

NETW211: Fundamentals of Cloud Computing

Course Project
Presentation

By Glenn Delostrico

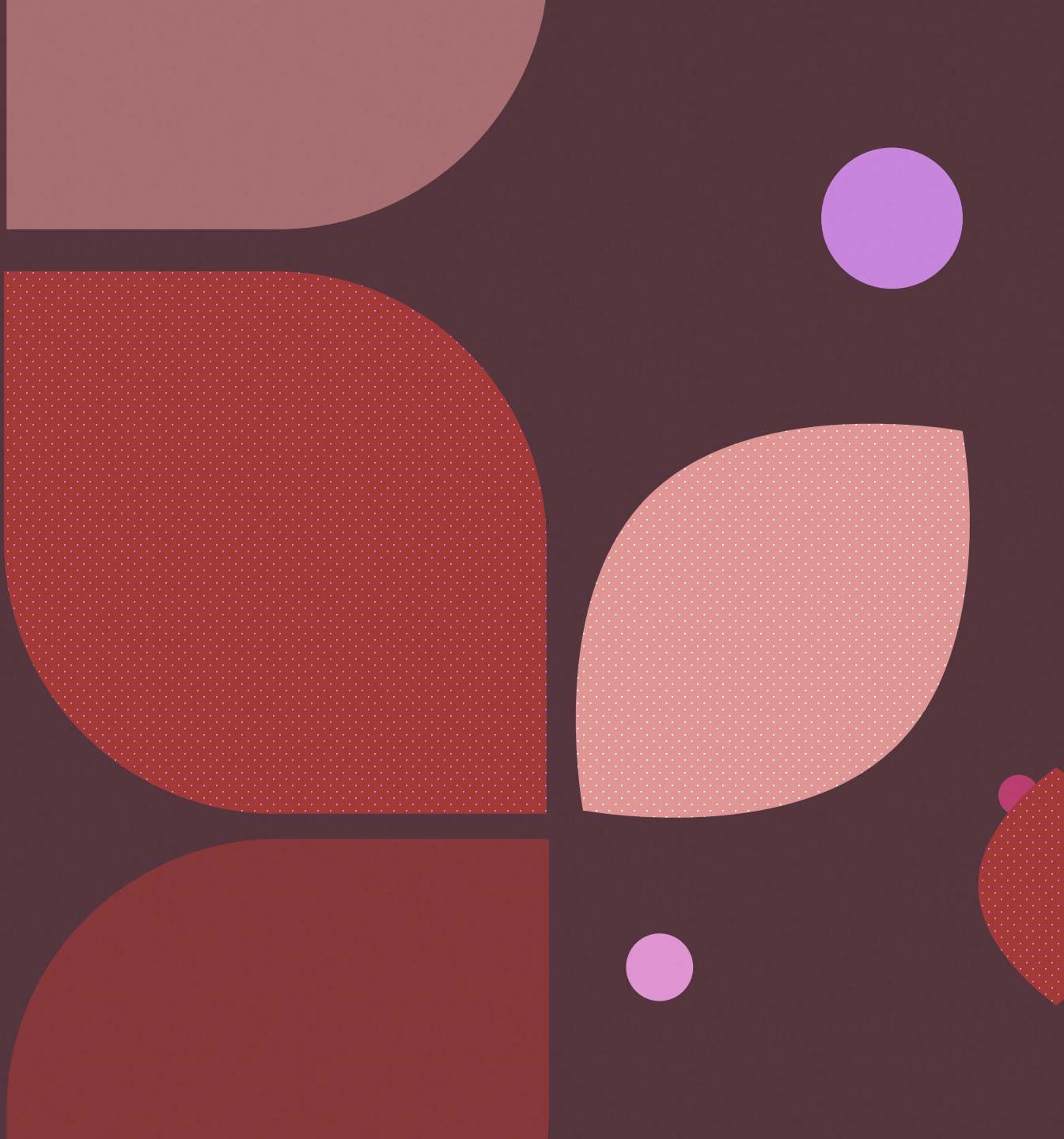
Table of Contents

- Virtual Machine (VM) Instances
- Virtual Private Cloud (VPC)
- Azure VM Security
- Cloud Storage
- Cloud Monitoring



Virtual Machine (VM) Instances

- Deploying a VM in Azure
- Connecting to the VM
- Deleting the VM



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.

^ Essentials	
Resource group (move)	: NETW211-GD
Status	: Running
Location	: West US 3
Subscription (move)	: Azure for Students
Subscription ID	: 03f4f57f-82b9-4901-ac2c-dccd7c83f312
Tags (edit)	: Click here to add tags
Operating system	: Windows
Size	: Standard B1s (1 vcpu, 1 GiB memory)
Public IP address	: 20.171.45.157
Virtual network/subnet	: NETW211-GD-vnet/default
DNS name	: Not configured

Connecting to the VM

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

Device specifications

Device name	NETW211VM
Processor	Intel(R) Xeon(R) Platinum 8370C CPU @ 2.80GHz 2.79 GHz
Installed RAM	1.00 GB
Device ID	AD1DFCD6-4559-4093-B1FE-C06440EAB70A
Product ID	00430-00000-00000-AA965
System type	64-bit operating system, x64-based processor
Pen and touch	No pen or touch input is available for this display

