

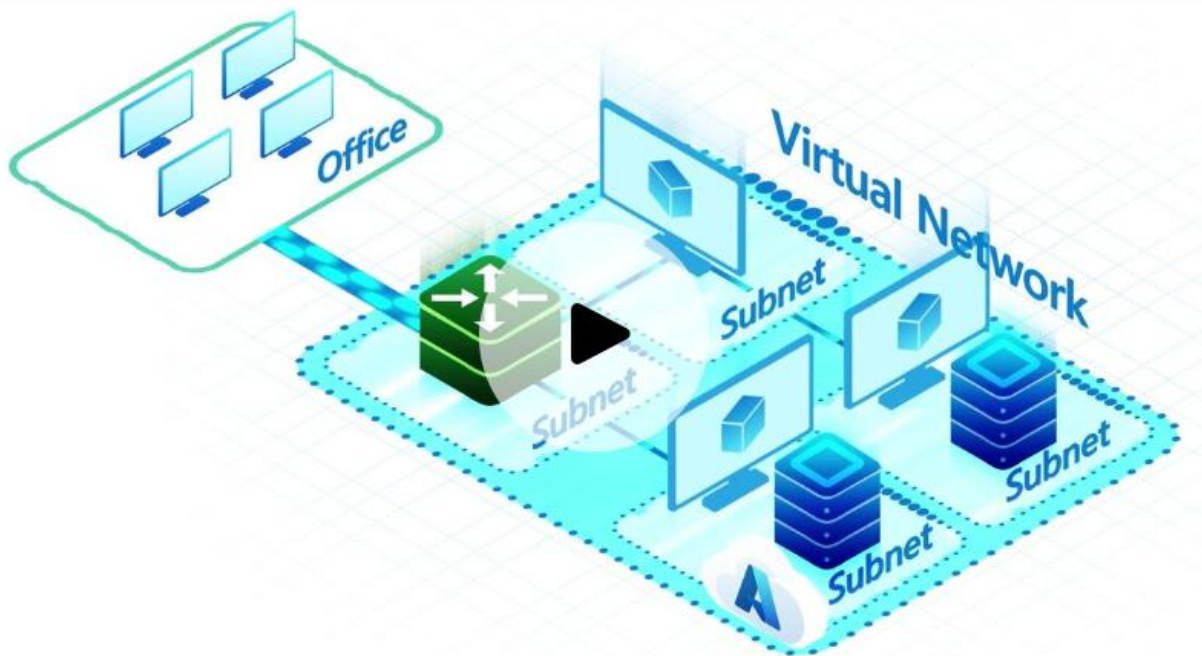
1. Objective:

- ✓ Explore VNet, Subnet, Vnet Peering and it's Types. Do r&d on Azure Virtual Network.
- ✓ Create a VNET and Its Subnets and launch a Windows Linux VM in each subnet, VM should be able to ping each other. Create two Vnets and create a connection between them using Vnet peering.

2. Introduction

Microsoft Azure, or just **Azure** is the cloud computing platform developed by Microsoft. It has management, access and development of applications and services to individuals, companies, and governments through its global infrastructure.

Azure Virtual Network is a service that provides the fundamental building block for your private network in Azure. An instance of the service (a virtual network) enables many types of Azure resources to securely communicate with each other, the internet, and on-premises networks. These Azure resources include virtual machines (VMs).



A **virtual machine** is like a physical computer, but it is actually a digital version of it. Actually, it is not so much different from physical computers because they have also memory, CPU, as well as they have disks to store our data or various files and one more interesting thing is that they can also connect to the internet.

You can create a virtual network in the cloud dedicated to your Azure account. It is the fundamental building block where you can launch Azure resources.

Azure VNet is the networking layer of Azure VMs.

