutbound'
    >>     ResourceGroupName = 'rg-dev-alfa'
    >> }
PS /home/rahul> $publicIP = Get-AzPublicIpAddress @pubip
PS /home/rahul> $lb = @{
    >>     ResourceGroupName = 'rg-dev-alfa'
    >>     Name = 'myLoadBalancer'
    >> }
PS /home/rahul> $lb = Get-AzLoadBalancer @lb
PS /home/rahul> $fe = @{
    >>     Name = 'myFrontEndOutbound'
    >>     PublicIPAddress = $publicIP
    >> }
PS /home/rahul> $lb | Add-AzLoadBalancerFrontendIPConfig @fe | Set-AzLoadBalancer

Name          : myLoadBalancer
ResourceGroupName : rg-dev-alfa
Location      : eastus
Id            : /subscriptions/ee7bab70-0709-4f4f-9829-790225dc5be4/resourceGroups/rg-dev-alfa/providers/Microsoft.Network/loadBalancers/myLoadBalancer
Etag          : W/"3d320f1c-2eda-4b64-bfde-3ebaaa784765"
ResourceGuid   : f698d3c4-16b8-4baf-8f2f-8de3ad5c0e91
ProvisioningState : Succeeded
Tags          :
FrontendIpConfigurations : [
    {
        Name          : myFrontEndOutbound
        PublicIPAddress : $publicIP
        LoadBalancerBackendAddressPools : [
            {
                Name          : myBackendPool
                BackendAddressPoolType : IP
                BackendAddressPool : {
                    Id            : /subscriptions/ee7bab70-0709-4f4f-9829-790225dc5be4/resourceGroups/rg-dev-alfa/providers/Microsoft.Network/loadBalancers/myLoadBalancer/backendAddressPools/myBackendPool
                    Etag          : W/"3d320f1c-2eda-4b64-bfde-3ebaaa784765"
                    ResourceGuid   : f698d3c4-16b8-4baf-8f2f-8de3ad5c0e91
                    ProvisioningState : Succeeded
                    Tags          :
                    VirtualMachineBackendAddressPools : [
                        {
                            Name          : myVM
                            VirtualMachine : {
                                Id            : /subscriptions/ee7bab70-0709-4f4f-9829-790225dc5be4/resourceGroups/rg-dev-alfa/providers/Microsoft.Compute/virtualMachines/myVM
                                Etag          : W/"3d320f1c-2eda-4b64-bfde-3ebaaa784765"
                                ResourceGuid   : f698d3c4-16b8-4baf-8f2f-8de3ad5c0e91
                                ProvisioningState : Succeeded
                                Tags          :
                            }
                            Port          : 80
                            Weight        : 1
                            BackendPort    : 80
                            FrontendPort   : 80
                            BackendAddress : {
                                Id            : /subscriptions/ee7bab70-0709-4f4f-9829-790225dc5be4/resourceGroups/rg-dev-alfa/providers/Microsoft.Network/loadBalancers/myLoadBalancer/backendAddressPools/myBackendPool/backendAddresses/myVM
                                Etag          : W/"3d320f1c-2eda-4b64-bfde-3ebaaa784765"
                                ResourceGuid   : f698d3c4-16b8-4baf-8f2f-8de3ad5c0e91
                                ProvisioningState : Succeeded
                                Tags          :
                            }
                        }
                    ]
                }
            }
        ]
    }
]

```

```

$be = @{
    Name = 'myBackEndPoolOutbound'
}
$lb | Add-AzLoadBalancerBackendAddressPoolConfig @be | Set-AzLoadBalancer

```

```

$rule = @{
    Name = 'myOutboundRule'
    AllocatedOutboundPort = '10000'
    Protocol = 'All'
    IdleTimeoutInMinutes = '15'
    FrontendIPConfiguration = $lb.FrontendIpConfigurations[1]
    BackendAddressPool = $lb.BackendAddressPools[1]
}
$lb | Add-AzLoadBalancerOutBoundRuleConfig @rule | Set-AzLoadBalancer

```

Add virtual machines to outbound pool

```

## Get the load balancer configuration ##
$lb = @{
    ResourceGroupName = 'rg-dev-alfa'
    Name = 'myLoadBalancer'
}
$lb = Get-AzLoadBalancer @lb