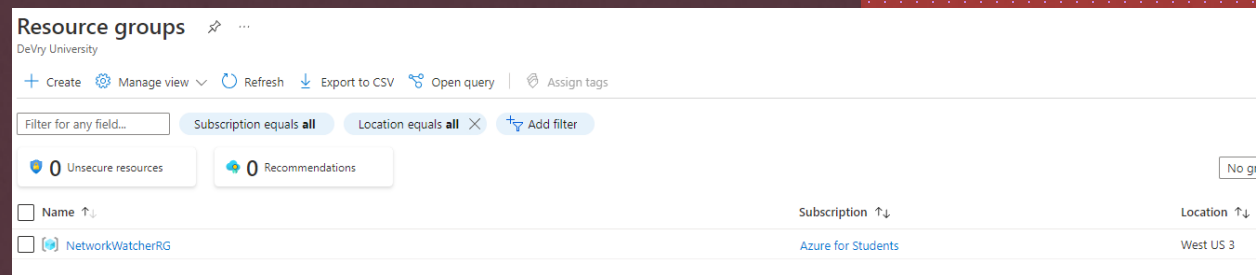
Rename this PC

Windows specifications

Edition	Windows Server 2019 Datacenter
Version	1809
Installed on	9/5/2022
OS build	17763.3287

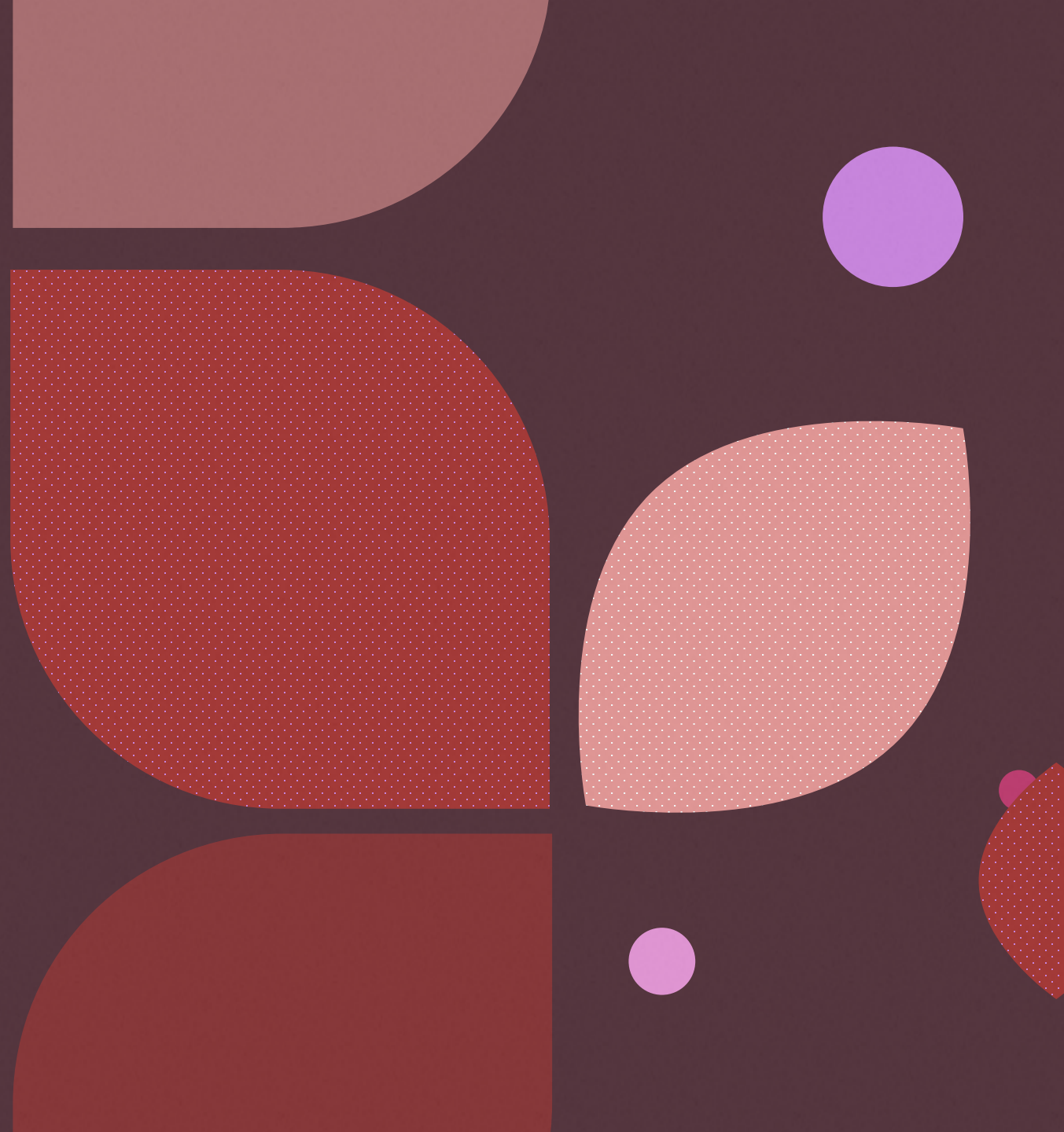
Deleting the VM

This screenshot should show the *Resource groups* page, with the *Azure for Students* subscription selection and the “No resource groups to display” message.



Virtual Private Cloud (VPC)

- Creating a VNet with Two Subnets
- Deploying VMs into Subnets
- Verifying Connectivity between VMs



Creating a VNet with Two Subnets

- 1. With a /24 network prefix, how many **usable** IPv4 host addresses are there? [hint: you learned this in NETW191]
 - Answer here: 254
 -
- 2. 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? [hint: where did the missing addresses go?]
 - Answer here: 1) Goes to the Network Address 2) Reserved for the VPC router 3) Reserved for the DNS 4) Reserved for Azure 5) Reserved for network broadcast
- References (here are two examples to get your research started):
 - 1. IP Subnet Calculator, <https://www.calculator.net/ip-subnet-calculator.html>
 - 2. Azure Virtual Network frequently asked questions, <https://docs.microsoft.com/en-us/azure/virtual-network/virtual-networks-faq>
 - 3.
 - 4.