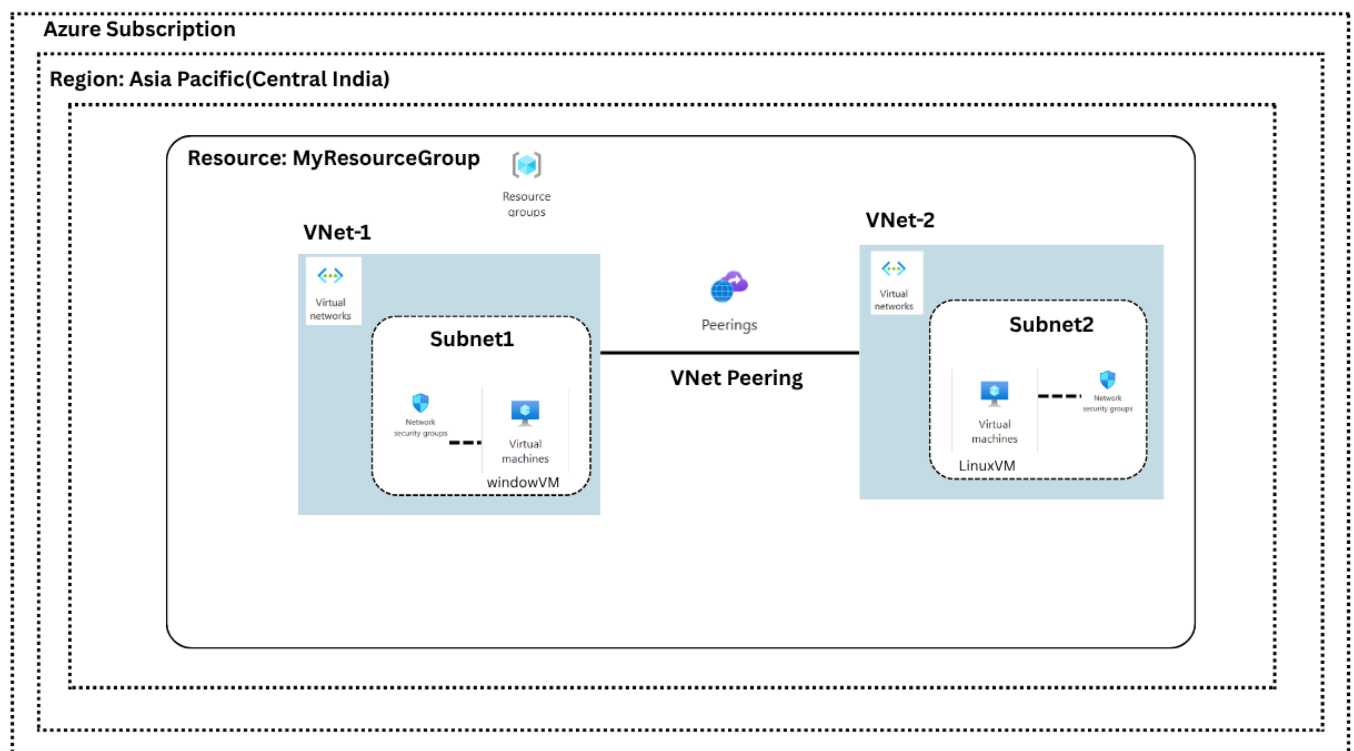
A VNet spans all the Availability Zones in the region. After creating a VNet, you can add one or more subnets in each Availability Zone.

A **virtual network** (VNet) allows you to specify an IP address range for the VNet, add subnets, associate network security groups, and configure route tables.

A **subnet** is a range of IP addresses in your VNet. You can launch Azure resources into a specified subnet. Use a **public subnet** for resources that need to connect to the Internet and a **private subnet** for resources that won't be connected to the Internet.

To protect the Azure resources in each subnet, use **network security groups**.

3. Architecture



Points to Note:

1. Azure subscription: Azure for Students
2. Azure Region selected: Asia Pacific (Central India)
3. VNet1 hosts a Windows VM (WindowVM) in Subnet1.
4. VNet2hosts a Linux VM (LinuxVM) in Subnet2.
5. Network Security Groups (NSGs) with ICMP, RDP, and SSH allowed
6. VNet Peering has been configured between VNet1 and VNet2.

