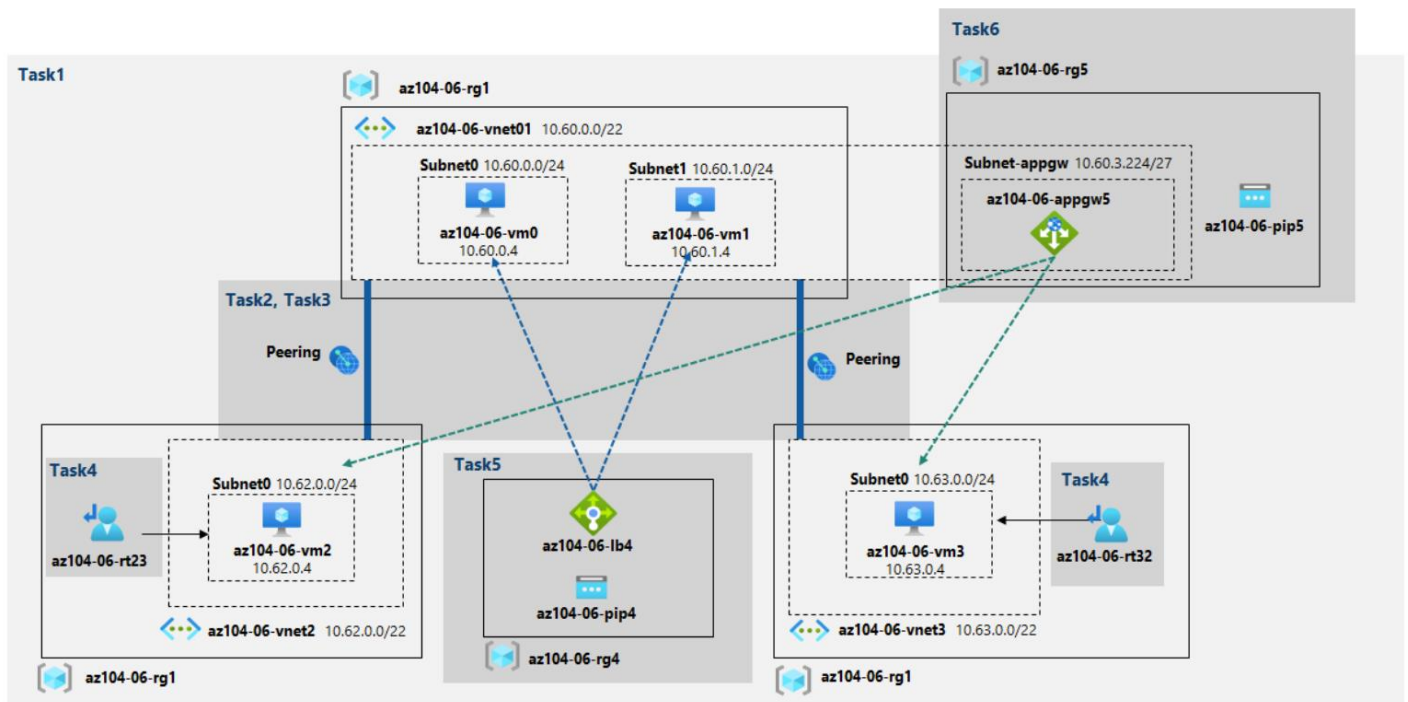


A5-Implement Traffic Management Project

My tasks:

1. Provision the environment
2. Configure hub and spoke network topology
3. Test transitivity of virtual networking peering
4. Configure routing in the hub and spoke topology
5. Implement Azure Load Balancer
6. Implement Azure Application Gateway

