ACKNOWLEDGEMENT

I would like to express my sincere gratitude and appreciation to "Celebal Technology" for providing me with the opportunity to undertake a valuable and enriching summer internship in the "Cloud Infrastructure & Security" domain. This experience has been instrumental in shaping my professional growth and has given me invaluable insights into the dynamic world of cloud technologies and security.

First and foremost, I am deeply thankful to the management and leadership team at "Celebal Technology" for entrusting me with significant responsibilities and fostering an environment of continuous learning. Their guidance and support have been pivotal in enhancing my understanding of cloud infrastructure and security principles.

I would also like to extend my heartfelt thanks to my supervisor, Sanskar Pareek, for their mentorship and continuous encouragement throughout my internship. Their expertise in the field and willingness to share knowledge has been instrumental in my personal and professional development

Additionally, I am indebted to the entire "Cloud Infrastructure & Security" team for their warm welcome and willingness to engage with me as a valuable member of the team. Their collaborative spirit and willingness to answer my questions have been immensely beneficial in improving my technical skills and industry knowledge.

I must acknowledge the support and assistance provided by my fellow interns, whose camaraderie and shared experiences have made this internship even more enjoyable and rewarding.

Thanks,
Mohammadsafik Shaikh
(20IT141)

ABSTRACT

During my summer internship at "Celebal Technology" with a focus on "Cloud Infrastructure & Security" in collaboration with the cloud technology provider "Microsoft Azure," I had the opportunity to delve into the world of cloud computing and gain valuable insights into its practical applications. Throughout the internship, I acquired in-depth knowledge and hands-on experience in various essential concepts, including "Vnet Peering," "Local Network Gateway," "Virtual Network Gateway," and "Site-to-Site Connection."

The internship commenced with an extensive introduction to Microsoft Azure's cloud platform, its architecture, and its various services. As I progressed, I dived into the intricacies of "Vnet Peering," understanding its significance in connecting virtual networks and facilitating seamless communication between them. This concept broadened my understanding of cloud networking and enhanced my proficiency in designing scalable and interconnected infrastructures.

Furthermore, the exploration of "Local Network Gateway" and "Virtual Network Gateway" proved to be crucial in comprehending secure network connectivity, extending on-premises networks to the cloud, and establishing a robust framework for data transmission. Working on practical use cases, I learned how to configure and manage these gateways effectively, ensuring secure and efficient communication.

One of the highlights of my internship was the hands-on experience with "Site-to-Site Connection," a fundamental feature that enables secure and encrypted connections between on-premises infrastructure and the Azure cloud. Understanding the complexities of establishing and maintaining these connections provided valuable insights into safeguarding sensitive data and achieving seamless hybrid cloud integration.

DESCRIPTION OF COMPANY

Celebal Technology is a leading technology company specializing in Cloud Computing services, offering a wide array of solutions to transform businesses into efficient and agile entities. With a robust work flow encompassing planning, design, development, and maintenance, Celebal Technology is at the forefront of delivering cutting-edge cloud solutions to its clients worldwide.

- **Planning**
  - At Celebal Technology, the journey towards successful cloud implementation starts with meticulous planning. Our team of skilled professionals works closely with clients to understand their unique requirements, challenges, and goals.
- **Design**
  - Once the planning phase is complete, our expert architects and engineers step in to design a tailor-made cloud environment. Leveraging their extensive knowledge of cloud platforms such as Amazon Web Services (AWS), Microsoft Azure, our team crafts robust and secure cloud architectures.
- **Development**
  - With a solid design in place, Celebal Technology's development team takes the reins to create customized cloud solutions. Our agile development approach ensures rapid deployment and continuous iteration, allowing businesses to embrace cloud capabilities swiftly and adapt to evolving needs.
- **Different Services Provided**
  - Cloud Migration
  - Cloud Security
  - Cloud Automation
  - Cloud Backup and Disaster Recovery

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Chapter – 1 : Introduction

1.1 Training Definition

Microsoft Azure offers a range of training programs to help individuals and businesses understand and leverage the power of cloud computing. The training focuses on various aspects of Azure, equipping participants with the knowledge and skills needed to deploy, manage, and optimize cloud-based solutions effectively.

1.2 Description

IaaS: Microsoft Azure's Infrastructure as a Service offers virtualized computing resources, including virtual machines, storage, and networking components. Users can provision, manage, and scale these resources as needed, without the complexities of managing physical infrastructure.

PaaS: Platform as a Service in Azure enables developers to build, deploy, and manage applications without worrying about underlying infrastructure. Azure's PaaS offerings include application hosting, databases, and development frameworks, streamlining the application development and deployment process.

SaaS: Microsoft Azure's Software as a Service model delivers software applications over the internet, eliminating the need for installation and maintenance. Users can access these applications directly through a web browser, enhancing productivity and reducing the burden of software management.

1.3 Task Requirement

- Knowledge of Cloud Computing
- Need one Clod Platform for Development (Microsoft Azure)
- Need one Subscription account for Deployment resource in Cloud.

Chapter – 2 : Account Setup

2.1 Requirement

- **Access to Services:** An Azure account grants you access to a wide range of cloud computing services provided by Microsoft. These services include virtual machines, storage, databases, machine learning, networking, and more.
- **Resource Management:** Having an Azure account allows you to create and manage cloud resources efficiently. You can provision virtual machines, set up databases, create storage accounts, and deploy various applications and services in the cloud.
- **Billing and Usage Tracking:** Azure accounts are associated with billing and payment information. With an account, you can track your cloud usage and understand the costs incurred by your cloud resources.
- **Security and Identity Management:** An Azure account plays a crucial role in securing your cloud resources. It serves as an identity for you and your team members, allowing you to control access to resources and set permissions
- **Compliance and Support:** Microsoft Azure provides various compliance certifications, ensuring that your cloud infrastructure meets industry and regulatory standards. Having an Azure account allows you to leverage these compliant services and build applications that adhere to specific regulations.
- **Integration with Developer Tools:** An Azure account seamlessly integrates with various developer tools and services. It enables you to use Azure DevOps for continuous integration and continuous deployment (CI/CD), access Azure APIs and SDKs, and collaborate with other developers using Azure services.

2.2 What is Subscription Account ?

In Microsoft Azure, a "subscription" is an agreement between a customer and Microsoft that provides access to Azure services and resources. It is the fundamental billing unit in Azure, and each subscription is associated with a unique Azure tenant.

- Billing and Usage

- Resource Isolation
- Resource Quotas
- Resource Groups
- Management and Permissions
- Azure Policy and Governance
- Azure Resource Manager (ARM)

2.3 Creating a Microsoft Azure Student subscription account

- Sign up for Azure for Students
- Sign in with Microsoft Account
- Verify Your Status as a Student
- Complete Verification and Get Access
- Access Azure Portal
- Activate Azure for Students Offer
- Start Exploring Azure

Chapter – 3 : Create a VM in a Virtual Network

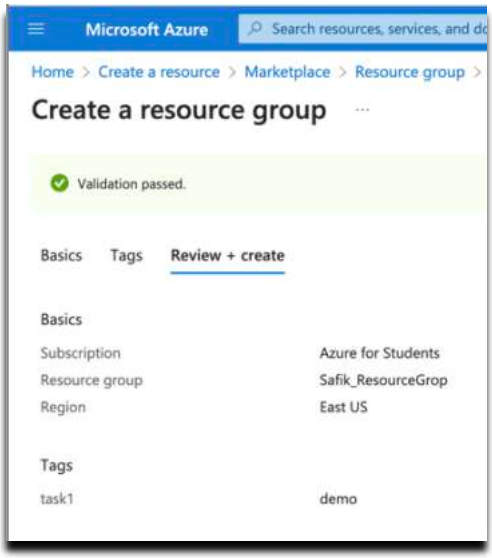
3.1 Description

- **Resource Group :**
  - A resource group is a container that holds related resources for an Azure solution. The resource group can include all the resources for the solution, or only those resources that you want to manage as a group. You decide how you want to allocate resources to resource groups based on what makes the most sense for your organization. Generally, add resources that share the same lifecycle to the same resource group so you can easily deploy, update, and delete them as a group.

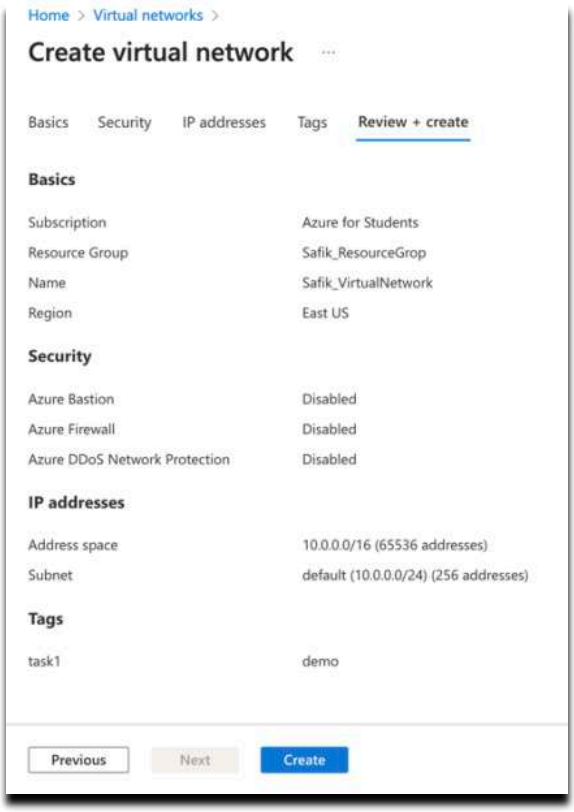
- **Virtual Network :**
  - Azure Virtual Network is the fundamental building block for your private network in Azure. A virtual network enables many types of Azure resources, such as Azure Virtual Machines (VM), to securely communicate with each other, the internet, and on-premises networks. A virtual network is similar to a traditional network that you'd operate in your own data center. An Azure Virtual Network brings with it extra benefits of Azure's infrastructure such as scale, availability, and isolation.

- **Virtual Machine :**
  - Azure virtual machines are one of several types of on-demand, scalable computing resources that Azure offers. Typically, you choose a virtual machine when you need more control over the computing environment than the other choices offer An Azure virtual machine gives you the flexibility of virtualization without having to buy and maintain the physical hardware that runs it. However, you still need to maintain the virtual machine by performing tasks, such as configuring, patching, and installing the software that runs on it.

