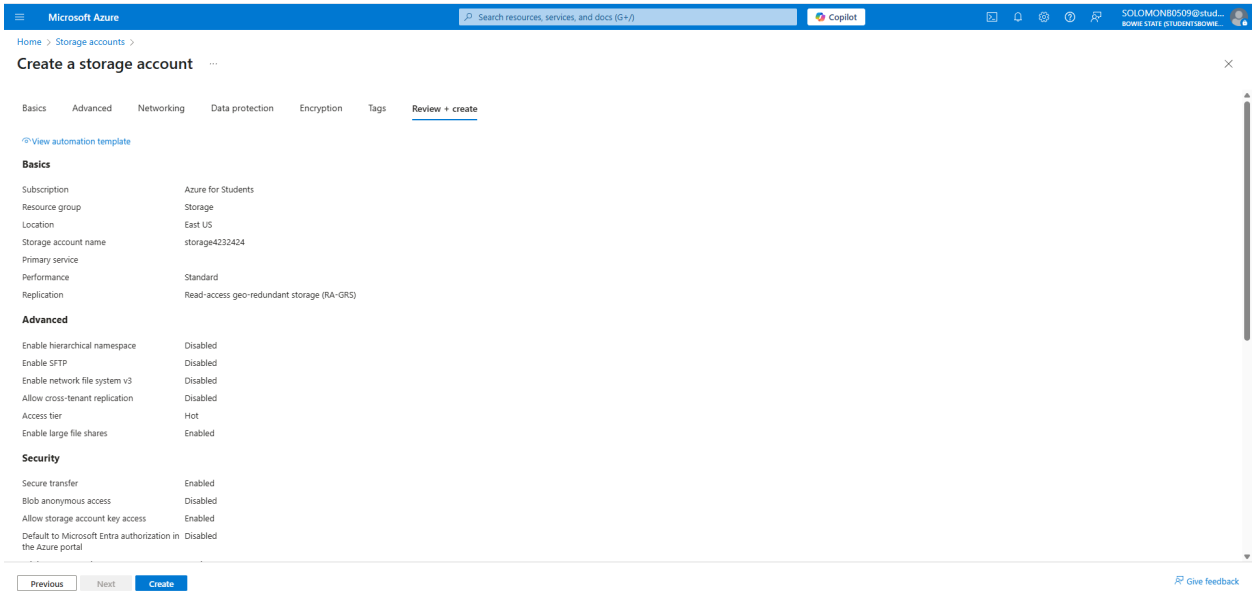
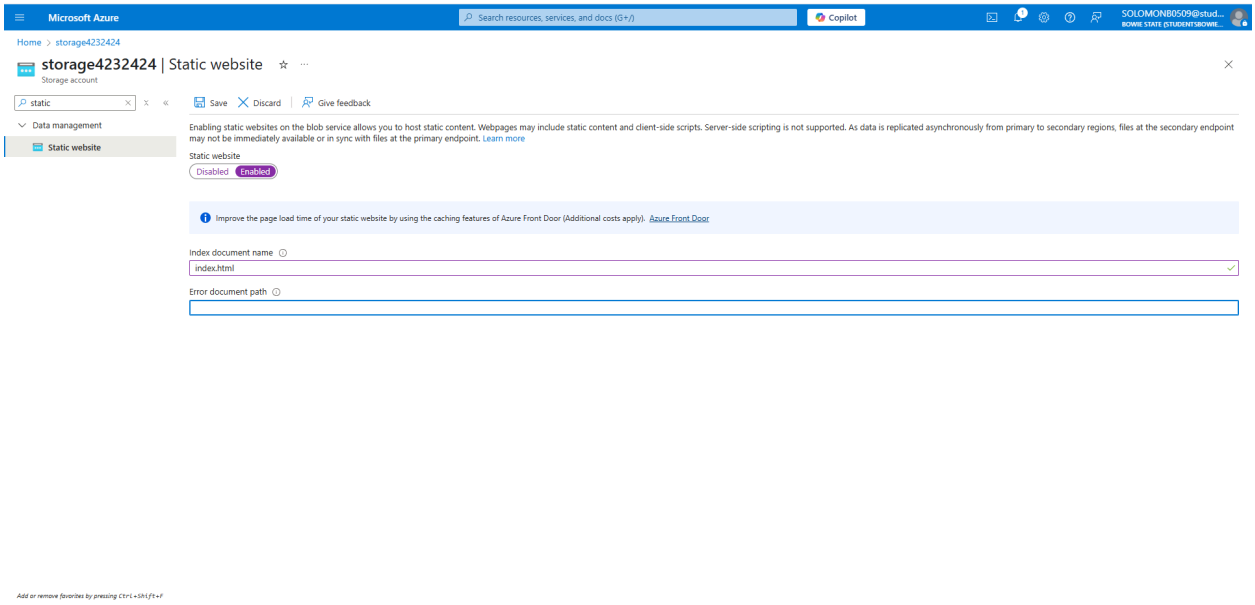
Branden Solomon
5/7/25
Professor Francis
CTEC 475

Capstone Module 10

1. I’m using an Azure Account and MFA for this Capstone Project.

2.