Architecture diagram of the implementing Traffic Management



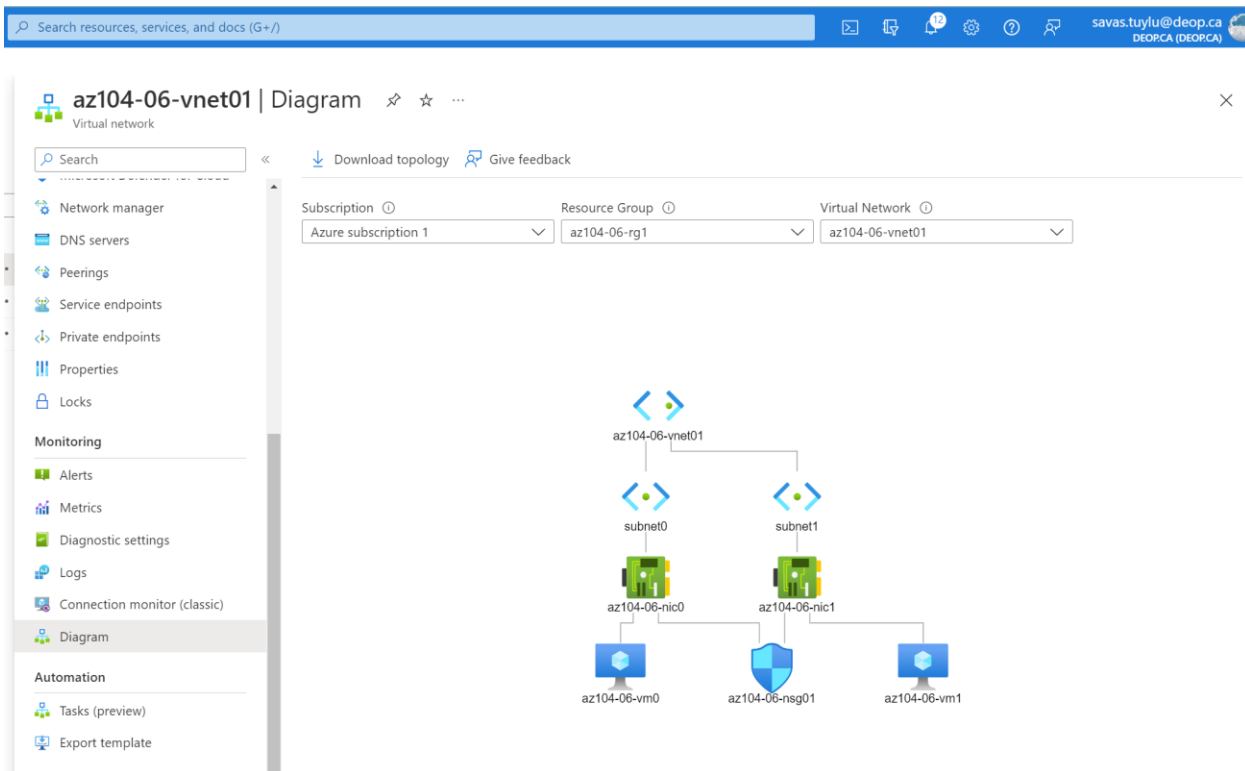
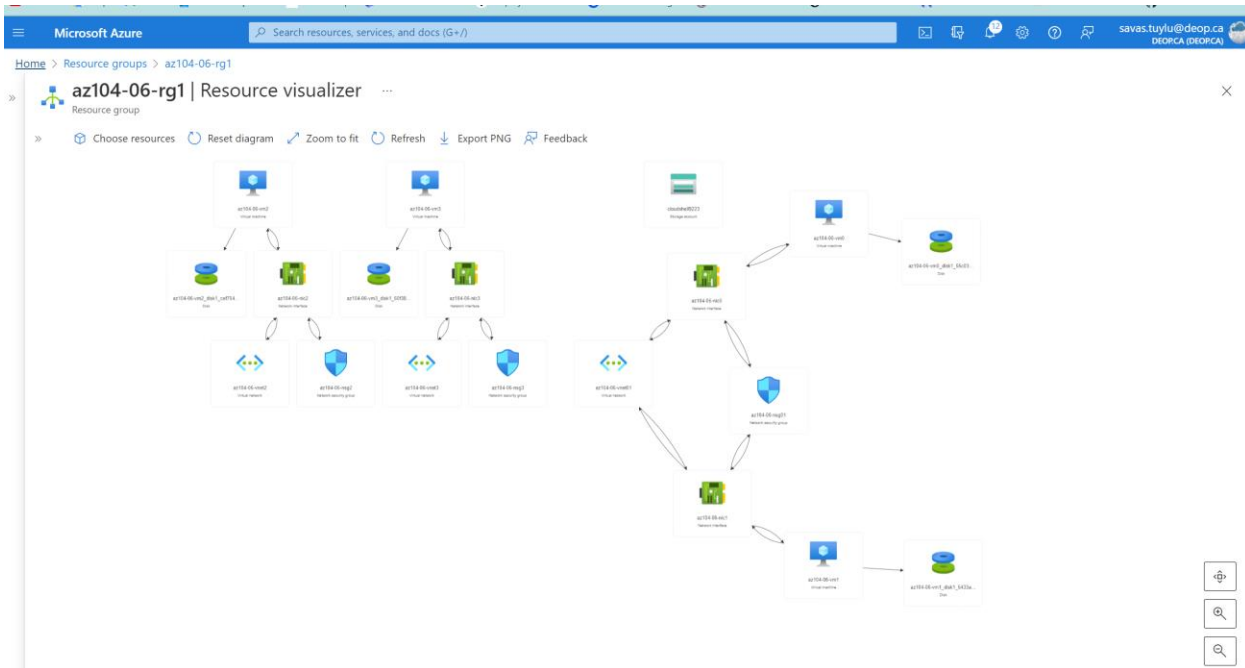
I tested managing network traffic targeting Azure virtual machines in the hub and spoke network topology, which Contoso considers implementing in its Azure environment. My approach needs to include implementing connectivity between spokes by relying on user defined routes that force traffic to flow via the hub, as well as traffic distribution across virtual machines by using layer 4 and layer 7 load balancers. For this purpose, I intend to use Azure Load Balancer (layer 4) and Azure Application Gateway (layer 7).