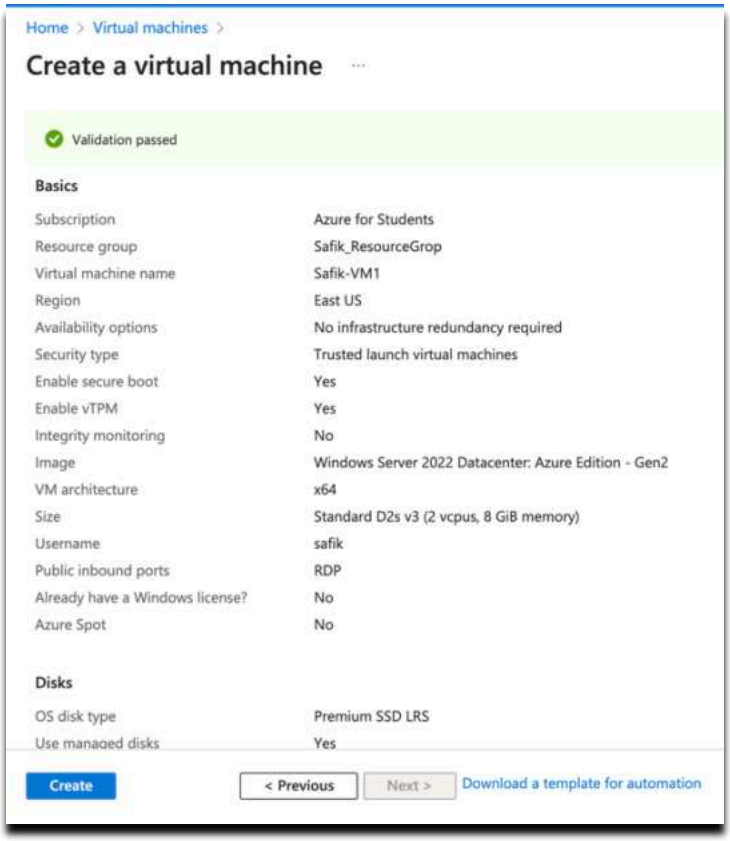
3.2 Screenshot



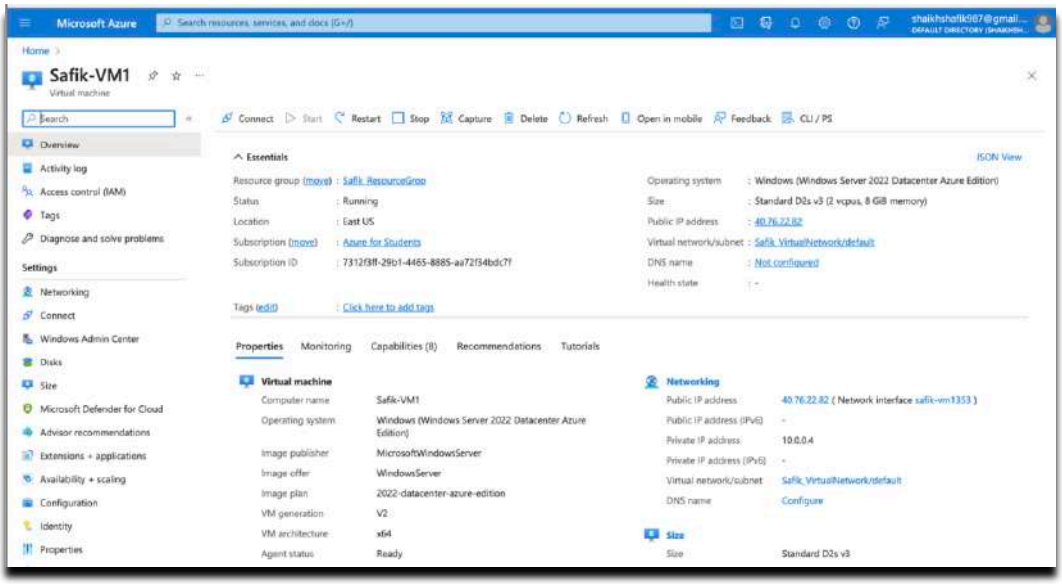
1. Create resource-group.



2. Create Virtual network.



3. Create Virtual machine.



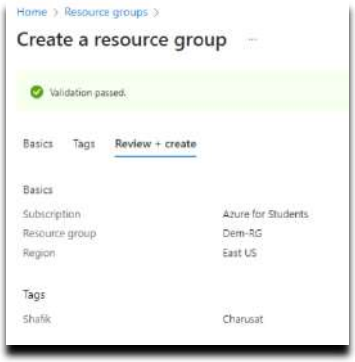
4. Dashboard of Virtual-Machine.

Chapter – 4 : Create 2 VM in different VNet & perform VNet peering

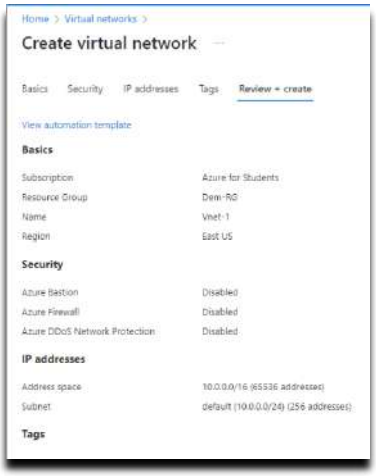
4.1 Description

- **Azure Peering :**
  - Azure Peering Service is a networking service that enhances the connectivity to Microsoft cloud services such as Microsoft 365, Dynamics 365, software as a service (SaaS) services, Azure, or any Microsoft services accessible via the public internet.

4.2Screenshot

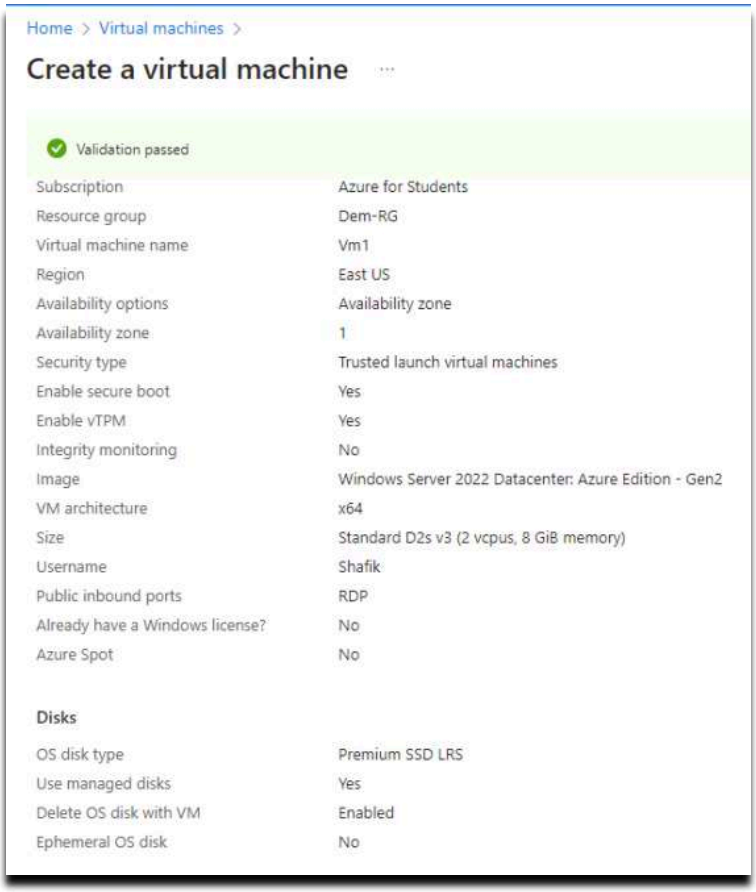


1. Create Resource Group.

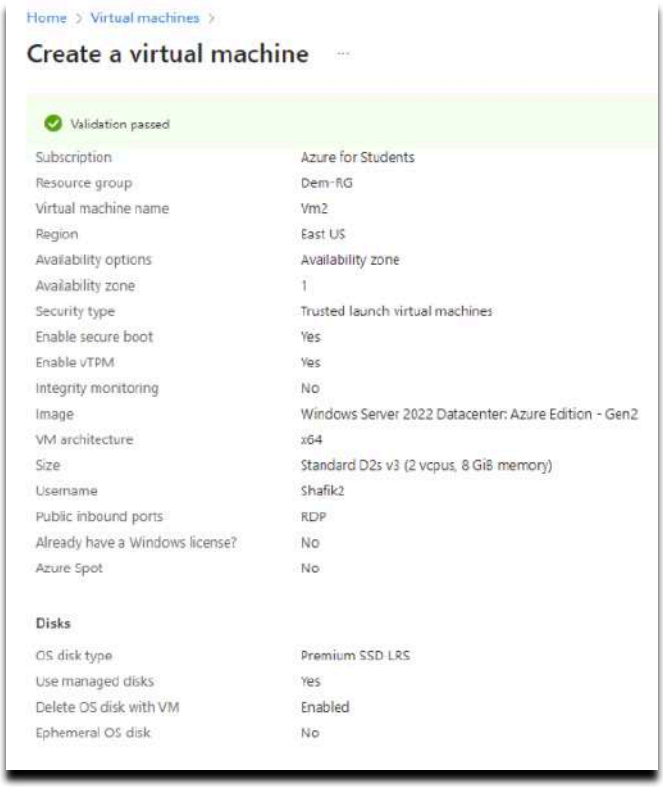


2. Create Virtual Network.

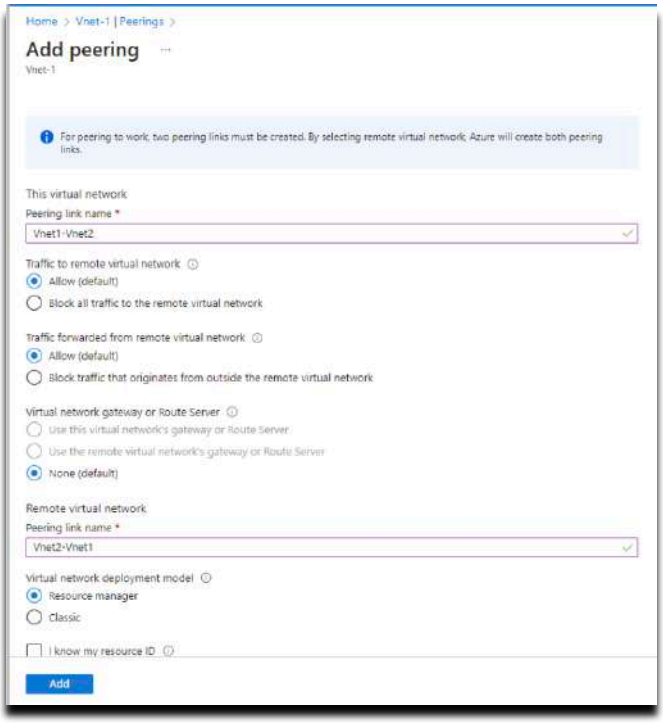
3. Create Second VNet.