Microsoft Azure
Search resources, services, and docs (G+/)
Copilot
SOLOMONB0509@stud...
BOWIE STATE (STUDENTSBOWIE...
Home > Storage accounts >
Create a storage account
Basics
Advanced
Networking
Data protection
Encryption
Tags
Review + create
View automation template
Basics
Subscription
Azure for Students
Resource group
Storage
Location
East US
Storage account name
storage4232424
Primary service
Performance
Standard
Replication
Read-access geo-redundant storage (RA-GRS)
Advanced
Enable hierarchical namespace
Disabled
Enable SFTP
Disabled
Enable network file system v3
Disabled
Allow cross-tenant replication
Disabled
Access tier
Hot
Enable large file shares
Enabled
Security
Secure transfer
Enabled
Blob anonymous access
Disabled
Allow storage account key access
Enabled
Default to Microsoft Entra authorization in the Azure portal
Disabled
Previous
Next
Create
Give feedback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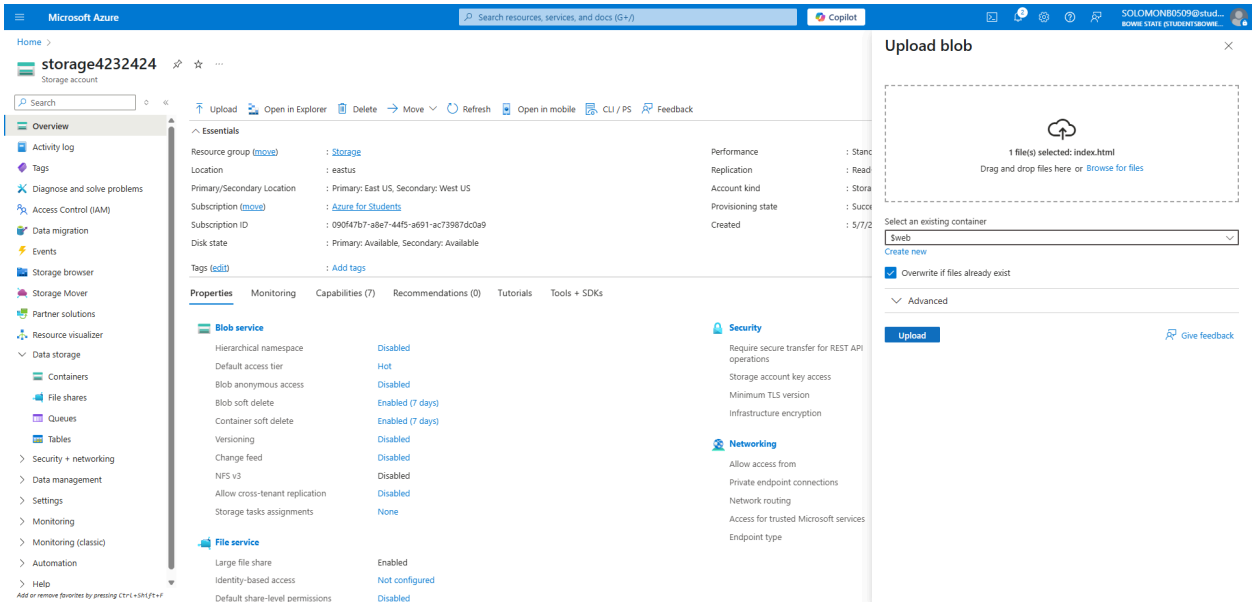
BOWIE STATE (STUDENTSBOWIE...
Home > storage4232424
storage4232424 | Static website
Storage account
static
Data management
Static website
Save
Discard
Give feedback
Enabling static websites on the blob service allows you to host static content. Webpages may include static content and client-side scripts. Server-side scripting is not supported. As data is replicated asynchronously from primary to secondary regions, files at the secondary endpoint may not be immediately available or in sync with files at the primary endpoint. Learn more
Static website
Disabled
Enabled
Improve the page load time of your static website by using the caching features of Azure Front Door (Additional costs apply). Azure Front Door
Index document name
index.html
Error document path
Add or remove favorites by pressing Ctrl+Shift+F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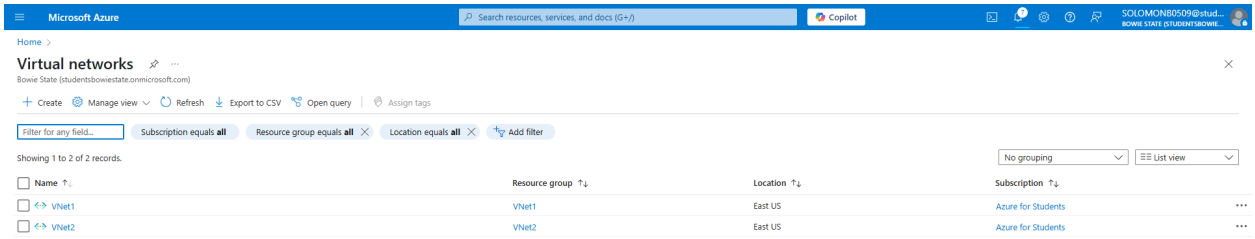
BOWIE STATE (STUDENTSBOWIE...
Home
storage4232424
Storage account
Search
Overview
Activity log
Tags
Diagnose and solve problems
Access Control (IAM)
Data migration
Events
Storage browser
Storage Mover
Partner solutions
Resource visualizer
Data storage
Containers
File shares
Queues
Tables
Security + networking
Data management
Settings
Monitoring
Monitoring (classic)
Automation
Help
Add or remove favorites by pressing Ctrl+Shift+F
Upload
Open in Explorer
Delete
Move
Refresh
Open in mobile
CLI / PS
Feedback
Essentials
Resource group (move) : Storage
Location : eastus
Primary/Secondary Location : Primary: East US, Secondary: West US
Subscription (move) : Azure for Students
Subscription ID : 090f47b7-a8e7-44f5-a691-ac73987dc0a9
Disk state : Primary: Available, Secondary: Available
Tags (edit) : Add tags
Performance : Stanc
Replication : Read
Account kind : Stora
Provisioning state : Succe
Created : 5/7/2
Properties
Monitoring
Capabilities (7)
Recommendations (0)
Tutorials
Tools + SDKs
Blob service
Hierarchical namespace Disabled
Default access tier Hot
Blob anonymous access Disabled
Blob soft delete Enabled (7 days)
Container soft delete Enabled (7 days)
Versioning Disabled
Change feed Disabled
NFS v3 Disabled
Allow cross-tenant replication Disabled
Storage tasks assignments None
File service
Large file share Enabled
Identity-based access Not configured
Default share-level permissions Disabled
Security
Require secure transfer for REST API operations
Storage account key access
Minimum TLS version
Infrastructure encryption
Networking
Allow access from
Private endpoint connections
Network routing
Access for trusted Microsoft services
Endpoint type
Upload blob
1 file(s) selected: index.html
Drag and drop files here or Browse for files
Select an existing container
$web
Create new
Overwrite if files already exist
Advanced
Upload
Give feedback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BOWIE STATE (STUDENTSBOWIE...
Home
Virtual networks
Bowie State (studentsbowiestate.onmicrosoft.com)
Create
Manage view
Refresh
Export to CSV
Open query
Assign tags
Filter for any field...
Subscription equals all
Resource group equals all
Location equals all
Add filter
Showing 1 to 2 of 2 records.
No grouping
List view
Name
Resource group
Location
Subscription
VNet1
VNet1
East US
Azure for Students
VNet2
VNet2
East US
Azure for Students