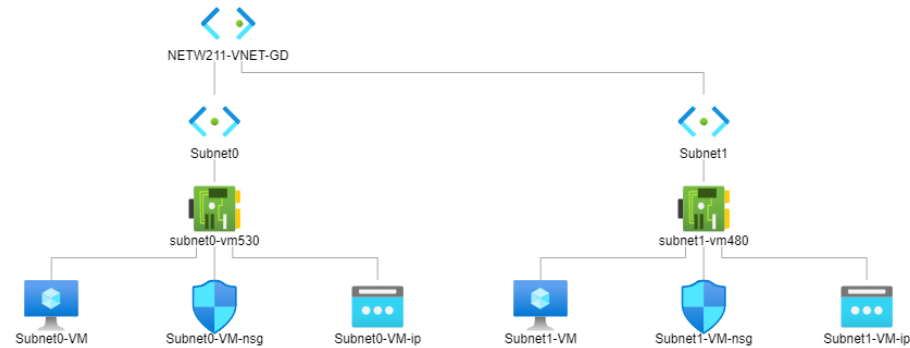
Deploying VMs into Subnets cont'd

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

Virtual machine		Networking	
Computer name	Subnet1-VM	Public IP address	20.244.117.188
Health state	-	Public IP address (IPv6)	-
Operating system	Windows (Windows Server 2019 Datacenter)	Private IP address	10.0.1.4
Publisher	MicrosoftWindowsServer	Private IP address (IPv6)	-
Offer	WindowsServer	Virtual network/subnet	NETW211-VNET-GD/Subnet1
Plan	2019-datacenter-gensecond	DNS name	Configure
VM generation	V2		
VM architecture	x64	Size	
Agent status	Ready	Size	Standard B1s
Agent version	2.7.41491.1044	vCPUs	1
Host group	None	RAM	1 GiB
Host	-		
Proximity placement group	-	Disk	
Colocation status	N/A	OS disk	Subnet1-VM_OsDisk_1_7b85a229c4ab4247aef
Capacity reservation group	-	Encryption at host	Disabled
		Azure disk encryption	Not enabled
		Ephemeral OS disk	N/A

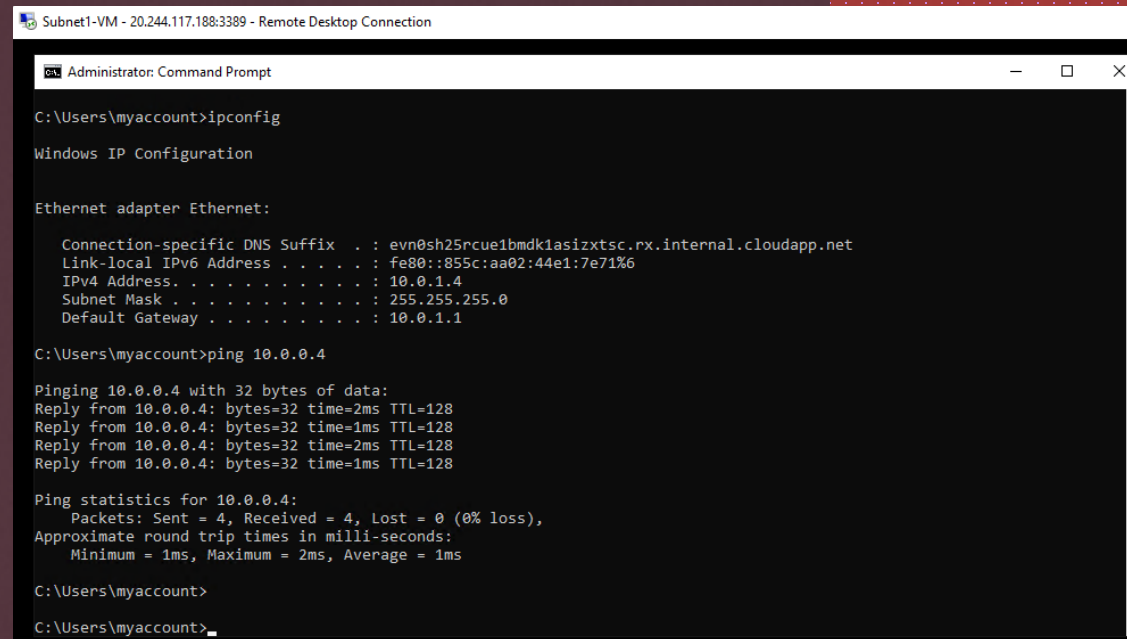
Deploying VMs into Subnets cont'd

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*).



Verifying Connectivity between VMs

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



```
Subnet1-VM - 20.244.117.188:3389 - Remote Desktop Connection

Administrator: Command Prompt

C:\Users\myaccount>ipconfig

Windows IP Configuration

Ethernet adapter Ethernet:

    Connection-specific DNS Suffix  . : evn0sh25rcue1bmdk1asizxtsc.rx.internal.cloudapp.net
    Link-local IPv6 Address . . . . . : fe80::855c:aa02:44e1:7e71%6
    IPv4 Address. . . . . : 10.0.1.4
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : 10.0.1.1

C:\Users\myaccount>ping 10.0.0.4

Pinging 10.0.0.4 with 32 bytes of data:
Reply from 10.0.0.4: bytes=32 time=2ms TTL=128
Reply from 10.0.0.4: bytes=32 time=1ms TTL=128
Reply from 10.0.0.4: bytes=32 time=2ms 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 = 2ms, Average = 1ms

C:\Users\myaccount>

C:\Users\myaccount>_
```