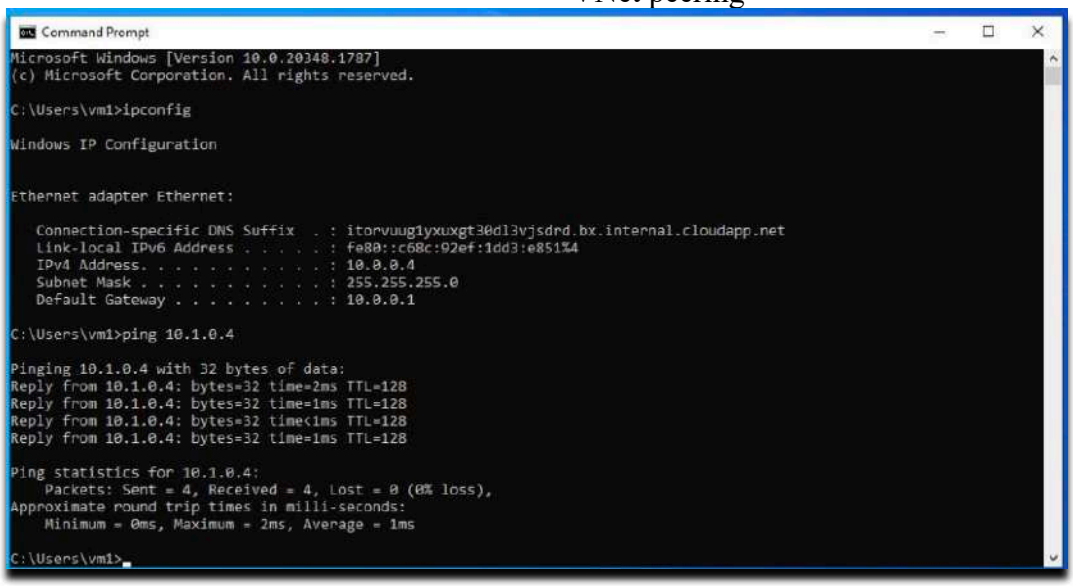
4. Create Virtual machine with Vnet-1.



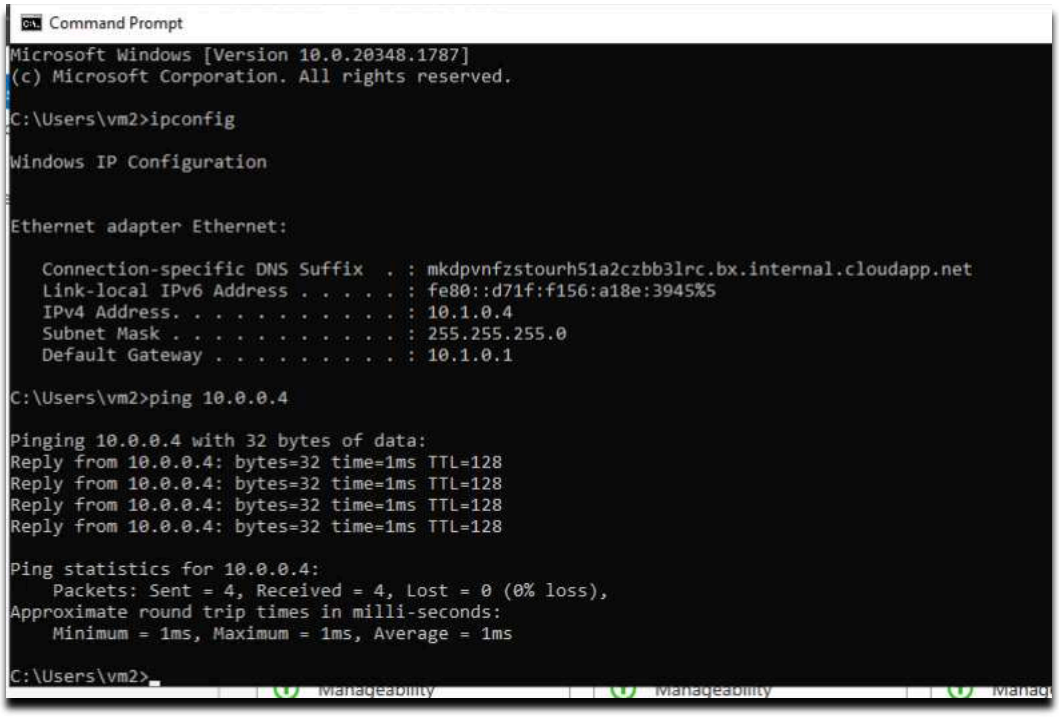
5. Create VM-2 with Vnet-2.



6. Create Vnet-Peering between Vnet-1 and Vnet-2.



7. Pinging Vm1 to Vm2 with use of Vnet peering.



8. Pinging Vm2 to Vm1 with use of Vnet peering.

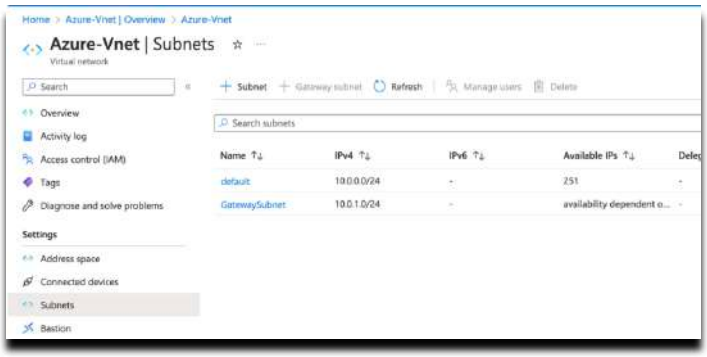
Chapter – 5 : Create Site to Site Connections

5.1 Description

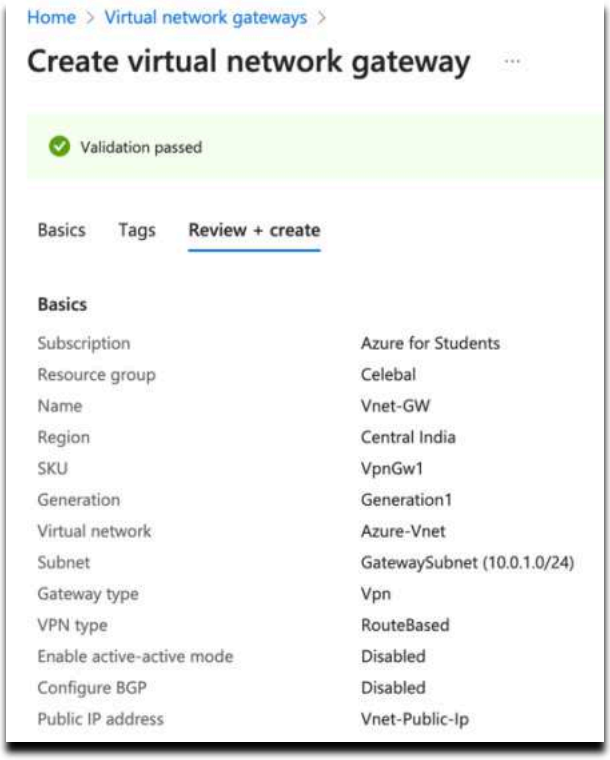
- **Azure Site to Site Connections :**
    - Site-to-Site (S2S) Connection is a networking feature in Microsoft Azure that enables the secure connection between an on-premises network and a virtual network (VNet) in Azure. It allows organizations to extend their on-premises network to the cloud, creating a hybrid network architecture.

5.2 Screenshot

1. Create Vnet in central-india region.



2. In Vnet add GatewaySubnets

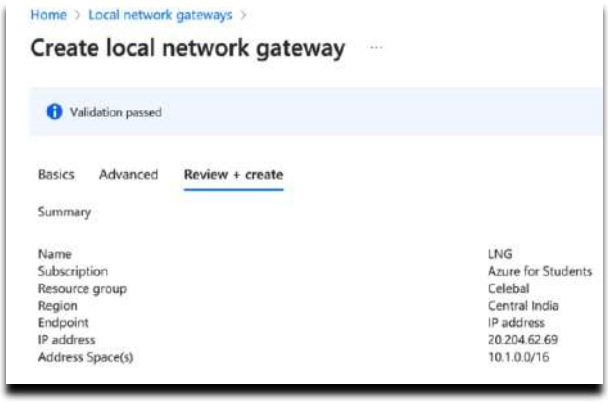


3. Create Virtual network Gateway.

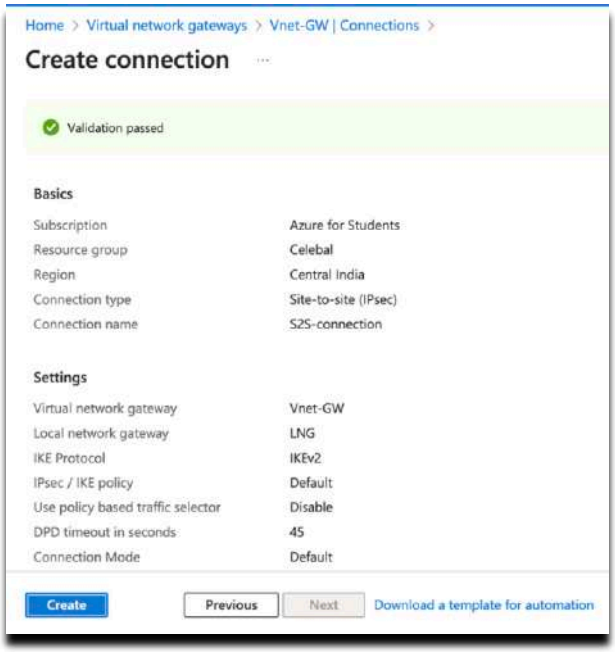
4. Create second Vnet in Onprem-RG.

5. Create Virtual Machine in OnPrem-RG.

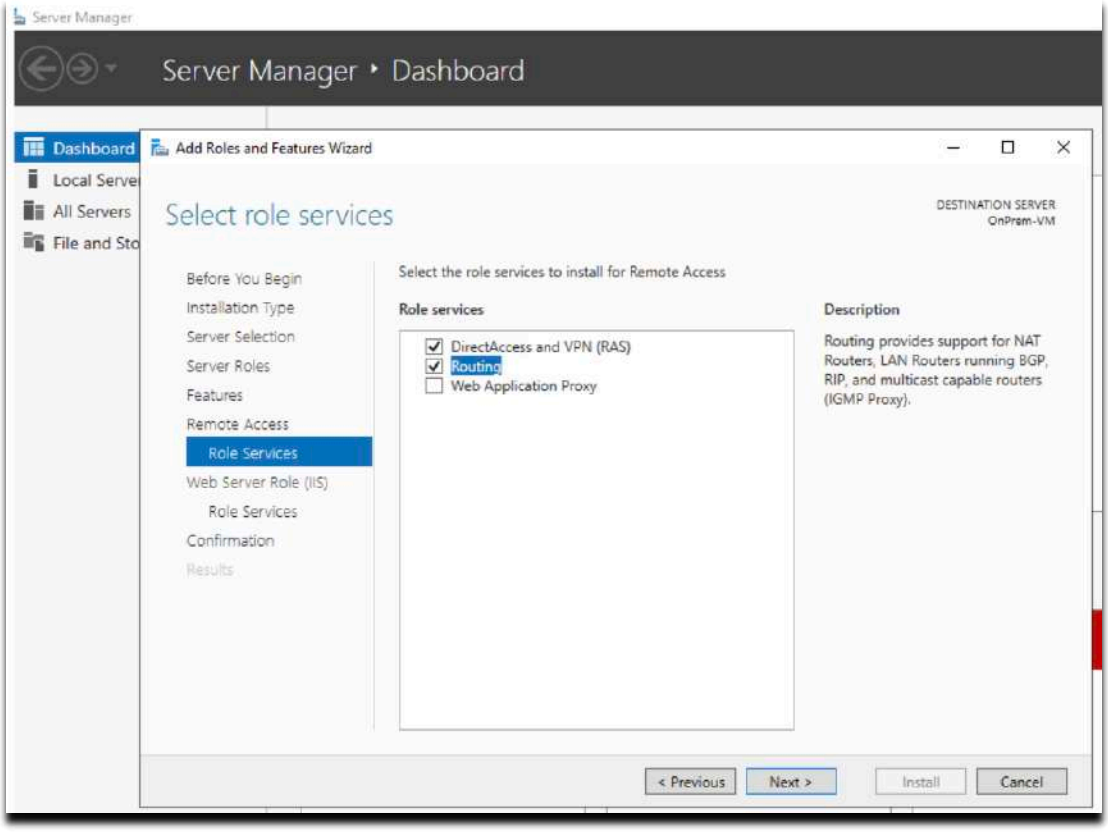
6. Create second VM for Azure.



