AZURE INFRASTRUCTURE SOLUTION AZ-305 (COURSE-END PROJECT)

DEPLOYING AZURE PROTECTED GEO-REDUNDANT SOLUTION WITH PATH-BASED ROUTING

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PROBLEM STATEMENT AND MOTIVATION

Project Agenda: To deploy a geo-redundant solution on Azure by configuring virtual networks, setting up dedicated VMs for content types, using Application Gateway for path-based routing, and ensuring secure, low-latency access with Traffic Manager.
Description: This project aims to deploy a geo-redundant solution on Azure that ensures high availability, scalability, and low-latency access to services. The solution involves configuring virtual networks (VNets) to securely connect resources, setting up dedicated virtual machines (VMs) for specific content types to optimize resource use, and using an Application Gateway for path-based routing.
To enhance global availability and reduce latency, Traffic Manager will route traffic to the nearest available region, ensuring continuous access even during regional outages. This approach guarantees a highly available, secure, and performance-optimized deploy

Tools Required: An azure account with root access
Expected Deliverables:

- Login to Azure Portal
- Create a Resource Group
- Provision a Virtual Network (VNet)
- Provision an Application Gateway
- Create a Traffic Manager Profile
- Add Application Gateway Endpoints to Traffic Manager
- Verify Configuration and Connectivitity.

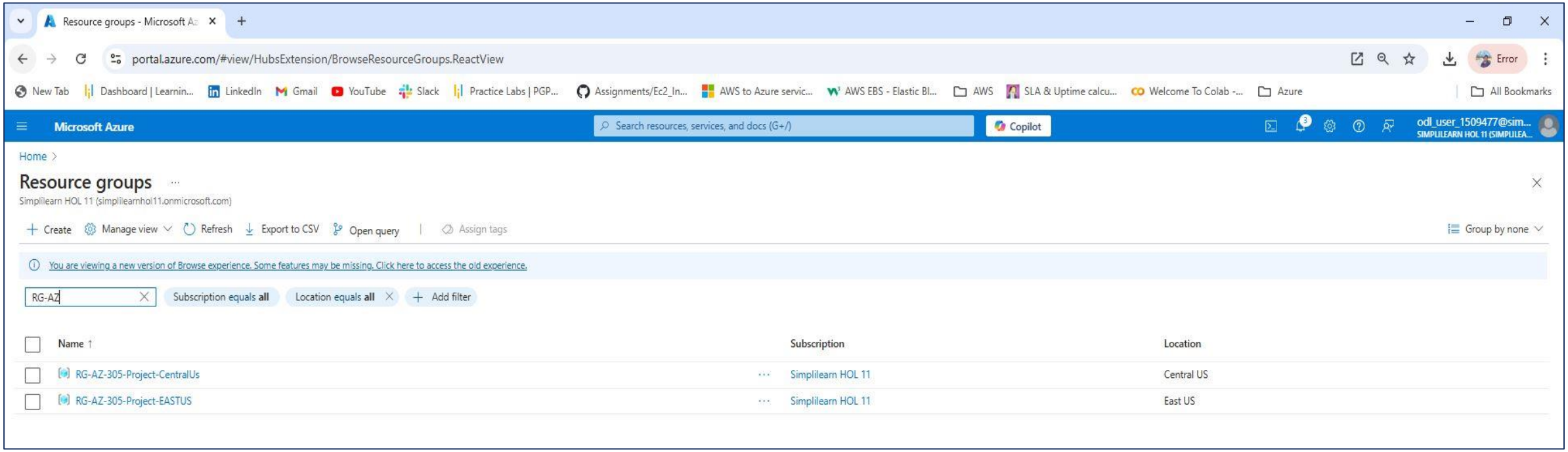
PROJECT INTRODUCTION

- **Objective:** Explain the need for traffic routing in Azure VM deployments (High availability, load balancing, failover).
- **Challenges:** Highlight potential challenges with direct public IP assignments to VMs (limited scalability, single points of failure, security concerns).
- **Solution:** Introduce Application Gateway and Traffic Manager as key components for efficient and secure traffic routing.
- **Visual:** A simple diagram showing direct VM access vs. Application Gateway and Traffic Manager in front of your VMs.

STEP 1 - CREATE 2 AZURE RESOURCE GROUP IN 2 DIFFERENT REGIONS (CENTRAL US & EAST US)

Create 2 Resource Group in 2 different Azure location :