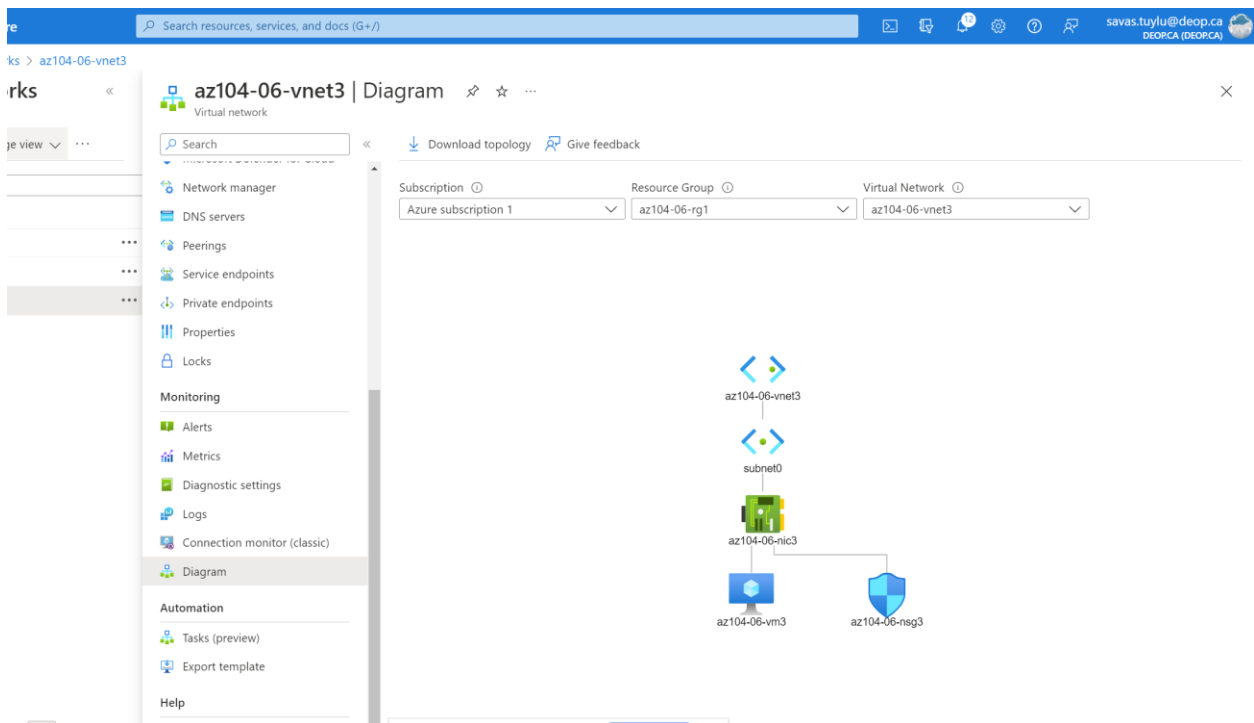
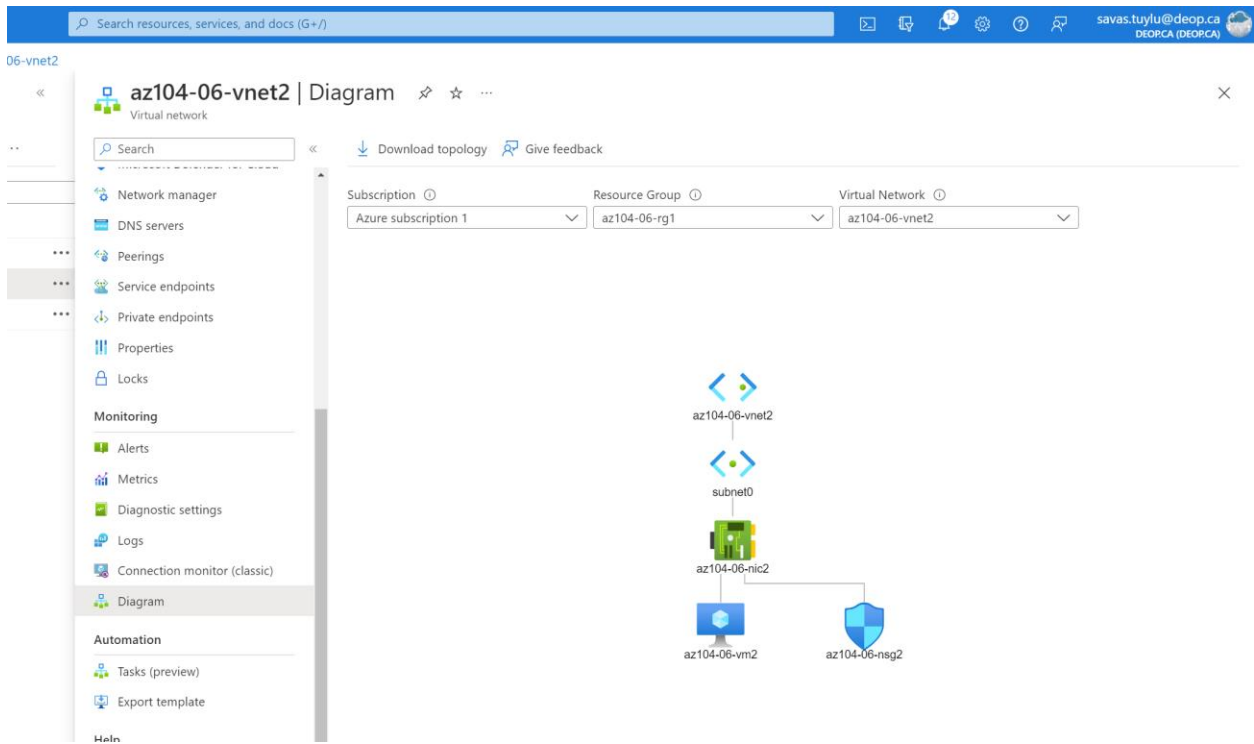
OSI (Open Source Interconnection) 7 Layer Model

