

# Jeanine Carhart

## NETW 211

Final Project

December 18, 2022

Introduction

# Topics Covered

Hardware virtualization

Cloud security

Cloud migration

Cloud computing platforms  
and services

Cloud infrastructure

Cloud storage

Capacity planning

Performance monitoring

# Agenda

# Agenda

- 1 Cloud Computing
- 2 Virtualization of Networking
- 3 Network Services on a Cloud Platform
- 4 Identify Cloud-Centric Access Control Techniques
- 5 Assess Cloud-Centric Security Techniques
- 6 Evaluate Cloud Storage Technologies
- 7 Common Cloud Maintenance Tools, Techniques,  
and Services

# Module 1

Cloud Computing:

Azure account creation

# Creating Azure Account

Microsoft Azure

Search resources, services, and docs (G+/)



jcarhart3@my.devry.edu  
DEVRY UNIVERSITY (MYDEVRYE...)

Home >

## Subscriptions

DeVry University (mydevryedu.onmicrosoft.com)

+ Add Manage Policies View Requests View eligible subscriptions

Search for any fiel...

Subscriptions == **DeVry NETW211 2022**

My role == **all**

Status == **all**

Secure Score == **all** X

Add filter

Subscription name ↑↓	Subscription ID ↑↓	My role ↑↓	Current cost	Secure Score ↑↓	Parent management group ↑↓	Status ↑↓	
DeVry NETW211 2022	7c362e70-76ef-4696-a7d6-e868...	Owner	0.00	-	Tenant Root Group	Active	...

# Module 2

Virtualization of Networking:  
Virtual Machine Instances



# Deploying a VM in Azure

The screenshot displays the Microsoft Azure portal interface. At the top, the navigation bar includes the Microsoft Azure logo, a search bar, and user information for '@my.devry.edu'. The breadcrumb trail shows the path: Home > CreateVm-MicrosoftWindowsServer.WindowsServer-201-20221119135543 | Overview >. The main header identifies the resource as 'NETW211-VM-jc' (Virtual machine). Below the header is a toolbar with actions like Connect, Start, Restart, Stop, Capture, Delete, Refresh, Open in mobile, CLI/PS, and Feedback. A left-hand navigation pane lists various management options such as 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, Continuous delivery, Availability + scaling, Configuration, Identity, Properties, Locks), and Operations. The main content area is divided into sections: 'Essentials' provides a quick overview of the VM's status (Running, East US) and links to related resources; 'Properties' offers a detailed table of VM specifications; 'Networking' details the IP addresses and network configuration; 'Size' shows the VM's hardware configuration; and 'Disk' provides information about the storage and encryption settings.

Microsoft Azure

Search resources, services, and docs (G+)

@my.devry.edu  
DEVRY UNIVERSITY (MYDEVRYE...)

Home > CreateVm-MicrosoftWindowsServer.WindowsServer-201-20221119135543 | Overview >

NETW211-VM-jc  
Virtual machine

Search

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

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

Continuous delivery

Availability + scaling

Configuration

Identity

Properties

Locks

Operations

Essentials

Resource group (move) : NETW211-RG-jc

Status : Running

Location : East US

Subscription (move) : Azure for Students

Subscription ID : d51749d4-914a-4e3a-8653-956450a1b37a

Tags (edit) : [Click here to add tags](#)

Operating system : Windows (Windows Server 2019 Datacenter)

Size : Standard B1s (1 vcpu, 1 GiB memory)

Public IP address : [20.168.216.254](#)

Virtual network/subnet : [NETW211-RG-jc-vnet/default](#)

DNS name : [Not configured](#)

JSON View

Properties Monitoring Capabilities (8) Recommendations Tutorials

Virtual machine

Computer name	NETW211-VM-jc
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

Networking

Public IP address	20.168.216.254
Public IP address (IPv6)	-
Private IP address	10.0.0.4
Private IP address (IPv6)	-
Virtual network/subnet	NETW211-RG-jc-vnet/default
DNS name	Configure

Size

Size	Standard B1s
vCPUs	1
RAM	1 GiB

Disk

OS disk	NETW211-VM-jc_disk1_d9d8ea62e65643e7bdbd5735cb8a6654
Encryption at host	Disabled

# Connecting to the VM

The screenshot displays the Microsoft Azure portal interface. At the top, the navigation bar includes the Microsoft Azure logo, a search bar, and user information for '@my.devry.edu'. The breadcrumb trail shows the path: Home > CreateVm-MicrosoftWindowsServer.WindowsServer-201-20221119135543 > Overview > NETW211-VM-jc. The main heading is 'NETW211-VM-jc | Connect', with 'Virtual machine' indicated below it. A search bar is present in the left sidebar.

