



CLOUD COMPUTING - MICROSOFT AZURE ZEN CLASS - MAIN PROJECT - 2

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Batch - CC2WE-E

Project Scope:

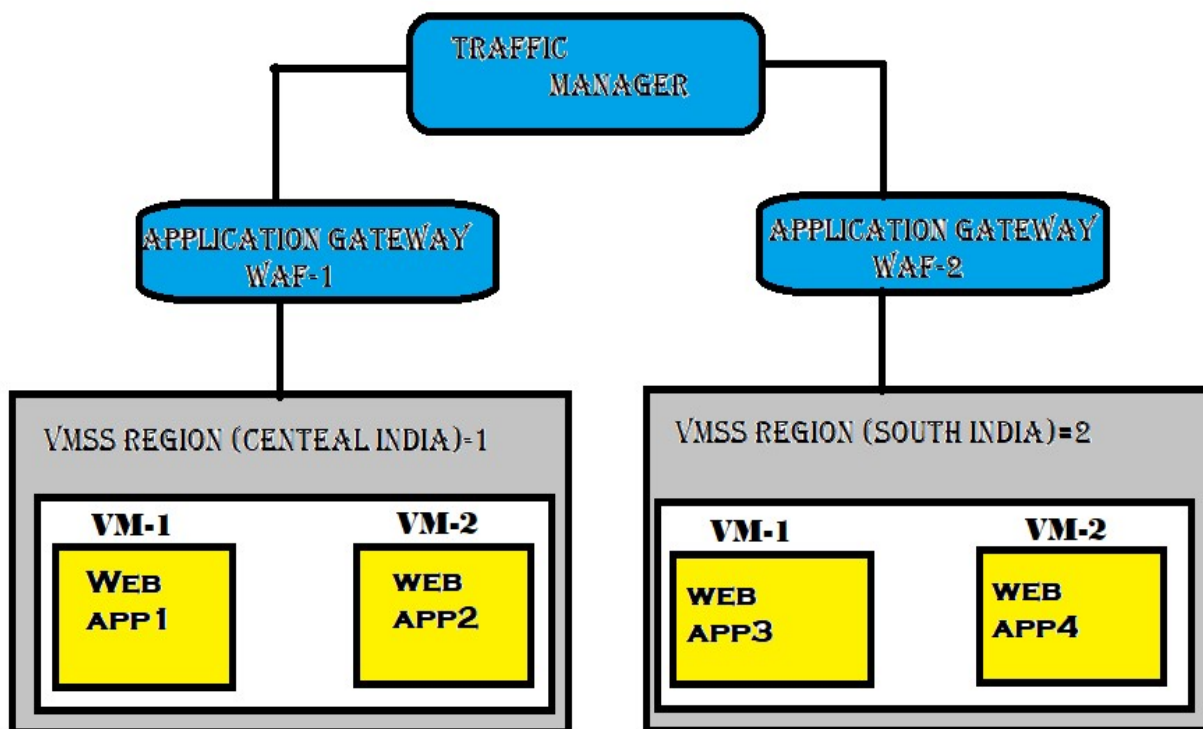
Create a web application, which is highly available in multiple regions, secure from web attacks, load balanced across regions using Application Gateway.

Architecture Overview:

- I began by creating a resource group at the location of East-US to organize all necessary resources.
- Within this group, I created two virtual machines (VMs): **VM1** was deployed in Central India, while **VM2** was set up in South India.
- After deploying the VMs, I installed Web app IIS (Internet Information Services) on both the VM's to serve web applications.
- I then added code to each IIS server, making them serve content on a topic related to virtual machines.
- Next, I set up Application Gateway 1 in Central India and connected it to VM1, allowing it to manage incoming traffic and provide load balancing.
- I also created Application Gateway 2 in South India and connected it to VM2, ensuring proper traffic management for this region.
- After configuring the application gateways, I performed a health check on both VMs to ensure they were operational and that the application gateways were routing traffic correctly.
- Following this, I created a Traffic Manager to enable global load balancing across regions.
- I linked the IP addresses of Application Gateway 1 and Application Gateway 2 as endpoints in the Traffic Manager, allowing it to distribute traffic based on user location or health status.
- Before linking the endpoints, I configured a DNS to associate with the IP addresses of the application gateways, ensuring that user requests are correctly routed.
- Finally, I tested the entire setup by simulating traffic through the Traffic Manager to ensure that the requests were properly directed to the appropriate application gateway and Web application, confirming that the configuration was functioning as expected.