Layer	Application/Example	Central Device/ Protocols	DOD4 Model
Application (7) Serves as the window for users and application processes to access the network services.	End User layer Program that opens what was sent or creates what is to be sent Resource sharing • Remote file access • Remote printer access • Directory services • Network management	User Applications SMTP	G A T E W A Y Can be used on all layers
Presentation (6) Formats the data to be presented to the Application layer. It can be viewed as the "Translator" for the network.	Syntax layer encrypt & decrypt (if needed) Character code translation • Data conversion • Data compression • Data encryption • Character Set Translation	JPEG/ASCII EBDIC/TIFF/GIF PICT	
Session (5) Allows session establishment between processes running on different stations.	Synch & send to ports (logical ports) Session establishment, maintenance and termination • Session support - perform security, name recognition, logging, etc.	Logical Ports RPC/SQL/NFS NetBIOS names	
Transport (4) Ensures that messages are delivered error-free, in sequence, and with no losses or duplications.	TCP Host to Host, Flow Control Message segmentation • Message acknowledgement • Message traffic control • Session multiplexing	PACKET F I L T E R I N G TCP/SPX/UDP	Host to Host
Network (3) Controls the operations of the subnet, deciding which physical path the data takes.	Packets ("letter", contains IP address) Routing • Subnet traffic control • Frame fragmentation • Logical-physical address mapping • Subnet usage accounting		Internet
Data Link (2) Provides error-free transfer of data frames from one node to another over the Physical layer.	Frames ("envelopes", contains MAC address) (end to end) [NIC card — Switch — NIC card] Establishes & terminates the logical link between nodes • Frame traffic control • Frame sequencing • Frame acknowledgment • Frame delimiting • Frame error checking • Media access control	Switch Bridge WAP PPP/SLIP	Land Based Layers Network
Physical (1) Concerned with the transmission and reception of the unstructured raw bit stream over the physical medium.	Physical structure Cables, hubs, etc. Data Encoding • Physical medium attachment • Transmission technique - Baseband or Broadband • Physical medium transmission Bits & Volts	Hub	

Task 1: Provision the environment

In this task, you will deploy four virtual machines into the same Azure region. The first two will reside in a hub virtual network, while each of the remaining two will reside in a separate spoke virtual network.