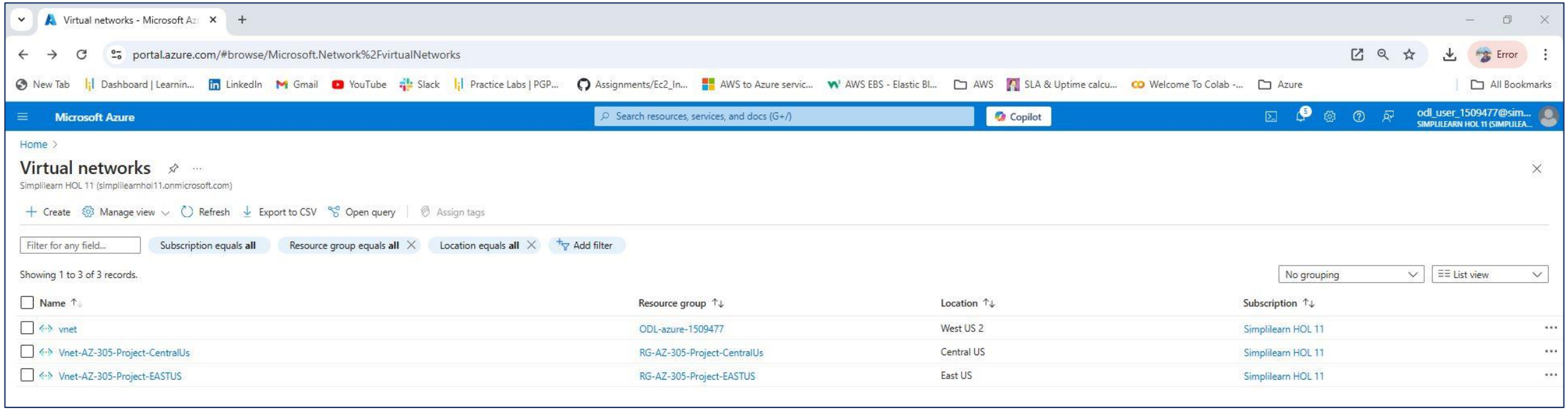
- ✓ RG-AZ-305-Project-EASTUS
- ✓ RG-AZ-305-Project-CentralUs



STEP 2 - CREATE VNET FOR EACH PREVIOUSLY CREATE AZURE RG

Create 2 Virtual Networks in 2 different Azure location for each RG group created :

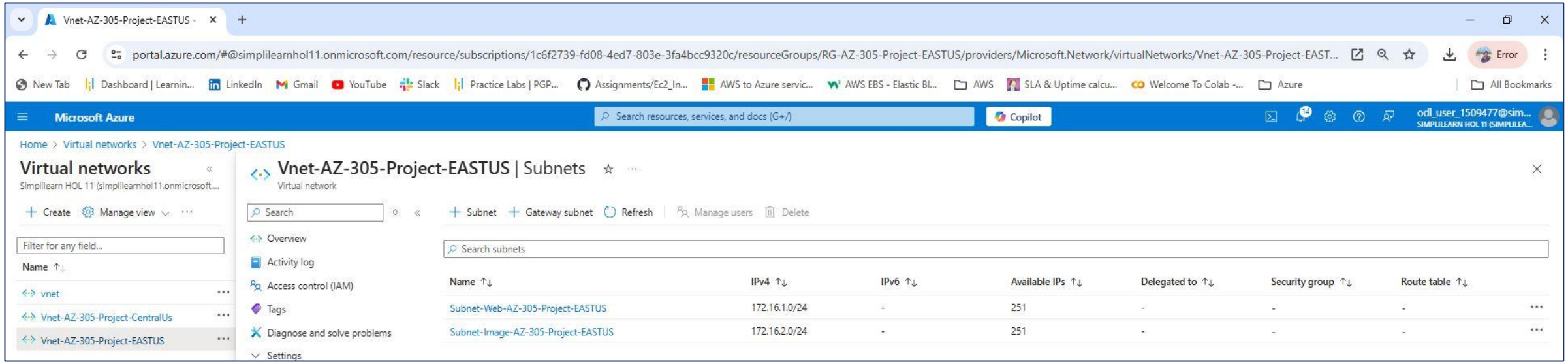
- ✓ Vnet-AZ-305-Project-EASTUS
- ✓ Vnet-AZ-305-Project-CentralUs



STEP 3 - CREATE 2 SUBNET (IMAGE & WEB) FOR VNET-AZ-305-PROJECT-EASTUS

Create 2 Subnet each for IMAGE & WEB Content on EAST US Vnet

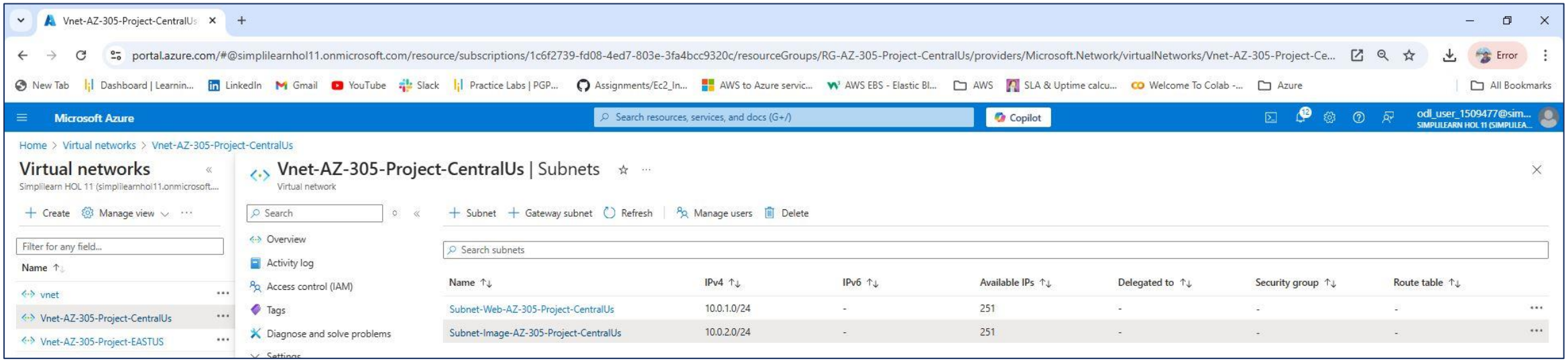
- ✓ Vnet-AZ-305-Project-EASTUS
  - ➢ Subnet-Image-AZ-305-Project-EASTUS - **CREATED**
  - ➢ Subnet-Web-AZ-305-Project-EASTUS - **CREATED**



