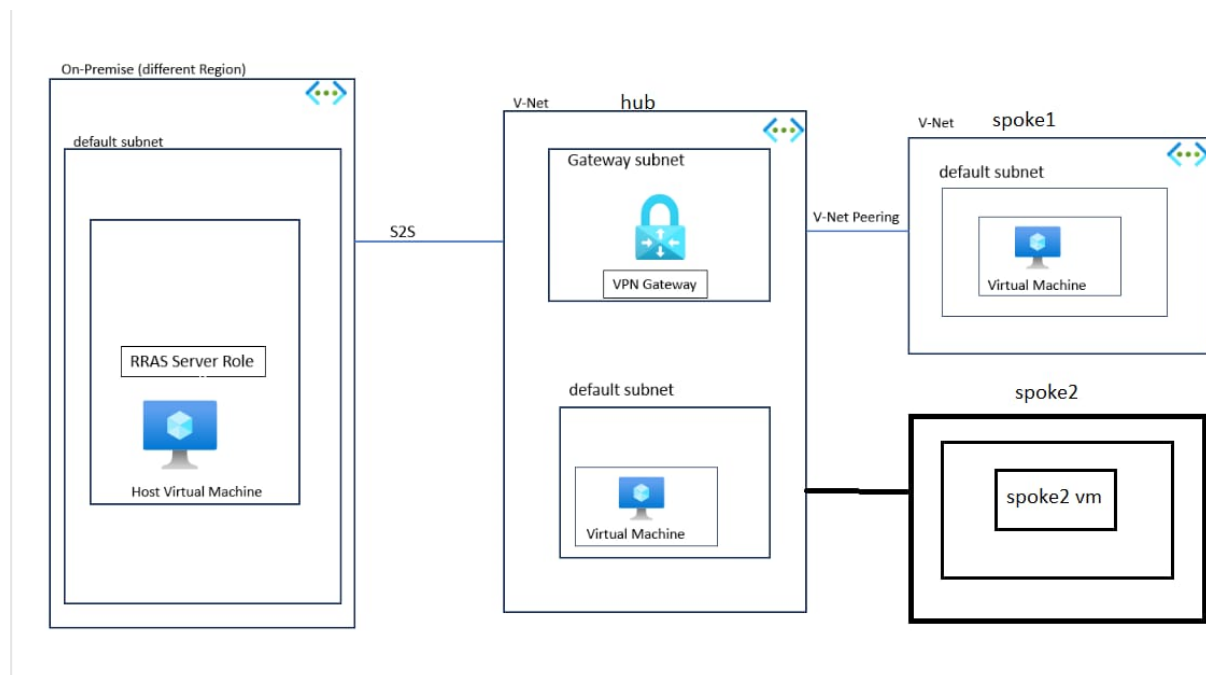
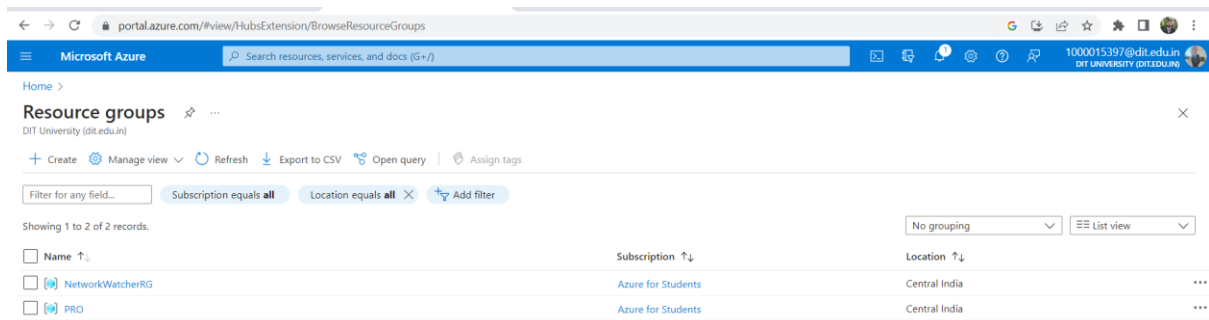


PROJECT REPORT

Project Description: Configuration of On-premises to Hub and Spoke connectivity using S2S tunneling from On-premises and hub and Transit Vnet peering from hub to spoke. Configure RRAS on on-premises VM and establish S2S connectivity to the Hub. The On-premise VM should be able to ping both Hub VM and Spoke VM successfully. The connectivity should be bi-directional. There is no direct connectivity established between spoke and On-premises Vnet.



Step1- create Resource Group to deploy all V-nets.



