

Azure Capstone Project:

Multi-Region File Upload Web Application Using Virtual Machines, Blob Storage, and Traffic Manager.

Step 1: Resource Groups (East & West)

Description: Shows both resource groups (RG-East and RG-West) created for organizing resources in respective regions.

The screenshot displays the Azure portal interface for the 'RG-East' resource group. The left sidebar shows the navigation menu with 'Overview' selected. The main content area shows the 'Resources' tab with a table of resources. The table has columns for Name, Type, and Location. The resources listed are:

Name	Type	Location
projectsg16	Storage account	East US
vm1-east	Virtual machine	East US
vm1-east-ip	Public IP address	East US
vm1-east-nsg	Network security group	East US
vm1-east883_22	Network Interface	East US
vm1-east_disk1_b38f84af4b9e4b3dba879bc23470a7f4	Disk	East US
vm2-east	Virtual machine	East US
vm2-east-ip	Public IP address	East US

The screenshot displays the Azure portal interface for the 'RG-West' resource group. The left sidebar shows the navigation menu with 'Overview' selected. The main content area shows the 'Resources' tab with a table of resources. The table has columns for Name, Type, and Location. The resources listed are:

Name	Type	Location
vm1-west	Virtual machine	West US
vm1-west-ip	Public IP address	West US
vm1-west-nsg	Network security group	West US
vm1-west216	Network Interface	West US
vm1-west_OsDisk_1_4972fb5928f44ee1b4e59dd00a992f6c	Disk	West US
vm2-west	Virtual machine	West US
vm2-west-ip	Public IP address	West US
vm2-west-nsg	Network security group	West US

Shows both resource groups (RG-East and RG-West) created for organizing resources in respective regions.

Step 2: Virtual Machines Overview

Description: Displays all 4 VMs across both regions with their status and regions.

The screenshot shows the Azure portal interface for a virtual machine named 'vm1-west' in the West US region. The left sidebar contains navigation options like Overview, Activity log, Access control (IAM), Tags, Diagnose and solve problems, Resource visualizer, Connect, Networking, Load balancing, Application security groups, Network manager, and Settings. The main content area displays the 'Essentials' tab with key information: Resource group (RG-West), Status (Running), Location (West US), Subscription (Azure subscription 1), and Subscription ID (ec3a97d7-7205-454c-8b5c-31da1bed3a22). It also shows the Operating system (Linux (ubuntu 24.04)), Size (Standard B1s (1 vcpu, 1 GiB memory)), Public IP address (172.184.101.97), Virtual network/subnet (ynet-west/subnet-vm1-west), DNS name (Not configured), Health state (-), and Time created (23/06/2025, 11:54 UTC). Below this, the 'Properties' tab is active, showing details for the 'Virtual machine' (Computer name: vm1-west, Operating system: Linux (ubuntu 24.04), VM generation: V2, VM architecture: x64) and 'Networking' (Public IP address: 172.184.101.97, Private IP address: 10.1.1.4).

The screenshot shows the Azure portal interface for a virtual machine named 'vm2-east' in the East US (Zone 2) region. The left sidebar contains navigation options like Overview, Activity log, Access control (IAM), Tags, Diagnose and solve problems, Resource visualizer, Connect, Networking, Load balancing, Application security groups, Network manager, and Settings. The main content area displays the 'Essentials' tab with key information: Resource group (RG-East), Status (Running), Location (East US (Zone 2)), Subscription (Azure subscription 1), and Subscription ID (ec3a97d7-7205-454c-8b5c-31da1bed3a22). It also shows the Operating system (Linux (ubuntu 24.04)), Size (Standard B1s (1 vcpu, 1 GiB memory)), Public IP address (20.42.81.238), Virtual network/subnet (ynet-east/subnet-vm2-east), DNS name (Not configured), Health state (-), and Time created (23/06/2025, 11:12 UTC). Below this, the 'Properties' tab is active, showing details for the 'Virtual machine' (Computer name: vm2-east, Operating system: Linux (ubuntu 24.04), VM generation: V2, VM architecture: x64) and 'Networking' (Public IP address: 20.42.81.238, Private IP address: 10.0.2.4).

Microsoft Azure portal showing the overview of a virtual machine named **vm2-west** in the West US region.

Essentials:

- Resource group: [RG-West](#)
- Status: Running
- Location: West US
- Subscription: [Azure subscription 1](#)
- Subscription ID: ec3a97d7-7205-454c-8b5c-31da1bed3a22
- Operating system: Linux (ubuntu 24.04)
- Size: Standard B1s (1 vcpu, 1 GiB memory)
- Public IP address: [20.66.105.249](#)
- Virtual network/subnet: [vnet-west/subnet-vm2-west](#)
- DNS name: [Not configured](#)
- Health state: -
- Time created: 23/06/2025, 11:56 UTC

Tags: [Add tags](#)

Properties:

Category	Property	Value
Virtual machine	Computer name	vm2-west
	Operating system	Linux (ubuntu 24.04)
	VM generation	V2
	VM architecture	x64
Networking	Public IP address	20.66.105.249 (Network interface vm2-west798)
	Public IP address (IPv6)	-
	Private IP address	10.1.2.4
	Private IP address (IPv6)	-

Microsoft Azure portal showing the overview of a virtual machine named **vm1-east** in the East US (Zone 2) region.

Essentials:

- Resource group: [RG-East](#)
- Status: Running
- Location: East US (Zone 2)
- Subscription: [Azure subscription 1](#)
- Subscription ID: ec3a97d7-7205-454c-8b5c-31da1bed3a22
- Availability zone: 2
- Operating system: Linux (ubuntu 24.04)
- Size: Standard B1s (1 vcpu, 1 GiB memory)
- Public IP address: [4.236.161.81](#)
- Virtual network/subnet: [vnet-east/subnet-vm1-east](#)
- DNS name: [Not configured](#)
- Health state: -
- Time created: 23/06/2025, 11:05 UTC

Tags: [Add tags](#)