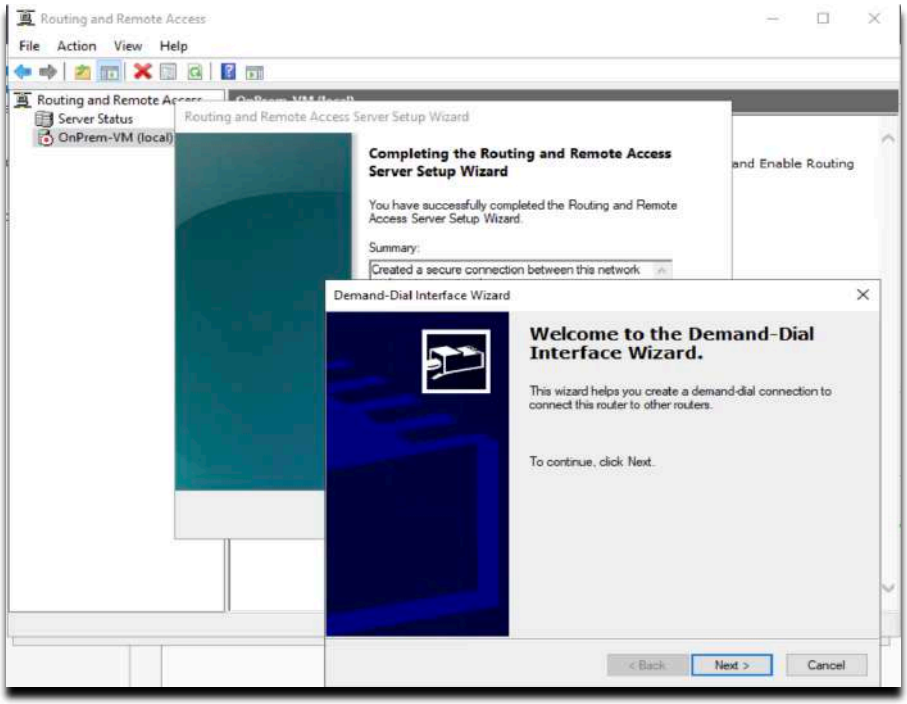
7. Create Local Virtual gateway.



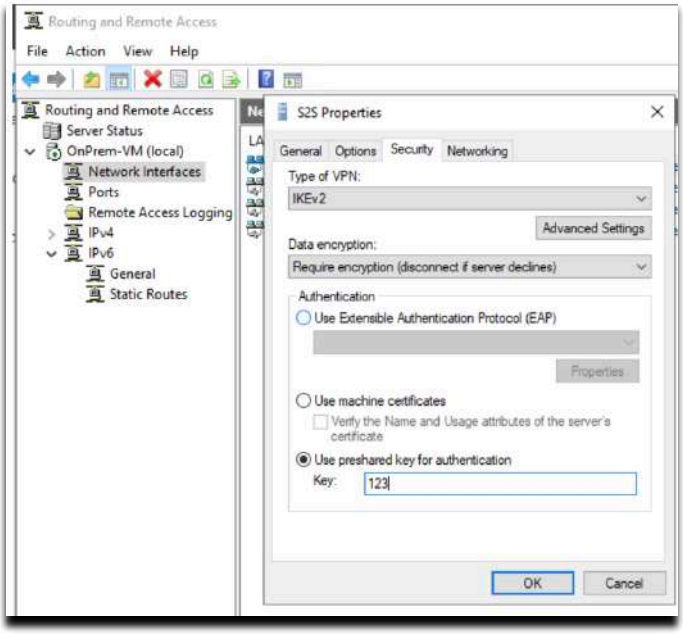
8. Create Site-to-Site Connection.



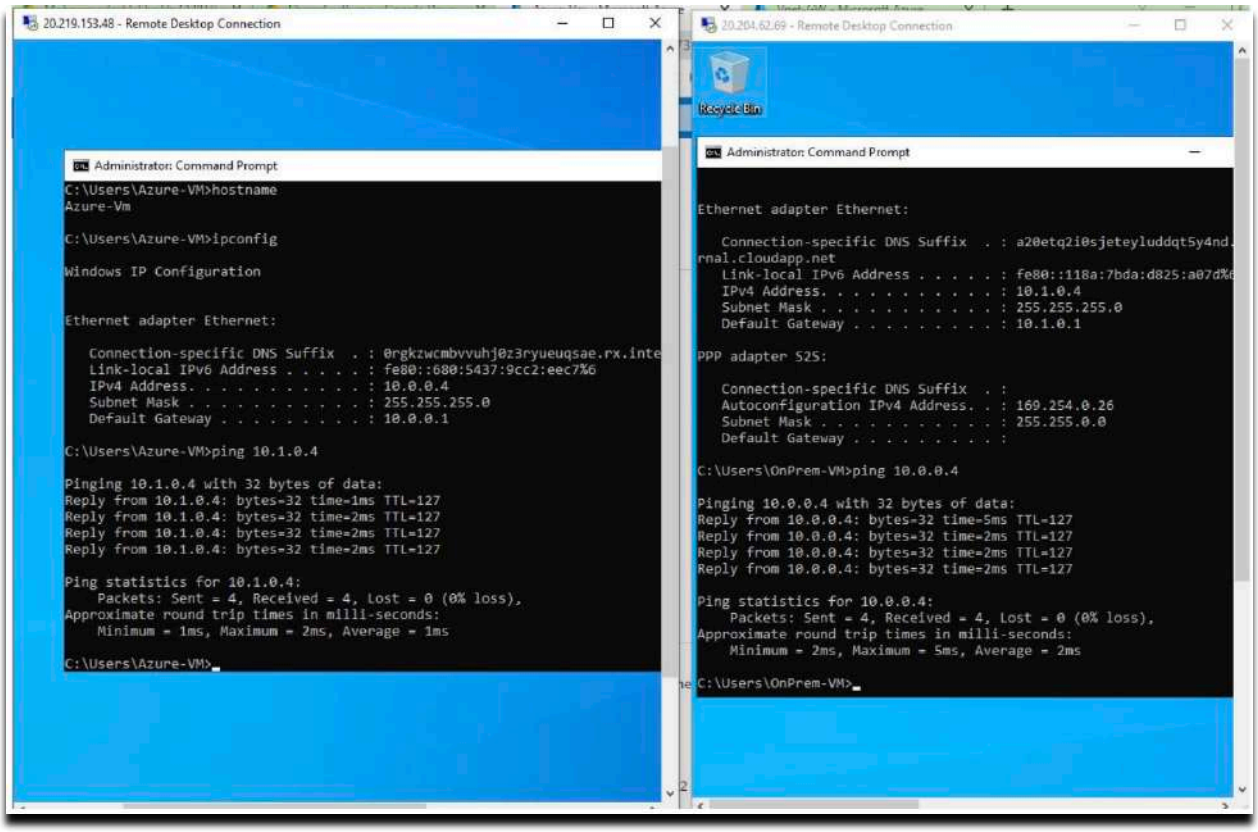
9. Start Onprem-VM and add Role Services.



10. Configure RRAS Network in OnPrem-Vm.



11. Configure S2S Properties.

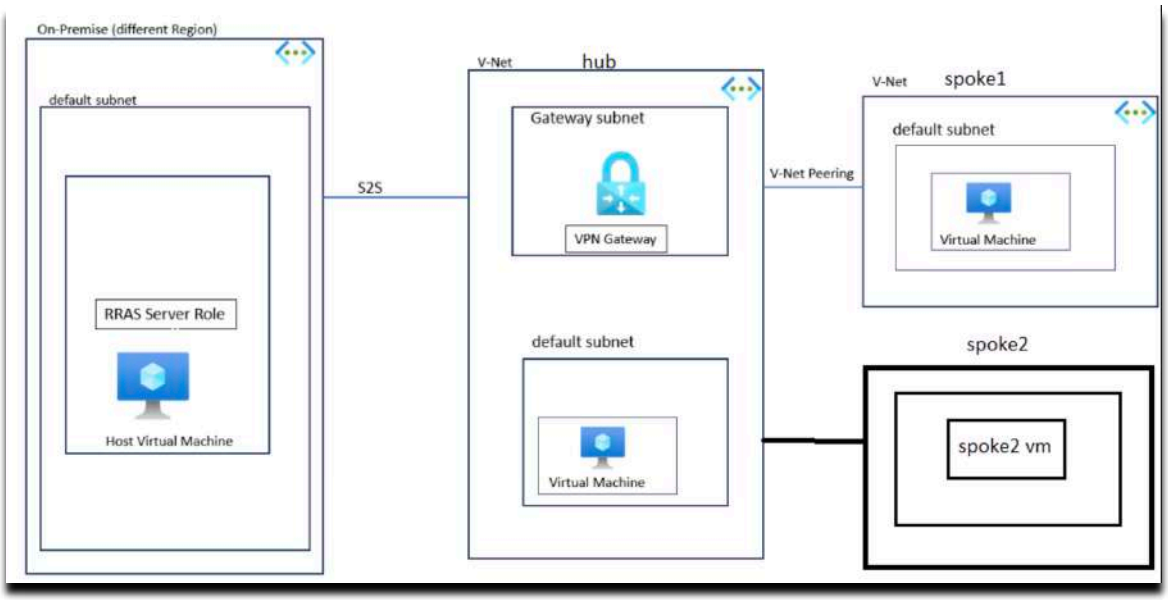


Pinging OnPrem-VM to Azure-Vm and Azure-Vm to OnPrem-VM.