The left sidebar contains a 'Settings' section with the following items: Overview, Activity log, Access control (IAM), Tags, Diagnose and solve problems, Networking, **Connect**, Windows Admin Center, Disks, Size, Microsoft Defender for Cloud, Advisor recommendations, Extensions + applications, Continuous delivery, Availability + scaling, Configuration, Identity, Properties, Locks, and Operations.

The main content area features a warning banner: 'To improve security, enable just-in-time access on this VM. →'. Below this, the 'Connect with RDP' section is active, showing 'Suggested method for connecting'. The IP address field is populated with 'Public IP address (20.168.216.254)' and the port number field with '3389'. A 'Download RDP File' button is visible. Under 'Can't connect?', there are links for 'Test your connection' and 'Troubleshoot RDP connectivity issues'. A 'Provide feedback' section includes a link to 'Tell us about your RDP experience'.

A 'Remote Desktop Connection' dialog box is overlaid on the screen. The title bar reads 'Remote Desktop Connection'. The main message is: 'The identity of the remote computer cannot be verified. Do you want to connect anyway?'. Below this, it states: 'The remote computer could not be authenticated due to problems with its security certificate. It may be unsafe to proceed.' The 'Certificate name' field shows 'Name in the certificate from the remote computer: NETW211-VMjc'. The 'Certificate errors' section lists: 'The following errors were encountered while validating the remote computer's certificate: The certificate is not from a trusted certifying authority.' At the bottom, it asks 'Do you want to connect despite these certificate errors?' with a checkbox for 'Don't ask me again for connections to this computer' and buttons for 'View certificate...', 'Yes', and 'No'.

# Deleting a VM

The screenshot shows the Microsoft Azure portal interface. At the top, there is a navigation bar with the Microsoft Azure logo, a search bar, and user information for '@my.devry.edu'. Below the navigation bar, the breadcrumb path is 'Home > NETW211-VM-jc'. The main content area displays a large cloud icon with a raindrop, indicating a resource not found. Below this, the text reads 'The VirtualMachine resource was not found'. There are two links: 'Get support' and 'Perform self-diagnostics'. A 'Summary' section is expanded, showing the following details:

Summary	
Session ID	Resource ID
1cb364289186486fbb211eb820124a8a	/subscriptions/d51749d4-914a-4e3a-8653-956450a1b3...
Extension	Content
HubsExtension	ResourceMenuBlade
Error code	
404	
Details	
The VirtualMachine resource was not found, it may have been deleted. If this was launched from a pinned tile on the dashboard, it should be removed. Resource ID: /subscriptions/d51749d4-914a-4e3a-8653-956450a1b37a/resourcegroups/NETW211-RG-jc/providers/Microsoft.Compute/virtualMachines/NETW211-VM-jc, Status Code: 404, Status Message: The Resource &#39;Microsoft.Compute/virtualMachines/NETW211-VM-jc&#39; under resource group &#39;NETW211-RG-jc&#39; was not found. For more details please go to <a href="https://aka.ms/ARMResourceNotFoundFix">https://aka.ms/ARMResourceNotFoundFix</a>	

# Module 3

Network Services on a Cloud  
Platform:

Azure VNet and Subnets

# 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:

**The formula is:  $2^n - 2 - 2 = 254$**

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:

**Azure reserves the first 4 and the last IP address including the network address, the default gateway, the network broadcast, and 2 for mapping the DNS IPs to the VNet space.**

<b>Network:</b>	<b>10.0.1.0</b>
<b>Default Gateway:</b>	<b>10.0.1.1</b>
<b>Reserved to map the DNS IPs to the <u>VNet</u> space:</b>	<b>10.0.1.2, 10.0.1.3</b>
<b>Network broadcasting address;</b>	<b>10.0.1.255</b>

# Creating a VNet with Two Subnets (cont.)

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. **Subnet Cheat Sheet – 24 Subnet Mask, 30, 26, 27, 29, and other IP Address CIDR Network References**

<https://www.freecodecamp.org/news/subnet-cheat-sheet-24-subnet-mask-30-26-27-29-and-other-ip-address-cidr-network-references/>

4. **Private IP addresses**

<https://learn.microsoft.com/en-us/azure/virtual-network/ip-services/private-ip-addresses>

# Deploying VMs into Subnets

The screenshot displays the Microsoft Azure portal interface for a virtual machine named 'Subnet0-VM'. The page is titled 'Subnet0-VM' and is categorized as a 'Virtual machine'. A navigation sidebar on the left lists various management options such as 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, Continuous delivery, Availability + scaling, Configuration, Identity, Properties, and Locks.