# For loop with variable to add virtual machines to backend outbound pool. ##

for ($i=1; $i -le 3; $i++)
{
    $nic = @{
        ResourceGroupName = 'rg-dev-alfa'
        Name = "myNicVM$i"
    }
    $nicvm = Get-AzNetworkInterface @nic

    ## Apply the backend to the network interface ##

```

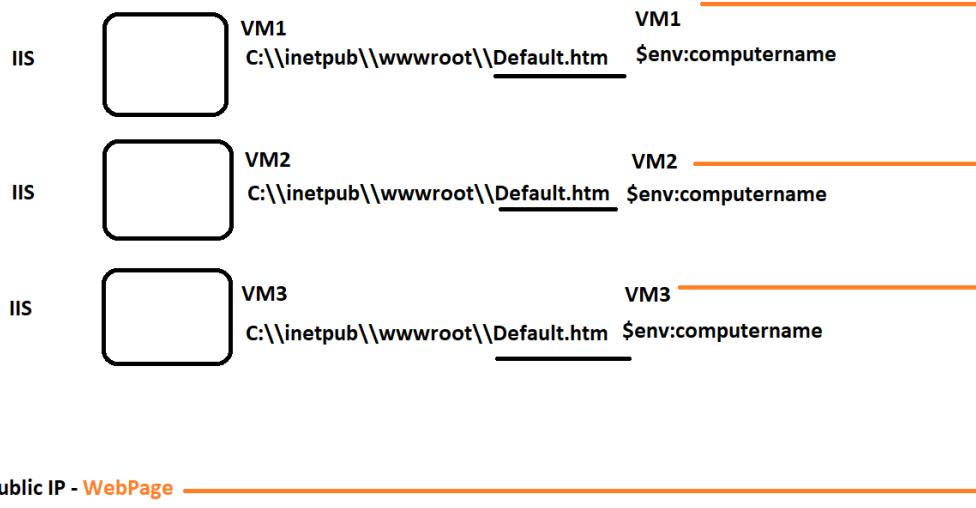
```

$be = @{
    Name = 'ipconfig1'
    LoadBalancerBackendAddressPoolId = $lb.BackendAddressPools[0].id,$lb.BackendAddressPools[1].id
}
$nicvm | Set-AzNetworkInterfaceIpConfig @be | Set-AzNetworkInterface
}

        }
EnableIPForwarding : False
EnableAcceleratedNetworking : False
VnetEncryptionSupported : False
AuxiliaryMode :
NetworkSecurityGroup : {
    "Id": "/subscriptions/ee7bab70-0709-4f4f-9829-7902"
}
TapConfigurations : []
Primary : True
MacAddress : 00-0D-3A-1C-25-CF
ExtendedLocation : null

Name : myNicVM2
ResourceGroupName : rg-dev-alfa
Location : eastus
Id : /subscriptions/ee7bab70-0709-4f4f-9829-79022
Etag : W/"c38328e3-e00e-4603-a0d4-a651e5119240"
ResourceGuid : 7f0ea23e-3c51-48df-8b78-c702ff34d0ce
ProvisioningState : Succeeded
Tags :
VirtualMachine : {

```



```

for ($i=1; $i -le 3; $i++)
{
$ext = @{
    Publisher = 'Microsoft.Compute'
    ExtensionType = 'CustomScriptExtension'
    ExtensionName = 'IIS'
    ResourceGroupName = 'rg-dev-alfa'
    VMName = "myVM$i"
    Location = 'eastus'
    TypeHandlerVersion = '1.8'
    SettingString = '{"commandToExecute":"powershell Add-WindowsFeature Web-Server; powershell Add-Content -Path \"C:\\inetpub\\wwwroot\\Default.htm\" -Value $($env:computername)"}'
}
Set-AzVMExtension @ext -AsJob
}

```

```

PS /home/rahul> for ($i=1; $i -le 3; $i++)
>> {
>> $ext = @{
>>   Publisher = 'Microsoft.Compute'
>>   ExtensionType = 'CustomScriptExtension'
>>   ExtensionName = 'IIS'
>>   ResourceGroupName = 'rg-dev-alfa'
>>   VMName = "myVM$i"
>>   Location = 'eastus'
>>   TypeHandlerVersion = '1.8'
>>   SettingString = '{"commandToExecute":"powershell Add-WindowsFeature Web-Server; powershell Add-Content -Path \\"C:\\inetpub\\wwwroot\\index.html\\" -Value \\\"Hello from $(Get-Location)\\\""}'
>> }
>> Set-AzVMExtension @ext -AsJob
>> }