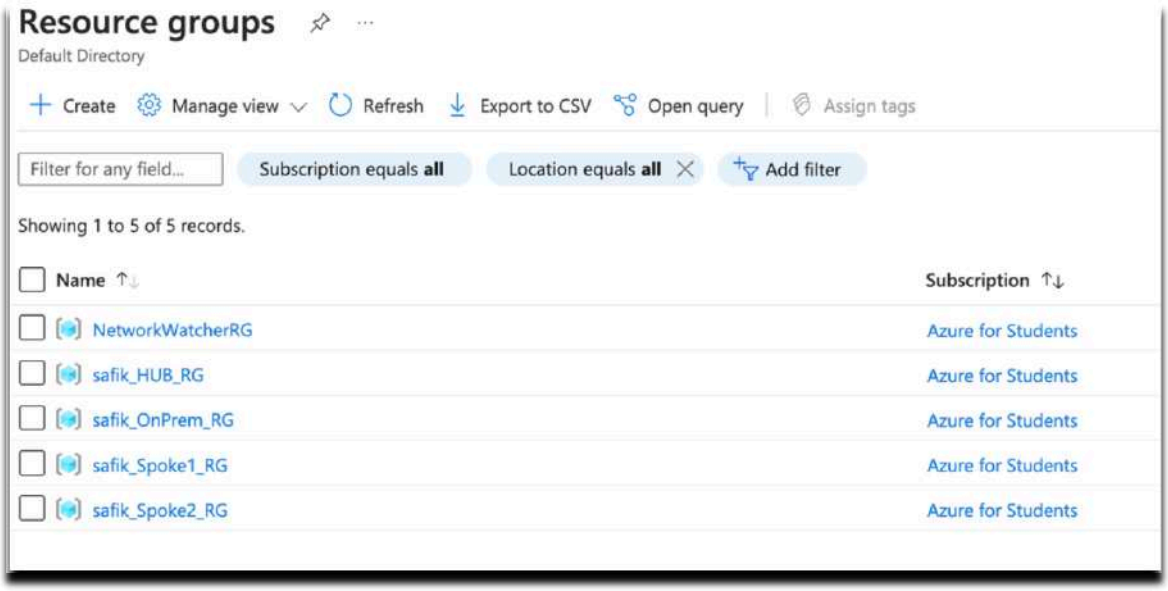
Chapter – 6 : Project Definition

6.1 Project Definition

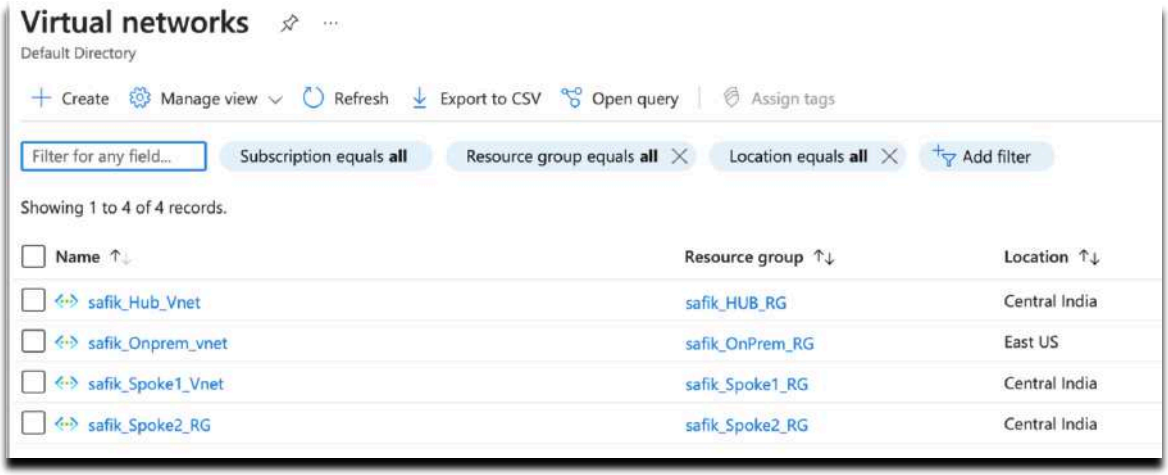
- Project Description Configuration of On-premises to Hub and Spoke connectivity using S2S tunneling from On-premises and hub and Transit Vnet peering from hub to spoke. Configure RRAS on on-premises VM and establish S2S connectivity to the Hub. The On-premises VM should be able to ping both Hub VM and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



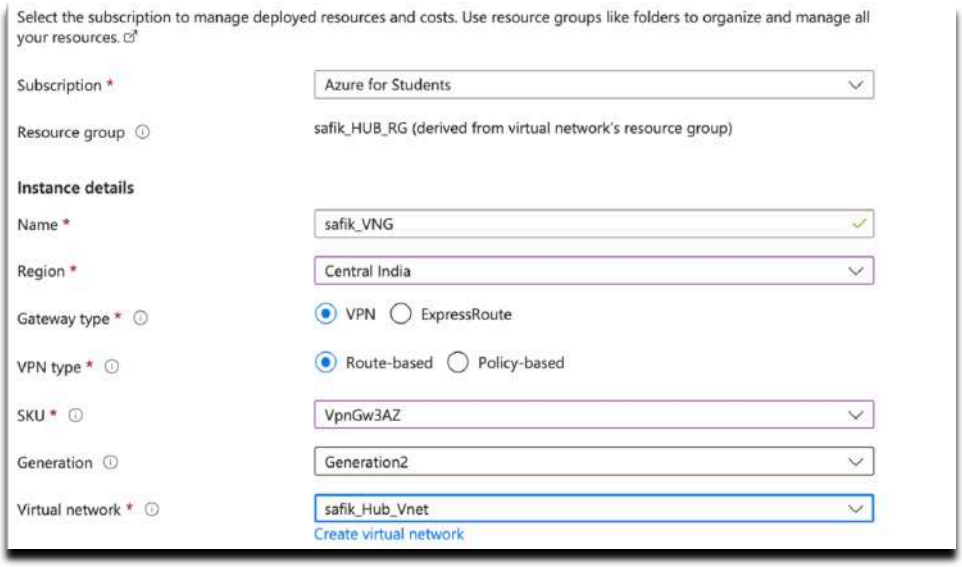
6.2 Screenshot



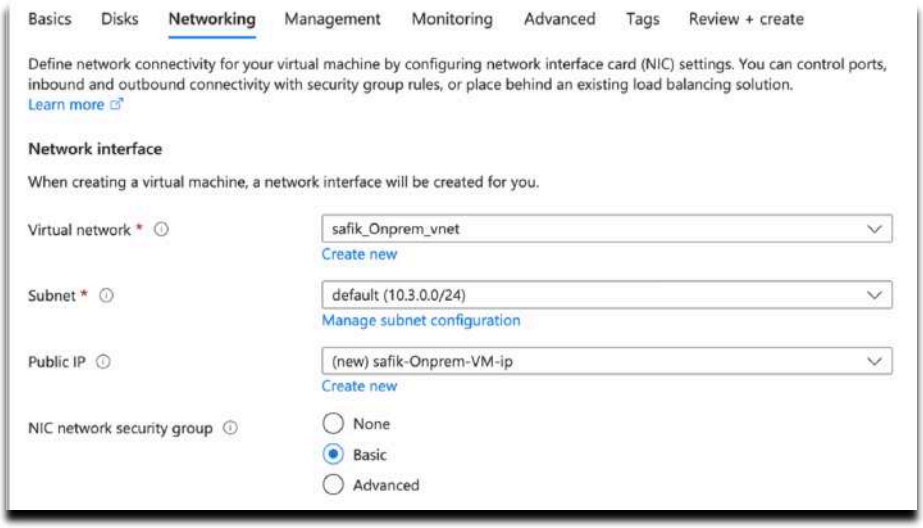
1. Create resource Group for HUB , OnPrem, Spoke1 , Spoke2.



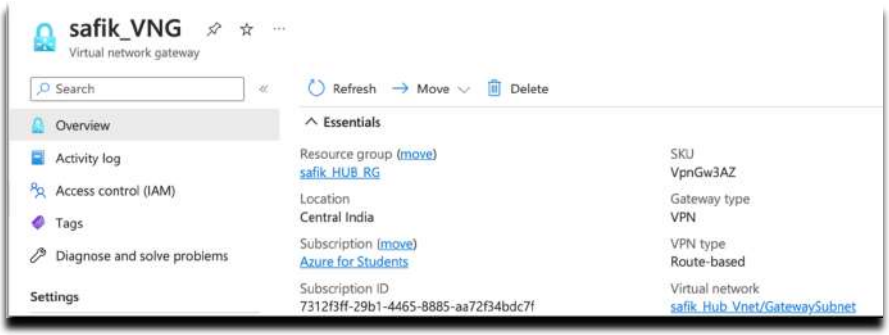
2. Create Virtual Network for HUB , OnPrem , Spoke1 , Spoke2.



3. Create Virtual Network Gateway.

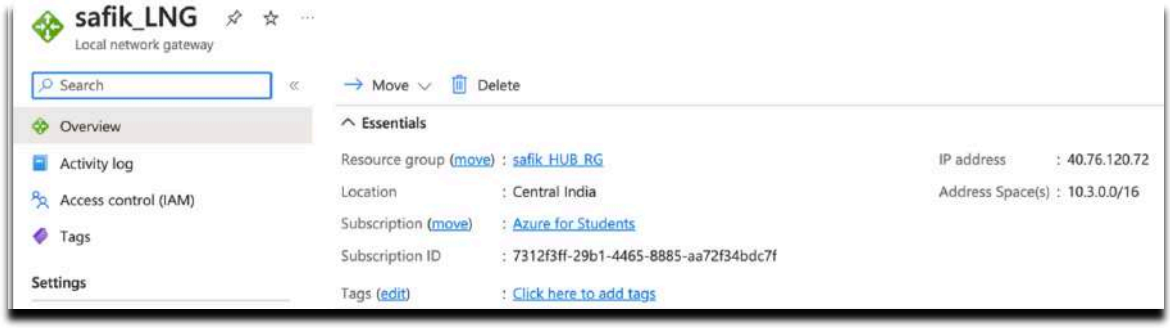


4. Networking Details of VNG.

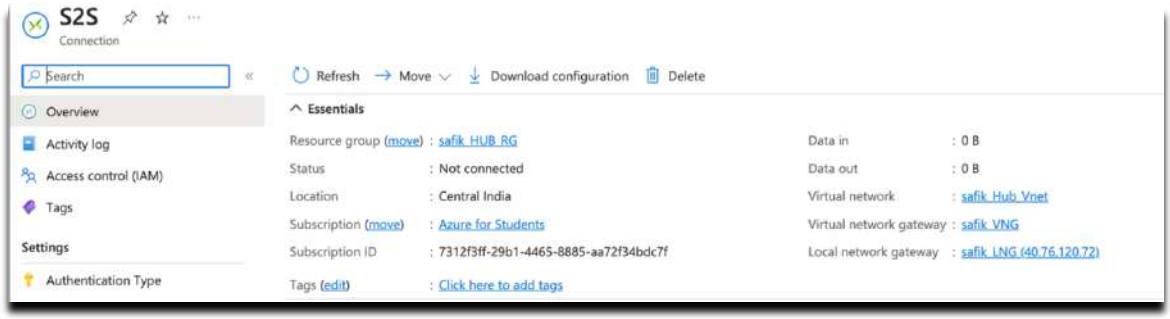


5. Overview of VNG.

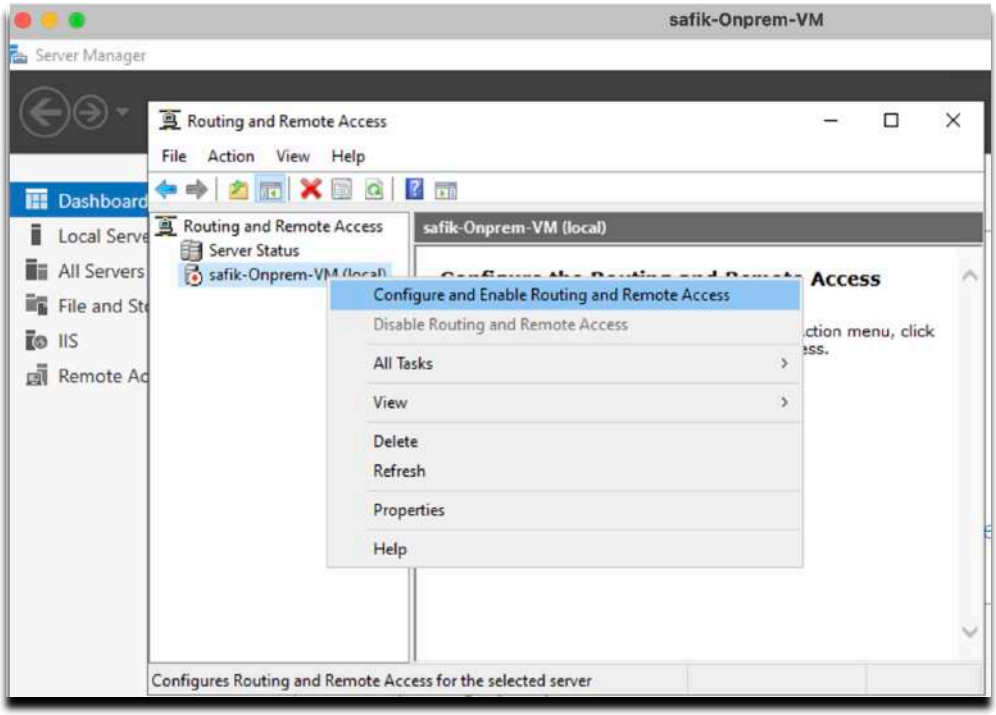
6. Create LNG in Hub-RG.