Verifying Connectivity between VMs cont'd

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

```
Subnet0-VM - 20.244.114.96:3389 - Remote Desktop Connection
Microsoft Windows [Version 10.0.17763.3406]
(c) 2018 Microsoft Corporation. All rights reserved.

C:\Users\myaccount>ipconfig

Windows IP Configuration

Ethernet adapter Ethernet:

    Connection-specific DNS Suffix  . : evn0sh25rcue1bmdk1asizxtsc.rx.internal.cloud
    Link-local IPv6 Address . . . . . : fe80::d03e:fc5:a20e:8735%6
    IPv4 Address. . . . . : 10.0.0.4
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : 10.0.0.1

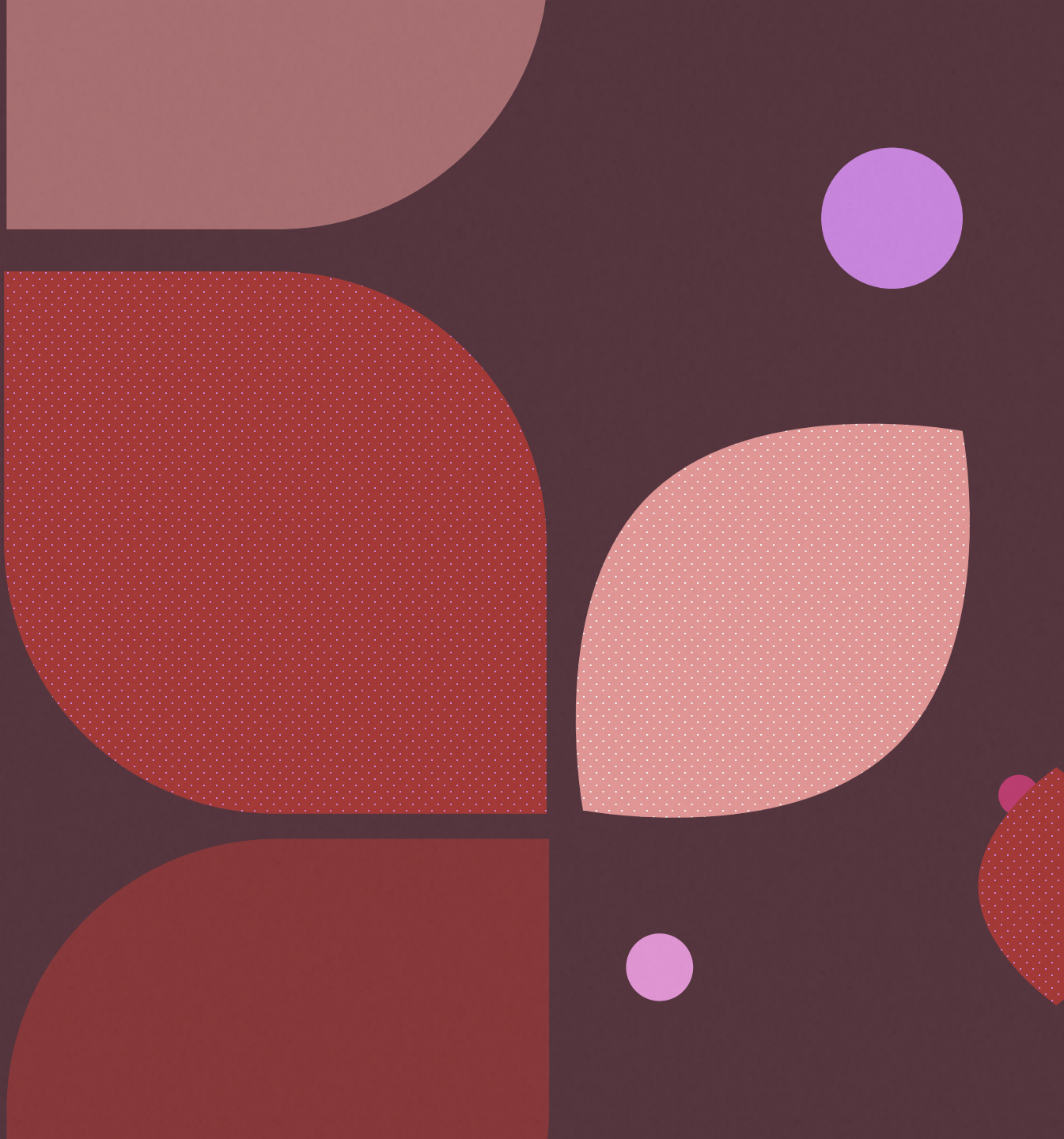
C:\Users\myaccount>ping 10.0.1.4

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=3ms TTL=128
Reply from 10.0.1.4: bytes=32 time=2ms TTL=128

Ping statistics for 10.0.1.4:
    Packets: Sent = 3, Received = 3, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 3ms, Average = 2ms
Control-C
^C
C:\Users\myaccount>
```

Azure VM Security

- Launching a VM
- Connecting to the VM via SSH
- Configuring an NSG



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.