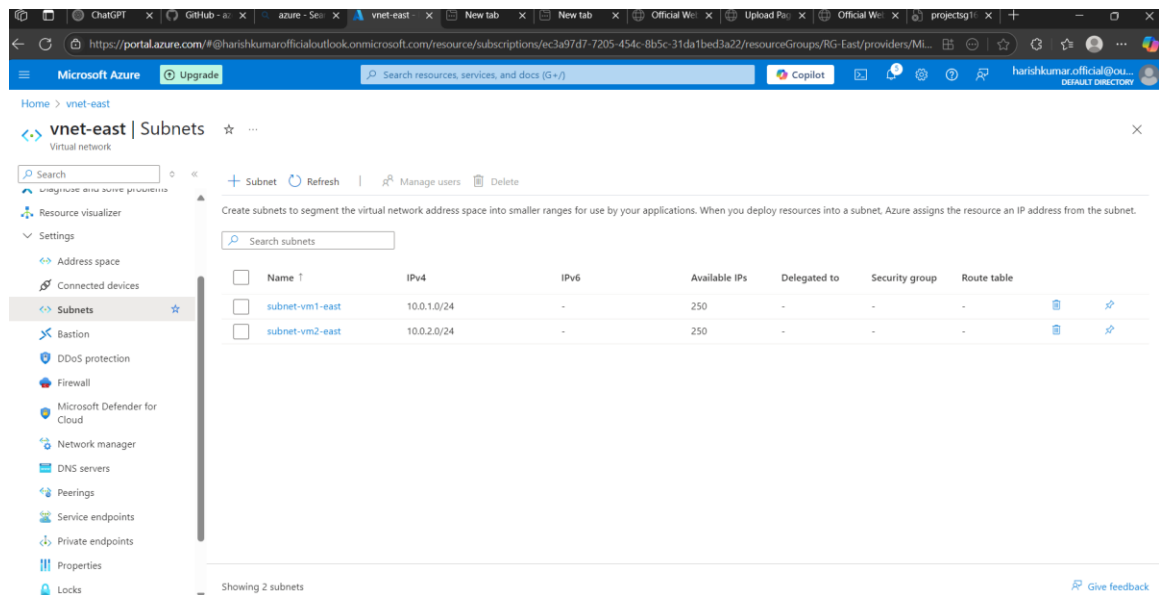
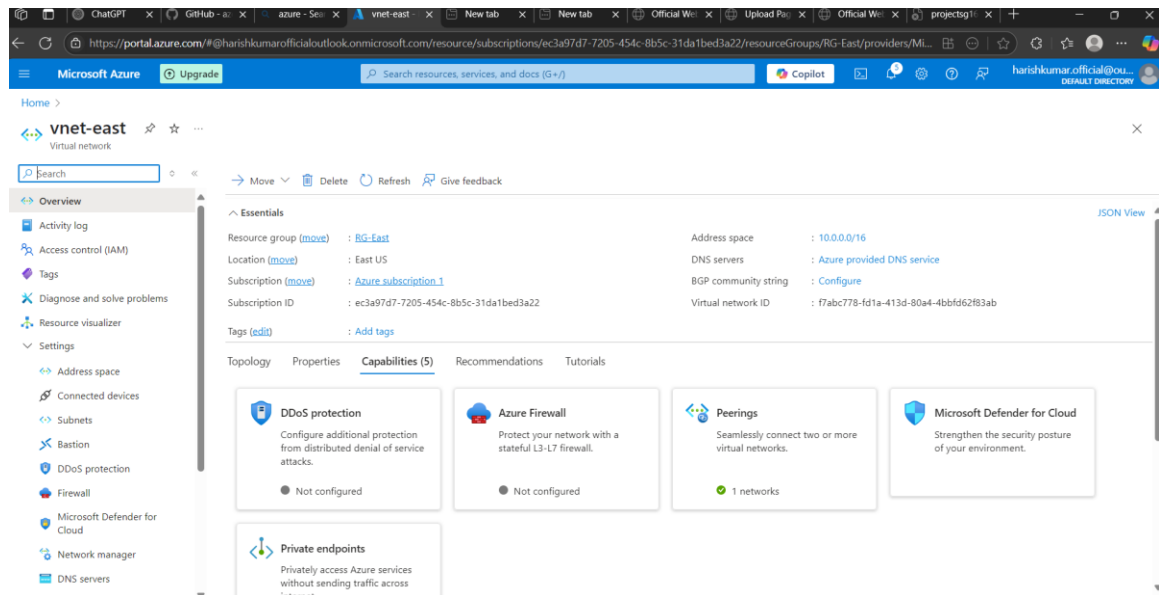
Properties:

Category	Property	Value
Virtual machine	Computer name	vm1-east
	Operating system	Linux (ubuntu 24.04)
	VM generation	V2
	VM architecture	x64
Networking	Public IP address	4.236.161.81 (Network interface vm1-east883_22)
	Public IP address (IPv6)	-
	Private IP address	10.0.1.4
	Private IP address (IPv6)	-

Overview of four virtual machines deployed across East and West regions, displaying status and distribution.

