NETW211 FINAL COURSE PROJECT
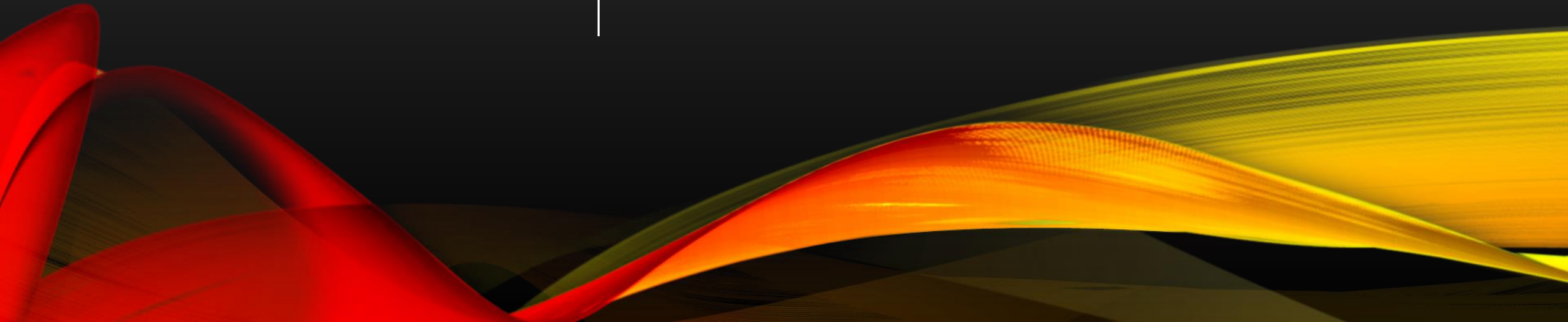
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INTRODUCTION

The purpose of this project was to gain experience creating infrastructure in Azure
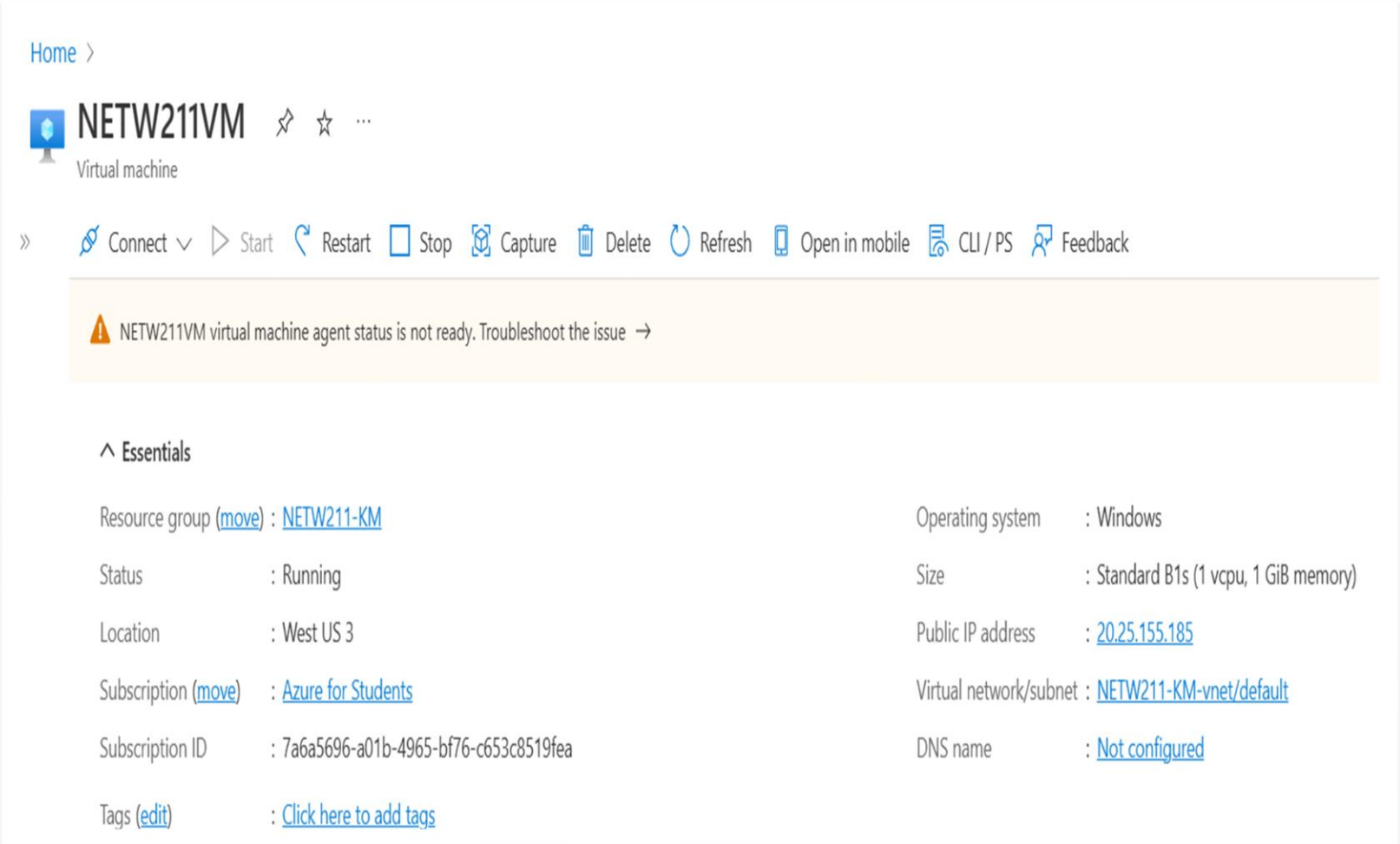
Over 6 weeks, we were tasked with setting up different infrastructure pieces such as network with IP addresses, virtual machines and data storage