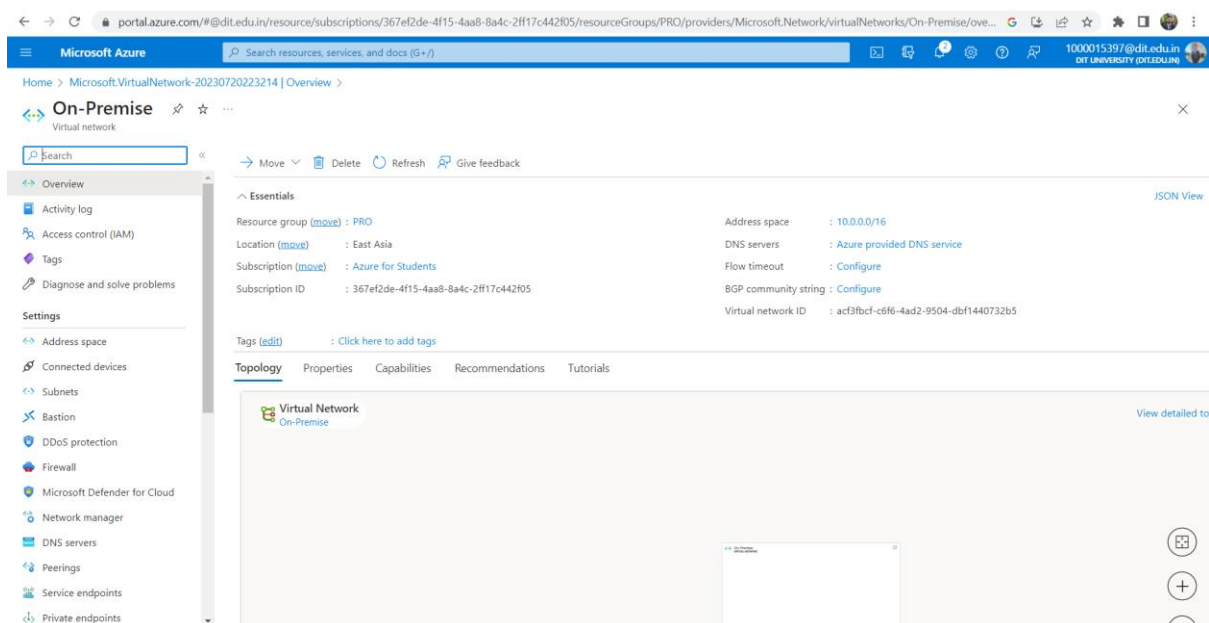
Step2-Create three Virtual Networks (VNet) - one for On-premises, one for Hub, and one for the Spoke. Specify the address space for each VNet, ensuring there is no overlap. For example:

On-premises VNet: 10.0.0.0/16

Hub VNet: 10.1.0.0/16

Spoke VNet: 10.2.0.0/16

Spoke2 Vnet:10.3.0.0/16



portal.azure.com/#@dit.edu.in/resource/subscriptions/367ef2de-4f15-4aa8-8a4c-2ff17c442f05/resourceGroups/PRO/providers/Microsoft.Network/virtualNetworks/hub/overview

Microsoft Azure Search resources, services, and docs (G+)

Home > Microsoft.VirtualNetwork-20230720223704 | Overview

hub Virtual network

Search

Move Delete Refresh Give feedback

Overview

Activity log

Access control (IAM)

Tags

Diagnose and solve problems

Settings

Address space

Connected devices

Subnets

Bastion

DDoS protection

Firewall

Microsoft Defender for Cloud

Network manager

DNS servers

Peerings

Service endpoints

Private endpoints

Essentials

Resource group (move) : PRO

Location (move) : Central India

Subscription (move) : Azure for Students

Subscription ID : 367ef2de-4f15-4aa8-8a4c-2ff17c442f05

Address space : 10.1.0.0/16

DNS servers : Azure provided DNS service

Flow timeout : Configure

BGP community string : Configure

Virtual network ID : a3bf8900-f7f8-48cb-84d0-81577101708a

Tags (edit) : Click here to add tags

Topology Properties Capabilities Recommendations Tutorials

Virtual Network hub

No Data Found

Please try updating the scope criteria

change scope

portal.azure.com/#@dit.edu.in/resource/subscriptions/367ef2de-4f15-4aa8-8a4c-2ff17c442f05/resourceGroups/PRO/providers/Microsoft.Network/virtualNetworks/spoke/overview

Microsoft Azure Search resources, services, and docs (G+)

Home > Microsoft.VirtualNetwork-20230720223944 | Overview

spoke Virtual network

Search

Move Delete Refresh Give feedback

Overview

Activity log

Access control (IAM)

Tags

Diagnose and solve problems

Settings

Address space

Connected devices

Subnets

Bastion

DDoS protection

Firewall

Microsoft Defender for Cloud

Network manager

DNS servers

Peerings

Service endpoints

Private endpoints

Essentials

Resource group (move) : PRO

Location (move) : Central India

Subscription (move) : Azure for Students

Subscription ID : 367ef2de-4f15-4aa8-8a4c-2ff17c442f05

Address space : 10.2.0.0/16

DNS servers : Azure provided DNS service

Flow timeout : Configure

BGP community string : Configure

Virtual network ID : 56c7889d-f0c6-4cb5-afc7-a158c01574d0

Tags (edit) : Click here to add tags

Topology Properties Capabilities Recommendations Tutorials

Virtual Network spoke

portal.azure.com/#@dit.edu.in/resource/subscriptions/367ef2de-4f15-4aa8-8a4c-2ff17c442f05/resourceGroups/PRO/providers/Microsoft.Network/virtualNetworks/spoke2/overview

Microsoft Azure Search resources, services, and docs (G+)

Home > Microsoft.VirtualNetwork-20230720224523 | Overview

spoke2 Virtual network

Search

Move Delete Refresh Give feedback

Overview

Activity log

Access control (IAM)