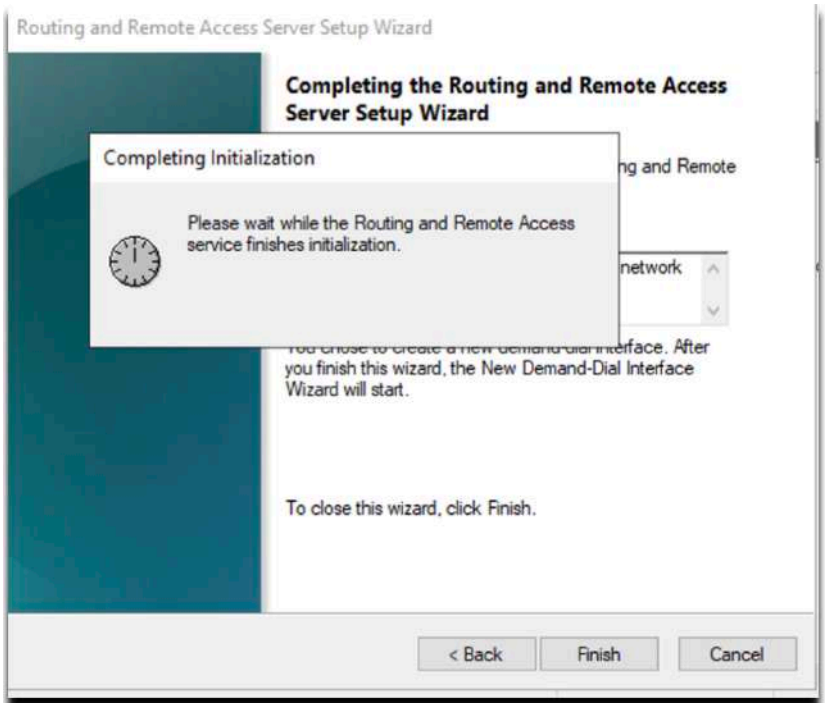
7. Overview of LNG.



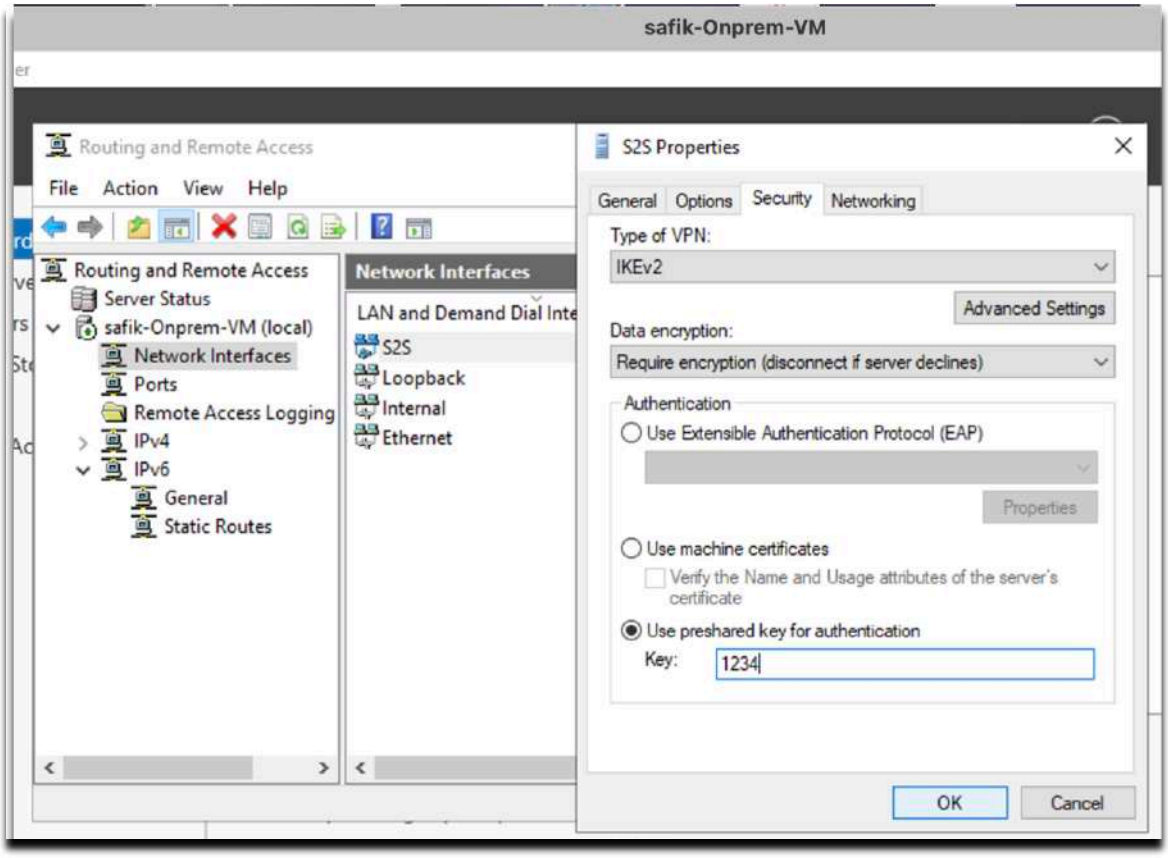
8. Create Site-to-site connetion.



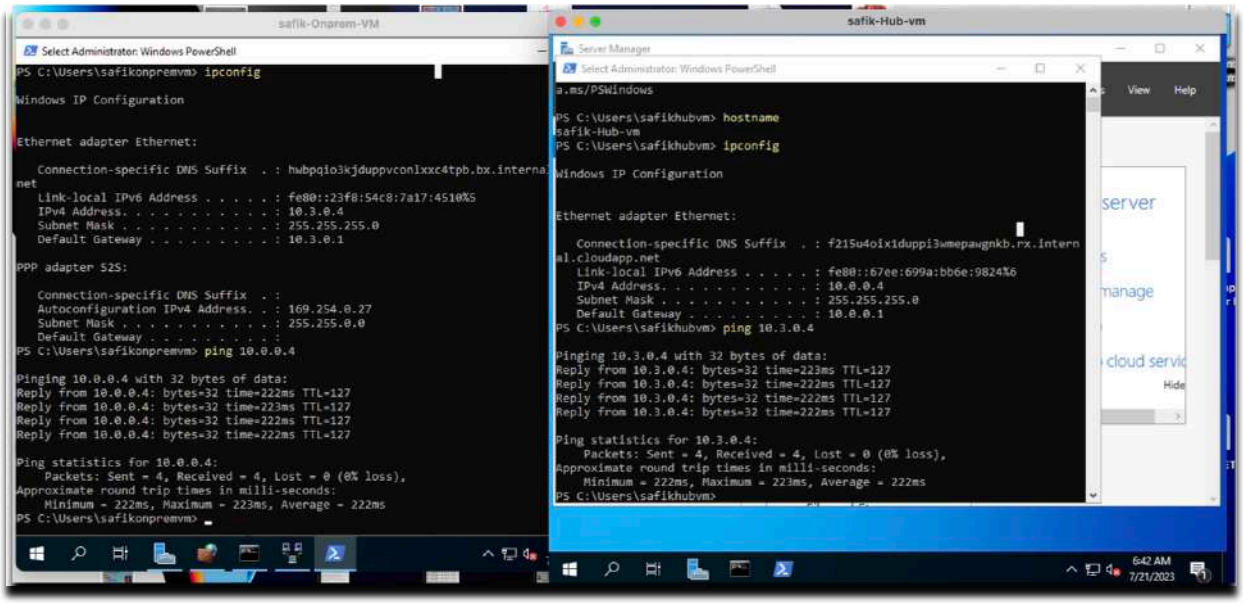
9. Configure RRAS in Onprem-VM.



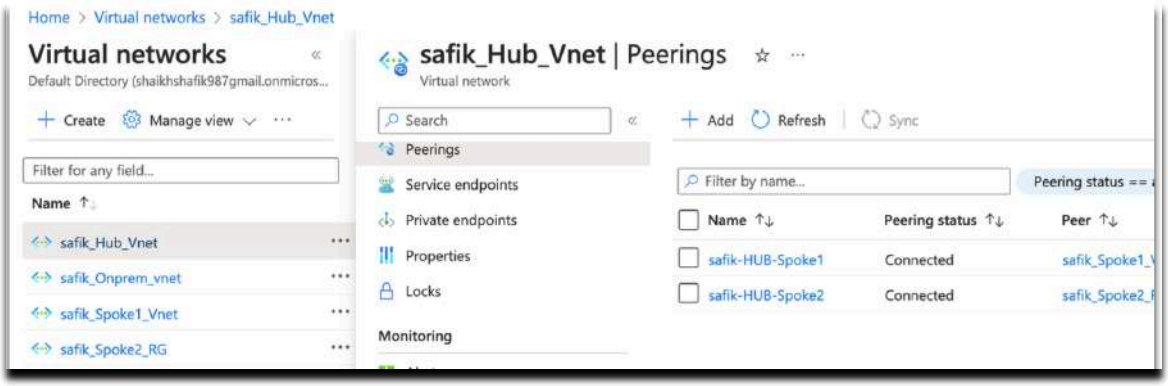
10. Succesfully Configure RRAS on Onprem-VM.