PropertiesMonitoringCapabilities (7)RecommendationsTutorials

Virtual machine

Computer name
Health state
Operating system
Publisher
Offer
Plan
VM generation
VM architecture
Agent status
Agent version
Host group
Host
Proximity placement group
Colocation status
Capacity reservation group

NETW211VM
-
Linux (ubuntu 20.04)
canonical
0001-com-ubuntu-server-focal
20_04-lts-gen2
V2
x64
Ready
2.8.0.11
None
-
-
N/A
-

Availability + scaling

Availability zone
Availability set
Scale Set

-
-
-

Networking

Public IP address
Public IP address (IPv6)
Private IP address
Private IP address (IPv6)
Virtual network/subnet
DNS name

20.207.199.119
-
10.0.0.4
-
NETW211-GD-vnet/default
[Configure](#)

Size

Size
vCPUs
RAM

Standard B1s
1
1 GiB

Disk

OS disk
Encryption at host
Azure disk encryption
Ephemeral OS disk
Data disks

NETW211VM_disk1_cde0a06b50e243c59612e4526ef6b10
Disabled
Not enabled
N/A
0

Azure Spot

Azure Spot
Azure Spot eviction policy

-
-

Connecting to the VM via SSH

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

```
azureuser@NETW211VM:~$ uname -r
5.15.0-1020-azure
azureuser@NETW211VM:~$ cat /etc/os-release
NAME="Ubuntu"
VERSION="20.04.5 LTS (Focal Fossa)"
ID=ubuntu
ID_LIKE=debian
PRETTY_NAME="Ubuntu 20.04.5 LTS"
VERSION_ID="20.04"
HOME_URL="https://www.ubuntu.com/"
SUPPORT_URL="https://help.ubuntu.com/"
BUG_REPORT_URL="https://bugs.launchpad.net/ubuntu/"
PRIVACY_POLICY_URL="https://www.ubuntu.com/legal/terms-and-policies/privacy-policy"
VERSION_CODENAME=focal
UBUNTU_CODENAME=focal
azureuser@NETW211VM:~$ ping -c 4 www.facebook.com
PING star-mini.c10r.facebook.com (31.13.68.35) 56(84) bytes of data:
64 bytes from edge-star-mini-shv-03-xsp1.facebook.com (31.13.68.35): icmp_seq=1 ttl=50 time=47.7 ms
64 bytes from edge-star-mini-shv-03-xsp1.facebook.com (31.13.68.35): icmp_seq=2 ttl=50 time=47.6 ms
64 bytes from edge-star-mini-shv-03-xsp1.facebook.com (31.13.68.35): icmp_seq=3 ttl=50 time=47.7 ms
^C
--- star-mini.c10r.facebook.com ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2003ms
rtt min/avg/max/mdev = 47.563/47.649/47.724/0.066 ms
azureuser@NETW211VM:~$ ip addr
```