Tags

Diagnose and solve problems

Settings

Address space

Connected devices

Subnets

Bastion

DDoS protection

Firewall

Microsoft Defender for Cloud

Network manager

DNS servers

Peerings

Service endpoints

Private endpoints

Essentials

Resource group (move) : PRO

Location (move) : Central India

Subscription (move) : Azure for Students

Subscription ID : 367ef2de-4f15-4aa8-8a4c-2ff17c442f05

Address space : 10.3.0.0/16

DNS servers : Azure provided DNS service

Flow timeout : Configure

BGP community string : Configure

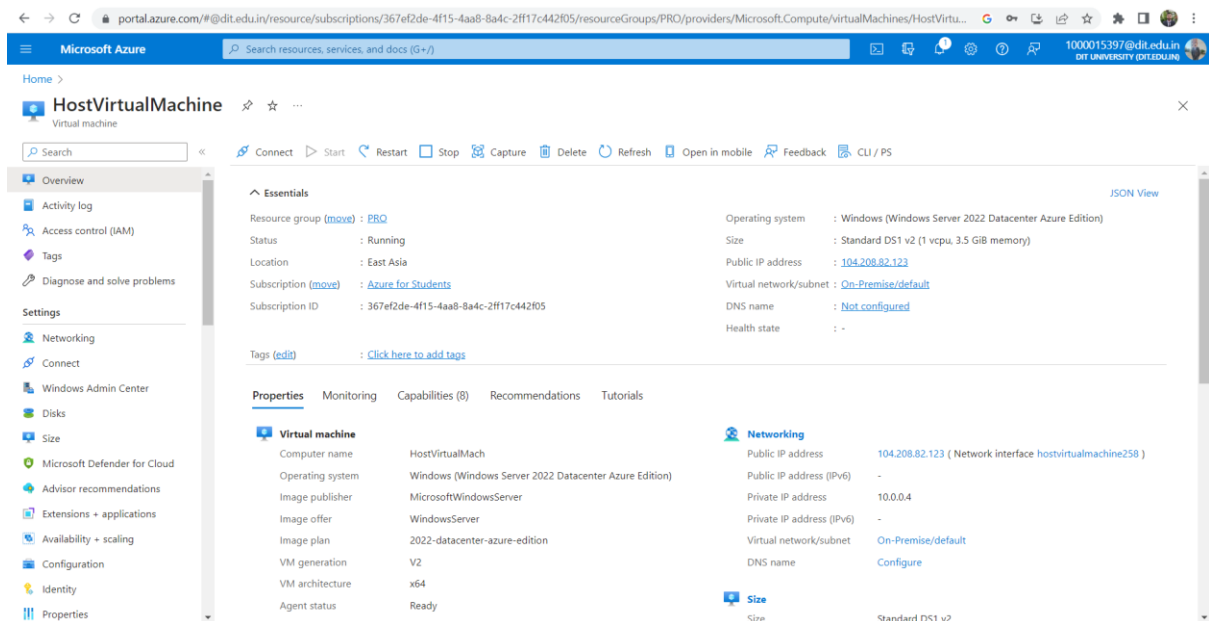
Virtual network ID : f3c97146-534d-4435-ba57-499f5775e840

Tags (edit) : Click here to add tags

Topology Properties Capabilities Recommendations Tutorials

Virtual Network spoke2

Step3-Create Virtual Machines:Create a Virtual Machine (VM) in each VNet for testing connectivity later. One VM in the On-premises VNet, one in the Hub VNet, and one in the Spoke Vnet, one in th Spoke 2 Vnet.



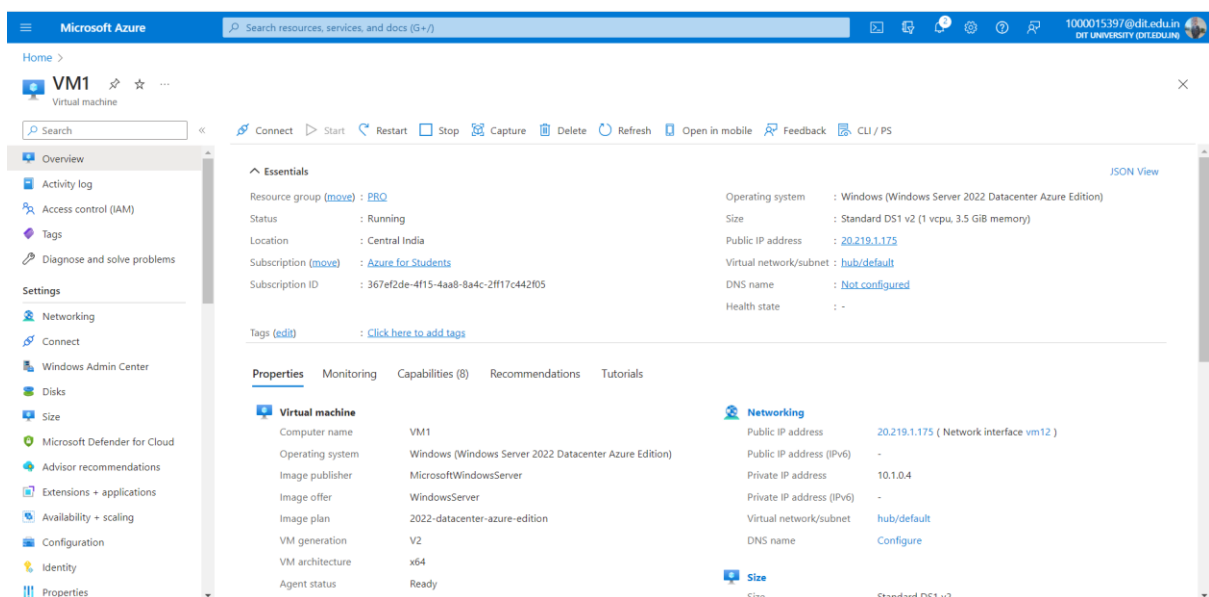
The screenshot displays the Azure portal interface for a virtual machine named 'HostVirtualMachine'. The left sidebar shows navigation options like Overview, Activity log, Access control (IAM), Tags, and Settings. The main content area is divided into 'Essentials' and 'Properties' sections.