STEP 4 - CREATE 2 SUBNET (IMAGE & WEB) FOR VNET-AZ-305-PROJECT-CENTRALUS

Create 2 Subnet each for IMAGE & WEB Content on CentralUs Vnet

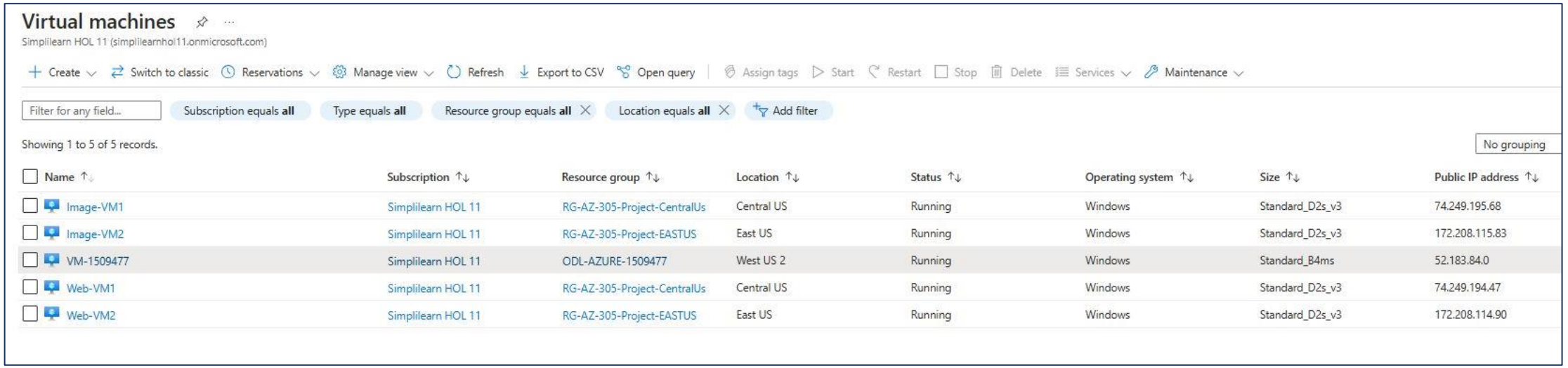
- ✓ Vnet-AZ-305-Project-CentralUs
  - ➢ Subnet-Image-AZ-305-Project-CentralUs - **CREATED**
  - ➢ Subnet-Web-AZ-305-Project-CentralUs - **CREATED**



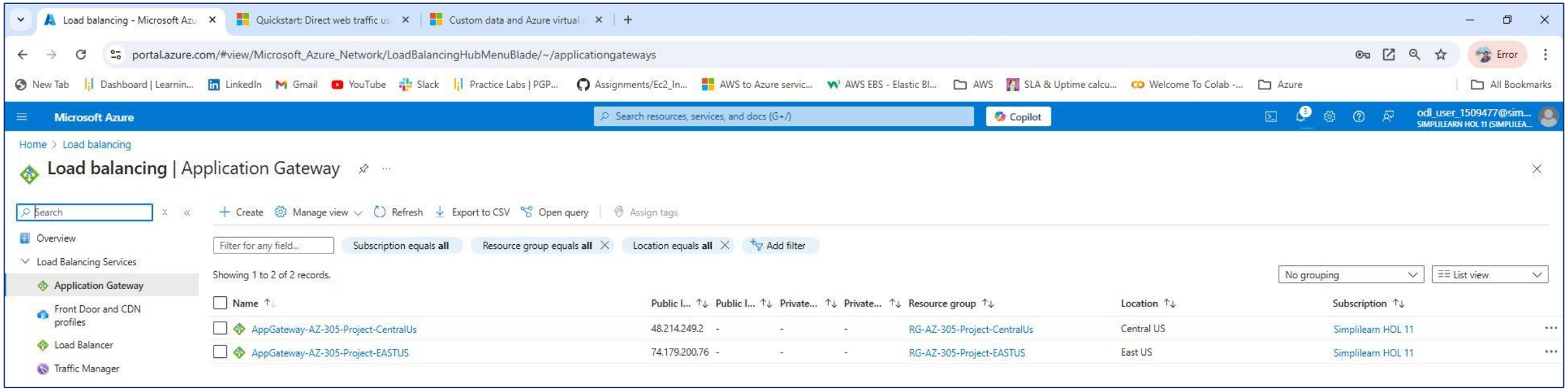
STEP 5 - CREATE 4 AZURE WINDOWS WM – UNDER BOTH EAST US & CENTRALUS VNET

Create 4 Azure Windows Machine with below configuration.