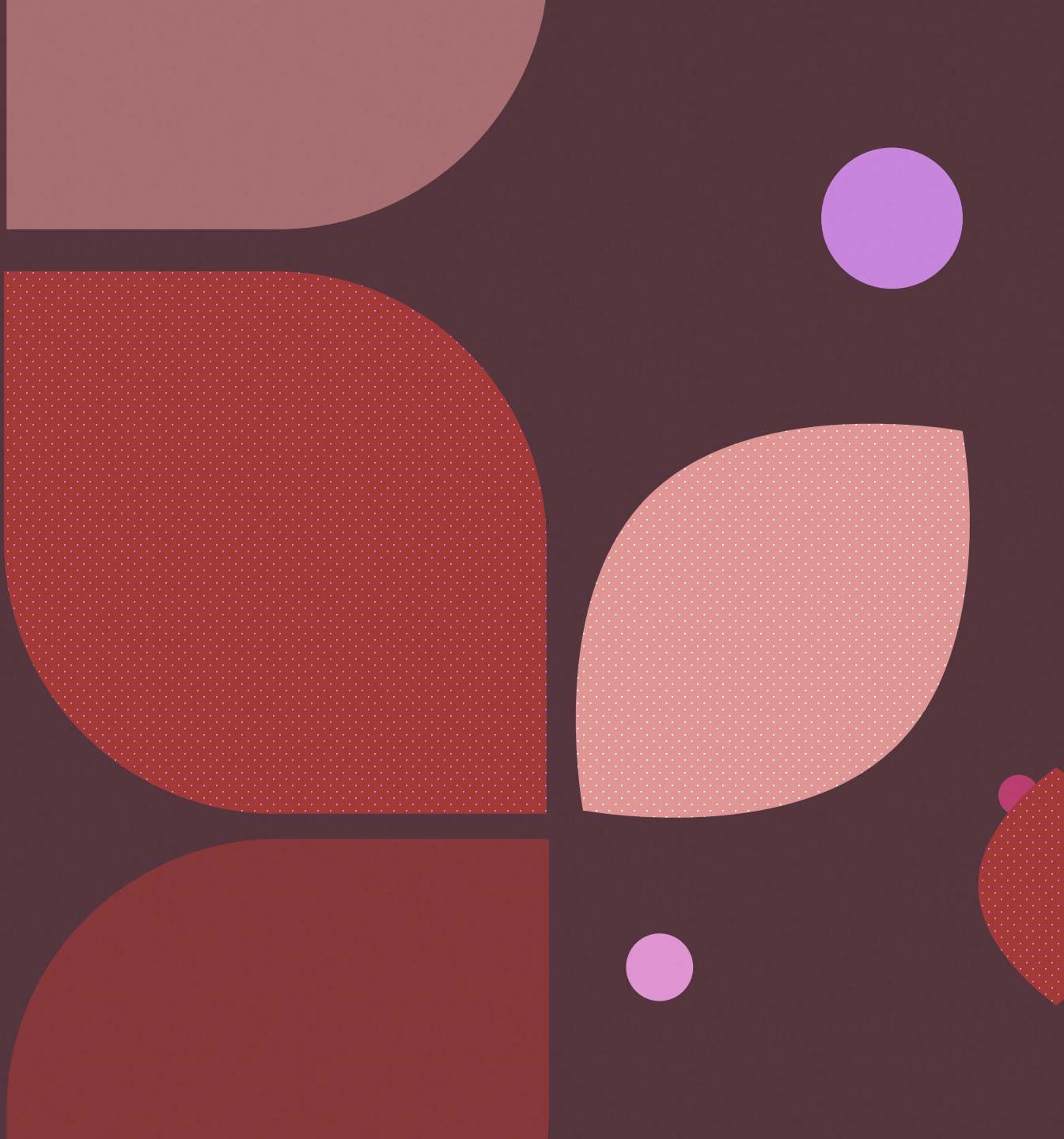
Configuring an NSG

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

Priority	Name	Port	Protocol	Source	Destination	Action	
300	🚩 SSH	22	TCP	Any	Any	🟢 Allow	***
310	Allow_Ping	Any	ICMP	Any	Any	🟢 Allow	***
65000	AllowVnetInBound	Any	Any	VirtualNetwork	VirtualNetwork	🟢 Allow	***
65001	AllowAzureLoadBalancerInBound	Any	Any	AzureLoadBalancer	Any	🟢 Allow	***
65500	DenyAllInBound	Any	Any	Any	Any	🔴 Deny	***

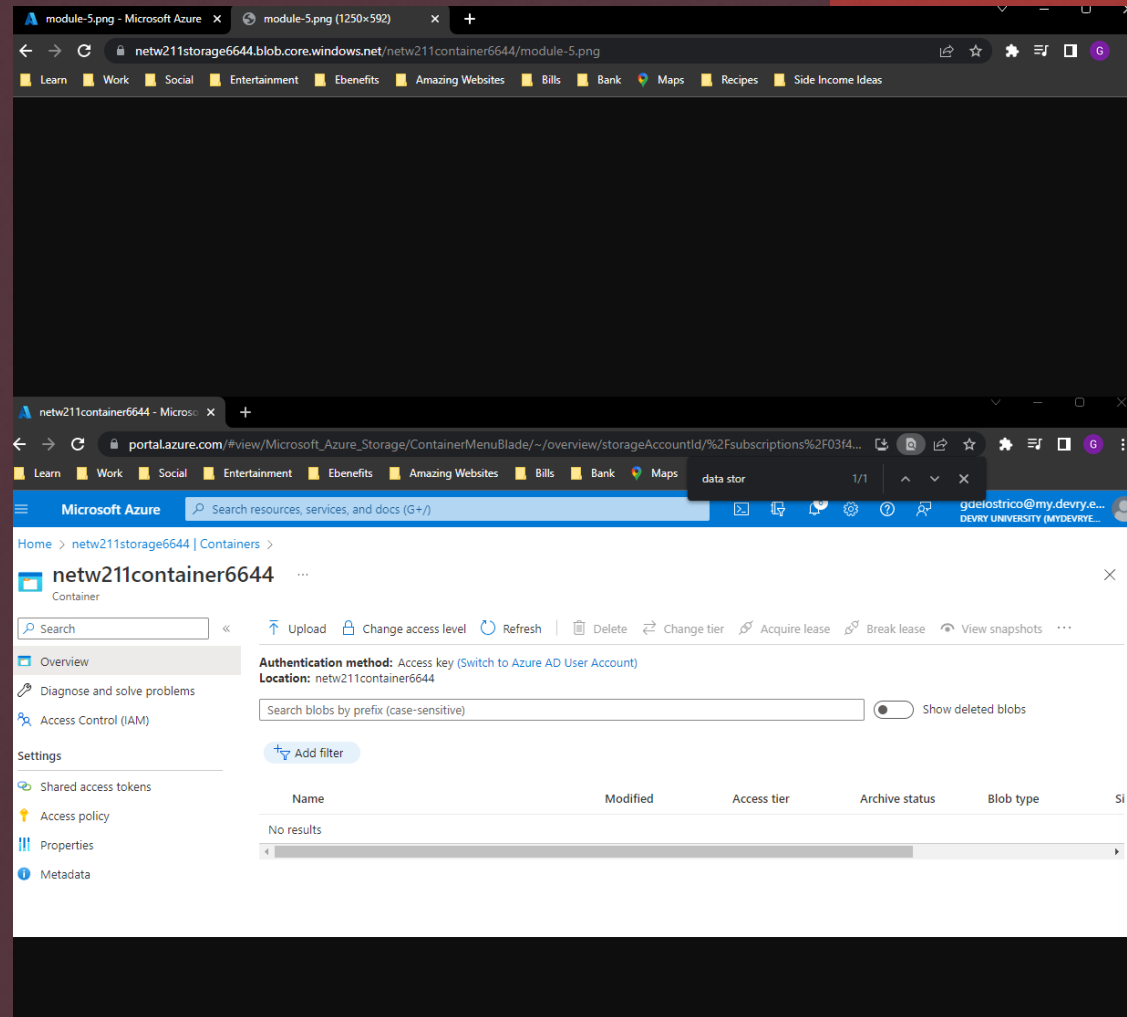
Cloud Storage

- Uploading and Accessing a File
- Creating a Blob Snapshots
- Enabling a Blob Versioning



Uploading and 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.