Step 3: Virtual Network and Subnets – East

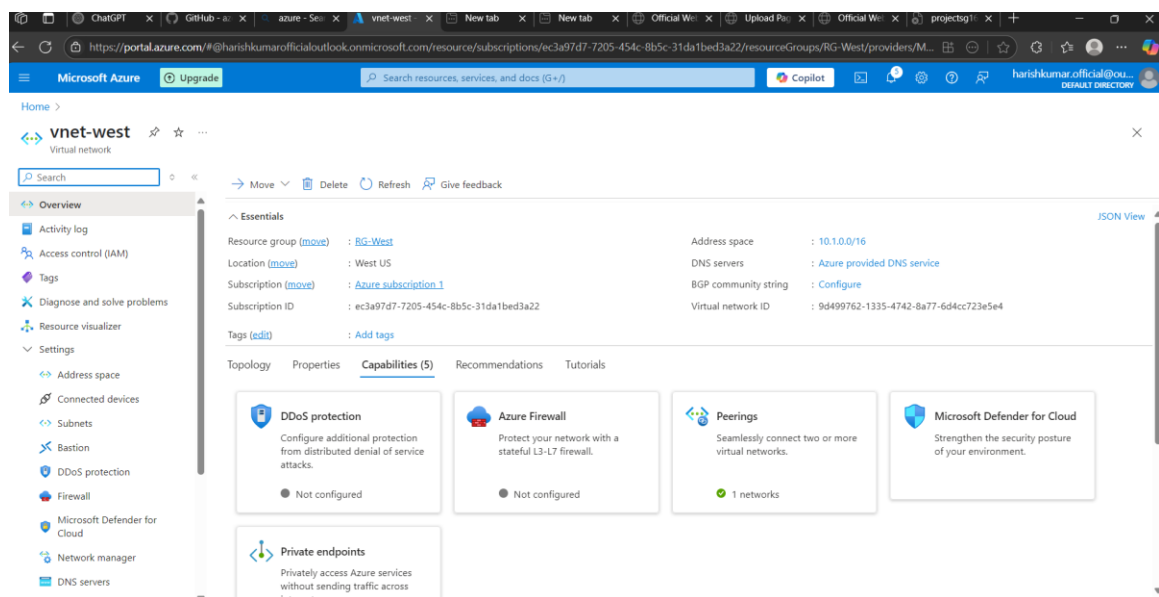
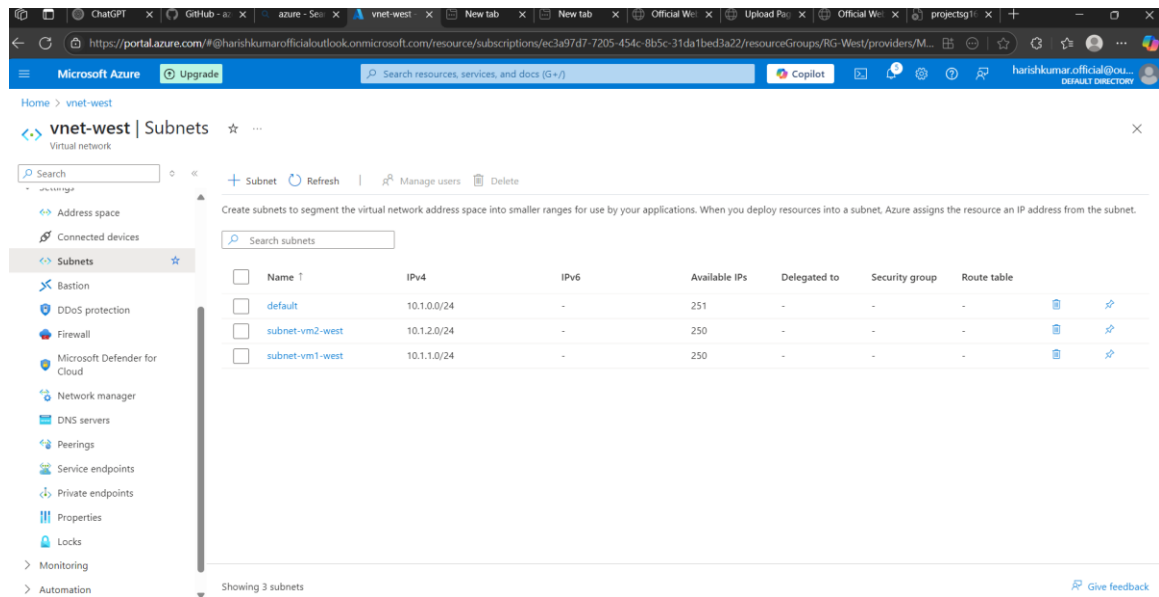
Description: Displays subnets created under vnet-east for vm1 and vm2.



Subnets under vnet-east were configured to support vm1 and vm2 for the East region deployment.

Step 4: Virtual Network and Subnets - West

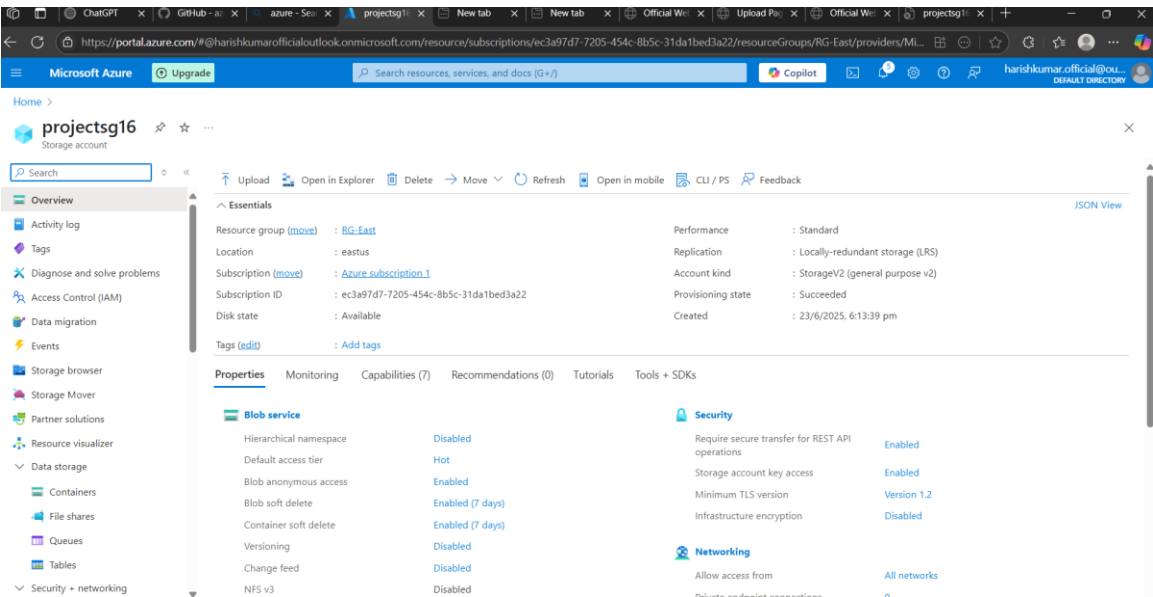
Description: Displays subnets created under vnet-west for vm1 and vm2.



Subnets under vnet-west were created to host vm1 and vm2 for the West region deployment.