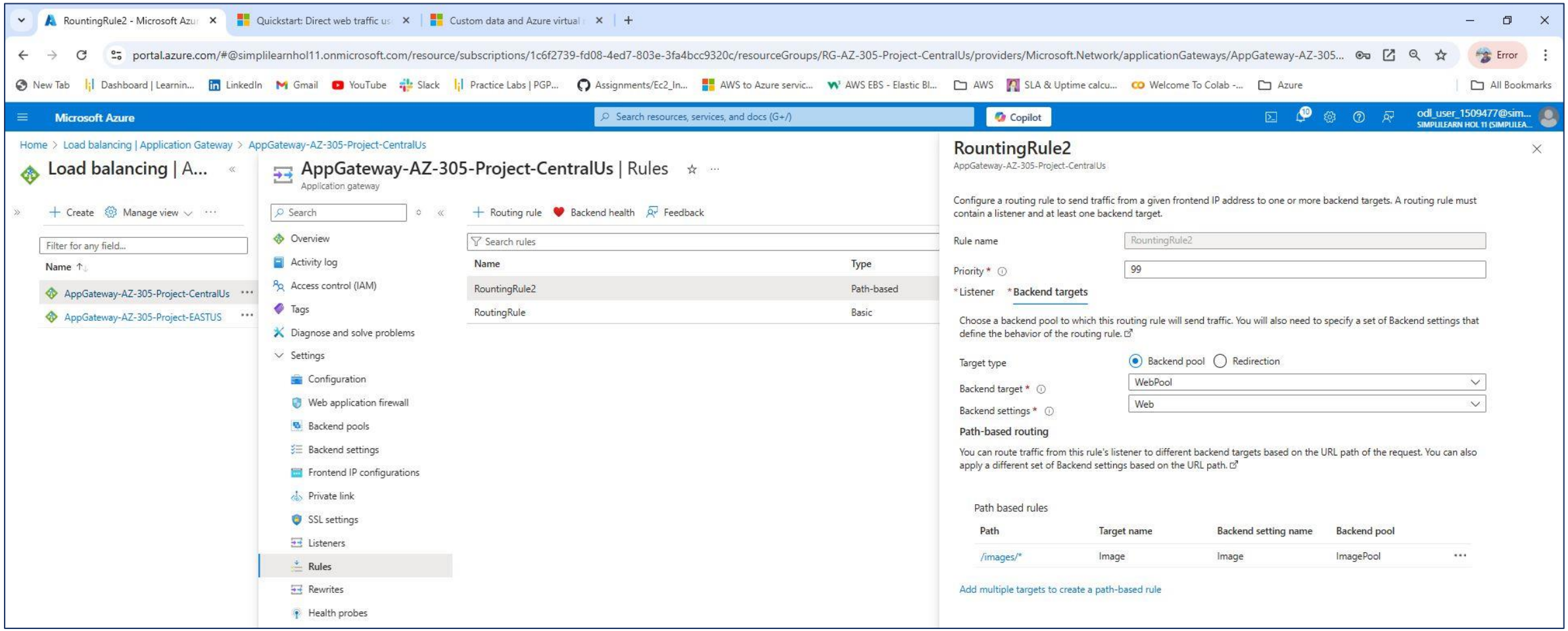
1. **Web-VM1 for WEB Content** on CentralUs region using Vnet-AZ-305-Project-CentralUs, Subnet-Web-AZ-305-Project-CentralUs. Install IIS and edit default page with name WEB SERVER – Central US.
2. **Image-VM1 for IMAGE Content** on CentralUs region using Vnet-AZ-305-Project-CentralUs, Subnet-Image-AZ-305-Project-CentralUs. Install IIS and edit default page with name Image SERVER – Central US.
3. **Web-VM2 for WEB Content** on EASTUS region using Vnet-AZ-305-Project-EASTUS, Subnet-Web-AZ-305-Project-EASTUS. Install IIS and edit default page with name WEB SERVER – EASTUS.
4. **Image-VM1 for IMAGE Content** on EASTUS region using Vnet-AZ-305-Project-EASTUS, Subnet-Image-AZ-305-Project-EASTUS. Install IIS and edit default page with name Image SERVER – EASTUS.