3.


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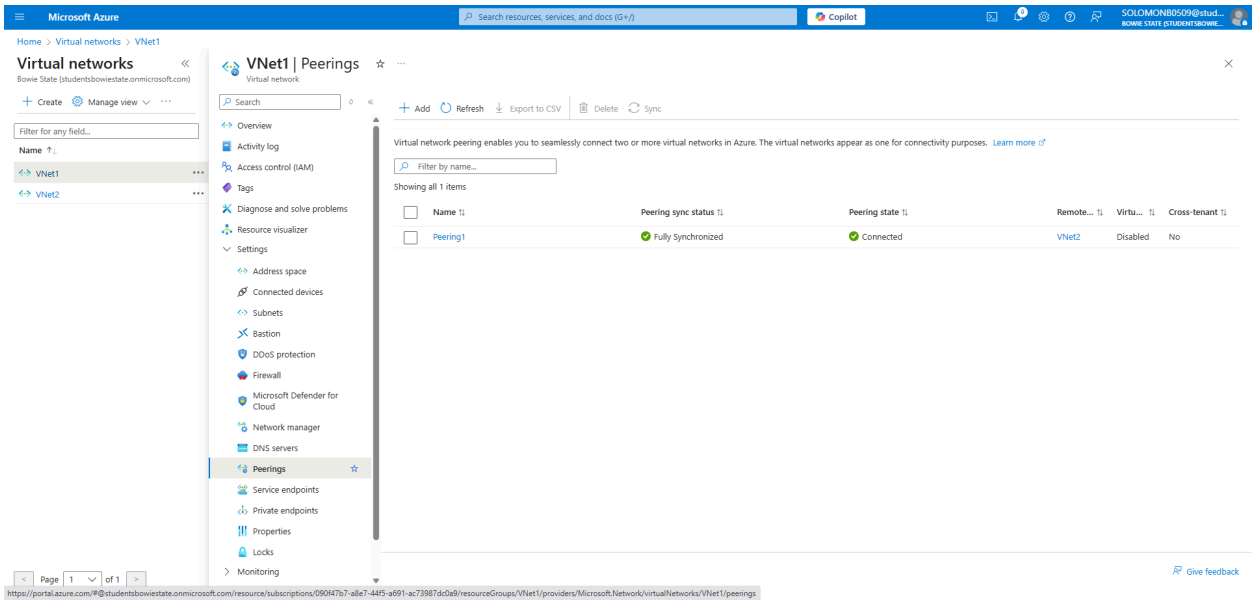
Next >