Step 5: Storage Account Overview

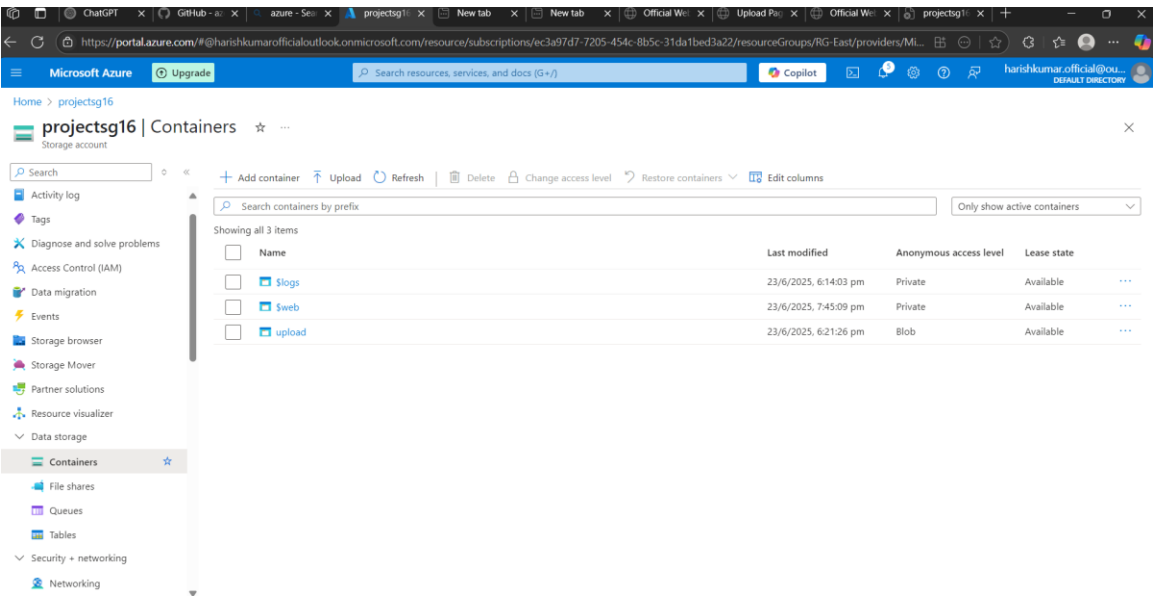
Description: Storage account (projectsg16) used to store uploaded files.



Storage account 'projectsg16' provisioned to manage and store uploaded application files.

Step 6: Upload Container in Storage

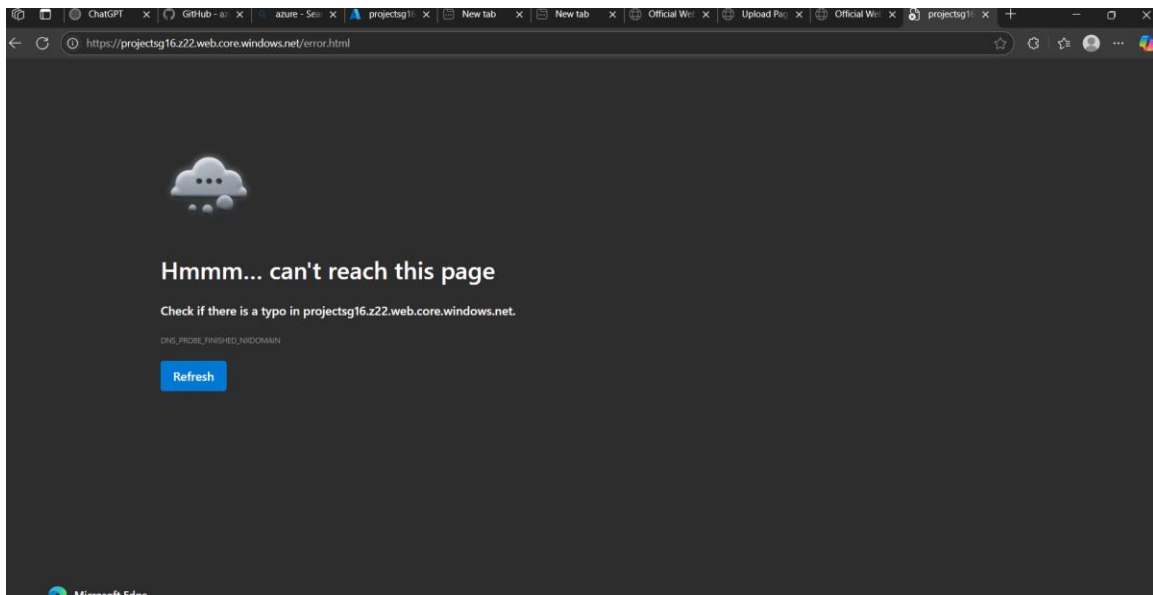
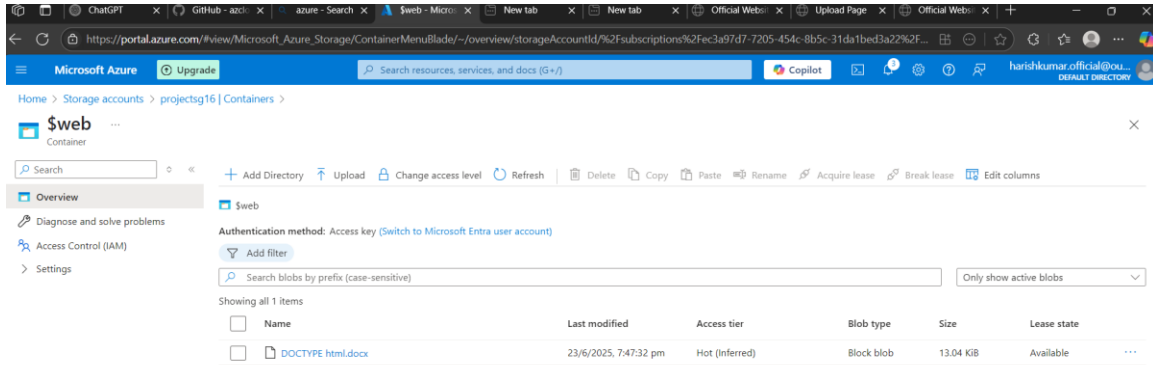
Description: Shows the 'upload' container with test files inside.



The 'upload' container within the storage account shows uploaded test files for validation.

Step 7: Static Website Configuration

Description: Enabling static website and setting error.html as fallback.



Static website hosting was enabled with a fallback to error.html in case of routing issues

Step 8: VM1-East Terminal Running Flask

Description: Flask app launched to serve the upload form from vm1-east.