STEP 6 - CREATE 2 AZURE APPLICATION GATEWAY – UNDER BOTH EAST US & CENTRALUS REGION

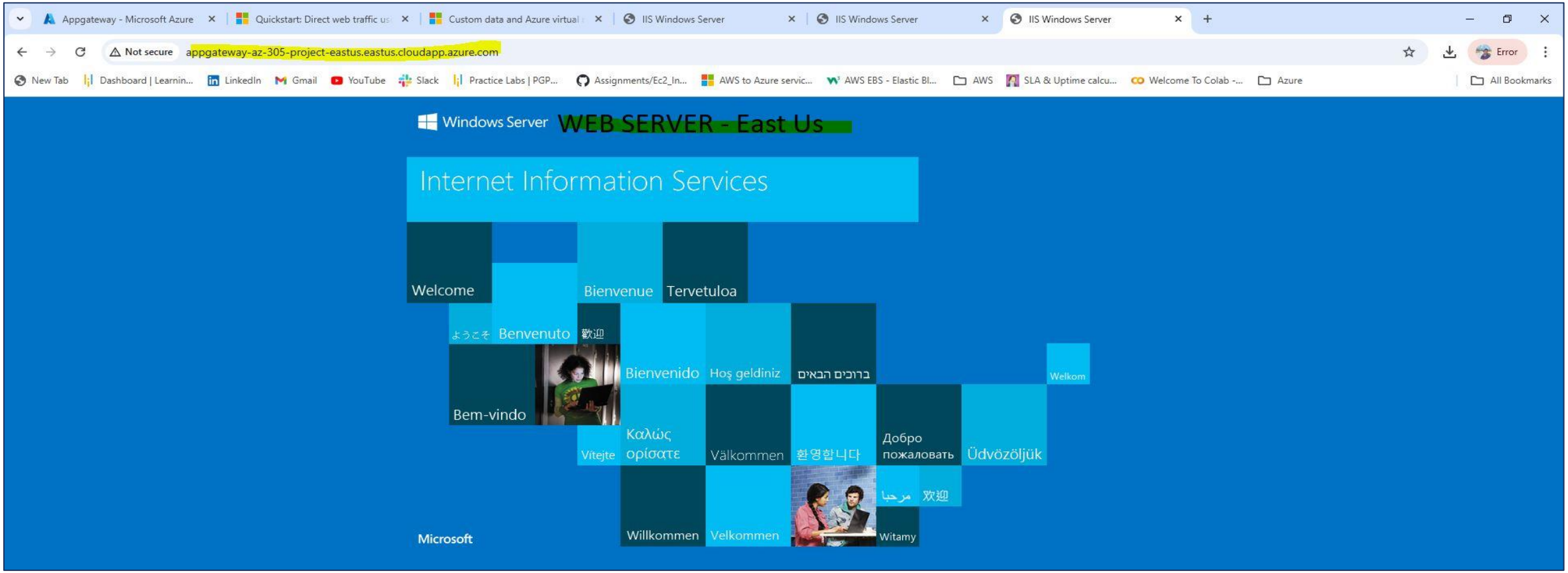


STEP 7 - CREATE PATH BASE RULE FOR EACH AZURE APPLICATION GATEWAY – DEFAULT WEB AND RULE BACKEND POOL FOR IMAGES



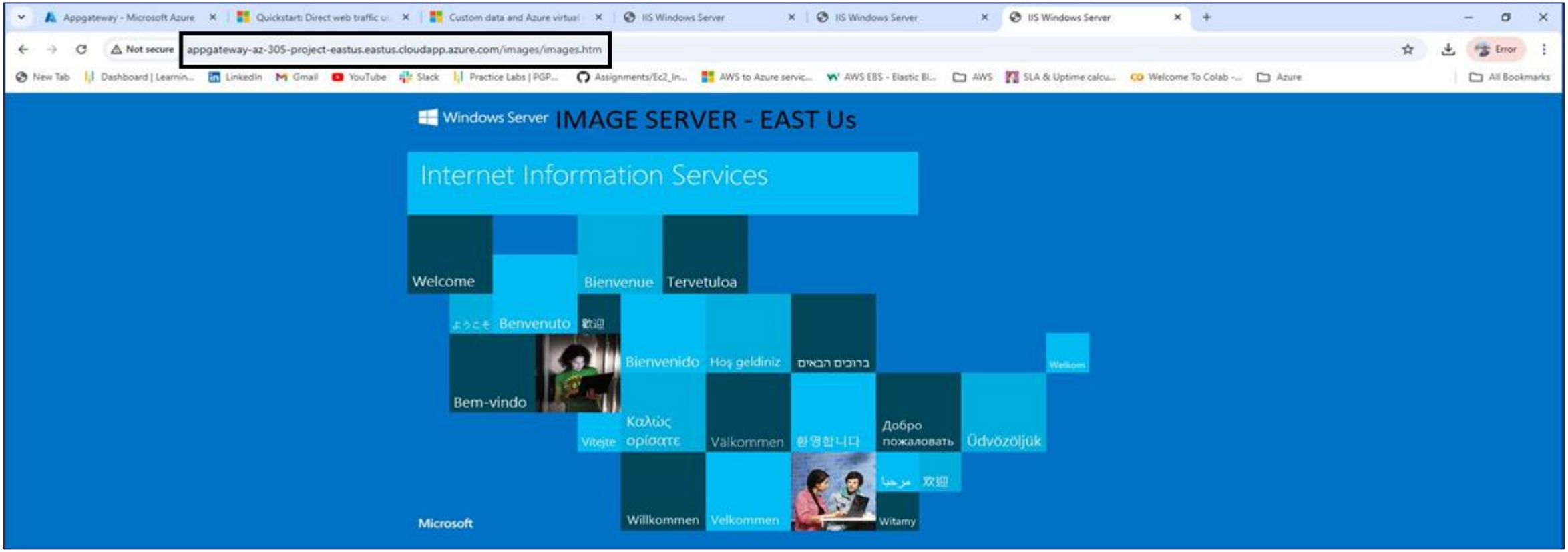
STEP 8 – VALIDATE EACH AZURE APPLICATION GATEWAY

Till now, each Azure location EAST US & Central US has 2-2 VM each. On each Region - 1 VM responsible for Web content & other is responsible for images. Lets validate each application gateway endpoint to check with rule based routing is working. **Below screenshot is for East US application gateway endpoint default pointing to Web Server**