Give feedback
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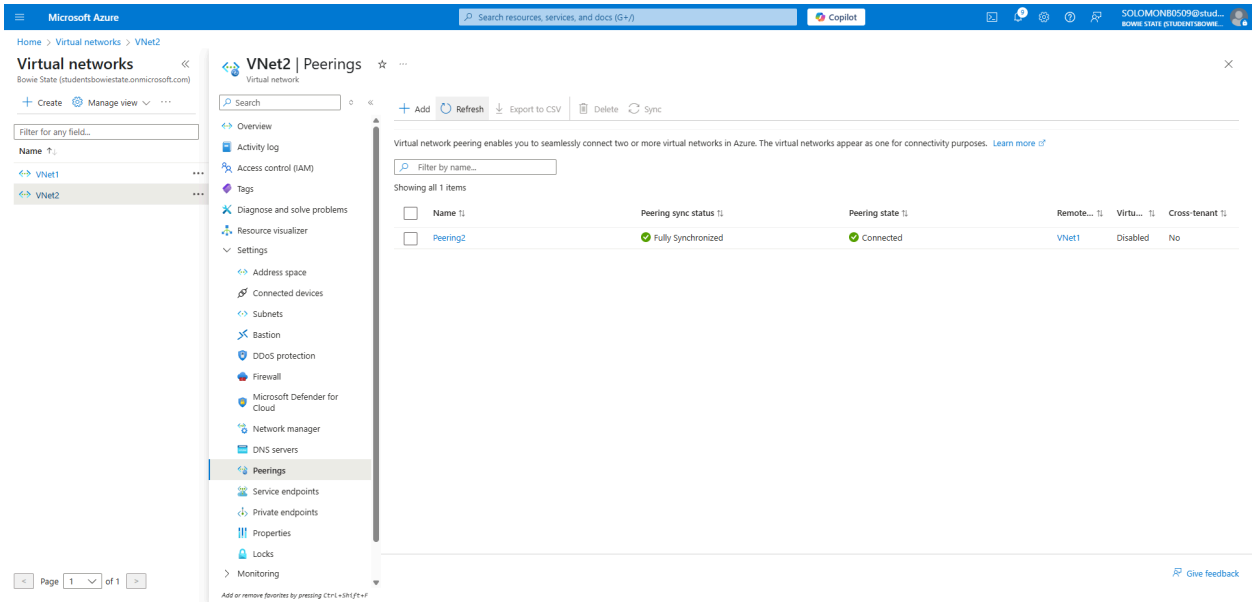
Copilot
SOLOMONB0509@stud...
BOWIE STATE (STUDENTSBOWIE...
Home > Virtual networks > VNet1
Virtual networks
Bowie State (studentsbowiestate.onmicrosoft.com)
Create
Manage view
Filter for any field...
Name
VNet1
VNet2
VNet1 | Peerings
Virtual network
Search
Overview
Activity log
Access control (IAM)
Tags
Diagnose and solve problems
Resource visualizer
Settings
Address space
Connected devices
Subnets
Bastion
DDoS protection
Firewall
Microsoft Defender for Cloud
Network manager
DNS servers
Peerings
Service endpoints
Private endpoints
Properties
Locks
Monitoring
Add
Refresh
Export to CSV
Delete
Sync
Virtual network peering enables you to seamlessly connect two or more virtual networks in Azure. The virtual networks appear as one for connectivity purposes. Learn more
Filter by name...
Showing all 1 items
Name
Peering sync status
Peering state
Remote...
Virtu...
Cross-tenant
Peering1
Fully Synchronized
Connected
VNet2
Disabled
No
Page 1 of 1
Give feedback
https://portal.azure.com/#@studentsbowiestate.onmicrosoft.com/resource/subscriptions/090f47b7-a8e7-44f5-a691-ac73987dc0a9/resourceGroups/VNet1/providers/Microsoft.Network/virtualNetworks/VNet1/peerings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Copilot
SOLOMONB0509@stud...
BOWIE STATE (STUDENTSBOWIE...
Home > Virtual networks > VNet2
Virtual networks
Bowie State (studentsbowiestate.onmicrosoft.com)
Create
Manage view
Filter for any field...
Name
VNet1
VNet2
Page 1 of 1
VNet2 | Peerings
Virtual network
Search
Overview
Activity log
Access control (IAM)
Tags
Diagnose and solve problems
Resource visualizer
Settings
Address space
Connected devices
Subnets
Bastion
DDoS protection
Firewall
Microsoft Defender for Cloud
Network manager
DNS servers
Peerings
Service endpoints
Private endpoints
Properties
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Monitoring
Add or remove favorites by pressing Ctrl+Shift+F
Add
Refresh
Export to CSV
Delete
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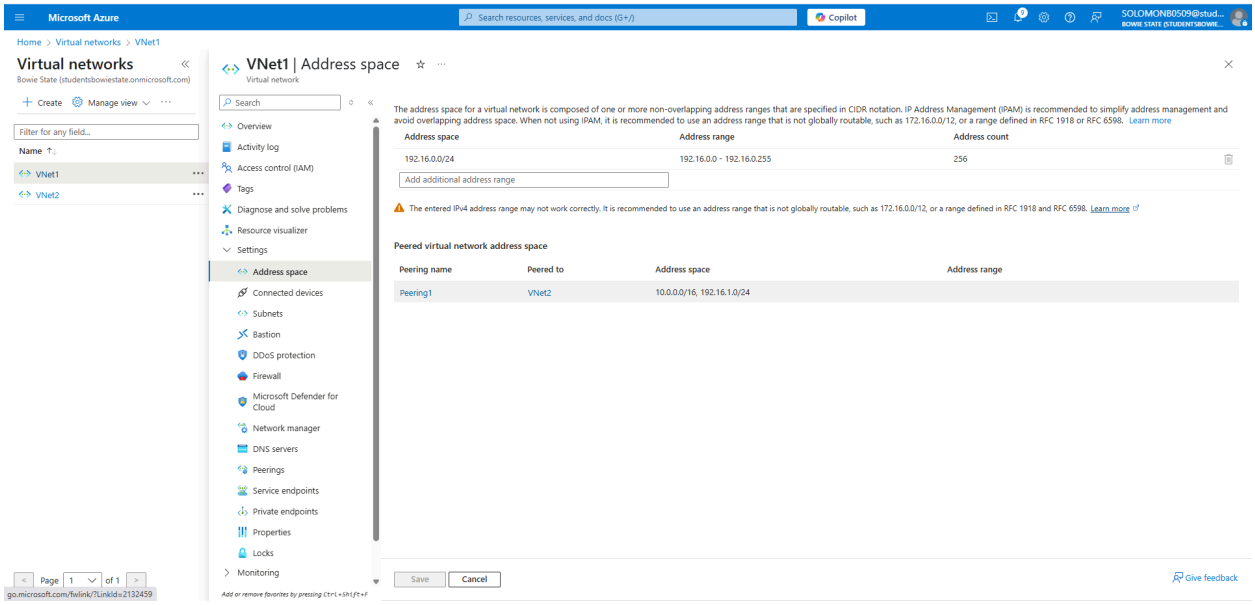
Virtual network peering enables you to seamlessly connect two or more virtual networks in Azure. The virtual networks appear as one for connectivity purposes. Learn more
Filter by name...
Showing all 1 items
Name
Peering sync status
Peering state
Remote...
Virtu...
Cross-tenant
Peering2
Fully Synchronized
Connected
VNet1
Disabled
No
Give feedback