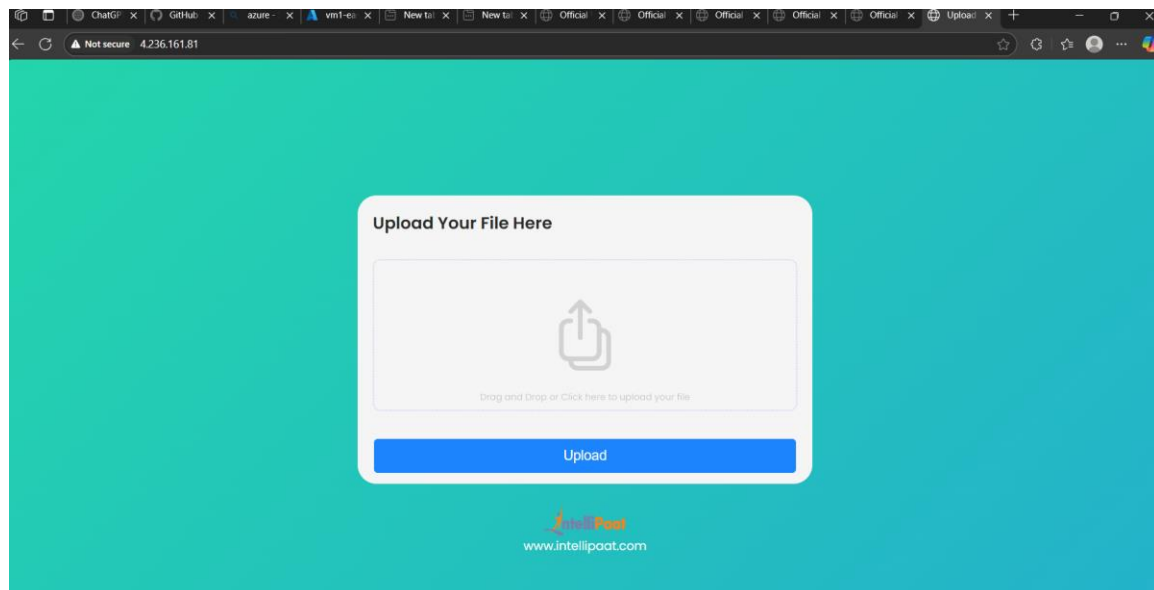
```
Requirement already satisfied: cryptography>=2.1.4 in ./env/lib/python3.12/site-packages (from azure-storage-blob) (45.0.4)
Requirement already satisfied: typing-extensions>=4.6.0 in ./env/lib/python3.12/site-packages (from azure-storage-blob) (4.14.0)
Requirement already satisfied: isodate>=0.6.1 in ./env/lib/python3.12/site-packages (from azure-storage-blob) (0.7.2)
Requirement already satisfied: blinker>=1.9.0 in ./env/lib/python3.12/site-packages (from flask) (1.9.0)
Requirement already satisfied: click>=8.1.3 in ./env/lib/python3.12/site-packages (from flask) (8.2.1)
Requirement already satisfied: itsdangerous>=2.2.0 in ./env/lib/python3.12/site-packages (from flask) (2.2.0)
Requirement already satisfied: Jinja2>=3.1.2 in ./env/lib/python3.12/site-packages (from flask) (3.1.6)
Requirement already satisfied: MarkupSafe>=2.1.1 in ./env/lib/python3.12/site-packages (from flask) (3.0.2)
Requirement already satisfied: Werkzeug>=3.1.0 in ./env/lib/python3.12/site-packages (from flask) (3.1.3)
Requirement already satisfied: requests>=2.21.0 in ./env/lib/python3.12/site-packages (from azure-core>=1.30.0->azure-storage-blob) (2.32.4)
Requirement already satisfied: six>=1.11.0 in ./env/lib/python3.12/site-packages (from azure-core>=1.30.0->azure-storage-blob) (1.17.0)
Requirement already satisfied: cffi>=1.14 in ./env/lib/python3.12/site-packages (from cryptography>=2.1.4->azure-storage-blob) (1.17.1)
Requirement already satisfied: pycparser in ./env/lib/python3.12/site-packages (from cffi>=1.14->cryptography>=2.1.4->azure-storage-blob) (2.22)
Requirement already satisfied: charset-normalizer<4,>=2 in ./env/lib/python3.12/site-packages (from requests>=2.21.0->azure-core>=1.30.0->azure-storage-blob) (3.4.2)
Requirement already satisfied: idna<4,>=2.5 in ./env/lib/python3.12/site-packages (from requests>=2.21.0->azure-core>=1.30.0->azure-storage-blob) (3.10)
Requirement already satisfied: urllib3<3,>=1.21.1 in ./env/lib/python3.12/site-packages (from requests>=2.21.0->azure-core>=1.30.0->azure-storage-blob) (2.5.0)

(env) azureuser@vm1-east:~/azproject$ python3 app.py
* Serving Flask app 'app'
* Debug mode: off
Permission denied
(env) azureuser@vm1-east:~/azproject$ sudo python3 app.py
Traceback (most recent call last):
  File "/home/azureuser/azproject/app.py", line 6, in <module>
    from flask import Flask, request, redirect, url_for, render_template
ModuleNotFoundError: No module named 'flask'
(env) azureuser@vm1-east:~/azproject$ source venv/bin/activate
python3 app.py
* Serving Flask app 'app'
* Debug mode: off
Permission denied
(env) azureuser@vm1-east:~/azproject$ sudo ./venv/bin/python3 app.py
* Serving Flask app 'app'
* Debug mode: off
WARNING: This is a development server. Do not use it in a production deployment. Use a production WSGI server instead.
* Running on all addresses (0.0.0.0)
* Running on http://127.0.0.1:80
* Running on http://10.0.1.0:80
```

Flask application deployed and running on vm1-east to serve the file upload form.

Step 9: VM1-East Browser Upload Page

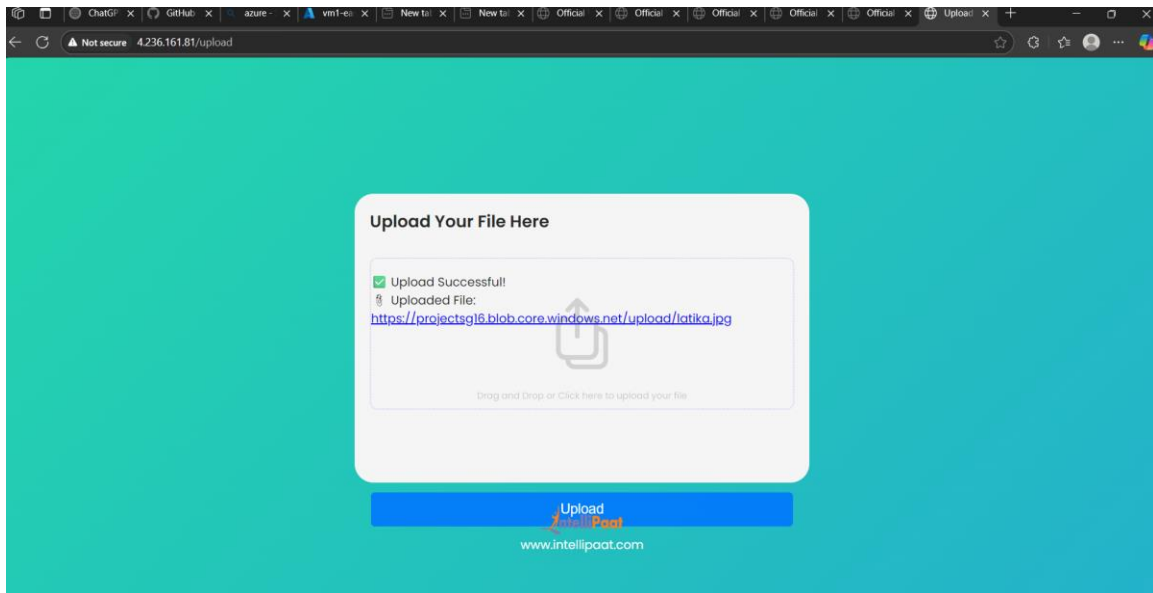
Description: Upload page accessed through public IP of vm1-east.