Id      Name          PSJobTypeName    State       HasMoreData Location          Command
--      --          -----          ----       -----          -----          -----
6      Long Running  AzureLongRunni... Running     True      localhost        Set-AzVMExtension
7      Long Running  AzureLongRunni... Running     True      localhost        Set-AzVMExtension
8      Long Running  AzureLongRunni... Running     True      localhost        Set-AzVMExtension

PS /home/rahul>

```

Installation of IIS is going on? How can we check the same from GUI?

| Name  | Type            | Subscription   | Resource group | Location | Status  |
|-------|-----------------|----------------|----------------|----------|---------|
| myVM1 | Virtual machine | MSDN Platforms | rg-dev-alfa    | East US  | Running |
| myVM2 | Virtual machine | MSDN Platforms | rg-dev-alfa    | East US  | Running |
| myVM3 | Virtual machine | MSDN Platforms | rg-dev-alfa    | East US  | Running |

myVM1 | Extensions + applications

| Name   | Type                           | Version | Status                 | Automatic upgrade status |
|--------|--------------------------------|---------|------------------------|--------------------------|
| BGInfo | Microsoft.Compute.BGInfo       | 2.*     | Provisioning succeeded | Not supported            |
| IIS    | Microsoft.Compute.CustomScript | 1.*     | Transitioning          | Not supported            |

myVM2 | Extensions + applications

| Name   | Type                           | Version | Status                 | Automatic upgrade s |
|--------|--------------------------------|---------|------------------------|---------------------|
| BGInfo | Microsoft.Compute.BGInfo       | 2.*     | Provisioning succeeded | Not supported       |
| IIS    | Microsoft.Compute.CustomScript | 1.*     | Provisioning succeeded | Not supported       |

| <b>Id</b> | <b>Name</b>       | <b>PSJobTypeName</b> | <b>State</b> | <b>HasMoreData</b> | <b>Location</b> | <b>Command</b>     |
|-----------|-------------------|----------------------|--------------|--------------------|-----------------|--------------------|