4.


Microsoft Azure
Search resources, services, and docs (G+/)
Copilot
Home > Virtual networks > VNet1
Virtual networks
Bowie State (studentsbowiestate.onmicrosoft.com)
Create
Manage view
Filter for any field...
Name
VNet1
VNet2
VNet1 | Address space
Virtual network
Search
Overview
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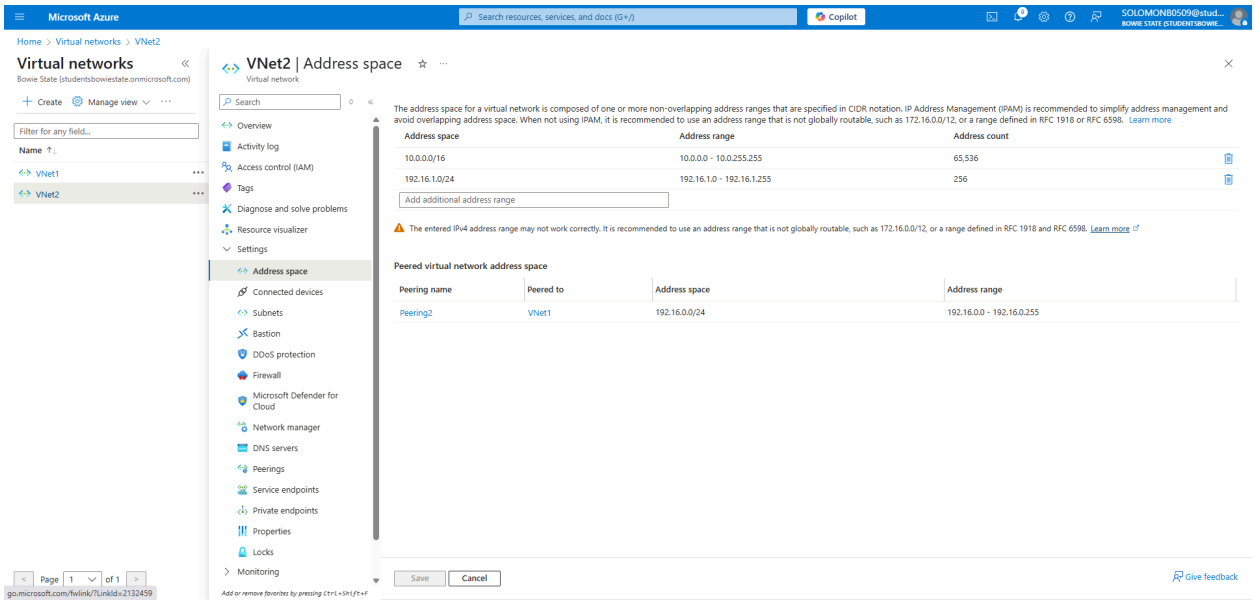
Access control (IAM)
Tags
Diagnose and solve problems
Resource visualizer
Settings
Address space
Connected devices
Subnets
Bastion
DDoS protection
Firewall
Microsoft Defender for Cloud
Network manager
DNS servers
Peerings
Service endpoints
Private endpoints
Properties
Locks
Monitoring
The address space for a virtual network is composed of one or more non-overlapping address ranges that are specified in CIDR notation. IP Address Management (IPAM) is recommended to simplify address management and avoid overlapping address space. When not using IPAM, it is recommended to use an address range that is not globally routable, such as 172.16.0.0/12, or a range defined in RFC 1918 or RFC 6598. Learn more