4. Deployment and Configuration

- i. Login to Azure Account.
- ii. Created a resource group named **MyResourceGroup**.
Selected region Central India

The screenshot shows the 'Create a resource group' page in the Azure portal. The breadcrumb navigation at the top reads 'Home > Resource groups >'. The page title is 'Create a resource group' followed by a three-dot menu icon. Below the title are three tabs: 'Basics' (which is selected and underlined), 'Tags', and 'Review + create'. A descriptive paragraph explains that a resource group is a container for related resources. Below this, there are three form fields: 'Subscription *' with a dropdown menu showing 'Azure for Students', 'Resource group name *' with a text input field containing 'MyResourceGroup', and 'Region *' with a dropdown menu showing '(Asia Pacific) Central India'. At the bottom of the page, there are three buttons: 'Previous' (disabled), 'Next' (disabled), and 'Review + create' (active).

- iii. Created 2 Virtual Networks named VNet-1 and VNet-2 in the same region withing same resource group.
Vnet-1: Address Space: 10.0.0.0/16
Subnet: name – Subnet1 - 10.0.1.0/24

The screenshot shows the 'Create virtual network' page in the Azure portal. The breadcrumb navigation at the top reads 'Home > Virtual networks >'. The page title is 'Create virtual network' followed by a three-dot menu icon. Below the title are five tabs: 'Basics' (selected and underlined), 'Security', 'IP addresses', 'Tags', and 'Review + create'. Under the 'Basics' tab, there is a section titled 'Project details' with a descriptive paragraph. Below this, there are two dropdown menus: 'Subscription *' showing 'Azure for Students' and 'Resource group *' showing 'MyResourceGroup'. A 'Create new' link is visible below the resource group dropdown. Below these is a section titled 'Instance details' with two form fields: 'Virtual network name *' with a text input field containing 'VNet-1', and 'Region *' with a dropdown menu showing '(Asia Pacific) Central India'. A 'Deploy to an Azure Extended Zone' link is visible below the region dropdown. At the bottom of the page, there are three buttons: 'Previous' (disabled), 'Next' (disabled), and 'Review + create' (active).

Home > Virtual networks >

Create virtual network ...

Basics Security IP addresses Tags Review + create

Configure your virtual network address space with the IPv4 and IPv6 addresses and subnets you need. [Learn more](#)

Define the address space of your virtual network with one or more IPv4 or IPv6 address ranges. Create subnets to segment the virtual network address space into smaller ranges for use by your applications. When you deploy resources into a subnet, Azure assigns the resource an IP address from the subnet. [Learn more](#)

+ Add a subnet

10.0.0.0/16 [Delete address space](#)

10.0.0.0 /16

10.0.0.0 - 10.0.255.255 65,536 addresses

Subnets	IP address range	Size	NAT gateway
Subnet1	10.0.1.0 - 10.0.1.255	/24 (256 addresses)	- edit delete

Previous

Next

Review + create

Vnet-2: Address Space: 10.1.0.0/16
Subnet: name – Subnet2 - 10.1.1.0/24

Home > Virtual networks >

Create virtual network ...

Basics Security IP addresses Tags Review + create

[Learn more.](#)

Project details

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

Subscription *

Azure for Students

Resource group *

MyResourceGroup

[Create new](#)

Instance details

Virtual network name *

VNet-2

Region * ⓘ

(Asia Pacific) Central India

[Deploy to an Azure Extended Zone](#)

Previous

Next

Review + create

Home > Virtual networks >

Create virtual network ...

Basics Security **IP addresses** Tags Review + create

Configure your virtual network address space with the IPv4 and IPv6 addresses and subnets you need. [Learn more](#)

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+ Add a subnet

10.1.0.0/16 [Delete address space](#)

10.1.0.0 /16

10.1.0.0 - 10.1.255.255 65,536 addresses

Subnets	IP address range	Size	NAT gateway
Subnet2	10.1.1.0 - 10.1.1.255	/24 (256 addresses)	- Edit Delete

Previous Next **Review + create**

iv. Created windows virtual machine in subnet1 of VNet-1.

Configurations: Name: WinVM

Resource group: MyResourceGroup

Image: Windows Server 2019

Size: Standard_B1s

VNet: VNet1

Subnet: Subnet1

Home > Compute infrastructure | Virtual machines >

Create a virtual machine ...