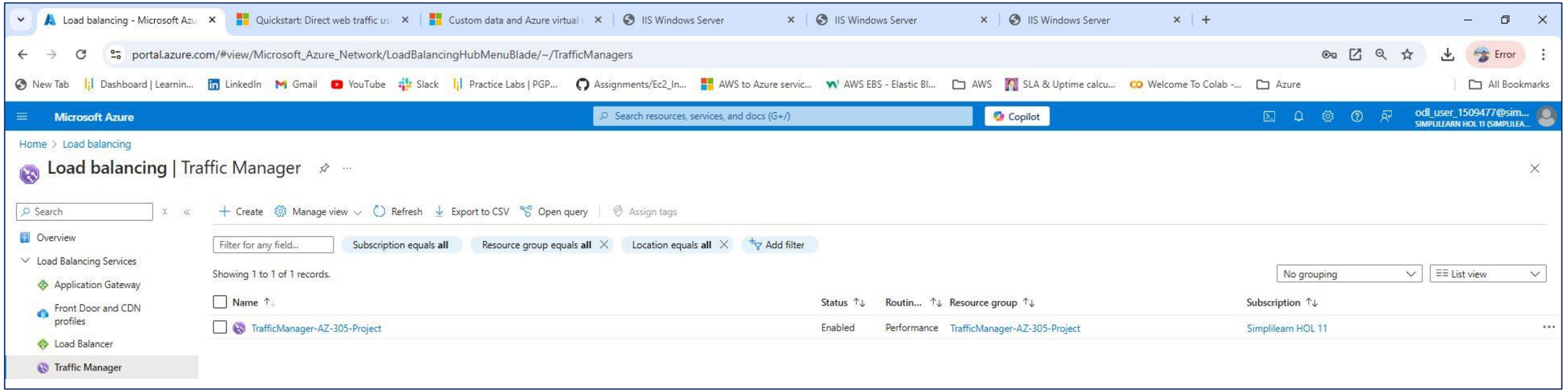
STEP 9 – VALIDATE AZURE APPLICATION GATEWAY WITH PATH BASED RULE

Below screenshot is for East US application gateway endpoint with Image path pointing to Image Server using path-based rule.



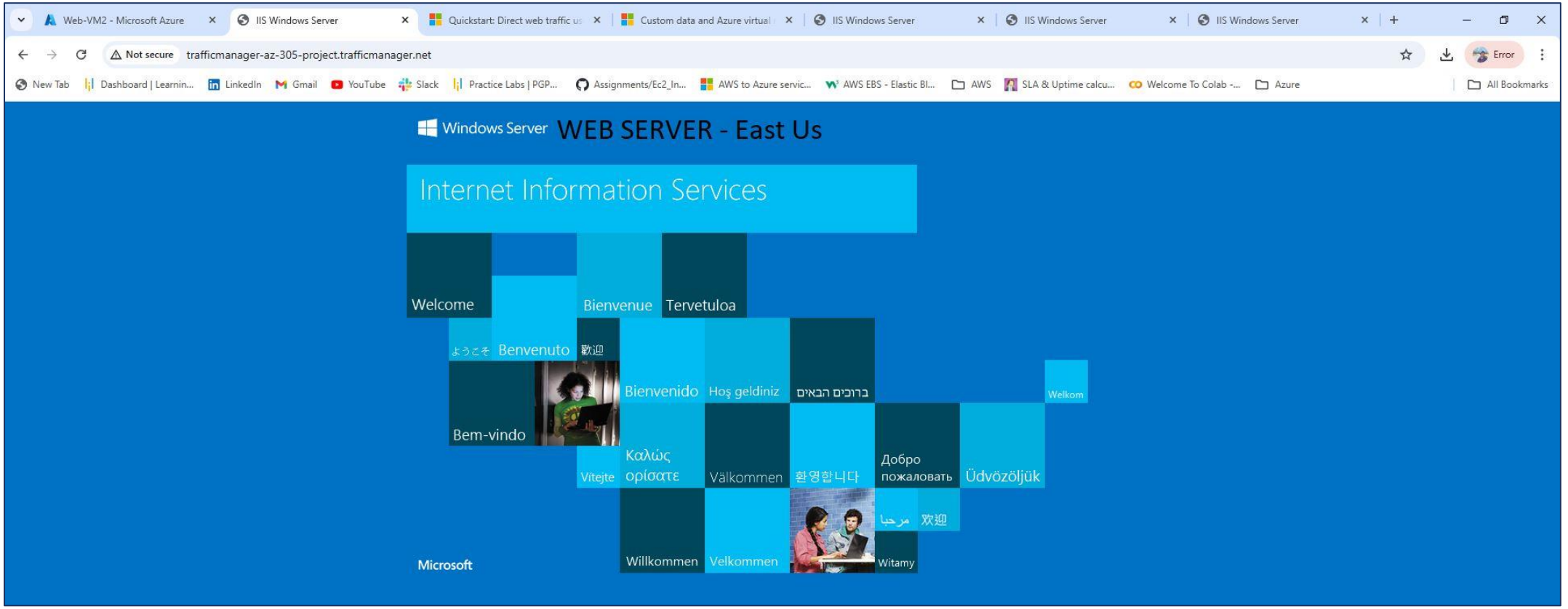
STEP 10 - CREATE AZURE TRAFFIC MANAGER WITH BOTH PREVIOUSLY CREATED APPLICATION GATEWAY AS ENDPOINTS.