| 1         | PowerShell.OnI... |                      | Stopped      | False              |                 | ...                |
| 2         | Long Running O... | AzureLongRunni...    | Completed    | True               | localhost       | New-AzBastion      |
| 3         | Long Running O... | AzureLongRunni...    | Completed    | True               | localhost       | New-AzVM           |
| 4         | Long Running O... | AzureLongRunni...    | Completed    | True               | localhost       | New-AzVM           |
| 5         | Long Running O... | AzureLongRunni...    | Completed    | True               | localhost       | New-AzVM           |
| 6         | Long Running O... | AzureLongRunni...    | Completed    | True               | localhost       | Set-AzVMEextension |
| 7         | Long Running O... | AzureLongRunni...    | Completed    | True               | localhost       | Set-AzVMEextension |
| 8         | Long Running O... | AzureLongRunni...    | Failed       | True               | localhost       | Set-AzVMEextension |

PS /home/cabubu>

Run the Script again, if the extension is there, the script will ignore it and if extension is not there, it will install it.

|    |      |         |      |                   |         |      |           |                    |
|----|------|---------|------|-------------------|---------|------|-----------|--------------------|
| 8  | Long | Running | O... | AzureLongRunni... | Failed  | True | localhost | Set-AzVMEextension |
| 9  | Long | Running | O... | AzureLongRunni... | Running | True | localhost | Set-AzVMEextension |
| 10 | Long | Running | O... | AzureLongRunni... | Running | True | localhost | Set-AzVMEextension |
| 11 | Long | Running | O... | AzureLongRunni... | Running | True | localhost | Set-AzVMEextension |

Finally, we are now going to test load balancer.

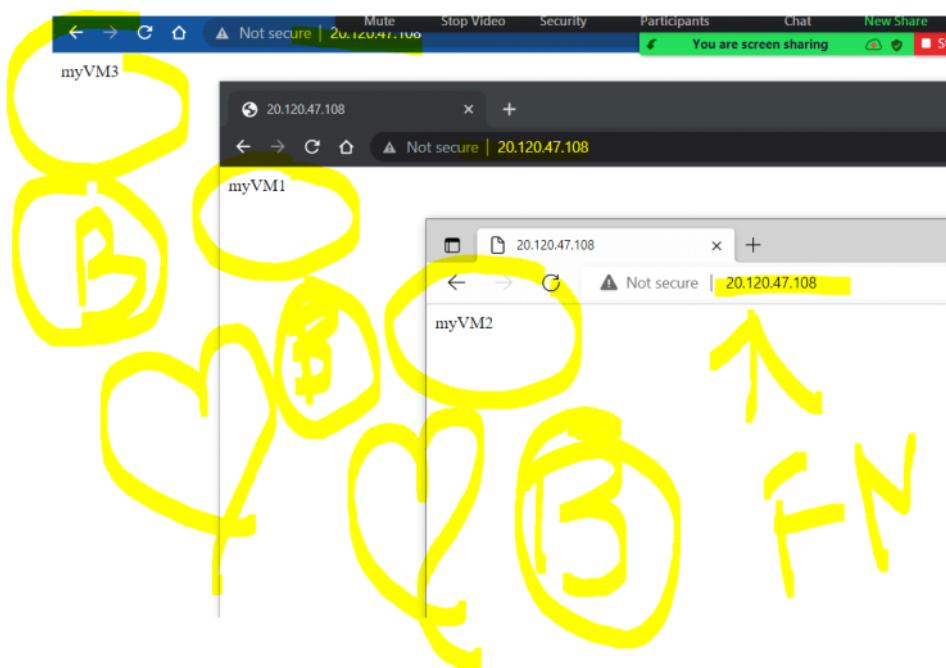
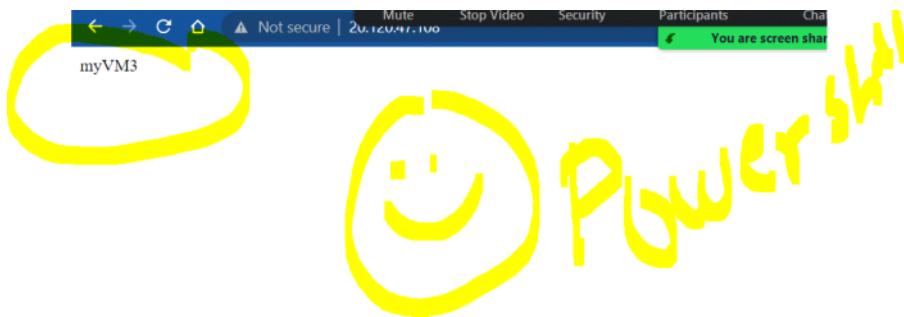
```
$ip = @{
    ResourceGroupName = 'rg-dev-alfa'
    Name = 'myPublicIP'
}
Get-AzPublicIPAddress @ip | select ipAddress
```