Upload form accessed via public IP of vm1-east, confirming external reachability.

Step 10: VM1-East Upload Success

Description: File uploaded successfully from east VM.



File upload confirmed via the east VM with a success message, validating endpoint functionality.

Step 11: VM1-West Terminal Running Flask

Description: Flask app launched to serve the upload form from vm1-west

```
azureuser@vm1-east: ~/azproj x azureuser@vm2-east: ~/azproj x azureuser@vm1-west: ~/azproj x azureuser@vm2-west: ~/azproj x +
Usage of /: 8.0% of 28.02GB Users logged in: 1
Memory usage: 41% IPv4 address for eth0: 10.1.1.4
Swap usage: 0%

1 device has a firmware upgrade available.
Run 'fwupdmgr get-upgrades' for more information.

Expanded Security Maintenance for Applications is not enabled.

32 updates can be applied immediately.
31 of these updates are standard security updates.
To see these additional updates run: apt list --upgradable

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status

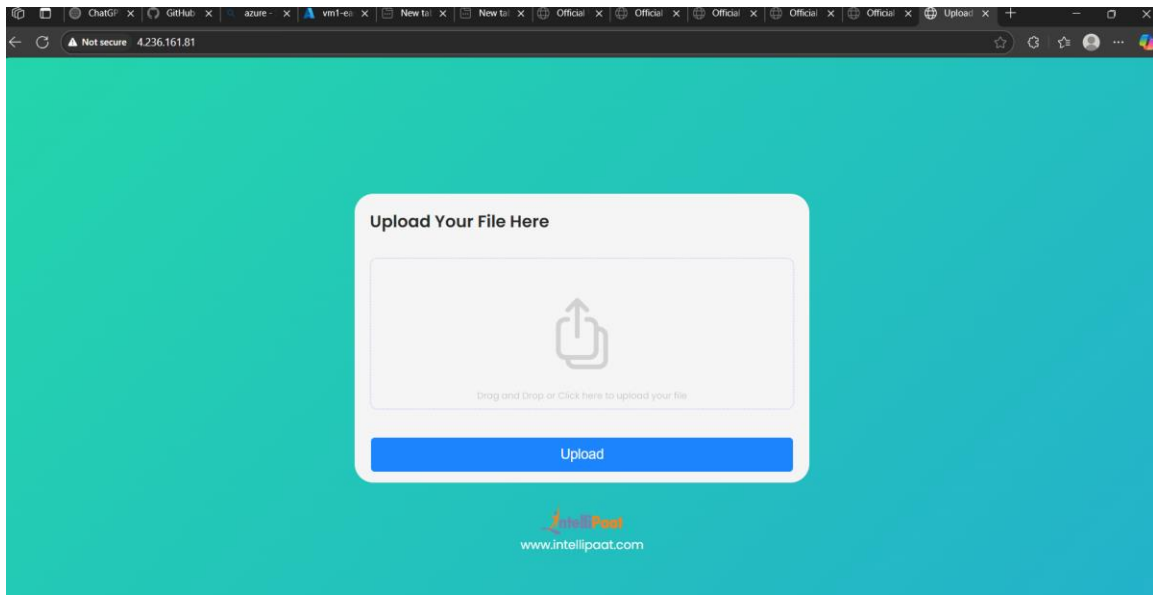
1 device has a firmware upgrade available.
Run 'fwupdmgr get-upgrades' for more information.

Last login: Mon Jun 23 12:06:37 2025 from 49.206.98.0
azureuser@vm1-west:~$ cd ~/azproject
azureuser@vm1-west:~/azproject$ sudo ./venv/bin/python3 app.py
* Serving Flask app 'app'
* Debug mode: off
Address already in use
Port 80 is in use by another program. Either identify and stop that program, or start the server with a different port.
azureuser@vm1-west:~/azproject$ sudo lsof -i :80
COMMAND PID USER FD TYPE DEVICE SIZE/OFF NODE NAME
python3 4537 root 3u IPv4 26491 0t0 TCP *:http (LISTEN)
azureuser@vm1-west:~/azproject$ sudo kill -9 4537
azureuser@vm1-west:~/azproject$ sudo ./venv/bin/python3 app.py
* Serving Flask app 'app'
* Debug mode: off
WARNING: This is a development server. Do not use it in a production deployment. Use a production WSGI server instead.
* Running on all addresses (0.0.0.0)
* Running on http://127.0.0.1:80
* Running on http://10.1.1.1:80
```

Flask application launched on vm1-west to serve the same upload interface.