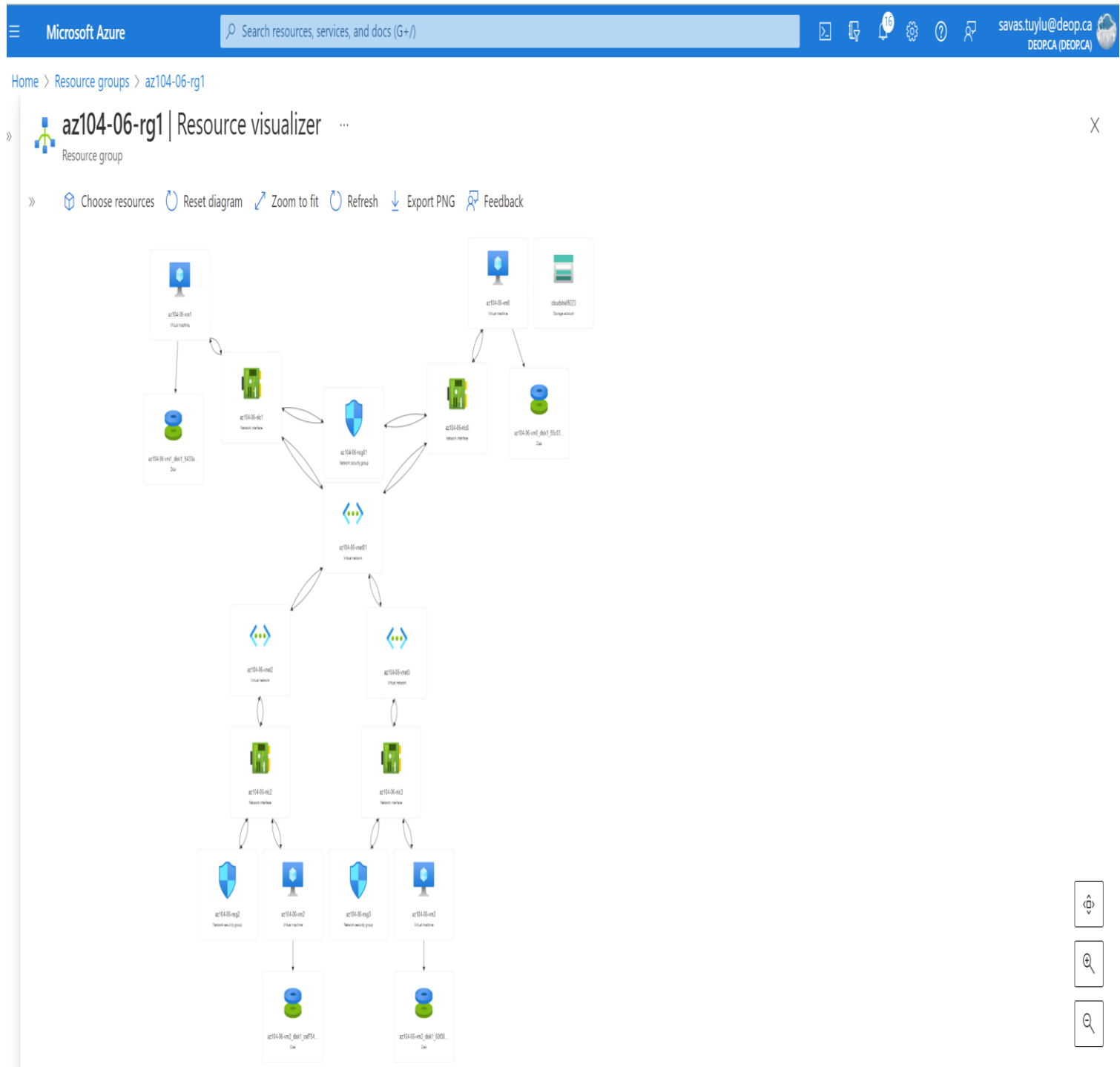




Task 2-3: Configure hub and spoke network topology & Test transitivity of virtual networking peering