```

PS /home/rahul> $ip = @{
>>   ResourceGroupName = 'rg-dev-alfa'
>>   Name = 'myPublicIP'
>> }
PS /home/rahul> Get-AzPublicIPAddress @ip | select IPAddress

IpAddress
-----
20.120.47.108

```



#### If you wish to connect to the VM using Bastion Host, use below steps

Home > Virtual machines >

**myVM1** Virtual machine

Search Connect Start Restart Stop Capture

- Overview
- Activity log
- Access control (IAM)
- Tags
- Diagnose and solve problems
- Bastion**
- Status
- Running
- Location
- East US (Zone 1)
- Subscription ([move](#))
- MSDN Platforms
- Subscription ID
- ee7bab70-0709-4f4f-9829-790225dc5be4
- Availability zone
- 1
- Tags ([edit](#))
- [Click here to add tags](#)

**Properties** Monitoring Capabilities (8) Recommendations

myVM1 | Bastion

Virtual machine

Search

- Overview
- Activity log
- Access control (IAM)
- Tags
- Diagnose and solve problems

Settings

- Networking
- Connect
- Windows Admin Center (preview)
- Disks
- Size
- Microsoft Defender for Cloud
- Advisor recommendations
- Extensions + applications

Azure Bastion protects your virtual machines by providing lightweight, browser-based connectivity without exposing them through public IP addresses. Deploying will automatically create a Bastion host on a subnet network. [Learn more](#)

Using Bastion: **myBastion**, Provisioning State: **Succeeded**

Please enter username and password to your virtual machine to connect using Bastion.

Connection Settings

Username: rahul

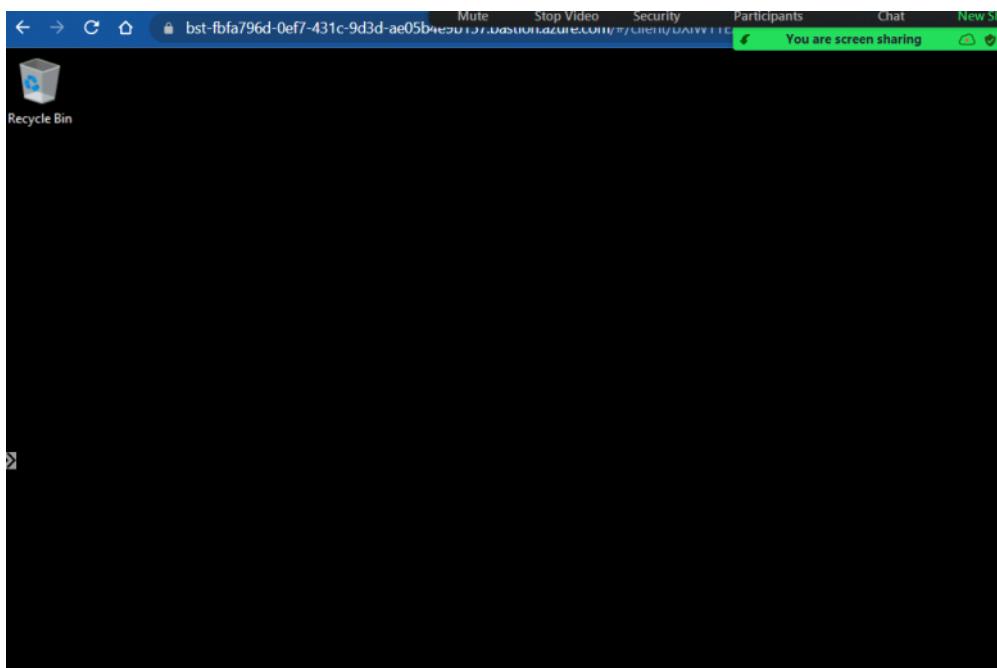
Authentication Type: Password

Password: Welcome@123456

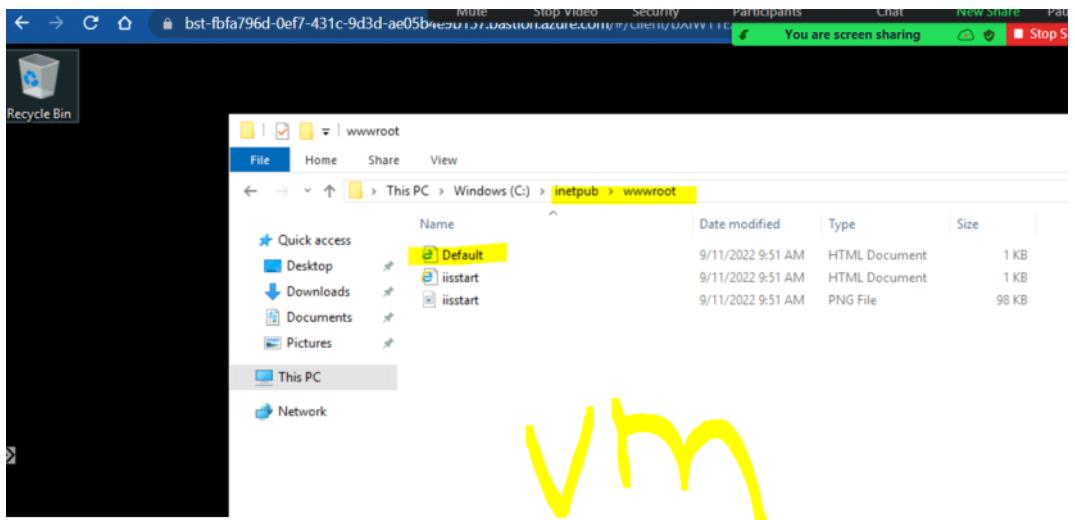
Open in new browser tab

**Connect**

Opens in Browser



You can go to C:\InetPub\wwwroot and find the file



### Bastion Host

<https://docs.microsoft.com/en-us/azure/bastion/bastion-overview>

**End of 11th September 2022**