Address space
Address range
Address count
192.16.0.0/24
192.16.0.0 - 192.16.0.255
256
Add additional address range
The entered IPv4 address range may not work correctly. It is recommended to use an address range that is not globally routable, such as 172.16.0.0/12, or a range defined in RFC 1918 and RFC 6598. Learn more
Peered virtual network address space
Peering name
Peered to
Address space
Address range
Peering1
VNet2
10.0.0.0/16, 192.16.1.0/24
Save
Cancel
Give feedback
Page 1 of 1
go.microsoft.com/fwlink/?Linkid=2132459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Copilot
Home > Virtual networks > VNet2
Virtual networks
Bowie State (studentsbowiestate.onmicrosoft.com)
Create
Manage view
Filter for any field...
Name
VNet1
VNet2
VNet2 | Address space
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Address space
Address range
Address count
10.0.0.0/16
10.0.0.0 - 10.0.255.255
65,536
192.16.1.0/24
192.16.1.0 - 192.16.1.255
256
Add additional address range
The entered IPv4 address range may not work correctly. It is recommended to use an address range that is not globally routable, such as 172.16.0.0/12, or a range defined in RFC 1918 and RFC 6598. Learn more
Peered virtual network address space
Peering name
Peered to
Address space
Address range
Peering2
VNet1
192.16.0.0/24
192.16.0.0 - 192.16.0.255
Save
Cancel
Give feedback
Page 1 of 1
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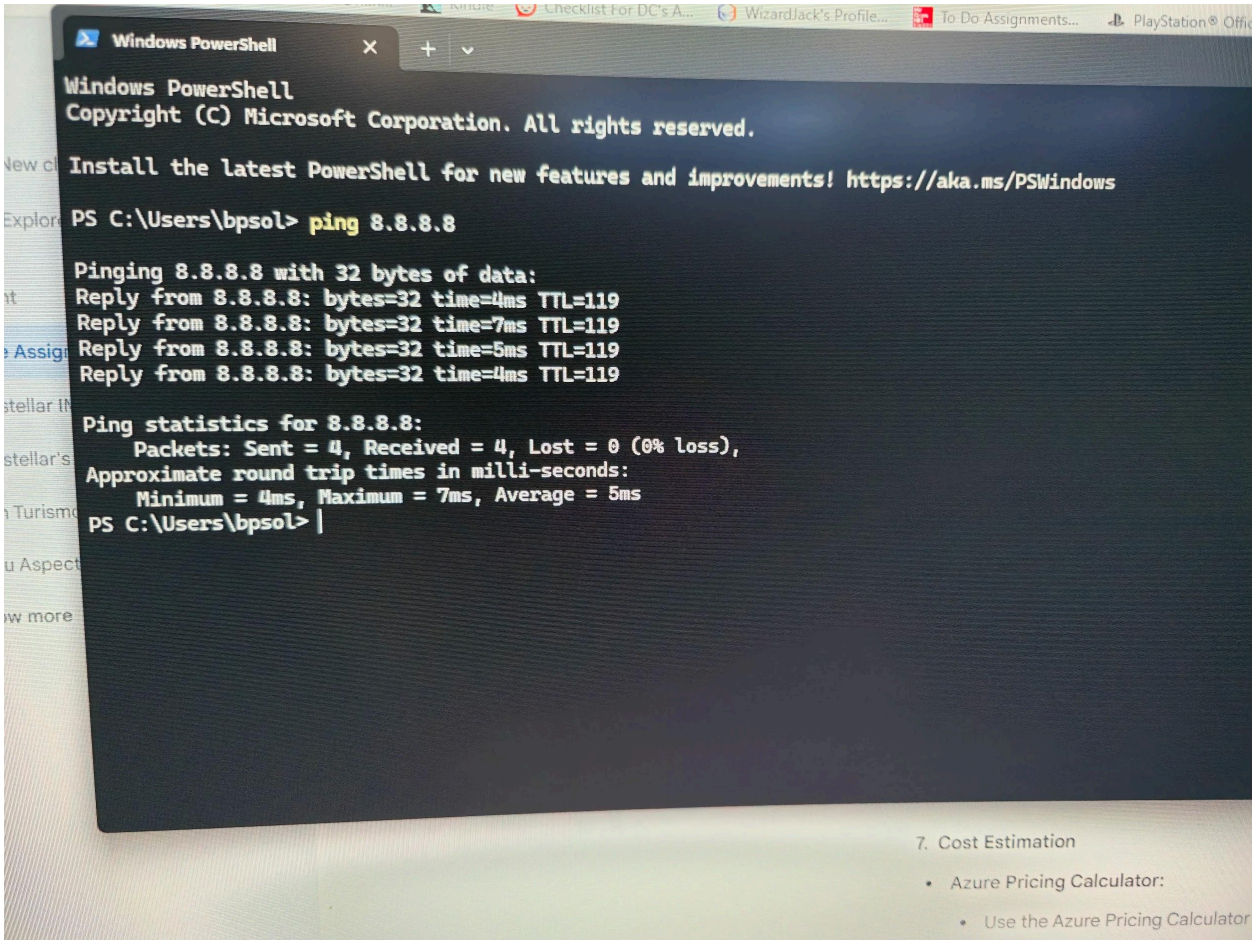
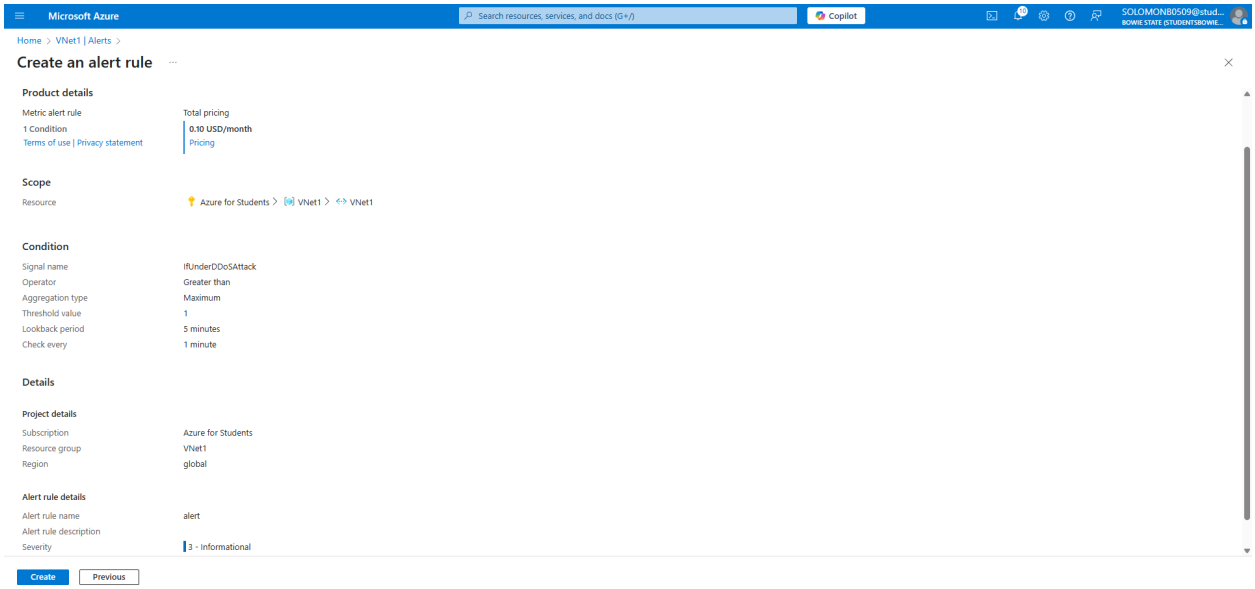
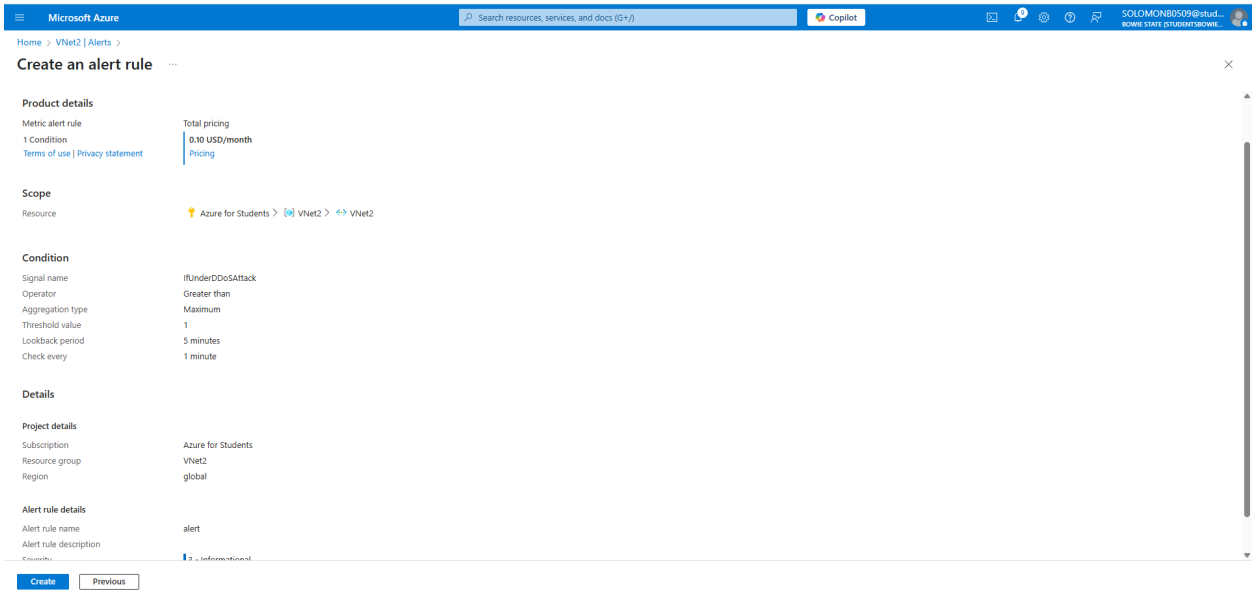
5. 
Windows PowerShell
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.
Install the latest PowerShell for new features and improvements! https://aka.ms/PSWindows
PS C:\Users\bpsol> ping 8.8.8.8
Pinging 8.8.8.8 with 32 bytes of data:
Reply from 8.8.8.8: bytes=32 time=4ms TTL=119
Reply from 8.8.8.8: bytes=32 time=7ms TTL=119
Reply from 8.8.8.8: bytes=32 time=5ms TTL=119
Reply from 8.8.8.8: bytes=32 time=4ms TTL=119
Ping statistics for 8.8.8.8:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 4ms, Maximum = 7ms, Average = 5ms
PS C:\Users\bpsol>
7. Cost Estimation
Azure Pricing Calculator:
Use the Azure Pricing Calculator