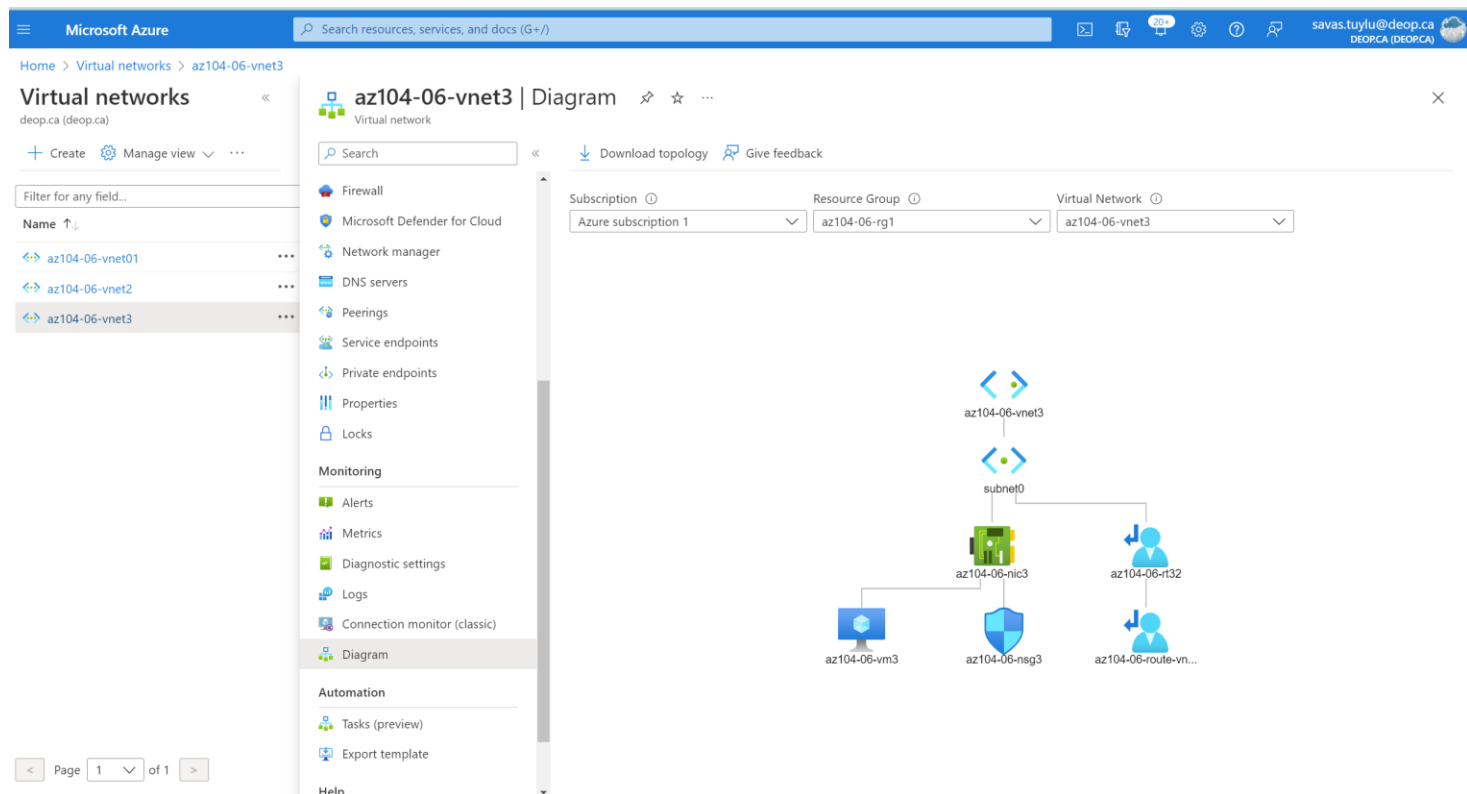
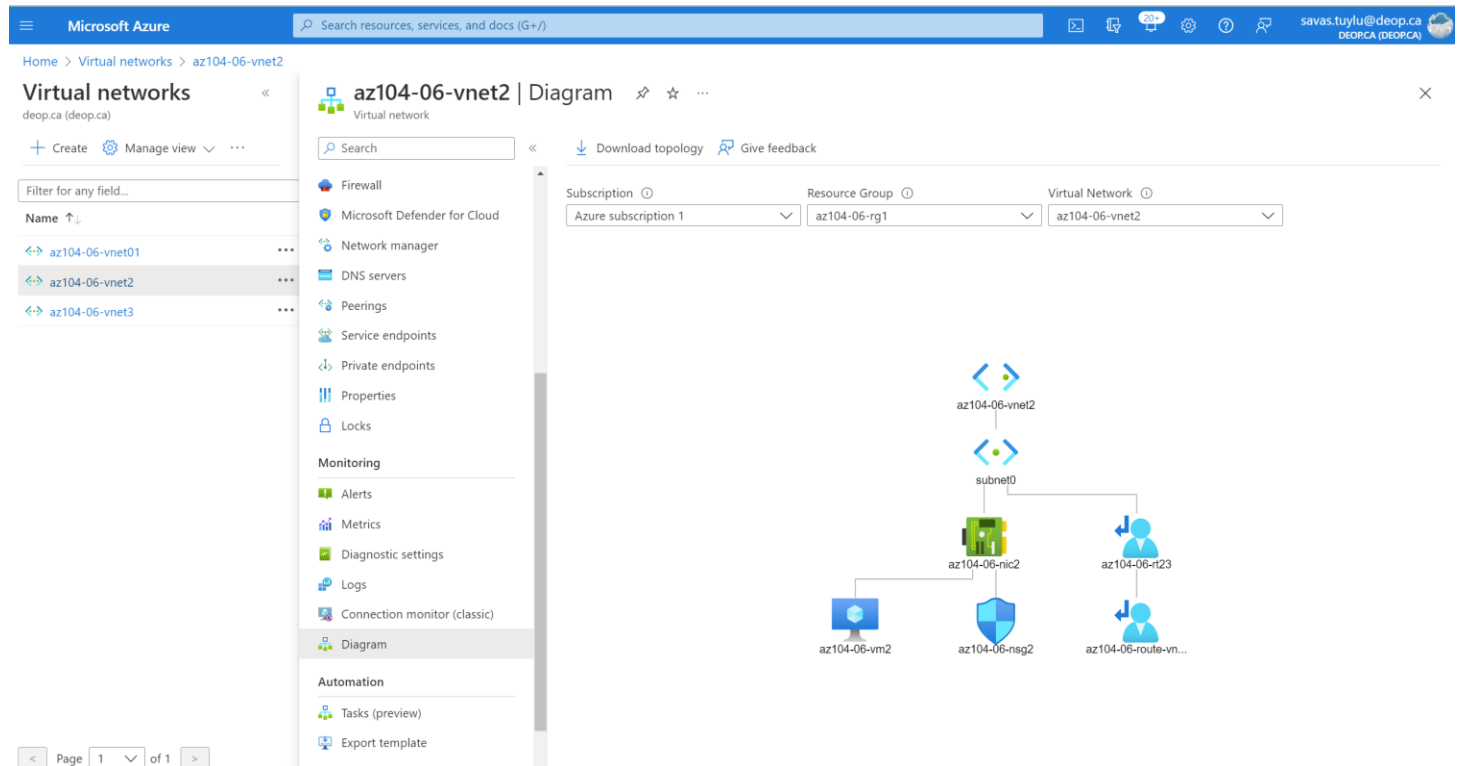
First of all, I configured local peering between the virtual networks I deployed in the previous tasks in order to create a hub and spoke network topology.