VIRTUAL MACHINES

DEPLOYING A VM IN AZURE

This screenshot should show the NETW211VM page with information such as the resource group name, subscription, public IP address, etc.

Home >

NETW211VM
Virtual machine

» ⚡ Connect ⌄ ▷ Start ↻ Restart ⬜ Stop 📷 Capture 🗑 Delete ⟳ Refresh 📱 Open in mobile 🖥 CLI / PS 📣 Feedback

⚠ NETW211VM virtual machine agent status is not ready. Troubleshoot the issue →

∧ Essentials

Resource group (move)	: NETW211-KM	Operating system	: Windows
Status	: Running	Size	: Standard B1s (1 vcpu, 1 GiB memory)
Location	: West US 3	Public IP address	: 20.25.155.185
Subscription (move)	: Azure for Students	Virtual network/subnet	: NETW211-KM-vnet/default
Subscription ID	: 7a6a5696-a01b-4965-bf76-c653c8519fea	DNS name	: Not configured
Tags (edit)	: Click here to add tags		

Launching a VM

This screenshot should show the *NETW211-VM-Your Initials* page, with information such as the resource group name, subscription, public IP address, etc.

NETW211-VM-KM
Virtual machine

🔍 Search

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

Settings

- Networking
- Connect
- Disks
- Size
- Microsoft Defender for Cloud
- Advisor recommendations
- Extensions + applications
- Continuous delivery

⚡ Connect ∨   ▷ Start   ↻ Restart   ☐ Stop   ⬚ Capture   🗑 Delete   ↻ Refresh   📱 Open in mobile   CLI / PS   Feedback

∧ **Essentials**   JSON View

Resource group (move) : NETW211-RG-KM	Operating system : Linux (ubuntu 20.04)
Status : Running	Size : Standard B1s (1 vcpu, 1 GiB memory)
Location : East US 2	Public IP address : 20.119.234.193
Subscription (move) : Azure for Students	Virtual network/subnet : NETW211-RG-KM-vnet/default
Subscription ID : 7a6a5696-a01b-4965-bf76-c653c8519fea	DNS name : Not configured
Tags (edit) : Click here to add tags	

Properties   Monitoring   Capabilities (7)   Recommendations   Tutorials

🖥 **Virtual machine**   **Networking**

Computer name	NETW211-VM-KM	Public IP address	20.119.234.193
Health state	-	Public IP address (IPv6)	-
Operating system	Linux (ubuntu 20.04)	Private IP address	10.0.0.4
Publisher	canonical	Private IP address (IPv6)	-
Offer	0001-com-ubuntu-server-focal	Virtual network/subnet	NETW211-RG-KM-vnet/default

NETWORK WITH SUBNETS

CREATING A VNET WITH TWO SUBNETS

With a /24 network prefix, how many usable IPv4 host addresses are there?