[Help me create a low cost VM](#) [Help me create a VM optimized for high availability](#) [Help me choose the right VM size for my workload](#)

Basics Disks Networking Management Monitoring Advanced Tags Review + create

Create a virtual machine that runs Linux or Windows. Select an image from Azure marketplace or use your own customized image. Complete the Basics tab then Review + create to provision a virtual machine with default parameters or review each tab for full customization. [Learn more](#)

This subscription may not be eligible to deploy VMs of certain sizes in certain regions.

Project details

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

Subscription * ⓘ Azure for Students

Resource group * ⓘ MyResourceGroup [Create new](#)

Instance details

Virtual machine name * ⓘ winVM ✓

Region * ⓘ (Asia Pacific) Central India

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

Home > Compute infrastructure | Virtual machines >

Create a virtual machine

Help me create a low cost VM | Help me create a VM optimized for high availability | Help me choose the right VM size for my workload

Zone options ⓘ

☒ Self-selected zone
Choose up to 3 availability zones, one VM per zone

☐ Azure-selected zone (Preview)
Let Azure assign the best zone for your needs

i Using an Azure-selected zone is not supported in region 'Central India'.

Availability zone * ⓘ

Zone 1

w You can now select multiple zones. Selecting multiple zones will create one VM per zone. [Learn more](#)

Security type ⓘ

Trusted launch virtual machines

[Configure security features](#)

Image * ⓘ

Windows Server 2019 Datacenter - x64 Gen2

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

VM architecture ⓘ

☐ Arm64

☒ x64

i Arm64 is not supported with the selected image.

Run with Azure Spot discount ⓘ

☐

Size ⓘ

Standard_B1s - 1 vcpu, 1 GiB memory (\$11.10/month) (free services eligible)

< Previous | Next : Disks > | Review + create

Home > Compute infrastructure | Virtual machines >

Create a virtual machine

Help me create a low cost VM | Help me create a VM optimized for high availability | Help me choose the right VM size for my workload

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

Virtual network * ⓘ

VNet-1

[Create new](#)

Subnet * ⓘ

Subnet1 (10.0.1.0/24)

[Manage subnet configuration](#)

Public IP ⓘ

(new) winVM-ip

[Create new](#)

NIC network security group ⓘ

☐ None

☒ Basic

☐ Advanced

Public inbound ports * ⓘ

☐ None

☒ Allow selected ports

Select inbound ports *

RDP (3389)

w 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.

< Previous | Next : Management > | Review + create

v. Created linux virtual machine in VNet-2 subnet2.

vi. Configurations: Name: linuxVM

Resource group: MyResourceGroup


Image: Ubuntu


Size: Standard_B1s

VNet: VNet2

Subnet: Subnet2





Create a virtual machine ...

 [Help me create a low cost VM](#) [Help me create a VM optimized for high availability](#) [Help me choose the right VM size for my workload](#)








 This subscription may not be eligible to deploy VMs of certain sizes in certain regions.

Project details

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

Subscription *  Azure for Students 
Resource group *  MyResourceGroup 
[Create new](#)


Instance details











Virtual machine name *  linuxVM 
Region *  (Asia Pacific) Central India 
Availability options  Availability zone 
Zone options 

- ☒ Self-selected zone
Choose up to 3 availability zones, one VM per zone
- ☐ Azure-selected zone (Preview)
Let Azure assign the best zone for your needs







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

Create a virtual machine ...

 [Help me create a low cost VM](#) [Help me create a VM optimized for high availability](#) [Help me choose the right VM size for my workload](#)

Availability zone *  Zone 1 
 You can now select multiple zones. Selecting multiple zones will create one VM per zone. [Learn more](#) 
Security type  Trusted launch virtual machines 
[Configure security features](#)
Image *   Ubuntu Server 22.04 LTS - x64 Gen2 
[See all images](#) | [Configure VM generation](#)
VM architecture 

- ☐ Arm64
- ☒ x64

Run with Azure Spot discount  ☐
Size *  Standard_B1s - 1 vcpu, 1 GiB memory (\$8.18/month) (free services eligible) 
[See all sizes](#)
Enable Hibernation  ☐
 Hibernation does not currently support Trusted launch and Confidential virtual machines for Linux images. [Learn more](#) 