At the top of the main content area, there is a search bar and a set of action buttons: Connect, Start, Restart, Stop, Capture, Delete, Refresh, Open in mobile, CLI / PS, and Feedback. A warning message states: 'Subnet0-VM virtual machine agent status is not ready. Troubleshoot the issue →'.

The 'Essentials' section provides key information about the VM:

- Resource group (move): [NETW211-RG](#)
- Status: Running
- Location: East US 2
- Subscription (move): [Azure for Students](#)
- Subscription ID: d51749d4-914a-4e3a-8653-956450a1b37a
- Tags (edit): [Click here to add tags](#)

Additional details are listed on the right side:

- Operating system: Windows
- Size: Standard B1s (1 vcpu, 1 GiB memory)
- Public IP address: [20.242.112.0](#)
- Virtual network/subnet: [NETW211-VNet-JC/Subnet0](#)
- DNS name: [Not configured](#)

The 'Properties' tab is active, showing detailed configuration for three categories:

- Virtual machine**

Computer name	Subnet0-VM
Health state	-
Operating system	Windows
Publisher	MicrosoftWindowsServer
Offer	WindowsServer
Plan	2019-datacenter-gensecond
VM generation	V2
VM architecture	x64
Agent status	Not Ready
Agent version	Unknown
Host group	None
- Networking**

Public IP address	20.242.112.0
Public IP address (IPv6)	-
Private IP address	10.0.0.4
Private IP address (IPv6)	-
Virtual network/subnet	NETW211-VNet-JC/Subnet0
DNS name	<a href="#">Configure</a>
- Size**

Size	Standard B1s
vCPUs	1
RAM	1 GiB

# Deploying VMs into Subnets (cont.)

The screenshot displays the Azure portal interface for a Windows Server VM. The top navigation bar includes a search bar and user information for '@my.devry.edu'. The left sidebar contains navigation options such as 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, Continuous delivery, Availability + scaling, Configuration, Identity, Properties, and Locks.

The main content area shows the VM's overview page for 'WindowsServer.WindowsServer-201-20221119173306'. A warning banner at the top indicates that the 'Subnet1-VM virtual machine agent status is not ready'. Below this, the 'Essentials' section provides key information:

- Resource group (move): [NETW211-RG](#)
- Status: Running
- Location: East US 2
- Subscription (move): [Azure for Students](#)
- Subscription ID: d51749d4-914a-4e3a-8653-956450a1b37a
- Tags (edit): [Click here to add tags](#)

Additional details include:

- Operating system: Windows
- Size: Standard B1s (1 vcpu, 1 GiB memory)
- Public IP address: [20.242.57.94](#)
- Virtual network/subnet: [NETW211-VNet-JC/Subnet1](#)
- DNS name: [Not configured](#)

The 'Properties' tab is active, showing detailed information for the 'Virtual machine' and 'Networking' sections.

Section	Property	Value
Virtual machine	Computer name	Subnet1-VM
	Health state	-
	Operating system	Windows
	Publisher	MicrosoftWindowsServer
	Offer	WindowsServer
	Plan	2019-datacenter-gensecond
	VM generation	V2
	VM architecture	x64
	Agent status	Not Ready
	Agent version	Unknown
Host group	None	
Networking	Public IP address	20.242.57.94
	Public IP address (IPv6)	-
	Private IP address	10.0.1.4
	Private IP address (IPv6)	-
	Virtual network/subnet	NETW211-VNet-JC/Subnet1
DNS name	Configure	
Size	Size	Standard B1s
	vCPUs	1
	RAM	1 GiB



# Deploying VMs into Subnets (cont.)

The screenshot displays the Azure portal interface for a virtual network named **NETW211-VNet-JC**. The main area shows a network diagram with the following components:

- Virtual Network:** NETW211-VNet-JC
- Subnets:** Subnet0 and Subnet1
- Virtual Machines:** subnet0-vm340 (connected to Subnet0) and subnet1-vm396 (connected to Subnet1)
- Associated Resources:** Subnet0-VM, Subnet0-VM-nsg, Subnet0-VM-ip, Subnet1-VM, Subnet1-VM-nsg, and Subnet1-VM-ip

The left-hand navigation pane includes sections for:

- Network manager:** DNS servers, Peerings, Service endpoints, Private endpoints, Properties, Locks
- Monitoring:** Alerts, Metrics, Diagnostic settings, Logs, Connection monitor (classic)
- Diagram:** (Currently selected)
- Automation:** Tasks (preview), Export template
- Help:** Connection troubleshoot, New Support Request

The top navigation bar shows the user is logged in as **@my.devry.edu** and the page is on **Page 1 of 1**.

# Verifying Connectivity between VMs

```
Microsoft Windows [Version 10.0.17763.3650]
(c) 2018 Microsoft Corporation. All rights reserved.

C:\Users\myaccount>ipconfig

Windows IP Configuration

Ethernet adapter Ethernet:

    Connection-specific DNS Suffix  . : dkpe11fjw3pulm4f5wjvchu5kc.cx.internal.cloudapp.net
    Link-local IPv6 Address . . . . . : fe80::1f19:c7fd:b568:b3e4%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=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 = 0ms, Maximum = 1ms, Average = 0ms

C:\Users\myaccount>
```

# Verifying Connectivity between VMs (cont.)

```
Microsoft Windows [Version 10.0.17763.3650]  
(c) 2018 Microsoft Corporation. All rights reserved.
```

```
C:\Users\myaccount>ipconfig
```

```
Windows IP Configuration
```

```
Ethernet adapter Ethernet:
```

```
Connection-specific DNS Suffix . . : dkpe11fjw3pulum4f5wjvchu5kc.cx.internal.cloudapp.net  
Link-local IPv6 Address . . . . . : fe80::f9c5:a4d:e11e:fa0a%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=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:\Users\myaccount>_
```

# Module 4

Identify Cloud-Centric Access

Control Techniques:

Azure VM Security

# Launching a VM

The screenshot displays the Microsoft Azure portal interface for a virtual machine. The top navigation bar includes the Microsoft Azure logo, a search bar, and user information for @my.devry.edu. The breadcrumb trail shows the path: Home > CreateVm-canonical.0001-com-ubuntu-server-focal-2-20221119182707 | Overview >. The main header identifies the resource as 'NEWT211-VM-JC' (Virtual machine) with icons for favorite, star, and close. Below the header is a search bar and a row of action buttons: Connect, Start, Restart, Stop, Capture, Delete, Refresh, Open in mobile, CLI / PS, and Feedback. A left-hand navigation pane lists various management options such as 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, Availability + scaling, Configuration, Identity, Properties, and Locks. The main content area is divided into several sections: 'Essentials' provides a summary of key properties like Resource group, Status (Running), Location (East US), Subscription, and Tags. 'Properties' is further divided into 'Virtual machine' (listing details like Computer name, Health state, Operating system, Publisher, Offer, Plan, VM generation, VM architecture, Agent status, Agent version, and Host group) and 'Networking' (listing Public IP address, Private IP address, and Virtual network/subnet). A 'Size' section at the bottom right specifies the VM's configuration: Standard B1s, 1 vCPU, and 1 GiB RAM. A 'JSON View' link is located in the top right corner of the Essentials section.

Microsoft Azure

Search resources, services, and docs (G+)

@my.devry.edu  
DEVRY UNIVERSITY (MYDEVRYE...)