Step 12: VM1-West Browser Upload Page

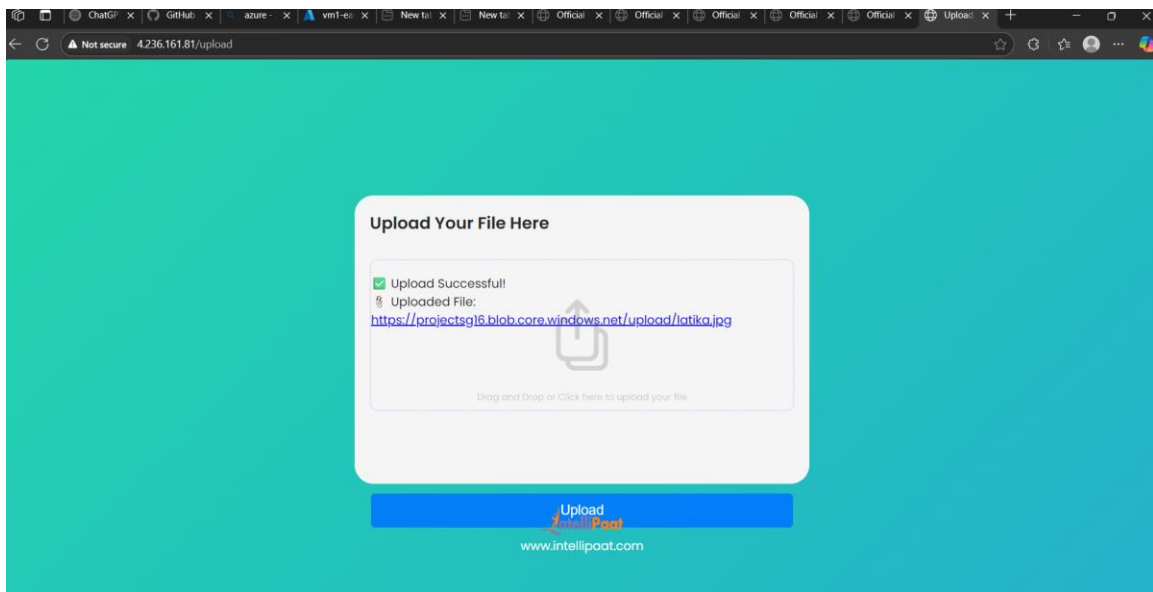
Description: Upload page accessed through public IP of vm1-west.



Upload form successfully accessed through vm1-west's public IP address.

Step 13: VM1-West Upload Success

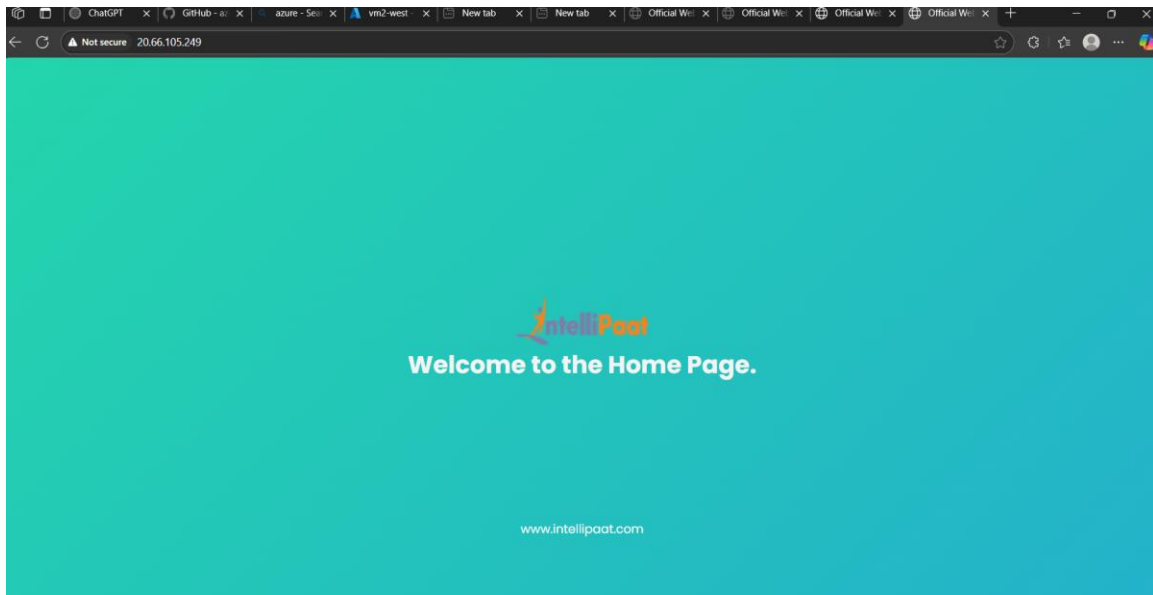
Description: File uploaded successfully from west VM.



File uploaded from the west VM, confirming identical behavior to the east deployment.

Step 14: VM2-East Homepage

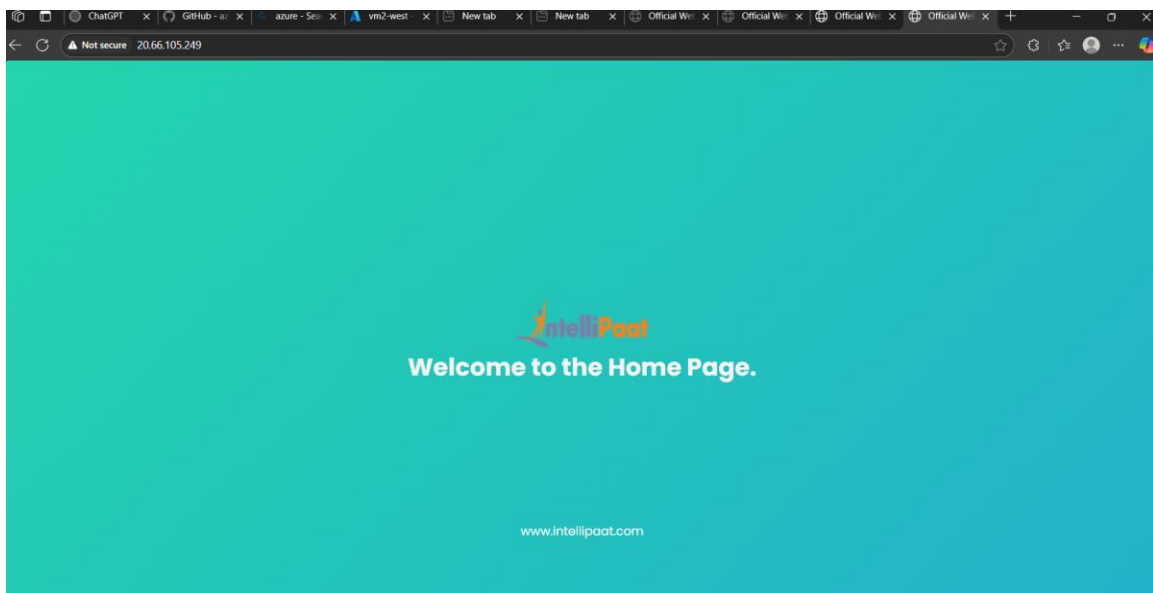
Description: Home page served by vm2-east showing static welcome.



vm2-east is serving a static home page, validating regional frontend availability.