Essentials:

- Resource group: PRO
- Status: Running
- Location: East Asia
- Subscription: Azure for Students
- Subscription ID: 367ef2de-4f15-4aa8-8a4c-2ff17c442f05
- Operating system: Windows (Windows Server 2022 Datacenter Azure Edition)
- Size: Standard D51 v2 (1 vcpu, 3.5 GiB memory)
- Public IP address: 104.208.82.123
- Virtual network/subnet: On-Premise/default
- DNS name: Not configured
- Health state: -

Properties:

Category	Property	Value
Virtual machine	Computer name	HostVirtualMach
	Operating system	Windows (Windows Server 2022 Datacenter Azure Edition)
	Image publisher	MicrosoftWindowsServer
	Image offer	WindowsServer
	Image plan	2022-datacenter-azure-edition
	VM generation	V2
	VM architecture	x64
Agent status	Ready	
Networking	Public IP address	104.208.82.123 (Network interface hostvirtualmachine258)
	Public IP address (IPv6)	-
	Private IP address	10.0.0.4
	Private IP address (IPv6)	-
	Virtual network/subnet	On-Premise/default
Size	Size	Standard D51 v2



The screenshot displays the Azure portal interface for a virtual machine named 'VM1'. The layout is similar to the previous screenshot, showing the 'Essentials' and 'Properties' sections.

Essentials:

- Resource group: PRO
- Status: Running
- Location: Central India
- Subscription: Azure for Students
- Subscription ID: 367ef2de-4f15-4aa8-8a4c-2ff17c442f05
- Operating system: Windows (Windows Server 2022 Datacenter Azure Edition)
- Size: Standard D51 v2 (1 vcpu, 3.5 GiB memory)
- Public IP address: 20.219.1.175
- Virtual network/subnet: hub/default
- DNS name: Not configured
- Health state: -

Properties:

Category	Property	Value
Virtual machine	Computer name	VM1
	Operating system	Windows (Windows Server 2022 Datacenter Azure Edition)
	Image publisher	MicrosoftWindowsServer
	Image offer	WindowsServer
	Image plan	2022-datacenter-azure-edition
	VM generation	V2
	VM architecture	x64
Agent status	Ready	
Networking	Public IP address	20.219.1.175 (Network interface vm12)
	Public IP address (IPv6)	-
	Private IP address	10.1.0.4
	Private IP address (IPv6)	-
	Virtual network/subnet	hub/default
Size	Size	Standard D51 v2

portal.azure.com/#@dit.edu.in/resource/subscriptions/367ef2de-4f15-4aa8-8a4c-2ff17c442f05/resourceGroups/PRO/providers/Microsoft.Compute/virtualMachines/VM2/over...

Microsoft Azure

Home > VM2

Virtual machine

Search

Connect Start Restart Stop Capture Delete Refresh Open in mobile Feedback CLI / PS

VM2 virtual machine agent status is not ready. Troubleshoot the issue →

Overview

Activity log

Access control (IAM)

Tags

Diagnose and solve problems

Settings

Networking

Connect

Windows Admin Center

Disks

Size

Microsoft Defender for Cloud

Advisor recommendations

Extensions + applications

Availability + scaling

Configuration

Identity

Properties

Essentials

Resource group (move) : PRO

Status : Running

Location : Central India

Subscription (move) : Azure for Students

Subscription ID : 367ef2de-4f15-4aa8-8a4c-2ff17c442f05

Tags (edit) : Click here to add tags

Operating system : Windows

Size : Standard D51 v2 (1 vcpu, 3.5 GiB memory)

Public IP address : 20.219.1.169

Virtual network/subnet : spoke/default

DNS name : Not configured

Health state : -

Properties Monitoring Capabilities (8) Recommendations Tutorials

Virtual machine

Computer name : VM2

Operating system : Windows

Image publisher : MicrosoftWindowsServer

Image offer : WindowsServer

Image plan : 2022-datacenter-azure-edition

VM generation : V2

VM architecture : x64

Networking

Public IP address : 20.219.1.169 (Network interface vm2504)

Public IP address (IPv6) : -

Private IP address : 10.2.0.4

Private IP address (IPv6) : -

Virtual network/subnet : spoke/default

DNS name : Configure

portal.azure.com/#@dit.edu.in/resource/subscriptions/367ef2de-4f15-4aa8-8a4c-2ff17c442f05/resourceGroups/PRO/providers/Microsoft.Compute/virtualMachines/VM3/connect...

Microsoft Azure

Home > CreateVm-MicrosoftWindowsServer.WindowsServer-202-20230720232148 | Overview > VM3

VM3 | Connect

Virtual machine

Search

Overview

Activity log

Access control (IAM)

Tags

Diagnose and solve problems

Settings

Networking

Connect

Windows Admin Center

Disks

Size

Microsoft Defender for Cloud

Advisor recommendations

Extensions + applications

Availability + scaling

Configuration

Identity

To improve security, enable just-in-time access on this VM. →

RDP SSH Bastion

Connect with RDP

^ Suggested method for connecting

Azure has checked the status for the most common prerequisites when connecting using this method.

- ✓ An inbound network security group rule has been created and your client IP address can access port 3389. [Learn more](#)
- ✓ The VM's network interface has a Public IP address. [Learn more](#)
- ✓ The VM is running.

To connect to your virtual machine via RDP, select an IP address, optionally change the port number, and download the RDP file.

IP address *

Public IP address (20.219.3.149)

Port number *

3389

Download RDP File

Can't connect?