Last, you tested transitivity of virtual network peering by using Network Watcher.



Task 4: Configure routing in the hub and spoke topology

In this task, I configured and tested routing between the two spoke virtual networks by enabling IP forwarding on the network interface of the **az104-06-vm0** virtual machine, enabling routing within its operating system, and configuring user-defined routes on the spoke virtual network.





Task5: Implement Azure Load Balancer

In this task, I implemented an Azure Load Balancer in front of the two Azure virtual machines in the hub virtual network.

The screenshot displays the Microsoft Azure portal interface. On the left, the 'Resource groups' section shows a list of resource groups: 'az104-06-rg1', 'az104-06-rg4', and 'NetworkWatcherRG'. The 'az104-06-rg4' resource group is selected. The main area shows the 'az104-06-rg4 | Resource visualizer' page. The visualizer displays a diagram with two resources: 'az104-06-lb4 Load balancer' and 'az104-06-pip4 Public IP address'. The 'az104-06-lb4' resource is connected to the 'az104-06-pip4' resource. The visualizer also includes a search bar, a 'Choose resources' button, and a 'Reset diagram' button. The 'Resource visualizer' is also visible in the left sidebar under the 'Resource Groups' section.

az104-06-1b4 - Microsoft Azure x (1) Microsoft Teams x New Tab x AZ-104 Exam Guide - Microsoft x 20.120.119.89 x +

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

Home > Resource groups > az104-06-rg1

az104-06-rg1 | Resource visualizer

Resource group

» Choose resources Reset diagram Zoom to fit Refresh Export PNG Feedback

The diagram illustrates the resource architecture for the 'az104-06-rg1' resource group. At the top level, there are four virtual machines (VMs) labeled 'az104-06-vm01' through 'az104-06-vm04'. These VMs are connected to a central 'az104-06-vm01' resource, which is further connected to a 'az104-06-vm01' resource. Below this, there are four 'az104-06-vm01' resources, each connected to a 'az104-06-vm01' resource. At the bottom, there are four 'az104-06-vm01' resources, each connected to a 'az104-06-vm01' resource. The diagram also shows a 'Storage account' resource at the top right, connected to the central VMs. The interface includes a search bar, a list of resources, and a 'Feedback' button.

az104-06-1b4 - Microsoft Azure x (1) Microsoft Teams x New Tab x AZ-104 Exam Guide - Microsoft x 20.120.119.89 x +