Step 15: VM2-West Homepage

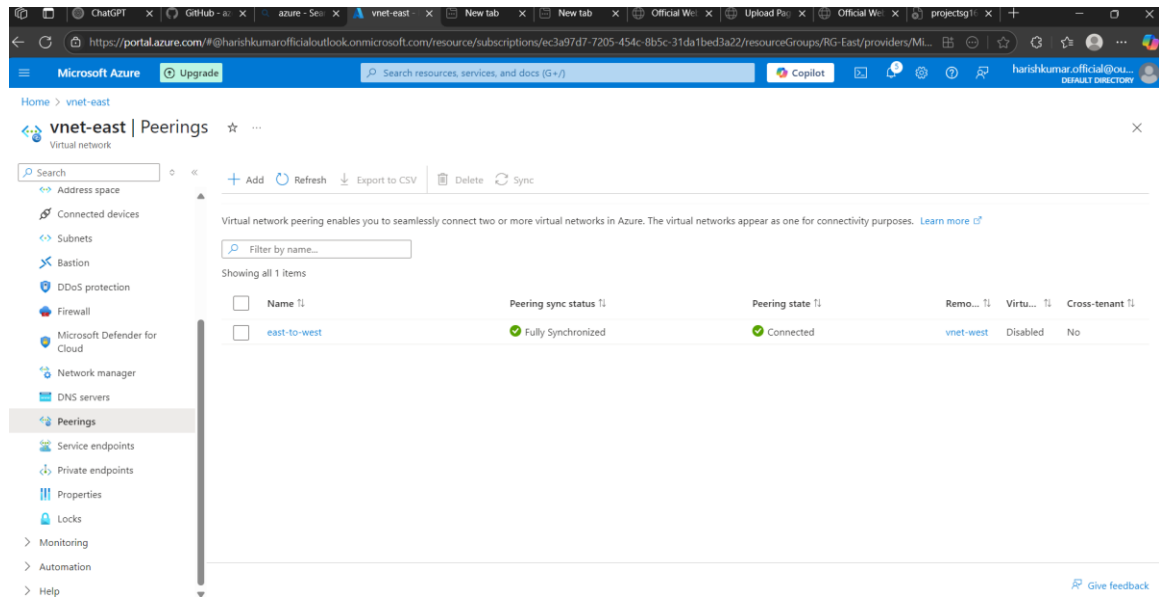
Description: Home page served by vm2-west showing static welcome.



vm2-west displays a static home page, mirroring the east region's functionality.

Step 16: VNet Peering - East to West

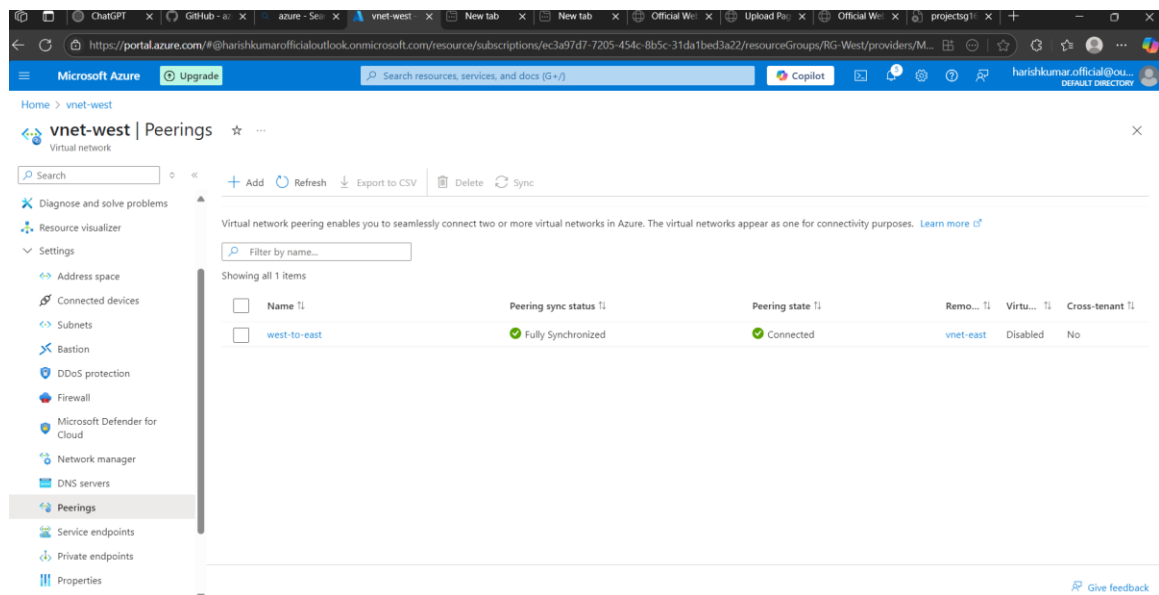
Description: vnet-east peered with vnet-west to allow internal communication.



vnet-east peering established to allow secure communication with vnet-west.

Step 17: VNet Peering - West to East

Description: vnet-west peered with vnet-east to allow internal communication.



vnet-west configured to peer with vnet-east, enabling bi-directional connectivity.

Step 18: Traffic Manager Profile

Description: Traffic Manager profile setup with performance routing.

Home > Load balancing > Traffic Manager >

Create Traffic Manager profile

Basics Tags Review + Create

Project details

Select the subscription to manage deployed resources and costs. Use resource groups like folders to organize and manage all your resources.

Subscription * Azure subscription 1

Resource group * NetworkWatcherRG

Instance details

Name * Traffic Manager profile and endpoints

Routing method * Performance

Resource group location * (US) East US

Previous + create < Back > Next + Done >

Traffic Manager profile created with performance-based routing for optimal response time.

Step 19: Traffic Manager Endpoints

Description: Endpoints added for vm1-east and vm1-west.

Microsoft Azure

Home > Traffic Manager Profiles > Traffic Manager Endpoint > Endpoints

Traffic Manager Endpoint

Endpoints

+ Add Edit Enable Disable

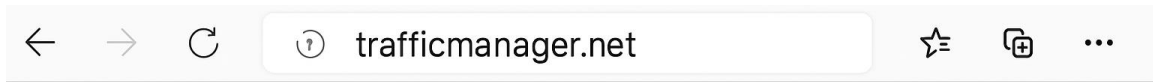
Search to filter items...

Name	Type	Status	Priority
vm1-east	Azure endpoint	Enabled	1
vm1-west	Azure endpoint	Enabled	2

Traffic Manager endpoints configured for both vm1-east and vm1-west for load balancing.

Step 20: DNS Test from Traffic Manager

Description: App accessed via trafficmanager.net DNS URL.



DNS Test from Traffic Manager

App accessed via trafficmanager.net DNS URL

Application accessed successfully through Traffic Manager's DNS URL, confirming setup.