There are a total of 251 usable IPv4 addresses

Given the answer above, why is the number of available IP addresses for Subnet0 (10.0.0.0/24) or Subnet1 (10.0.1.0/24) shown as 251?

They are being used as the following:

- 10.0.0.0 – network address
- 10.0.0.1 – default gateway
- 10.0.0.2 and 10.0.0.3 – used to map the Azure DNS IPs for the VNet
- 10.0.0.255 – is the network broadcast,

Deploying VMs into Subnets

This screenshot should show the *Properties* section of the **Subnet0-VM** page, showing the networking and size information of the VM.

Subnet0-VM
Virtual machine

Search Connect ∨ ▷ Start ↻ Restart ☐ Stop Capture 🗑 Delete ↻ Refresh Open in mobile CLI / PS Feedback

- Overview
- Activity log
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- Tags
- Diagnose and solve problems

Settings
- Networking
- Connect
- Windows Admin Center
- Disks
- Size
- Microsoft Defender for Cloud
- Advisor recommendations
- Extensions + applications
- Continuous delivery
- Availability + scaling

Virtual machine

Computer name	Subnet0-VM
Health state	-
Operating system	Windows (Windows Server 2019 Datacenter)
Publisher	MicrosoftWindowsServer
Offer	WindowsServer
Plan	2019-datacenter-gensecond
VM generation	V2
VM architecture	x64
Agent status	Ready
Agent version	2.7.41491.1057
Host group	None
Host	-
Proximity placement group	-
Colocation status	N/A
Capacity reservation group	-

Availability + scaling

Availability zone	-

Networking

Public IP address	20.119.165.81
Public IP address (IPv6)	-
Private IP address	10.0.0.4
Private IP address (IPv6)	-
Virtual network/subnet	NETW211-VNet-KM/Subnet0
DNS name	Configure

Size

Size	Standard B1s
vCPUs	1
RAM	1 GiB

Disk

OS disk	Subnet0-VM_disk1_d3f9e0c72cd549bcb7909b04dfc9ca7a
Encryption at host	Disabled
Azure disk encryption	Not enabled
Ephemeral OS disk	N/A
Data disks	0

Deploying VMs into Subnets
(continued)

This screenshot should show the *Properties* section of the **Subnet1-VM** page, showing the networking and size information of the VM.

Deploying VMs into Subnets
(continued)

This screenshot should show the topology diagram of your VNet (*NETW211-VNet-Your Initials*) with two subnets (*Subnet0* and *Subnet1*) and one VM in each subnet (*Subnet0-VM* and *Subnet1-VM*).