Home > CreateVm-canonical.0001-com-ubuntu-server-focal-2-20221119182707 | Overview >

NEWT211-VM-JC  
Virtual machine

Search

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

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

Availability + scaling

Configuration

Identity

Properties

Locks

JSON View

Essentials

Resource group (move) : [NEWT211-VM-JC\\_group](#)

Operating system : Linux (ubuntu 20.04)

Status : Running

Size : Standard B1s (1 vcpu, 1 GiB memory)

Location : East US

Public IP address : [20.127.91.200](#)

Subscription (move) : [Azure for Students](#)

Virtual network/subnet : [NEWT211-VM-JC\\_group-vnet/default](#)

Subscription ID : d51749d4-914a-4e3a-8653-956450a1b37a

DNS name : [Not configured](#)

Tags (edit) : [Click here to add tags](#)

Properties Monitoring Capabilities (7) Recommendations Tutorials

Virtual machine

Computer name : NEWT211-VM-JC

Health state : -

Operating system : Linux (ubuntu 20.04)

Publisher : canonical

Offer : 0001-com-ubuntu-server-focal

Plan : 20\_04-its-gen2

VM generation : V2

VM architecture : x64

Agent status : Ready

Agent version : 2.8.0.11

Host group : None

Networking

Public IP address : 20.127.91.200

Public IP address (IPv6) : -

Private IP address : 10.0.0.4

Private IP address (IPv6) : -

Virtual network/subnet : [NEWT211-VM-JC\\_group-vnet/default](#)

DNS name : [Configure](#)

Size

Size : Standard B1s

vCPUs : 1

RAM : 1 GiB

# Connecting to the VM via SSH

```
Welcome to Ubuntu 20.04.5 LTS (GNU/Linux 5.15.0-1023-azure x86_64)
```

```
* Documentation:  https://help.ubuntu.com
* Management:    https://landscape.canonical.com
* Support:       https://ubuntu.com/advantage
```

```
System information as of Sun Nov 20 02:40:34 UTC 2022
```

```
System load:  0.0      Processes:    100
Usage of /:   5.1% of 28.89GB Users logged in: 0
Memory usage: 30%     IPv4 address for eth0: 10.0.0.4
Swap usage:   0%
```

```
0 updates can be applied immediately.
```

```
The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.
```

```
Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.
```

```
To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.
```

```
azureuser@NEWT211-VM-JC:~$ uname -r
5.15.0-1023-azure
azureuser@NEWT211-VM-JC:~$ 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@NEWT211-VM-JC:~$ ping -c 4 www.facebook.com
PING star-mini.c10r.facebook.com (31.13.66.35) 56(84) bytes of data:
64 bytes from edge-star-mini-shv-01-iad3.facebook.com (31.13.66.35): icmp_seq=1 ttl=54 time=1.40 ms
64 bytes from edge-star-mini-shv-01-iad3.facebook.com (31.13.66.35): icmp_seq=2 ttl=54 time=1.55 ms
64 bytes from edge-star-mini-shv-01-iad3.facebook.com (31.13.66.35): icmp_seq=3 ttl=54 time=1.51 ms
64 bytes from edge-star-mini-shv-01-iad3.facebook.com (31.13.66.35): icmp_seq=4 ttl=54 time=1.56 ms

--- star-mini.c10r.facebook.com ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3005ms
```

# Configuring an NSG

```
Microsoft Windows [Version 10.0.22621.819]
(c) Microsoft Corporation. All rights reserved.

C:\Users\Maine Loc>ping 20.127.91.200

Pinging 20.127.91.200 with 32 bytes of data:
Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 20.127.91.200:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\Users\Maine Loc>ping 20.127.91.200

Pinging 20.127.91.200 with 32 bytes of data:
Reply from 20.127.91.200: bytes=32 time=83ms TTL=43
Reply from 20.127.91.200: bytes=32 time=76ms TTL=43
Reply from 20.127.91.200: bytes=32 time=75ms TTL=43
Reply from 20.127.91.200: bytes=32 time=77ms TTL=43

Ping statistics for 20.127.91.200:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 75ms, Maximum = 83ms, Average = 77ms

C:\Users\Maine Loc>
```

# Configuring an NSG (cont.)

```
Microsoft Windows [Version 10.0.22621.819]  
(c) Microsoft Corporation. All rights reserved.
```

```
C:\Users\Maine Loc>ping 20.127.91.200
```

```
Pinging 20.127.91.200 with 32 bytes of data:  
Request timed out.  
Request timed out.  
Request timed out.  
Request timed out.
```

```
Ping statistics for 20.127.91.200:  
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

```
C:\Users\Maine Loc>ping 20.127.91.200
```

```
Pinging 20.127.91.200 with 32 bytes of data:  
Reply from 20.127.91.200: bytes=32 time=83ms TTL=43  
Reply from 20.127.91.200: bytes=32 time=76ms TTL=43  
Reply from 20.127.91.200: bytes=32 time=75ms TTL=43  
Reply from 20.127.91.200: bytes=32 time=77ms TTL=43
```