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

Home > Compute infrastructure | Virtual machines >

Create a virtual machine

[Help me create a low cost VM](#)
[Help me create a VM optimized for high availability](#)
[Help me choose the right VM size for my](#)

incoming 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 * 📄 VNet-2 ▼
[Create new](#)

Subnet * 📄 Subnet2 (10.1.1.0/24) ▼
[Manage subnet configuration](#)

Public IP 📄 (new) linuxVM-ip ▼
[Create new](#)

NIC network security group 📄 None
☐ None
☒ Basic
☐ Advanced

Public inbound ports * 📄 None
☐ None
☒ Allow selected ports

Select inbound ports * SSH (22) ▼

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

vii. Created NSG (Network Security Group) for ICMP(ping)

Microsoft Azure | Upgrade

Home > windowVM-nsg > Inbound security rules

Search resources, services, and docs (5/17)

Capitol

Network security group

Overview
 Activity log
 Access control (IAM)
 Tags
 Diagnose and solve problems
 Resource visualizer
 Settings
 Inbound security rules
 Outbound security rules
 Network interfaces
 Subnets
 Properties
 Locks
 Monitoring
 Automation
 Help

Network security group security rules are evaluated by priority using the combination of source, source port, destination priority and direction as an existing rule. You can't delete default security rules, but you can override them with rules.

Filter by name

Priority	Name	Port	Protocol	Source
300	RDP	3389	TCP	Any
65000	AllowVnetInBound	Any	Any	Any
65001	AllowAzureLoadBalancerIn...	Any	Any	Any
65500	DenyAllInBound	Any	Any	Any

Add inbound security rule

Source 📄 Any ▼

Source port ranges * 📄 * ▼

Destination 📄 Any ▼

Service 📄 Custom ▼

Destination port ranges * 📄 * ▼

Protocol 📄 Any
☐ Any
☐ TCP
☐ UDP
☒ ICMPv4
☐ ICMPv6

Action 📄 Allow
☒ Allow
☐ Deny

[Add](#) [Cancel](#) [Give feedback](#)

Add or remove firewalls by pressing Ctrl+Shift+F

Home > linuxVM | Network settings > linuxVM-nsg

Search resources, services, and docs (5/17)

Capitol

Network security group

Overview
 Activity log
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 Help

Network security group security rules are evaluated by priority using the combination of source, source port, destination priority and direction as an existing rule. You can't delete default security rules, but you can override them with rules.

Filter by name

Priority	Name	Port	Protocol	Source
300	SSH	22	TCP	Any
65000	AllowVnetInBound	Any	Any	Any
65001	AllowAzureLoadBalancerIn...	Any	Any	Any
65500	DenyAllInBound	Any	Any	Any

Add inbound security rule

Source 📄 Any ▼

Source port ranges * 📄 * ▼

Destination 📄 Any ▼

Service 📄 Custom ▼

Destination port ranges * 📄 * ▼

Protocol 📄 Any
☐ Any
☐ TCP
☐ UDP
☒ ICMPv4
☐ ICMPv6

Action 📄 Allow
☒ Allow
☐ Deny

[Add](#) [Cancel](#) [Give feedback](#)

Add or remove firewalls by pressing Ctrl+Shift+F

- viii. Set up VNet peering
Configuration: name: VNet-1ToVNet-2
Virtual network: VNet-2
Allow traffic to remote virtual network.
Allow forwarded traffic

[Home](#) > [Virtual networks](#) > [VNet-1 | Peerings](#) >

Add peering

VNet-1

Virtual network peering enables you to seamlessly connect two or more virtual networks in Azure. This will allow either virtual network to directly connect and communicate with resources in the peered virtual network.

Remote virtual network summary

Peering link name *	VNet-1ToVNet-2
Virtual network deployment model ⓘ	<input checked="" type="radio"/> Resource manager <input type="radio"/> Classic
I know my resource ID ⓘ	<input type="checkbox"/>
Subscription *	Azure for Students
Virtual network *	VNet-2 (MyResourceGroup)

Remote virtual network peering settings

[Home](#) > [Virtual networks](#) > [VNet-1 | Peerings](#) >

Vnet1toVnet2

VNet-1

Virtual network peering enables you to seamlessly connect two or more virtual networks in Azure. This will allow resources in either virtual network to directly connect and communicate with resources in the peered virtual network.