Subscription ⓘ

| Azure for Students ˅ |

Resource Group ⓘ

| NETW211-RG ˅ |

Virtual Network ⓘ

| NETW211-VNet-KM ˅ |

NETW211-VNet-KM

Subnet0

subnet0-vm497

Subnet0-VM Subnet0-VM-nsg Subnet0-VM-ip

Subnet1

subnet1-vm148

Subnet1-VM Subnet1-VM-nsg Subnet1-VM-ip
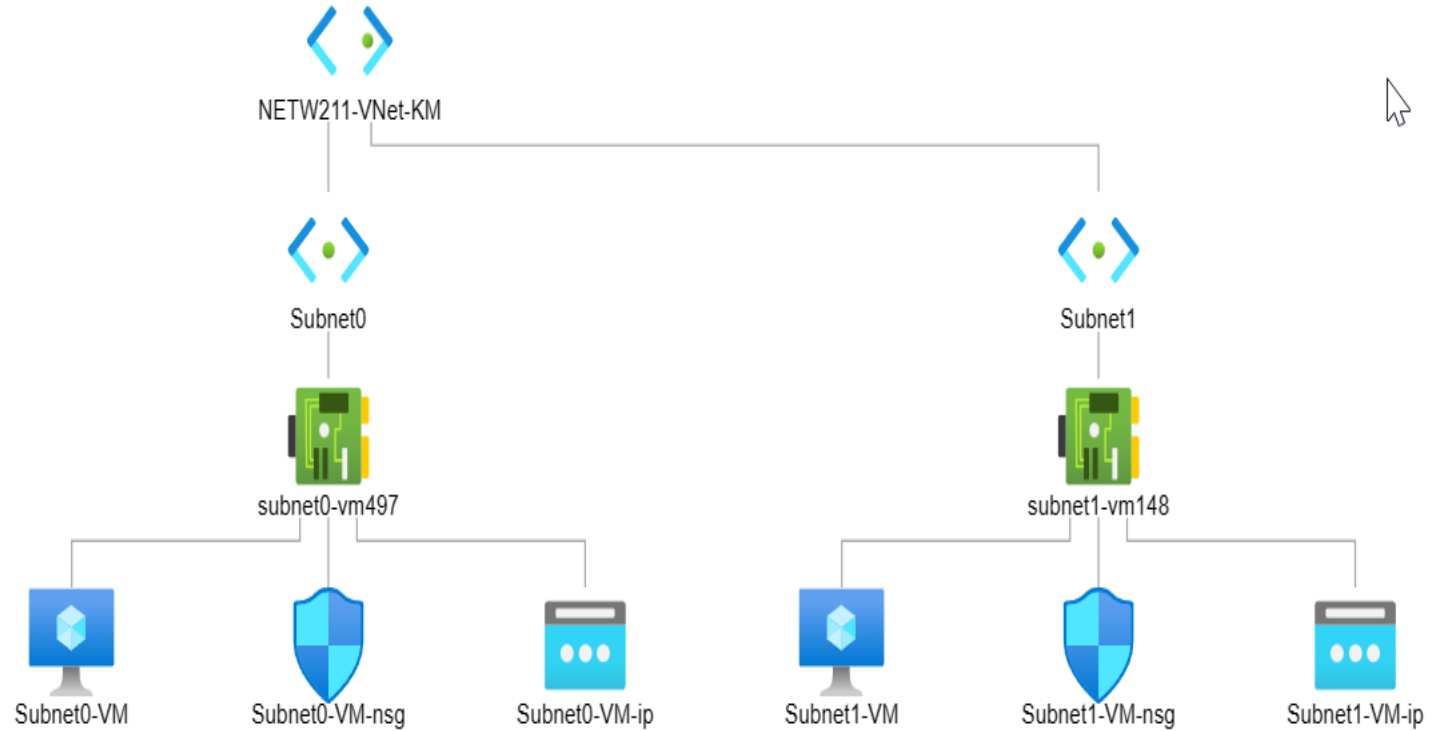
Configuring an NSG

This screenshot should show the Inbound port rules section with the newly added Allow_Ping rule.

CLOUD STORAGE

QUESTION

What does the access tier setting do?

Access tier settings allow the administrator to determine how data is organized by how often it is accessed and what its retention rate is.

What are the Azure blob storage access tiers?

Hot Tier – these files are accessed and modified most often. Has highest storage cost and can be accessed most quickly

Cool Tier – these files are accessed or modified less frequently and should have a minimum retention rate of 30 days. Has lower storage cost than hot but takes longer to access the data

Archive Tier – this is data that is not used or rarely used and should have a retention rate of at least 180 days. Has the lowest storage cost but takes the longest to access and download

Uploading & Accessing a File

This screenshot should show the browser window with the image uploaded from your local computer and the URL on top of the window.