6. 



7. The Azure pricing calculator I use calculates between $300 - $600 per year.

8.

A. Network Diagram (Guess):

- A box labeled "Azure"
- Inside Azure:
    - Two boxes: "VNet 1" (10.0.0.0/16) and "VNet 2" (10.1.0.0/16)
    - Inside VNet 1: "Subnet 1"
    - Inside VNet 2: "Subnet 2"
    - A circle labeled "Internet Gateway" is connected to VNet 1

- A line connecting VNet 1 and VNet 2 labeled "VNet Peering"
- In Subnet 1: "VM 1 (Public IP)"
- In Subnet 2: "VM 2 (Private IP)"

B. Resource Configuration (Guess):

VM 1:

a. Size: Standard_B1s
b. OS: Windows Server 2019
c. Public IP: 20.100.100.1
d. Private IP: 10.0.0.4

VM 2:

e. Size: Standard_B1s
f. OS: Ubuntu 20.04
g. Private IP: 10.1.0.4

Storage Account:

h. Type: Standard_LRS
i. Static Website: Enabled, index.html

VNet 1:

j. CIDR: 10.0.0.0/16
k. Subnet 1: 10.0.0.0/24

VNet 2:

l. CIDR: 10.1.0.0/16
m. Subnet 2: 10.1.0.0/24

NSG (Subnet 1):

n. Allow Inbound: Port 80 (HTTP), Port 22 (SSH), Port 3389 (RDP), ICMP
o. Allow Outbound: All

NSG (Subnet 2):

p. Allow Inbound: ICMP
q. Allow Outbound: ICMP

9. During my group assignment, a key question I received focused on the network security groups and their specific rules, prompting me to elaborate on the inbound and outbound traffic allowed for each virtual machine. I clarified why certain ports were open and the reasoning behind restricting other traffic to enhance security. To prepare for future presentations, I should anticipate more detailed inquiries about the cost optimization strategies employed, such as my selection of VM sizes and storage tiers. Additionally, I need to be ready to explain the rationale behind my choice of virtual network peering over other connectivity options and how it impacts network latency. Finally, I should practice articulating the scalability considerations of my design and how it could adapt to increased workloads.

10.