Remote virtual network summary

Remote Vnet Id	/subscriptions/e4222c98-fb45-40c4-8598-919236e34cd7/resourceGroups/...
IP address space	10.1.0.0/16

Local virtual network summary

Peering link name *	Vnet1toVnet2
Peering state	Connected

Local virtual network peering settings

Allow 'VNet-1' to access 'VNet-2' ⓘ	<input checked="" type="checkbox"/>
Allow 'VNet-1' to receive forwarded traffic ⓘ	<input type="checkbox"/>

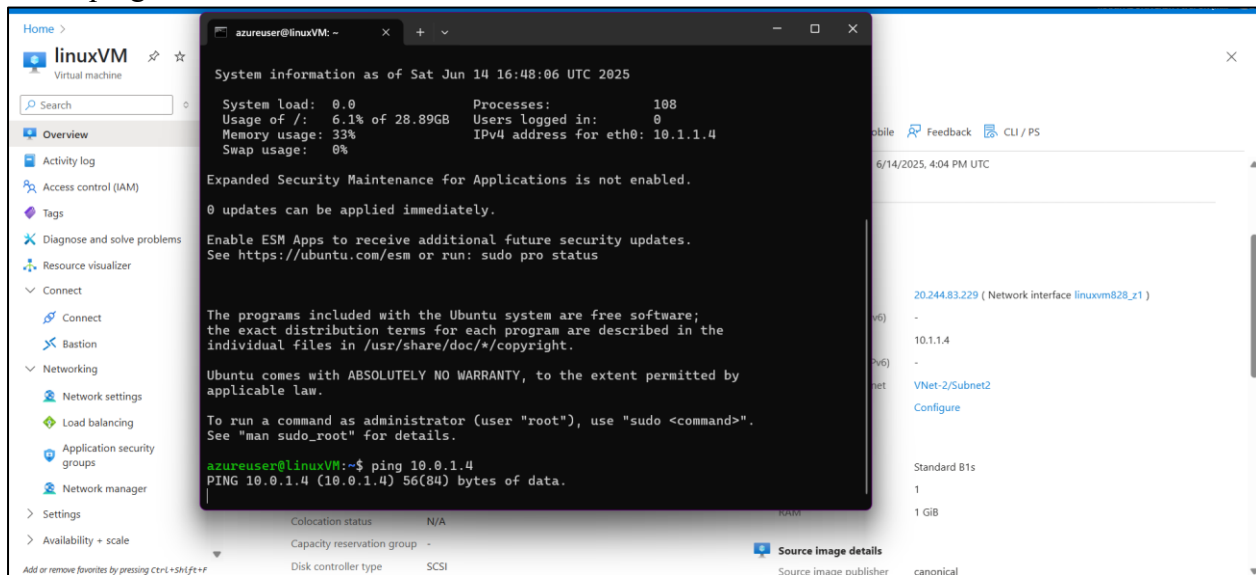
5. Result

VNet peering successfully implemented
VMs in different subnets in were able to ping each other.