Test network security groups

Step4-Configure VPN Gateway for Hub VNet:In the Hub VNet, create a Virtual Network Gateway (VPN Gateway). Choose the "Route-based" (also known as "Dynamic Routing") option

portal.azure.com/#create/Microsoft.VirtualNetworkGateway-ARM

Microsoft Azure

Home > Virtual network gateway

Create virtual network gateway

Validation failed. Click here to view details. →

Basics Tags Review + create

Basics

Subscription : Azure for Students

Resource group : PRO

Name : VPN

Region : Central India

SKU : vpnG2

Generation : Generation2

Virtual network : hub

Subnet : GatewaySubnet (10.1.1.0/24)

Gateway type : vpn

VPN type : RouteBased

Enable active-active mode : Enabled

Configure BGP : Disabled

Public IP address : vpn

SECOND PUBLIC IP ADDRESS : vpn1

Tags

Create Previous Next Download a template for automation

Errors

Summary Raw Error

ERROR DETAILS

Subscription 367ef2de-4f15-4aa8-8a4c-2ff17c442f05 has a quota of 3 for resources of type PublicIpAddress with sku Standard. Subscription currently has 3 resources and the template contains 2 new resources of the this type which exceeds the quota. Please contact support to increase the quota for resource type PublicIpAddress (Code: ResourceQuotaExceededLimitOnTemplate)

WAS THIS HELPFUL? 👍 👎

Troubleshooting Options

Check Usage + Quota of New Support Request of

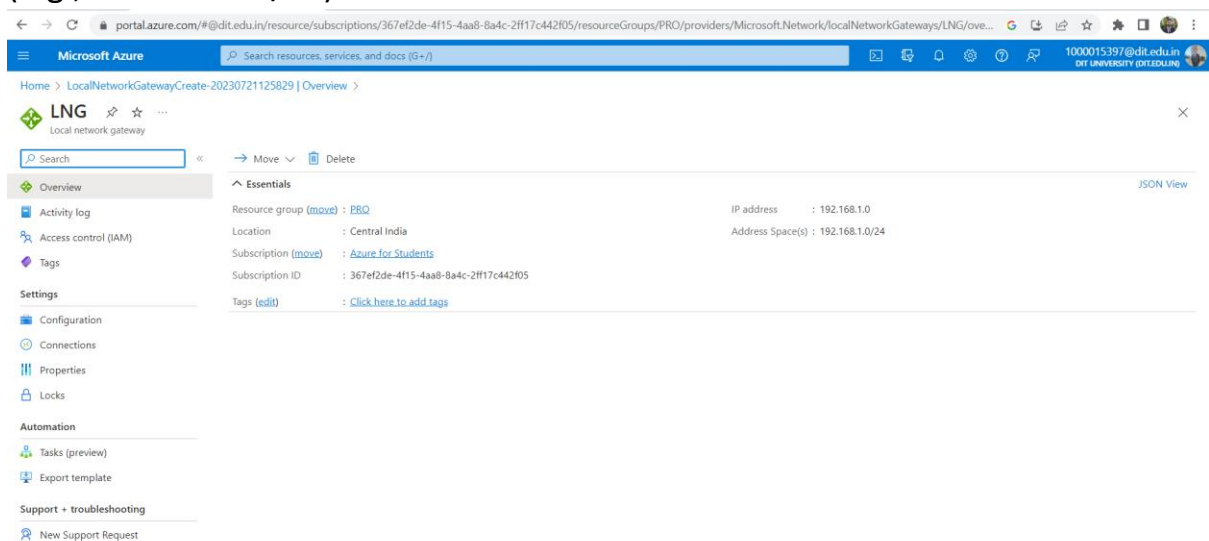
While Creating VPN Gateway inside hub it raise error of 3 ip address limit is exceed so now to resolve this issue we have to deassociate the ip adress of other .

The screenshot shows the Microsoft Azure portal interface. On the left, the 'Public IP addresses' page is visible, listing 'HostVirtualMachine-ip', 'VM1-ip', 'VM2-ip', and 'VM3-ip'. The 'VM1-ip' resource is selected. The main pane shows the 'VM1-ip' resource details, including its location (Central India), subscription (Azure for Students), and IP address (20.219.1.175). A 'Dissociation confirmation' dialog box is displayed in the center, asking for confirmation to permanently dissociate the public IP address 'VM1-ip' from the network interface card 'vm12'. The dialog has 'Yes' and 'No' buttons. Below the dialog, the 'Use public IP' section is visible, showing the 'Associate to a resource' and 'Configure a public IP address' options.

The screenshot also shows the 'VPN Gateway' resource page. The 'VPNGATE' resource is selected, showing its location (Central India), subscription (Azure for Students), and IP address (20.219.1.175). The 'Health check' section is visible, showing a 'Go to Resource health' button. The 'Monitoring' section shows 'Total tunnel ingress' and 'Total tunnel egress' graphs.

Step5- Create a Local Network Gateway representing your On-premises network. Provide the public IP address and the on-premises address space