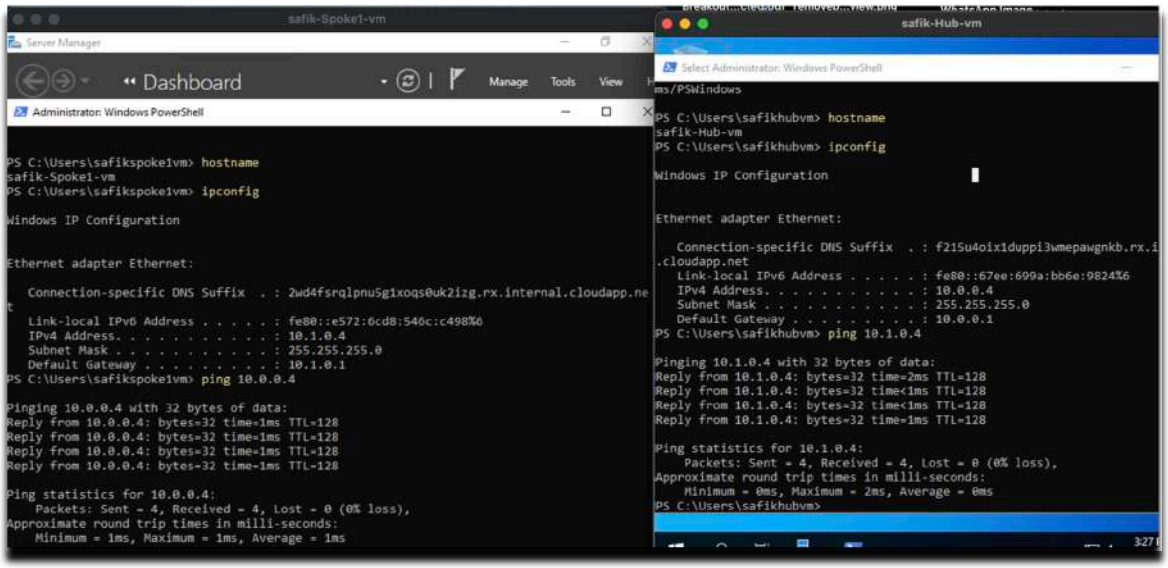
11. Configure S2S properties.



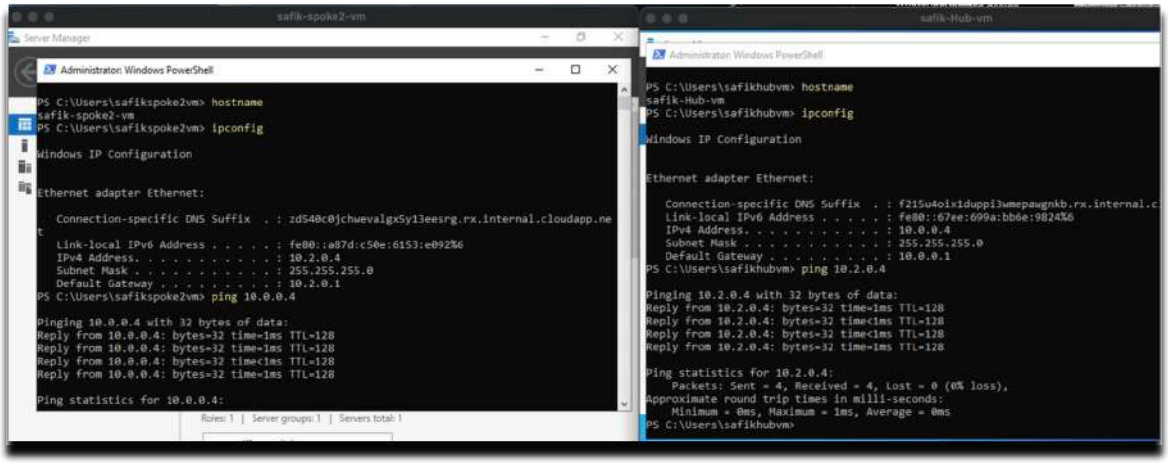
12. Pinging HUB – OnPrem VM , OnPrem – HUB VM.



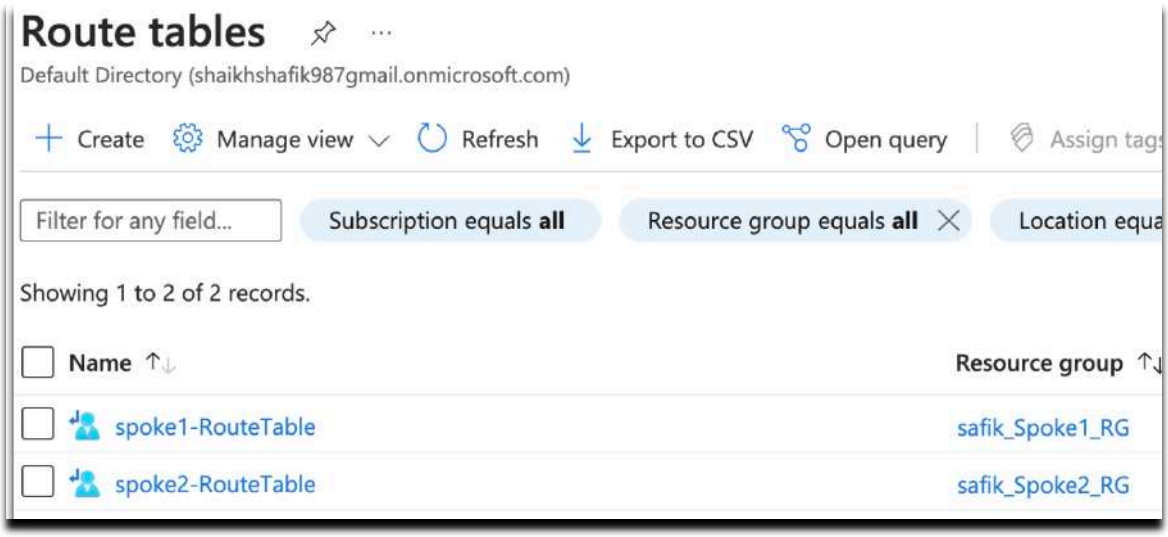
13. Configure VNet-Peering Between HUB and Spoke1 and Spoke2.



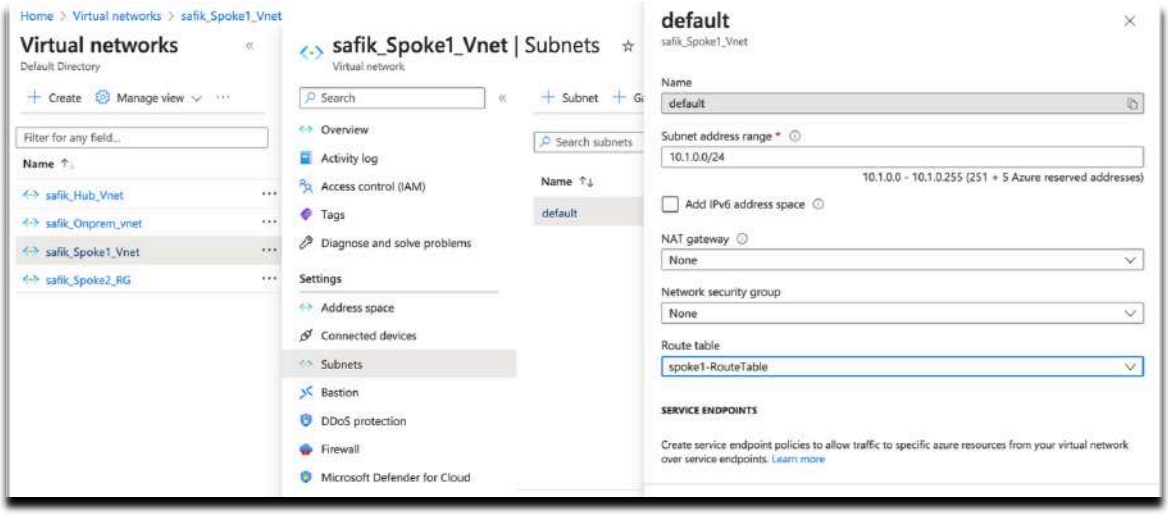
14. Pinging Spoke1 – HUB , HUB -Spoke1 VM.



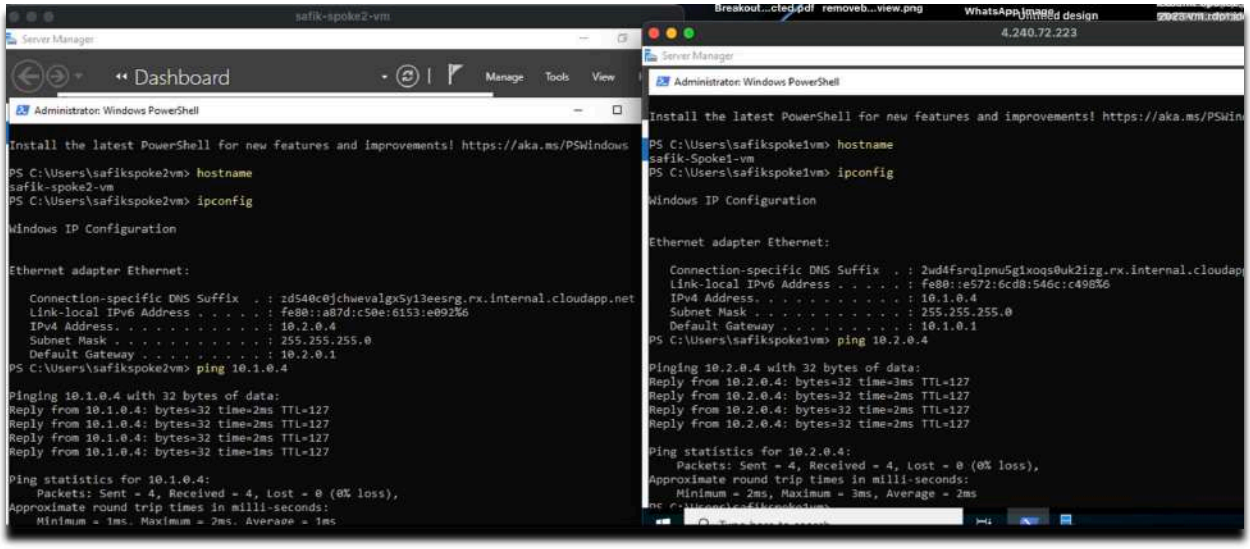
15. Pinging Spoke2 – HUB , HUB – Spoke2 VM.