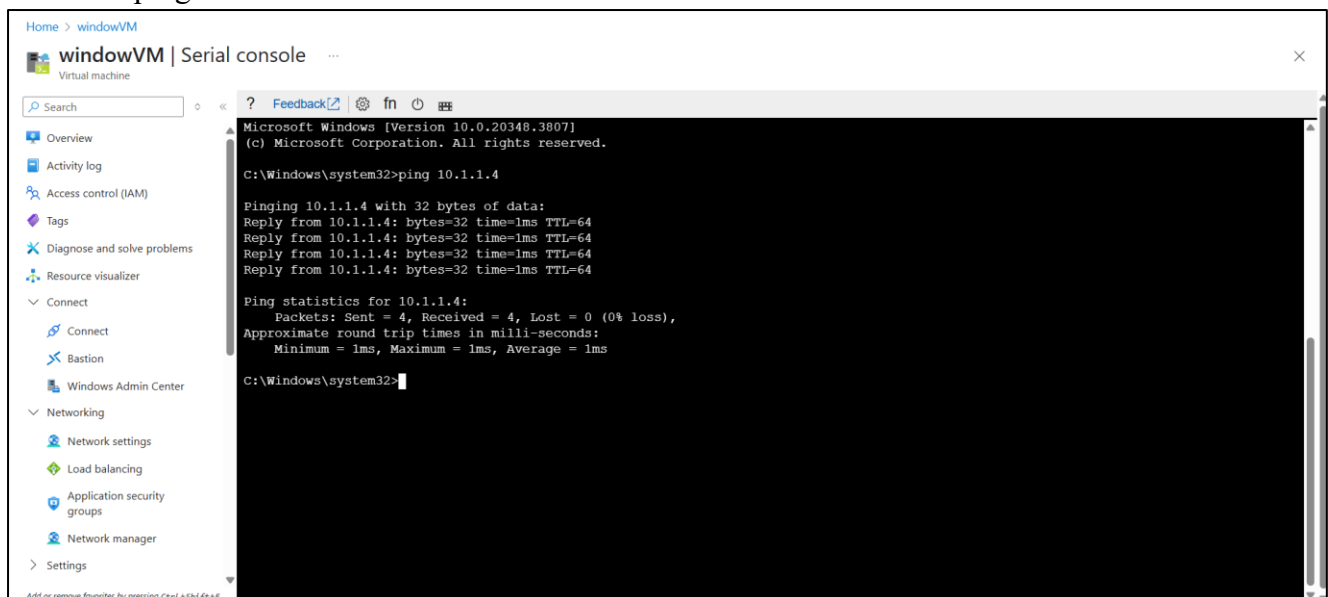
Windows : serial console

Linux: cmd prompt

Linux ping test



Windows ping test



6. Troubleshooting

Problem 1: VM Is Not Visible While Being Created

Solution: VNet is located in a different area. When creating a virtual machine, go to the VNet settings, check the Region, and match it.

Problem 2: 'None' is displayed for public IP

Solution: when configuring the virtual machine, disable the public IP. Go to VM → Networking → Add Public IP under NIC settings to resolve the issue.

Problem 3: The Ping command is not functioning.

Solution: Adding an inbound NSG rule is the solution.

Problem 4: Peering isn't functioning

Solution: Verify that peering is enabled in Bidirection. Make sure both peerings have "Allow traffic to remote virtual network" enabled.

7. References:

- <https://learn.microsoft.com/en-us/azure/virtual-network/virtual-networks-overview>
- <https://www.geeksforgeeks.org/devops/difference-between-azure-vnet-and-subnet/>
- https://www.nubops.com/?gad_source=1&gad_campaignid=22395825021&gbraid=0AAAAAqTd4rhEDLbFGXyvnUa2igDtZzTFH&gclid=Cj0KCQjwu7TCBhCYARIsAM_S3Ngzmy_nzyf-vTWelPe5bD0tb_H4ghoO1aA5kAX3uDR-H0npYuJ5G79oaAvFrEALw_wcB
- https://azure.microsoft.com/en-in/?ef_id=k_Cj0KCQjwxo_CBhDbARIsADWpDH66DmaB2iKOVCK9Hjzl1Mqdi27z4zjKfBRmoVOraWJad09GMT6upBIaApLREALw_wcB_k_&OCID=AIDcmmf1elj9v5_SEM_k_Cj0KCQjwxo_CBhDbARIsADWpDH66DmaB2iKOVCK9Hjzl1Mqdi27z4zjKfBRmoVOraWJad09GMT6upBIaApLREALw_wcB_k_&gad_source=1&gad_campaignid=1635074322&gbraid=0AAAAADcJh_v_rl0Oj7R4RJA1P3ji7dNmE&gclid=Cj0KCQjwxo_CBhDbARIsADWpDH66DmaB2iKOVCK9Hjzl1Mqdi27z4zjKfBRmoVOraWJad09GMT6upBIaApLREALw_wcB#pill-bar-products_tab3