Creating Blob Snapshots

This screenshot should show the browser window with the "*This is the original version. – Your Initials*" message and the URL on top of the window
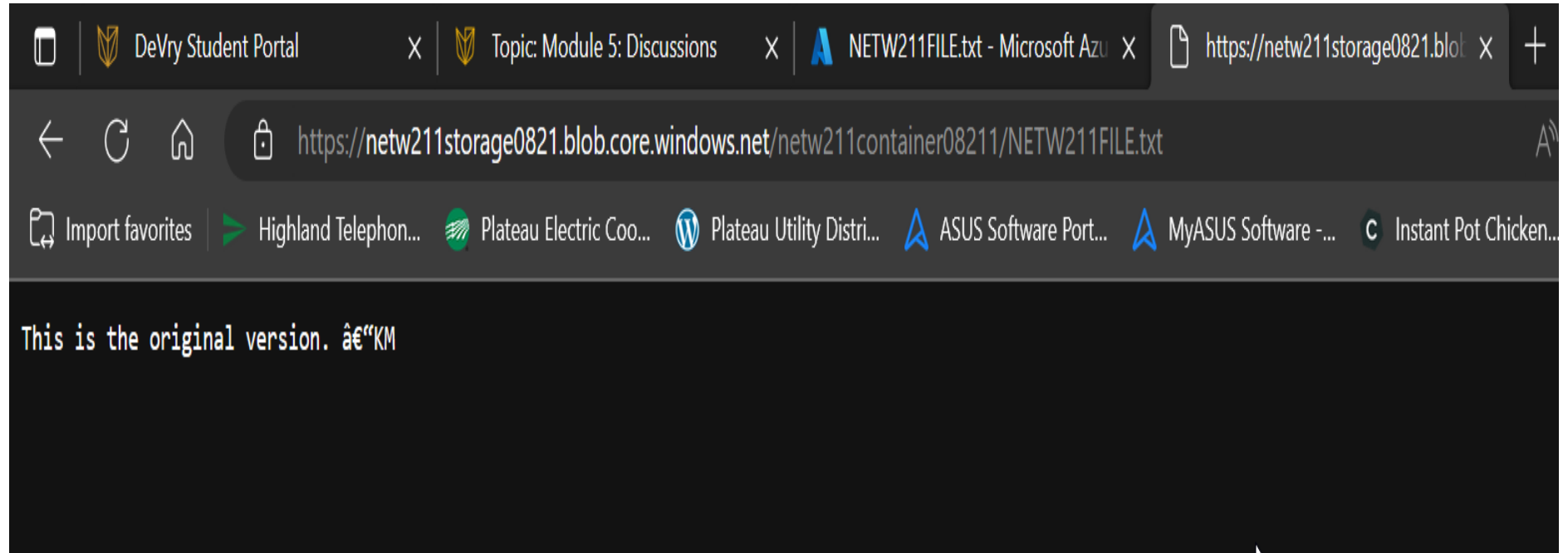
Enabling Blob Versioning

This screenshot should show the browser window with the "*This is the first revised version. – Your Initials*" message and the URL on top of the window.
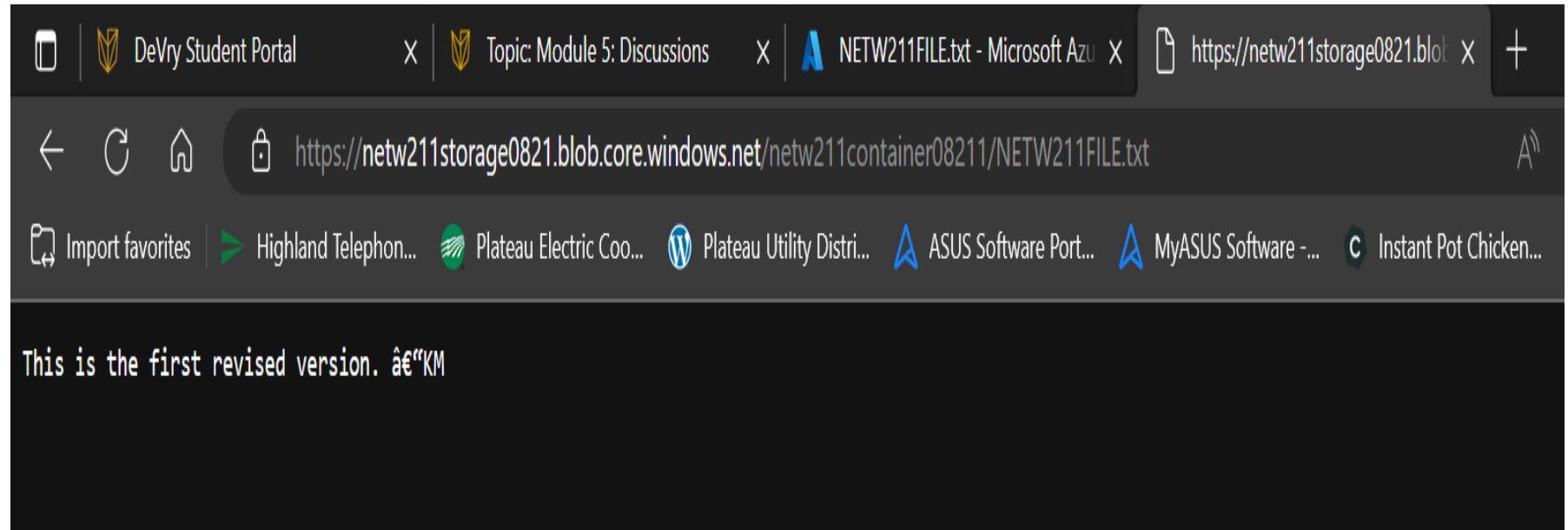
Setting up an Action Group and Notifications

This screenshot should show the "VM-Status-Change" action group on the *Manage actions* page.