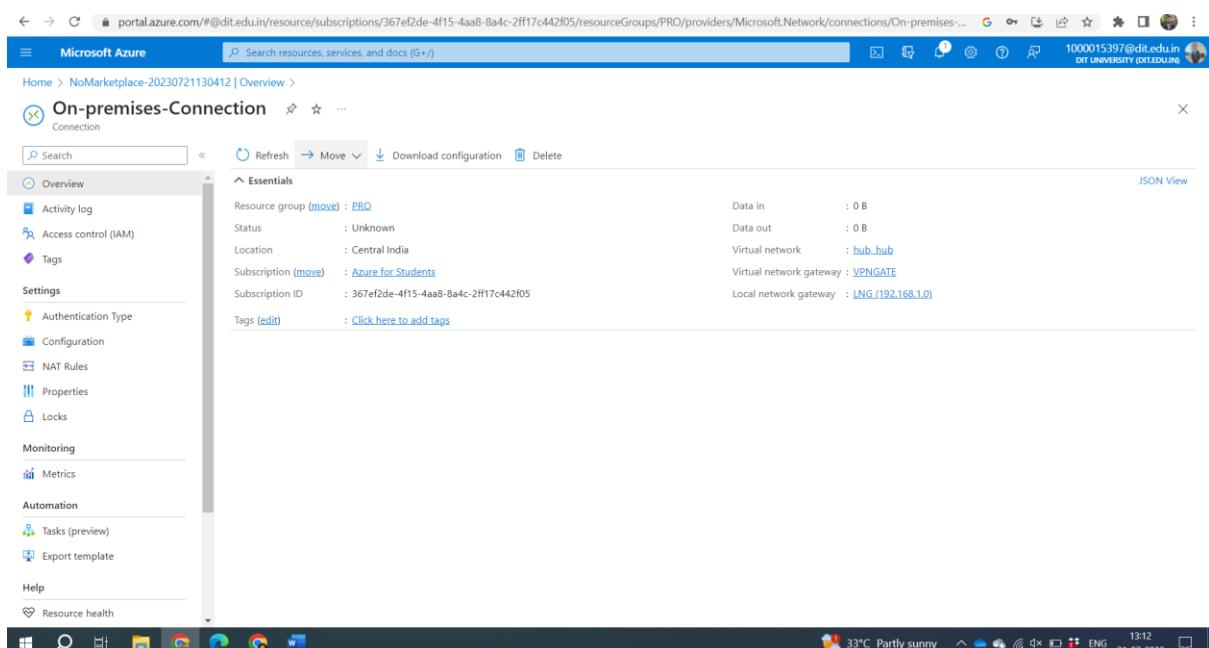
(e.g., 192.168.1.0/24).



The screenshot shows the Microsoft Azure portal interface. The top navigation bar includes the Microsoft Azure logo, a search bar, and the user's profile. The main content area displays the 'Overview' page for a 'Local network gateway' (LNG). The left sidebar contains a navigation menu with options like Overview, Activity log, Access control (IAM), Tags, Settings, Configuration, Connections, Properties, Locks, Automation, Tasks (preview), Export template, Support + troubleshooting, and New Support Request. The main content area shows the 'Essentials' section with the following details:

- Resource group (move): PRO
- Location: Central India
- Subscription (move): Azure for Students
- Subscription ID: 367ef2de-4f15-4aa8-8a4c-2ff17c442f05
- Tags (edit): Click here to add tags
- IP address: 192.168.1.0
- Address Space(s): 192.168.1.0/24

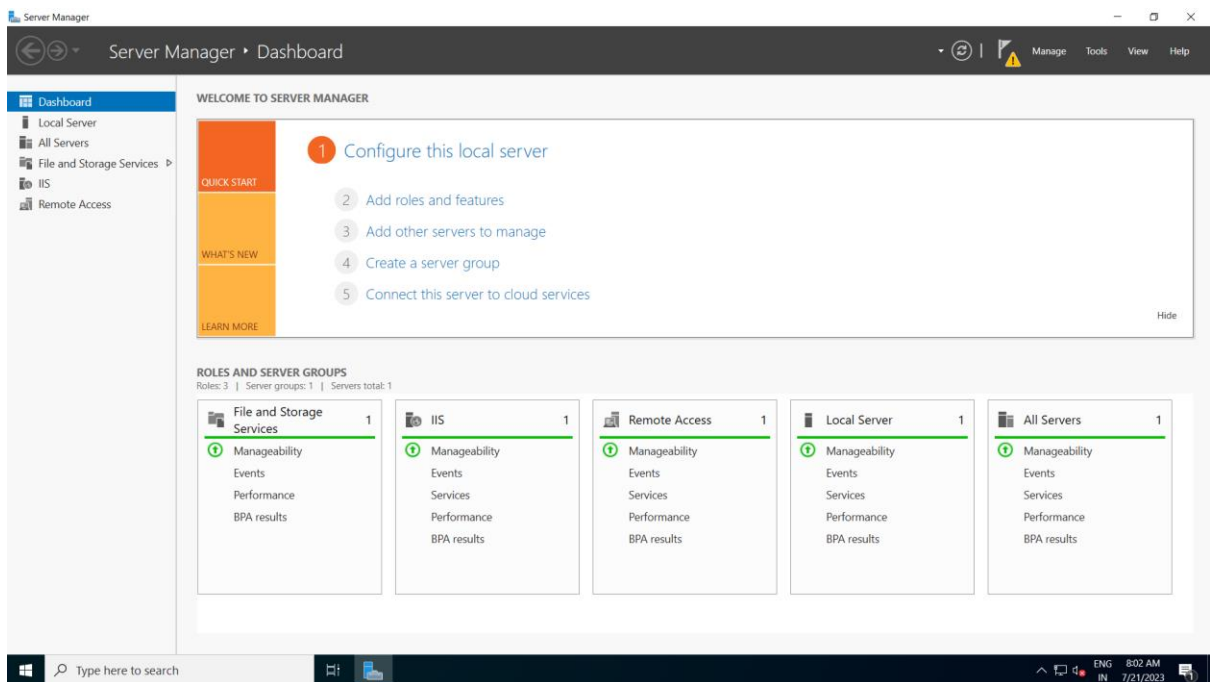
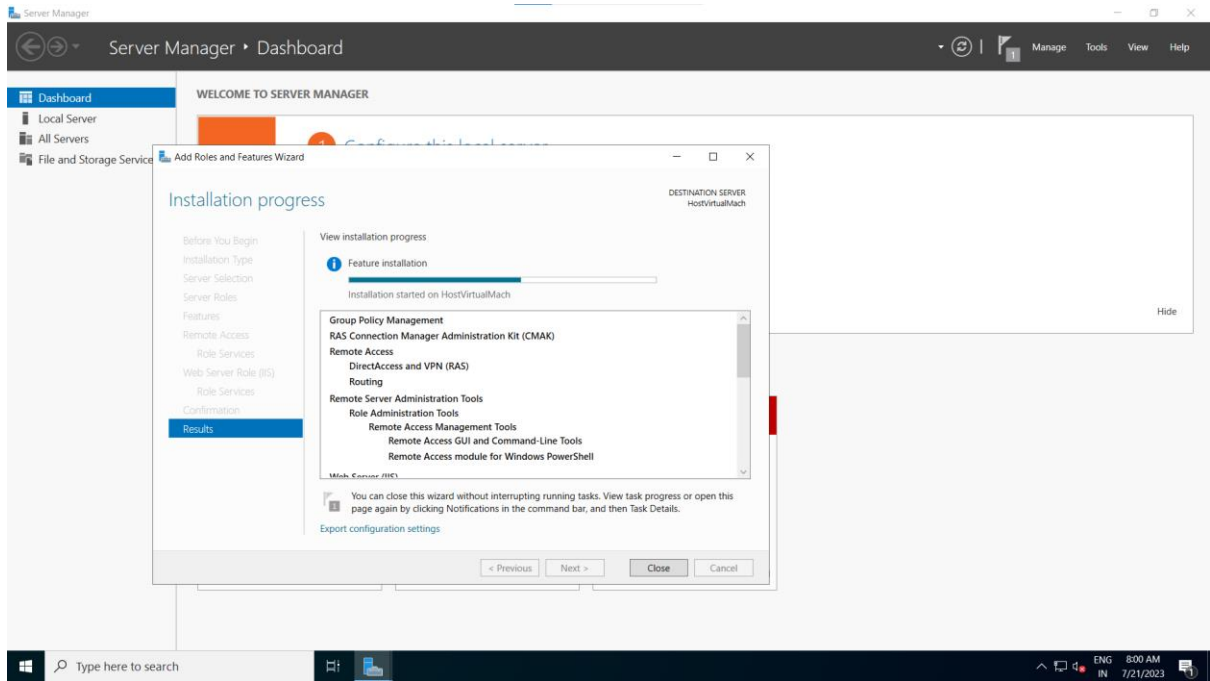
Step6-Create a Connection between the VPN Gateway (Hub VNet) and the Local Network Gateway (On-premises). This will establish the S2S tunnel