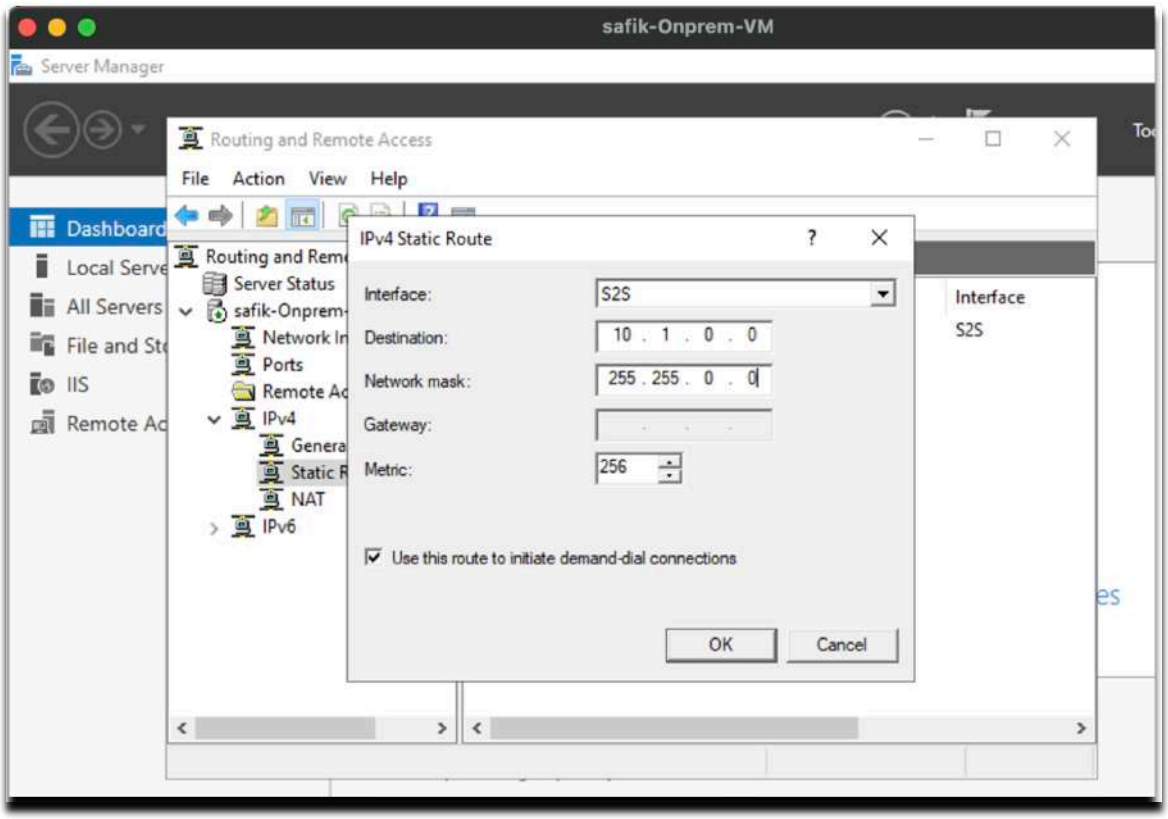
16. Create Route Table For Spoke1 and Spoke2.



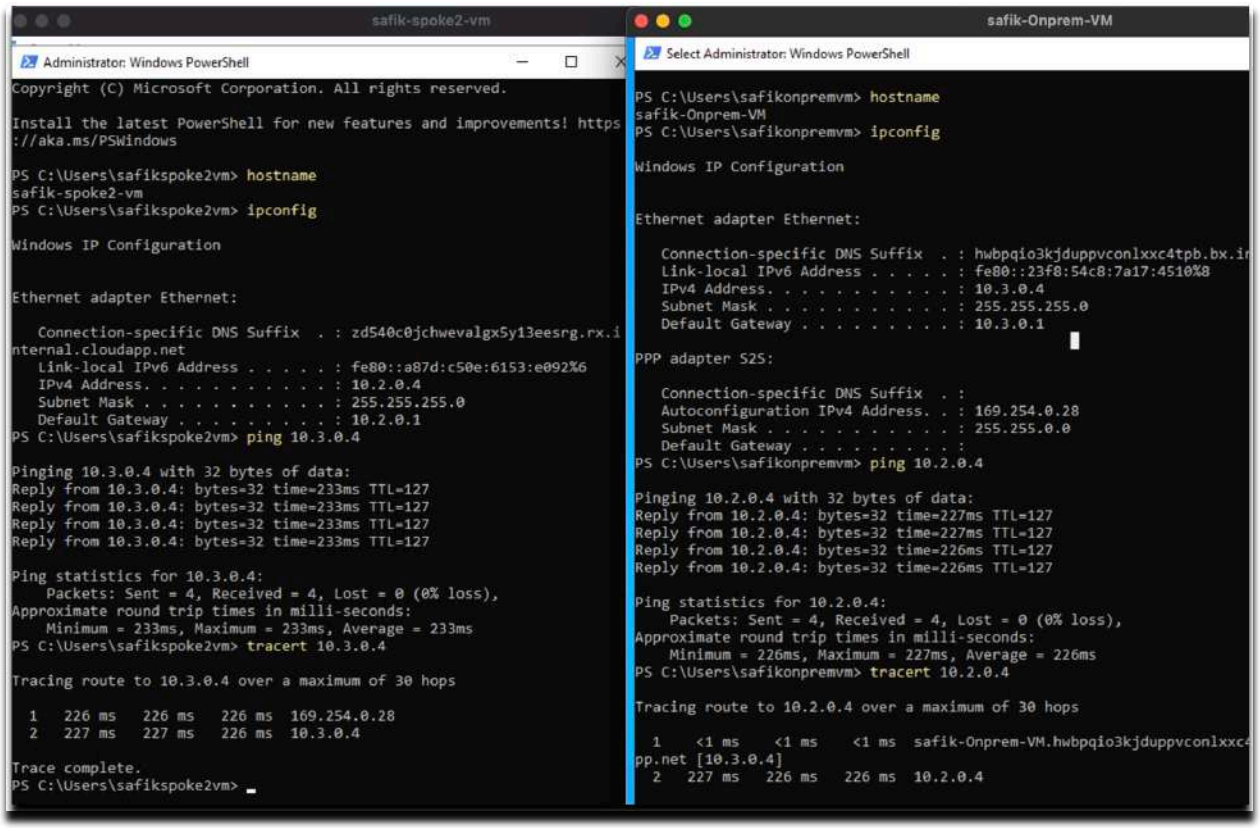
17. Now , We add Route Table in Vnet.



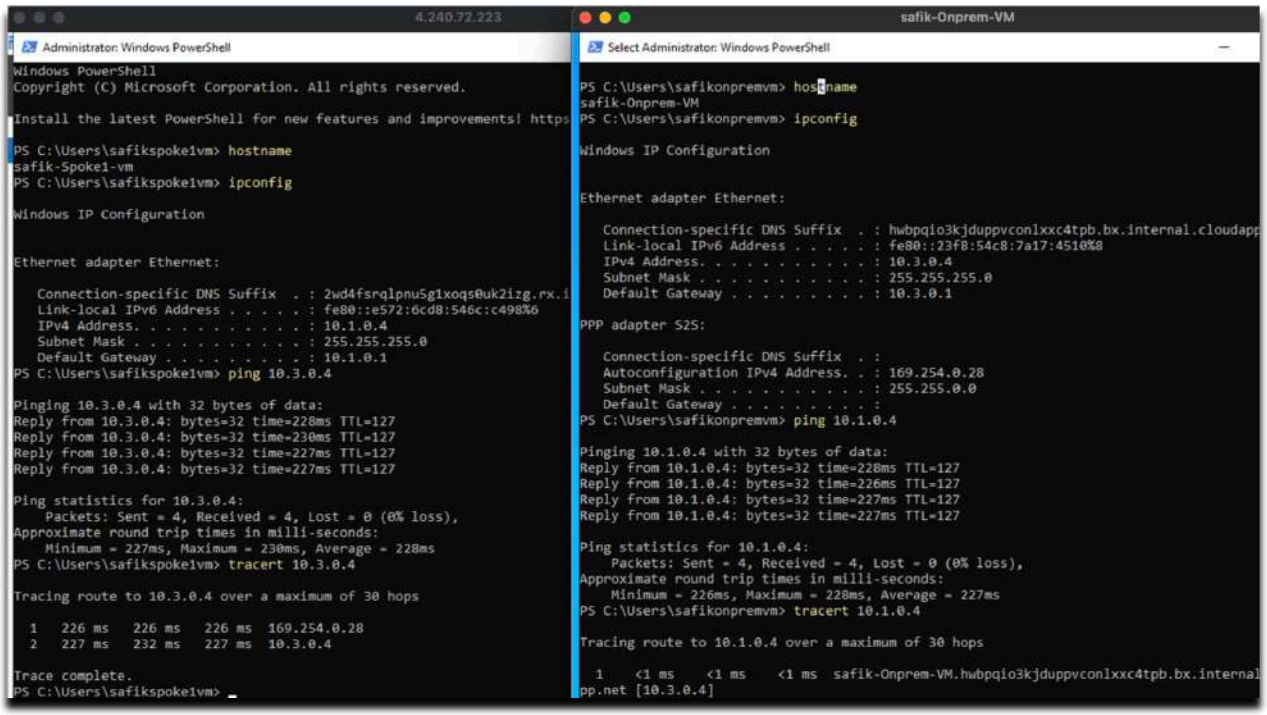
18. Pinging Spoke1-Spoke2 VM and Spoke2- Spoke1 VM.



19. Now Add Static Route for customize data Flow.



20. Pinging From Spoke2 – OnPrem , Onprem-Spoke2 VM.



21. Pinging Spoke1 – OnPrem VM and OnPrem – Spoke1 VM.

Chapter – 7 : Outcomes

7.1 Outcomes

During my internship at Celebal Technology, I had the privilege of working on cutting-edge technologies in Microsoft Azure's Cloud Infrastructure and Security domain. The immersive experience provided me with a comprehensive skill set and in-depth knowledge of various critical Azure services and concepts.

- **Virtual Network (VNet):** I gained a deep understanding of Azure Virtual Networks and their role as the building blocks of cloud-based infrastructures. I learned how to design and implement VNets, create subnets, and effectively manage IP address spaces to optimize resource utilization.
- **Virtual Network Peering:** I explored the importance of Virtual Network Peering in enabling seamless communication between Azure VNets. Understanding peering configurations allowed me to design interconnected and scalable cloud architectures.
- **Site-to-Site Connection:** My hands-on experience with Site-to-Site Connection in Azure was instrumental in establishing secure and encrypted connections between on-premises networks and Azure VNets. I learned to configure and manage VPN gateways to facilitate hybrid network architectures.
- **Virtual Network Gateway:** I honed my skills in configuring Virtual Network Gateways, enabling secure connectivity between Azure VNets and remote networks. This included implementing IPsec tunnels and ensuring smooth data transmission over the public internet.
- **Local Network Gateway: I** delved into Local Network Gateways, understanding their role in connecting on-premises networks to Azure VNets. This experience provided valuable insights into extending the corporate network into the cloud.
- **Routing and Remote Access Services (RRAS):** I acquired expertise in deploying RRAS in Azure to enable routing between VNets and on-premises networks. This knowledge enhanced the efficiency and resilience of the network infrastructure.

Chapter – 8 : Conclusion

8.1 Conclusion

My internship at Celebal Technology in the Microsoft Azure Cloud Infrastructure and Security domain was a transformative and enriching experience. I had the privilege of working with cutting-edge technologies and gaining practical expertise in various critical Azure services.

During the internship, I delved into the intricacies of Virtual Networks, Virtual Network Peering, Site-to-Site Connection, Virtual Network Gateway, Local Network Gateway, and Routing and Remote Access Services (RRAS). These hands-on experiences allowed me to design, deploy, and manage secure and scalable cloud infrastructures, enabling seamless communication between on-premises networks and Azure resources.

I also deepened my understanding of cloud security best practices, implementing identity and access management with Azure Active Directory, applying Network Security Groups for traffic control.

This internship not only equipped me with technical expertise but also instilled in me the importance of teamwork, continuous learning, and adaptability in the fast-paced world of cloud computing.

As I move forward, I am confident that the invaluable experiences and learning from this internship will serve as a driving force in shaping my professional growth and making a meaningful impact in the ever-evolving landscape of cloud technology.

Chapter – 9 : Reference

9.1 Reference

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