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Home > Resource groups > az104-06-rg1

az104-06-rg1 | Resource visualizer

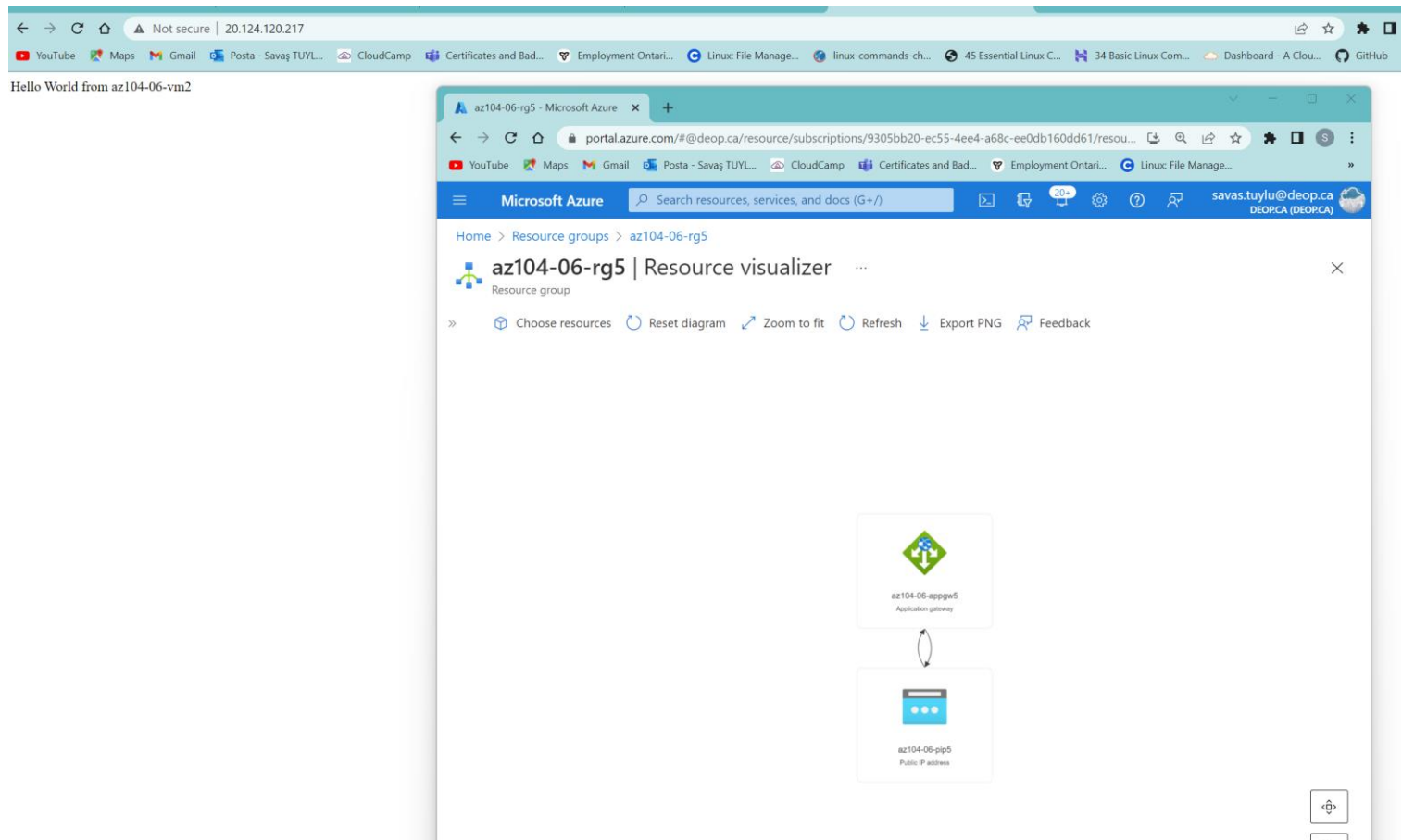
Resource group

» Choose resources Reset diagram Zoom to fit Refresh Export PNG Feedback

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Task6: Implement Azure Application Gateway

In this task, I implemented an Azure Application Gateway in front of the two Azure virtual machines in the spoke virtual networks.



Hello World from az104-06-vm3

az104-06-rg5 - Microsoft Azure

portal.azure.com/#@deop.ca/resource/subscriptions/9305bb20-ec55-4ee4-a68c-ee0db160dd61/resou...

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


savas.tuylu@deop.ca DEOPCA (DEOPCA)

Home > Resource groups > az104-06-rg5

az104-06-rg5 | Resource visualizer

Resource group

>> Choose resources Reset diagram Zoom to fit Refresh Export PNG Feedback



```
graph TD; az104-06-appgw5[az104-06-appgw5  
Application gateway] <--> az104-06-pip5[az104-06-pip5  
Public IP address];
```

az104-06-appgw5
Application gateway

az104-06-pip5
Public IP address