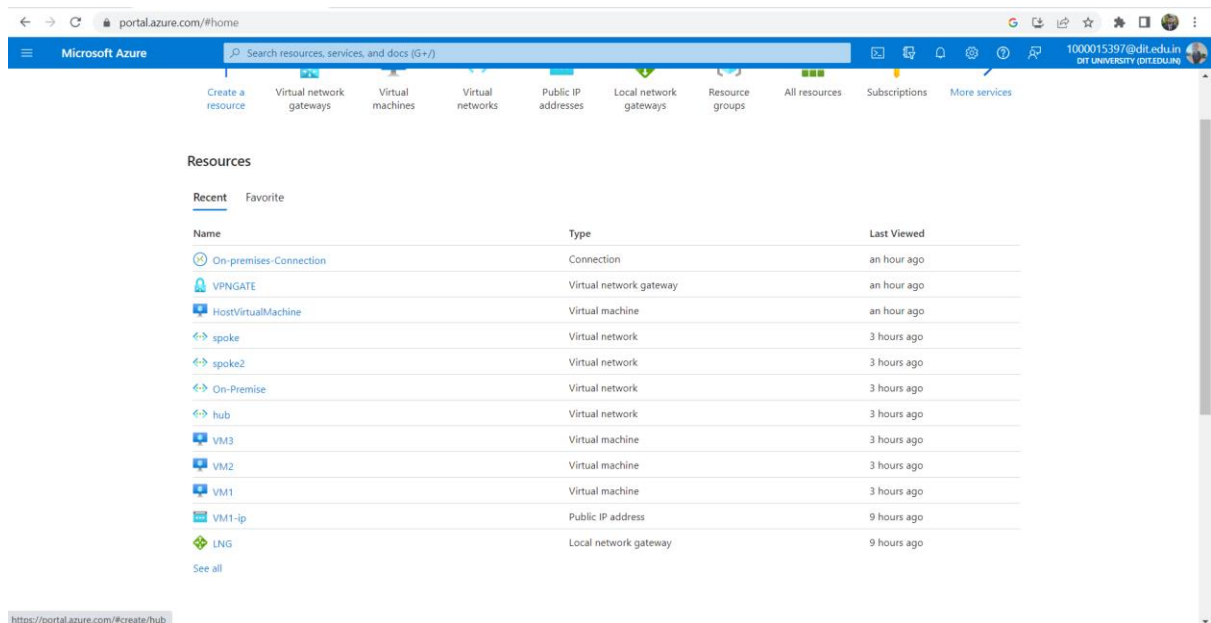
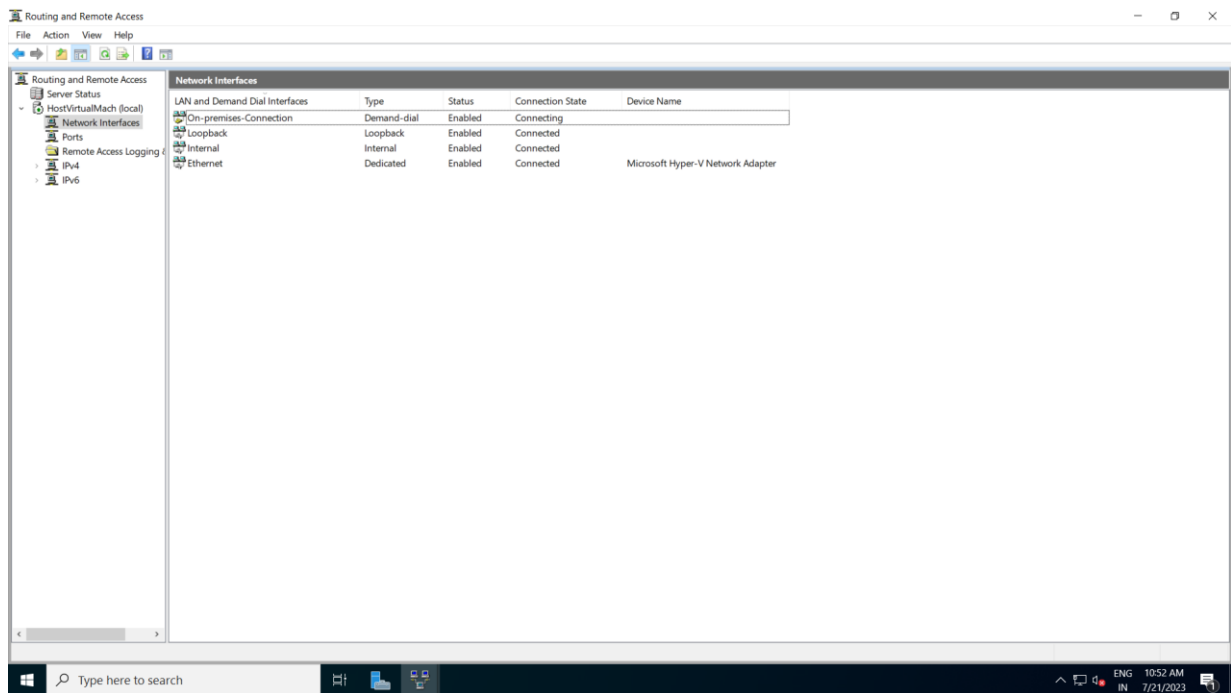