Load balancing Azure Traffic Manager is created as below. Both EAST US & Central US Application gateway endpoints are added to Traffic Manager.



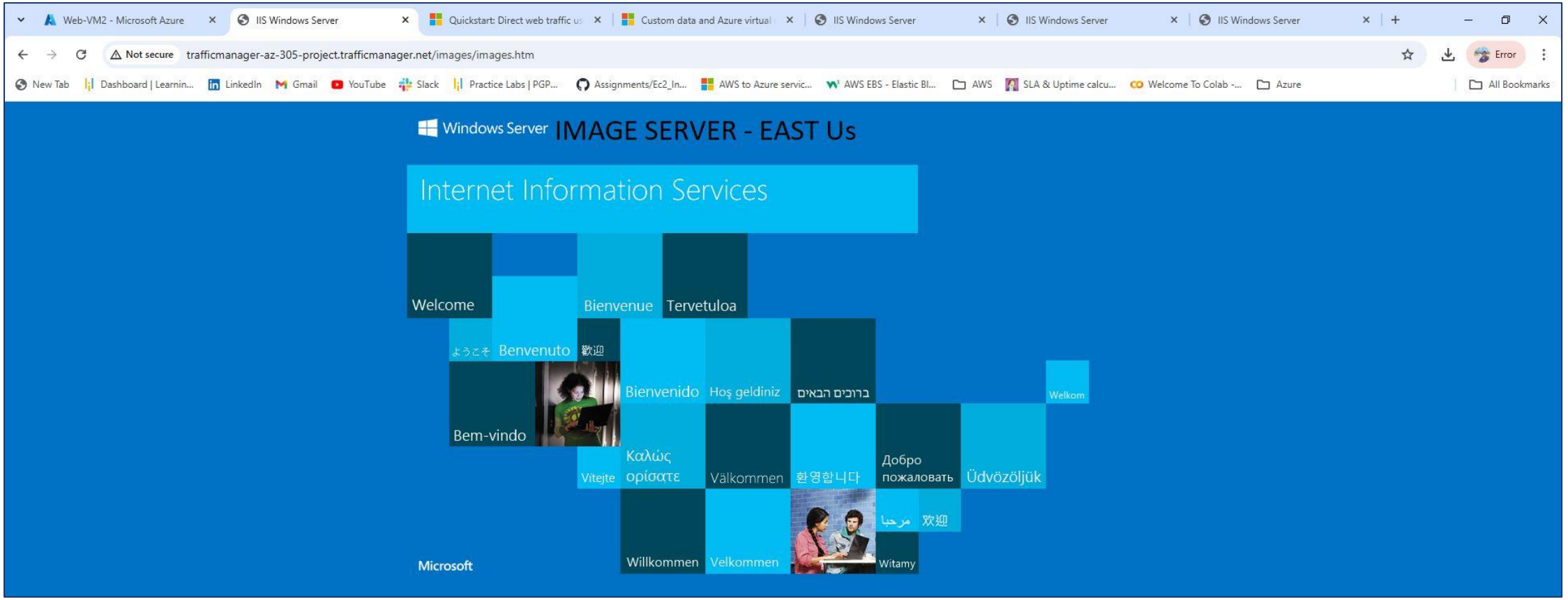
STEP FOR VALIDATION ON GLOBAL AVAILABILITY AND REDUCE LATENCY !!!!!

Hitting direct traffic manager endpoint. Due to my location machine nearly location from India, EAST US region was selected by traffic manager as nearly region.



CONTINUE –
VALIDATION ON GLOBAL AVAILABILITY AND REDUCE LATENCY !!!!!

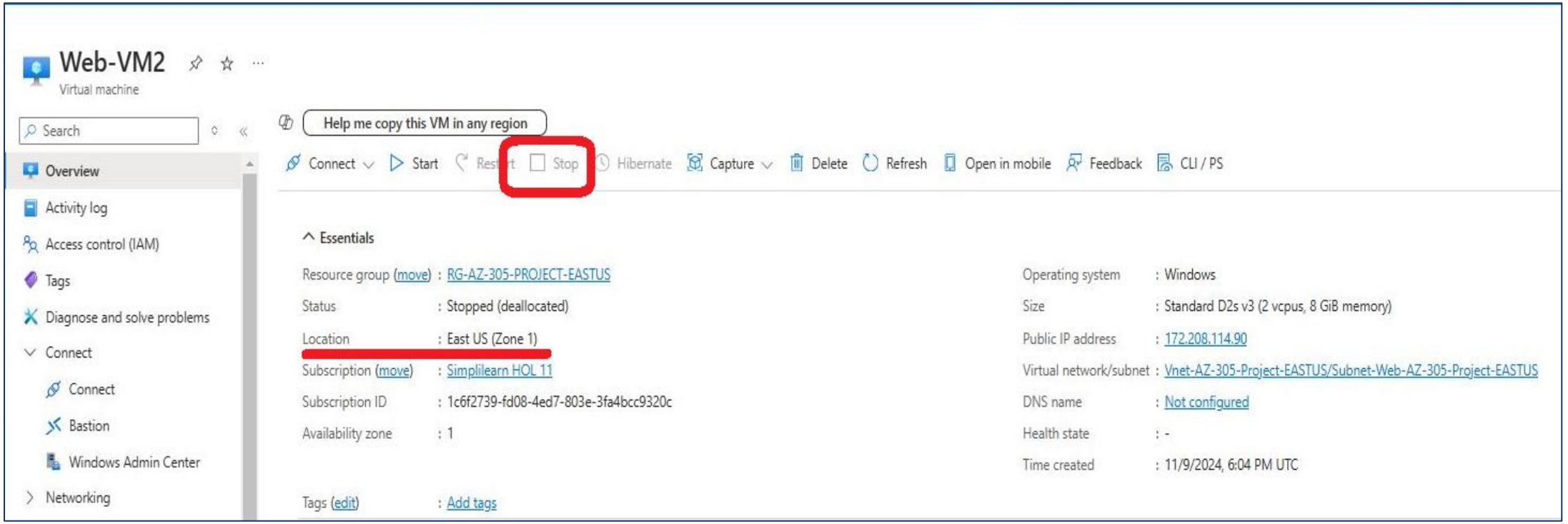
Validate application gateway path base rule for IMAGES content. As per below screenshot images rule is working fine !!