Setting up Alert Rules

This screenshot should show the *Alert rules* window showing the *VM-Deallocate* and *VM-Restart* rules.

TESTING CONNECTIONS

Connecting to the VM via SSH

This screenshot should show the *azureuser@NETW211-VM-Your Initials* window showing the IPv4 address of the VM in the Azure cloud.

CONNECTING TO THE VM

This screenshot should show the PROPERTIES for NETW211VM page, with the computer name, operating system version, hardware information, etc.

Verifying Connectivity between VMs

This screenshot should show the *ipconfig* and *ping 10.0.0.4* results in the command prompt window, including the **Subnet0***-VM – 10.0.0.4 – Remote Desktop Connection* window title.


```
Administrator: Command Prompt                                        —    □    ✕

C:\>hostname
Subnet1-VM

C:\>ipconfig

Windows IP Configuration


Ethernet adapter Ethernet:

   Connection-specific DNS Suffix  . : 2m41eqeruunejkhpav5ecpvmke.cx.internal.cloudapp.net
   Link-local IPv6 Address . . . . . : fe80::cbf1:30d6:3828:ceaf%6
   IPv4 Address. . . . . . . . . . . : 10.0.1.4
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . : 10.0.1.1

C:\>ping 10.0.0.4

Pinging 10.0.0.4 with 32 bytes of data:
Reply from 10.0.0.4: bytes=32 time=1ms TTL=128
Reply from 10.0.0.4: bytes=32 time=1ms TTL=128
Reply from 10.0.0.4: bytes=32 time=1ms TTL=128
Reply from 10.0.0.4: bytes=32 time=1ms TTL=128

Ping statistics for 10.0.0.4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 1ms, Average = 1ms

C:\>_
```

Verifying Connectivity between VMs
(continued)

This screenshot should show the *ipconfig* and *ping 10.0.1.4* results in the command prompt window, including the **Subnet1**-*VM – 10.0.1.4 – Remote Desktop Connection* window title.

```
Select Administrator: Command Prompt                              —    □    ✕

C:\>hostname
Subnet0-VM

C:\>ipconfig

Windows IP Configuration


Ethernet adapter Ethernet:

   Connection-specific DNS Suffix  . : 2m41eqeruunejkhpav5ecpvmke.cx.internal.cloudapp.net
   Link-local IPv6 Address . . . . . : fe80::bebf:7510:6ab1:fe8e%4
   IPv4 Address. . . . . . . . . . . : 10.0.0.4
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . : 10.0.0.1

C:\>ping 10.0.1.4

Pinging 10.0.1.4 with 32 bytes of data:
Reply from 10.0.1.4: bytes=32 time=1ms TTL=128
Reply from 10.0.1.4: bytes=32 time=1ms TTL=128
Reply from 10.0.1.4: bytes=32 time=1ms TTL=128
Reply from 10.0.1.4: bytes=32 time=1ms TTL=128

Ping statistics for 10.0.1.4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 1ms, Average = 1ms
```

Testing a configured NSG

This screenshot should show the successful ping result from your local computer to the VM in the Azure cloud.

Testing Alerts

This screenshot should show the *'VM-Restart'* *was activated* email message with the date and time of the alert.