The screenshot shows the Microsoft Azure portal interface. The top navigation bar includes the Microsoft Azure logo, a search bar, and the user's profile. The main content area displays the 'Overview' page for an 'On-premises-Connection'. The left sidebar contains a navigation menu with options like Overview, Activity log, Access control (IAM), Tags, Settings, Configuration, NAT Rules, Properties, Locks, Monitoring, Metrics, Automation, Tasks (preview), Export template, Help, and Resource health. The main content area shows the 'Essentials' section with the following details:

- Resource group (move): PRO
- Status: Unknown
- Location: Central India
- Subscription (move): Azure for Students
- Subscription ID: 367ef2de-4f15-4aa8-8a4c-2ff17c442f05
- Tags (edit): Click here to add tags
- Data in: 0 B
- Data out: 0 B
- Virtual network: hub_hub
- Virtual network gateway: VPNGATE
- Local network gateway: LNG (192.168.1.0)

Step7-Configure RRAS on the On-premises VM:Set up the Routing and Remote Access Service (RRAS) on the On-premises VM to act as the VPN device. Configure it with the necessary settings for the S2S VPN connection.





Ping to Check Connectivity of both the site

```
On-Prime-Vm - 20.254.2.180:3389 - Remote Desktop Connection
Administrator: Command Prompt
C:\Users\On-Prime>ipconfig

Windows IP Configuration

Ethernet adapter Ethernet:

    Connection-specific DNS Suffix  . : Suywuz2vedyebczmnpoeuwngk.rx.internal.cloudapp.net
    Link-local IPv6 Address . . . . . : fe80::3744:a1b:80c1:7404%6
    IPv4 Address. . . . . : 10.1.0.4
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : 10.1.0.1

PPP adapter S25:

    Connection-specific DNS Suffix  . :
    Autoconfiguration IPv4 Address. . : 169.254.0.27
    Subnet Mask . . . . . : 255.255.0.0
    Default Gateway . . . . . :

C:\Users\On-Prime>ping 10.0.0.4

Pinging 10.0.0.4 with 32 bytes of data:
Reply from 10.0.0.4: bytes=32 time=3ms TTL=127
Reply from 10.0.0.4: bytes=32 time=2ms TTL=127
Reply from 10.0.0.4: bytes=32 time=2ms TTL=127
Reply from 10.0.0.4: bytes=32 time=3ms TTL=127

Ping statistics for 10.0.0.4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
```

```
Azure-Vm - 20.254.2.180:3389 - Remote Desktop Connection
Administrator: Command Prompt
Microsoft Windows [Version 10.0.17763.4498]
(c) 2018 Microsoft Corporation. All rights reserved.

C:\Users\Azure-Vm>ipconfig

Windows IP Configuration

Ethernet adapter Ethernet:

    Connection-specific DNS Suffix  . : 3a121f19c8e8b6e0e02a19.ra.internal.cloudapp.net
    Link-local IPv6 Address . . . . . : fe80::94:caad:7f17:45b2%6
    IPv4 Address. . . . . : 10.1.0.4
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : 10.0.0.1

C:\Users\Azure-Vm>ping 10.1.0.4

Pinging 10.1.0.4 with 32 bytes of data:
Reply from 10.1.0.4: bytes=32 time=1ms TTL=127
Reply from 10.1.0.4: bytes=32 time=2ms TTL=127
Reply from 10.1.0.4: bytes=32 time=2ms TTL=127
Reply from 10.1.0.4: bytes=32 time=2ms TTL=127

Ping statistics for 10.1.0.4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 2ms, Average = 2ms

C:\Users\Azure-Vm>
```