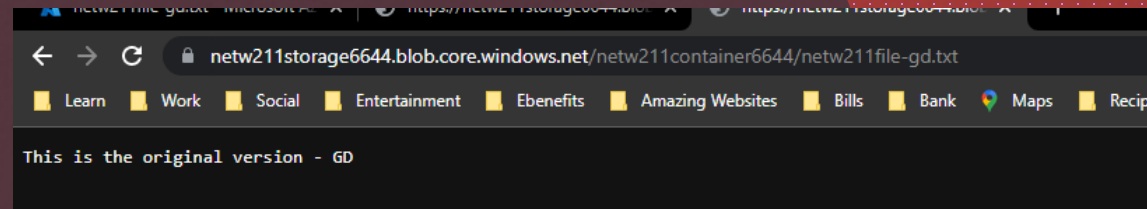
Question

- What does the *access tier* setting do? What are the Azure blob storage access tiers?
- [hint: in the Azure portal, on the *Upload blob* page, under *Advanced*, click the ? circle above the *Access tier* box.]
- Answer here:
- It optimizes data costs by placing your data in the appropriate access tier. Hot/Cool and Archive tier.

- References (here are two examples to get your research started):
- 1. Hot, Cool, and Archive access tiers for blob data, <https://docs.microsoft.com/en-us/azure/storage/blobs/access-tiers-overview>
- 2. Azure Blob Storage Access Tiers, <https://devry.percipio.com/courses/c7ef0333-8560-403f-a004-9c5c843866b0/videos/2658bbe6-ee97-438b-a376-fbb079c3b3a0>
- 3.
- 4.

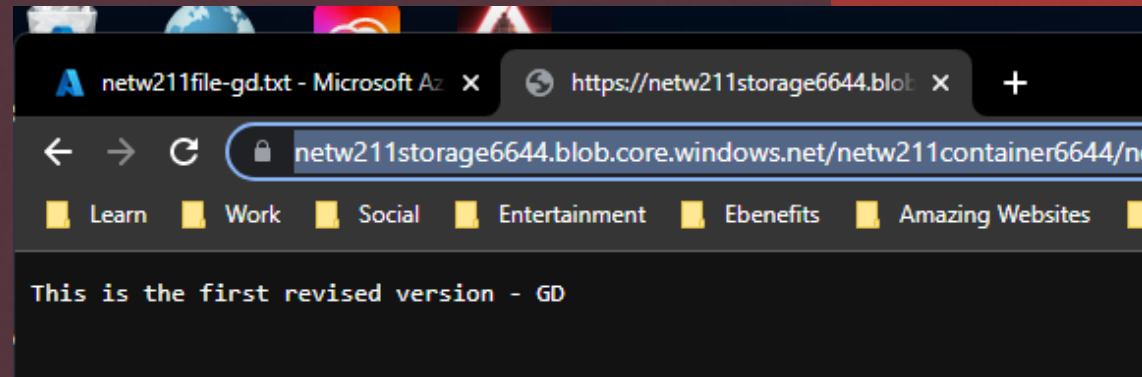
Creating Blob Snapshots

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



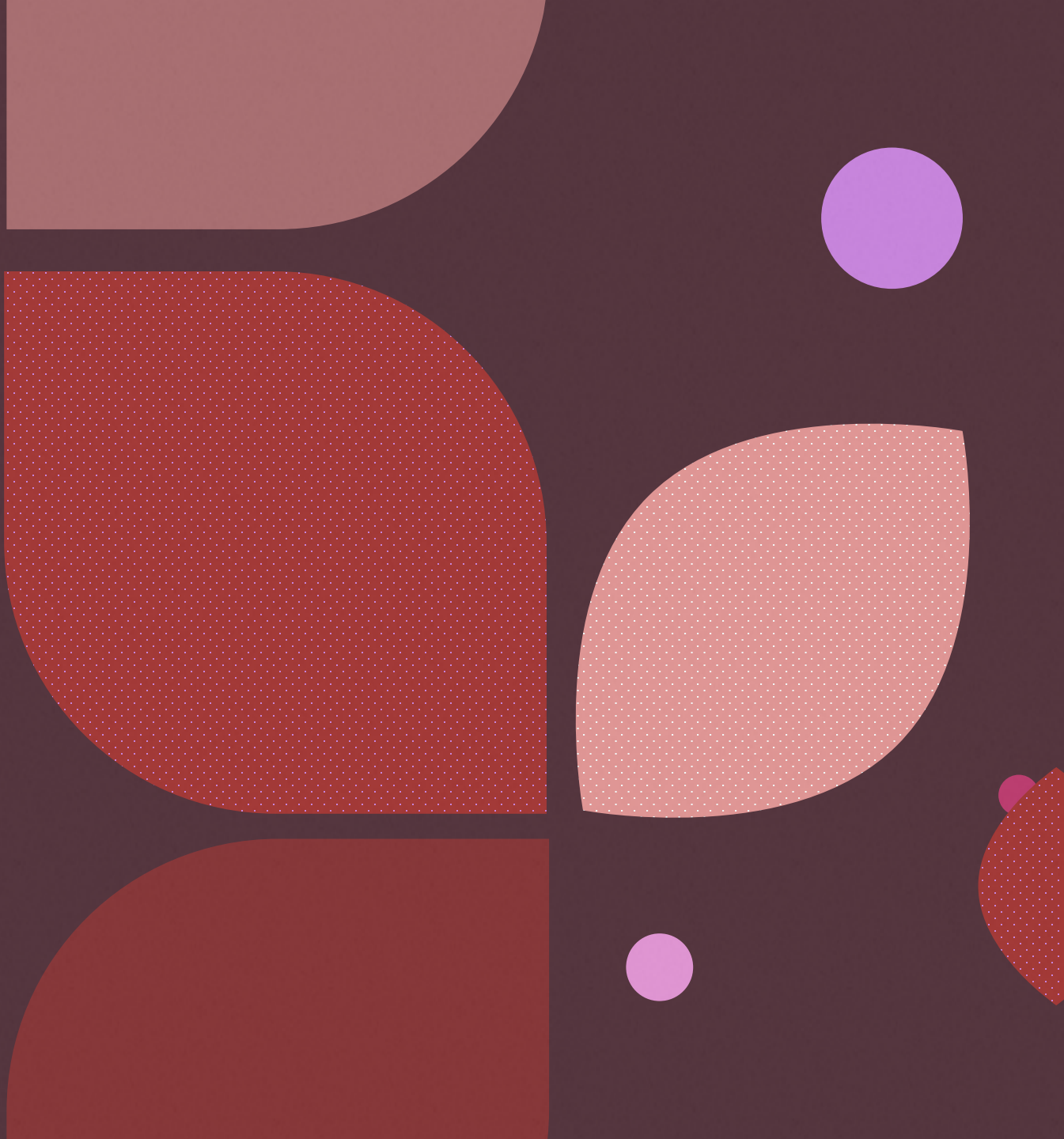
Enabling Blob Versioning

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.