```
Ping statistics for 20.127.91.200:  
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),  
    Approximate round trip times in milli-seconds:  
        Minimum = 75ms, Maximum = 83ms, Average = 77ms
```

```
C:\Users\Maine Loc>
```



# Module 5

Assess Cloud-Centric Security

Techniques:

Cloud Storage

# Uploading and Accessing a File

Home > netw211storage5976\_1670732468864 | Overview > netw211storage5976 | Containers >

## netwcontainer5976

Container

Search

Upload | Change access level | Refresh | Delete | Change tier | Acquire lease | Break lease | View snapshots | Create snapshot

**Authentication method:** Access key (Switch to Azure AD User Account)  
**Location:** netwcontainer5976

Search blobs by prefix (case-sensitive)  Show deleted

[Add filter](#)

Name	Modified	Access tier	Archive status	Blob type	Size
No results					

### Upload blob

netwcontainer5976/

Files

Select a file

Overwrite if files already exist

Advanced

Upload

# 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:

Depending on how it is utilized, the access tier setting enables you to store blob data in the most affordable way while letting users access it right away.

The levels of Azure blob access are:

An online storage layer designed for frequently accessed or updated data is called a "hot tier." The hot tier has the least expensive access fees but the most expensive storage expenses.

An online storage layer designed for data that is viewed or changed seldom is called the "cool tier." Data in the cool tier needs to be kept for at least 30 days. In contrast to the hot tier, the cool tier has greater access prices and lower storage expenses.

The archive layer is an offline storage level that is designed to store data with a flexible latency requirement of a few hours and that is rarely accessed. A minimum of 180 days should be allowed for the storage of data in the 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. <https://learn.microsoft.com/en-us/azure/storage/blobs/access-tiers-overview>
4. <http://learn.microsoft.com/en-us/azure/storage/blobs/storage-blobs-overview>

# Creating Blob Snapshots