FINAL STEP FOR VALIDATION ON GLOBAL AVAILABILITY BY SHUT DOWN EAST US VM'S

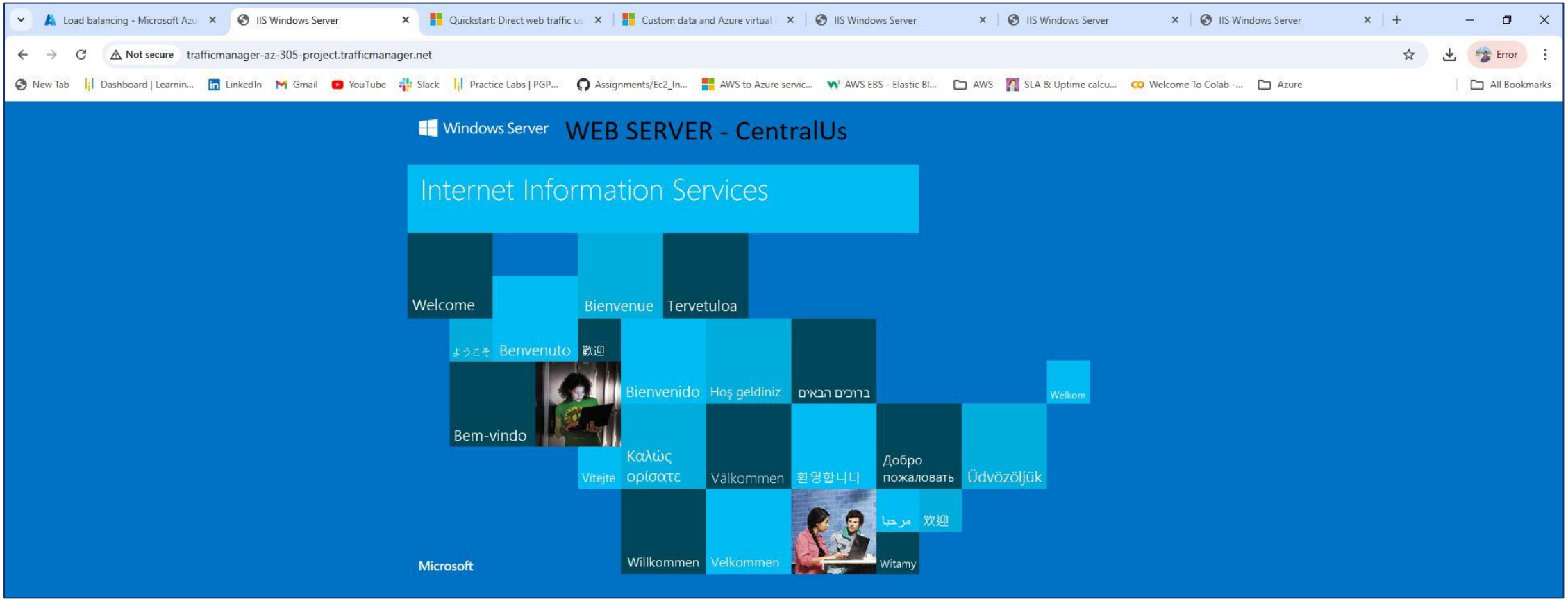
Now, to validation high application availability across regions, All EAST US VM machine's are forced shutdown. **Traffic manager should automatically shift request to central US**

Below Screenshot, EAST US VM shutdown.



CONTINUE -
FINAL STEP FOR VALIDATION ON GLOBAL AVAILABILITY BY SHUT DOWN EAST US VM'S

After Shutdown on EAST US VM, **Traffic manager automatically redirected by http port 80 request to central US.**



CONCLUSION

- Using Azure Application Gateway with path-based routing, required content is delivered with low latency.
- Using Azure Traffic Manager, application has high & global availability.
- Incase of any Azure region is down/patching/incase of disaster, All traffic will be automatically redirected to different region without any manual intervention.
- Zero downtime when any region is not availability.
- Low latency as based of client location nearest Azure region will be involved in serving request.

THANK YOU

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