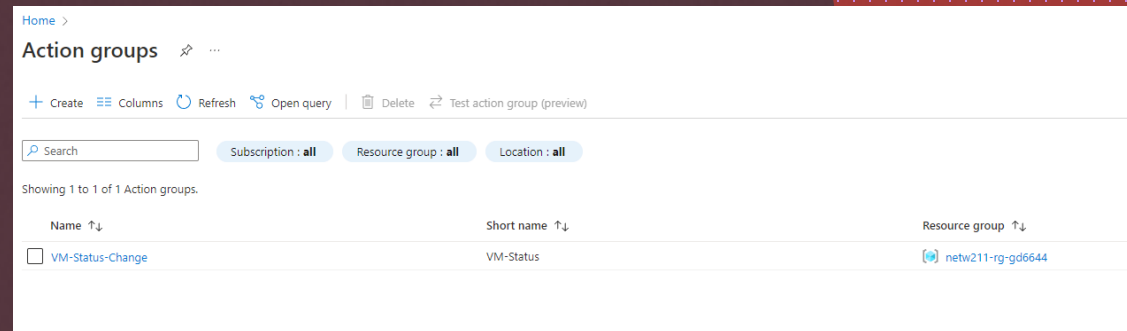
Cloud Monitoring

- Setting up an Action Group and Notifications
- Setting up Alert Rules
- Testing Alerts



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.

Alert rules

[+ Create](#) [Columns](#) [Refresh](#) [Export to CSV](#) [Open query](#) | [Delete](#) [Enable](#) [Disable](#)

Target resource type : all Target scope : NETW211-VM-GD Subscription : all

Showing 1 to 2 of 2 Alert rules.

Name ↑↓	Condition	Severity
<input type="checkbox"/> VM-Deallocate	Category=Administrative, Operation name=Microsoft.Co...	4 - Veri
<input type="checkbox"/> VM-Restart	Category=Administrative, Operation name=Microsoft.Co...	4 - Veri

Testing Alerts

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

Azure Monitor alert 'VM-Restart' was activated for 'NETW211-VM-GD' at October 11, 2022 1:31 UTC

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

Activity log alert	VM-Restart
Time	October 11, 2022 1:31 UTC
Category	Administrative
Operation name	Microsoft.Compute/virtualMachines/restart/action
Correlation ID	f1774a3c-4c83-4bb5-bb39-54032795a55f
Level	Informational
Resource ID	/subscriptions/03f4f57f-82b9-4901-ac2c-dccd7c83f312/resourceGroups/NETW211-RG-GD6644/providers/Microsoft.Compute/virtualMachines/NETW211-VM-GD
Caller	gdelostrico@my.devry.edu
Properties	{"eventCategory":"Administrative","entity":"/subscriptions/03f4f57f-82b9-4901-ac2c-dccd7c83f312/resourceGroups/NETW211-RG-GD6644/providers/Microsoft.Compute/virtualMachines/NETW211-VM-GD","message":"Microsoft.Compute/virtualMachines/restart/action","hierarchy":"11e7ae31-02be-46bb-ab11-80c715b5c90a/03f4f57f-82b9-4901-ac2c-dccd7c83f312"}

Testing Alerts cont'd

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

Azure Monitor alert 'VM-Deallocate' was activated for 'NETW211-VM-GD' at October 11, 2022 1:42 UTC

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

Activity log alert	VM-Deallocate
Time	October 11, 2022 1:42 UTC
Category	Administrative
Operation name	Microsoft.Compute/virtualMachines/deallocate/action
Correlation ID	69704130-16ad-460e-8797-bb4e1c35c9c0
Level	Informational
Resource ID	/subscriptions/03f4f57f-82b9-4901-ac2c-dccd7c83f312/resourceGroups/NETW211-RG-GD6644/providers/Microsoft.Compute/virtualMachines/NETW211-VM-GD
Caller	gdelostrico@my.devry.edu
Properties	{"eventCategory": "Administrative", "entity": "/subscriptions/03f4f57f-82b9-4901-ac2c-dccd7c83f312/resourceGroups/NETW211-RG-GD6644/providers/Microsoft.Compute/virtualMachines/NETW211-VM-GD", "message": "Microsoft.Compute/virtualMachines/deallocate/action", "hierarchy": "11e7ae31-02be-46bb-ab11-80c715b5c90a/03f4f57f-82b9-4901-ac2c-dccd7c83f312"}

Challenges

- Azure is slow
- The instructions are deprecated.



Career Skills Obtained

Virtual Machine (VM) Instances

Virtual Private Cloud (VPC)

Azure VM Security

Cloud Storage

Cloud Monitoring

Conclusion

I've completed AWS Practitioner Bootcamp and this class on Azure. I can see the difference between how the two leading cloud platforms perform. Overall, I learned how two companies are different and how services are very similar.