```
This is the original version. -JX
```

# Enabling Blob Versioning

```
This is the first revised version. -JC
```

# Module 6

Evaluate Cloud Storage

Technologies:

Cloud Monitoring

# Setting up an Action Group and Notifications

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

Home > Monitor | Alerts >

## Action groups

+ Create | Columns | Refresh | Open query | Delete | Enable | Disable | Test action group (preview)

Search | Subscription: all | Resource group: all | Location: all | Status: Enabled

Showing 1 to 1 of 1 Action groups. | No grouping

Name ↑↓	Short name ↑↓	Resource group ↑↓	Subscription ↑↓	Actions	Status ↑↓
<input type="checkbox"/> VM-STATUS	VM-STATUS	netw211-rg-5976	Azure for Students	1 Email	Enabled

< Previous | Page 1 of 1 | Next >

# Setting up Alert Rules

Microsoft Azure

Search resources, services, and docs (G+)

Home > NETW211-VM-jc | Alerts >

## Alert rules

+ Create Columns Refresh Export to CSV Open query Delete Enable Disable

Search Target resource type: all Target scope: NETW211-VM-jc Subscription: all Signal type: all Severity: all Status: Enabled

Showing 1 to 2 of 2 Alert rules. No grouping

Name ↑↓	Condition	Severity ↑↓	Target scope	Target resource type	Signal type ↑↓	Status ↑↓
<input type="checkbox"/> VM-Deallocate	Category=Administrative, Operation ...	4 - Verbose	NETW211-VM-jc	Virtual machine	Activity log	✓ Enabled
<input type="checkbox"/> VM-Restart	Category=Administrative, Operation ...	4 - Verbose	NETW211-VM-jc	Virtual machine	Activity log	✓ Enabled

< Previous Page 1 of 1 Next >



# Testing Alerts

Video link to install ...

**Today**

- Microsoft Azure  
Important notice: Azure ... 12:07 AM  
Azure Monitor alert VM-Restart was ...
- Microsoft Azure  
Important notice: Azure ... 12:06 AM  
Azure Monitor alert VM-Restart was ...
- Microsoft Azure  
Important notice: Azure ... 12:06 AM  
Azure Monitor alert VM-Restart was ...

**Yesterday**

- Microsoft Azure  
You're now in the VM- ... Sat 11:08 PM

## Azure Monitor alert 'VM-Restart' was activated for 'NETW211-VM-jc' at December 11, 2022 8:05 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	December 11, 2022 8:05 UTC
Category	Administrative
Operation name	Microsoft.Compute/virtualMachines/restart/action
Correlation ID	dbe3b370-196f-4e6c-8aeb-53c9f9379f79
Level	Informational
Resource ID	/subscriptions/d51749d4-914a-4e3a-8653-956450a1b37a/resourceGroups/Netw211-RG-5976/providers/Microsoft.Compute/virtualMachines/NETW211-VM-ic

# Testing Alerts (cont.)

The screenshot shows an email client interface with a dark theme. The top navigation bar includes icons for trash, folders, shields, a pencil, a folder with a plus sign, arrows, a lightning bolt for 'Quick steps', an envelope for 'Read / Unread', a tag, a flag, a star, a clock, a calendar, a refresh, and a menu. The left sidebar shows the 'Inbox' with a star icon and a 'Filter' button. Below the inbox header, there is a 'Video link to install ...' with a share icon, a red flag, and a blue star. Underneath is a 'Today' section containing four email notifications from 'Microsoft Azure'. Each notification is an 'Important notice' received at 12:15 AM, 12:15 AM, 12:07 AM, and 12:06 AM respectively, all regarding 'Azure Monitor alert VM-Deallocate' or 'VM-Restart was ...'. The main content area displays the details of the selected alert: 'Azure Monitor alert 'VM-Deallocate' was activated for 'NETW211-VM-jc' at December 11, 2022 8:13 UTC'. Below the title, a message states: 'You're receiving this notification as a member of the VM-STATUS action group because an Azure Monitor alert was activated.' A table below provides the following details:

Activity log alert	VM-Deallocate
Time	December 11, 2022 8:13 UTC
Category	Administrative
Operation name	Microsoft.Compute/virtualMachines/deallocate/action
Correlation ID	4bb5ba01-6fe0-4e3a-8955-ec8ad63e5829
Level	Informational
Resource ID	/subscriptions/d51749d4-914a-4e3a-8653-956450a1b37a/resourceGroups/Netw211-RG-5976/providers/Microsoft.Compute/virtualMachines/NETW211-VM-jc

# Module 7

Common Cloud Maintenance

Tools, Techniques, and Services

# Challenges

# Challenges

## Challenges

Unable to connect to my Microsoft Azure subscription for free student services in spite of continued help from my professors and MS tech support

## Solutions

As a last resort, I worked with another student to use a remote desktop app to connect to his Azure account to complete my assignments

# Career Skills

# Career Skills

## Career Skills

- Perseverance
- Problem Solving
- Analytical Thinking
- Resourcefulness
- Patience
- Communication
- Research
- Overcoming Obstacles

Conclusion



# Conclusion

## Lessons learned:

- ❖ Understand cloud computing
- ❖ Explain the virtualization of networking
- ❖ Examine network services on a cloud platform
- ❖ Identify cloud-centric access control techniques
- ❖ Assess cloud-centric security techniques
- ❖ Evaluate cloud storage technologies
- ❖ Apply common cloud maintenance tools, techniques, and services
- ❖ Explore the evolving job market in the digitized world
- ❖ Produce a network on a cloud platform

References

# References

## IP Subnet Calculator:

<https://www.calculator.net/ip-subnet-calculator.html>

## Azure Virtual Network FAQs:

<https://docs.microsoft.com/en-us/azure/virtual-network/virtual-networks-faq>

## IP Address CIDR Network References:

<https://www.freecodecamp.org/news/subnet-cheat-sheet-24-subnet-mask-30-26-27-29-and-other-ip-address-cidr-network-references/>

## Private IP addresses:

<https://learn.microsoft.com/en-us/azure/virtual-network/ip-services/private-ip-addresses>

# References (cont.)

**Hot, Cool, and Archive access tiers for blob data:**

<https://docs.microsoft.com/en-us/azure/storage/blobs/access-tiers-overview>

**Azure Blob Storage Access Tiers:**

<https://devry.percipio.com/courses/c7ef0333-8560-403f-a004-9c5c843866b0/videos/2658bbe6-ee97-438b-a376-fbb079c3b3a0>

**Microsoft/Learn:**

<https://learn.microsoft.com/en-us/azure/storage/blobs/access-tiers-overview>

<http://learn.microsoft.com/en-us/azure/storage/blobs/storage-blobs-overview>