Important notice: Azure Monitor alert VM-RESTART was activated

Inbox ×

Microsoft Azure <azure-noreply@microsoft.com> Unsubscribe
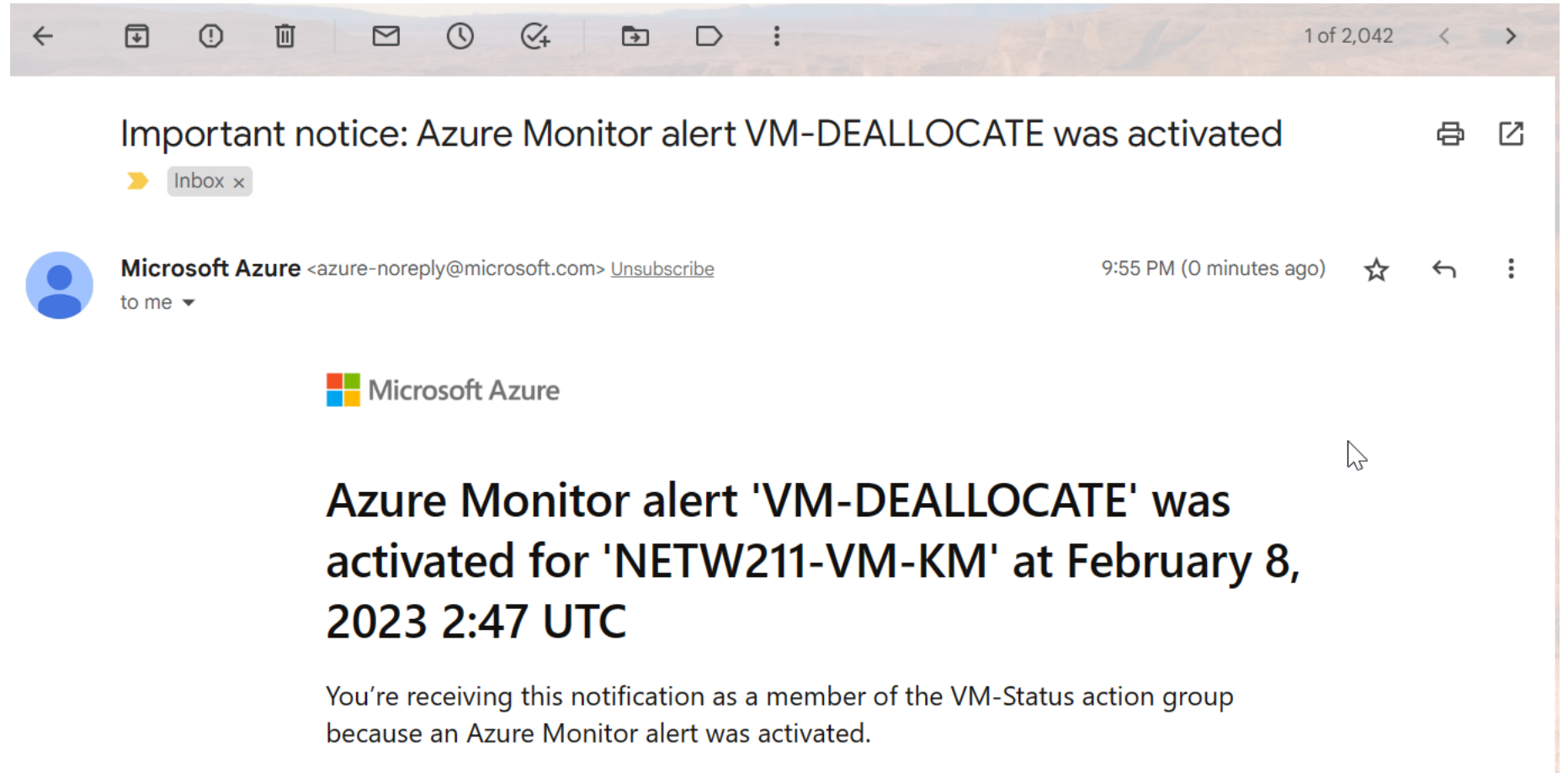
to me

9:45 PM (1 minute ago)

Microsoft Azure

Azure Monitor alert 'VM-RESTART' was activated for 'NETW211-VM-KM' at February 8, 2023 2:38 UTC

You're receiving this notification as a member of the VM-Status action group because an Azure Monitor alert was activated.

Testing Alerts (continued)

This screenshot should show the *'VM-Deallocate' was activated* email message with the date and time of the alert.

SUMMING UP THE PROJECT

CHALLENGES

Setting up the network in 2 segments and assigning a VM to that network

Navigating the Azure GUI to find the RBAC for specific areas

Using SSH to connect to a VMStuff

SKILLS LEARNED

Best practices to secure network devices in the Azure environment

Best Practices on how data should be stored and accessed

How to keep data storage costs low to ensure accurate and easy access to data

CONCLUSION

This project gave a thorough experience on how to use Azure cloud and set up each piece of the infrastructure.

It was emphasized that even though we are hosting in the cloud, we should be aware of how to secure the infrastructure to ensure only users that were vetted and approved are allowed access.

REFERENCES

IP Subnet Calculator,
https://www.calculator.net/ip-subnet-calculator.html

Azure Virtual Network frequently asked questions,
https://docs.microsoft.com/en-us/azure/virtual-network/virtual-networks-faq

Hot, Cool, and Archive access tiers for blob data,
https://docs.microsoft.com/en-us/azure/storage/blobs/access-tiers-overview