- This setup provides redundancy and high availability across multiple regions, ensuring that traffic is distributed optimally and that users experience low latency

Project Architecture:



Resource Group:

Home > Resource groups >

Create a resource group

Basics Tags Review + create

Resource group - A container that holds related resources for an Azure solution. The resource group can include all the resources for the solution, or only those resources that you want to manage as a group. You decide how you want to allocate resources to resource groups based on what makes the most sense for your organization. [Learn more](#)

Project details

Subscription * ⓘ Azure subscription 1

Resource group * ⓘ AbhiRam ✓

Resource details

Region * ⓘ (US) East US

🛠 Created a resource group at the location of East US

VM 1:

VM1 Virtual machine

Search

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

Overview

- Activity log
- Access control (IAM)
- Tags
- Diagnose and solve problems
- Connect
 - Connect
 - Bastion
- Windows Admin Center
- Networking
 - Network settings
 - Load balancing
 - Application security groups
 - Network manager
- Settings
- Availability + scale
- Security
- Backup + disaster recovery
- Operations

Essentials

Resource group (move) : [AbhiRam](#)

Status : Running

Location : Central India (Zone 1)

Subscription (move) : [Azure subscription 1](#)

Subscription ID : c4498e5c-6513-4872-b5f1-0db5f82228cf

Availability zone : 1

Tags (edit) : [Add tags](#)

Operating system : Windows (Windows Server 2022 Datacenter Azure E...)

Size : Standard B2s (2 vcpus, 4 GiB memory)

Public IP address : [4.213.225.105](#)

Virtual network/subnet : [VM1-vnet/default](#)

DNS name : [Not configured](#)

Health state : -

Time created : 10/22/2024, 9:21 AM UTC

Properties Monitoring Capabilities (8) Recommendations Tutorials

Virtual machine

Computer name	VM1
Operating system	Windows (Windows Server 2022 Datacenter Azure Edition)
VM generation	V2
VM architecture	x64
Agent status	Ready
Agent version	2.7.41491.1139
Hibernation	Disabled
Host group	-

Networking

Public IP address	4.213.225.105 (Network interface vm1256_z1)
Public IP address (IPv6)	-
Private IP address	10.0.0.4
Private IP address (IPv6)	-
Virtual network/subnet	VM1-vnet/default
DNS name	Configure

Size

Size	Standard B2s
------	--------------

VM 2:

The screenshot displays the 'Virtual machines' page in the Azure portal. On the left, a list of virtual machines shows 'VM1' and 'VM2'. 'VM2' is selected, and its details are shown on the right. The 'Overview' tab is active, displaying essential information about the VM.

Virtual machines
Default Directory (ssabhiram41@gmail.com@microsoft...)

Filter for any field...

VM1
VM2

Page 1 of 1

VM2
Virtual machine

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

Essentials

Resource group (move) : [AbhiRam](#)
Status : Running
Location : South India
Subscription (move) : [Azure subscription 1](#)
Subscription ID : c4498e5c-6513-4872-b5f1-0db5f82228cf

Operating system : Windows (Windows Server 2022 Datacenter Azure E...
Size : Standard B2s (2 vcpus, 4 GiB memory)
Public IP address : [13.71.65.74](#)
Virtual network/subnet : [VM2-vnet/default](#)
DNS name : [Not configured](#)
Health state : -
Time created : 10/22/2024, 9:23 AM UTC

Tags (edit) : [Add tags](#)

Properties Monitoring Capabilities (8) Recommendations Tutorials

Virtual machine

Computer name	VM2
Operating system	Windows (Windows Server 2022 Datacenter Azure Edition)
VM generation	V2
VM architecture	x64
Agent status	Ready
Agent version	2.7.41491.1139
Hibernation	Disabled
Host group	-

Networking

Public IP address	13.71.65.74 (Network interface vm2689)
Public IP address (IPv6)	-
Private IP address	10.0.0.4
Private IP address (IPv6)	-
Virtual network/subnet	VM2-vnet/default
DNS name	Configure

Size

Size	Standard B2s
------	--------------

Adding Port :

The screenshot displays the 'VM2 | Network settings' page in the Azure portal. The 'Network settings' tab is active, showing the network configuration for the VM. A 'Network security group VM2-nsg' is attached to the network interface 'vm2689'. The 'Rules' section shows a list of inbound and outbound port rules.

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

ssabhiram41@gmail.c...
DEFAULT DIRECTORY (SSABHIRA...

Home > Virtual machines > VM2

VM2 | Network settings
Virtual machine

Search

Overview
Activity log
Access control (IAM)
Tags
Diagnose and solve problems
Connect
Connect
Bastion
Windows Admin Center
Networking
Network settings
Load balancing
Application security groups
Network manager
Settings
Availability + scale
Security
Backup + disaster recovery
Operations

This is a new experience. [Please provide feedback](#)

Private IP address : 10.0.0.4
Admin security rules : 0 (Configure)
Accelerated networking : Disabled
Effective security rules : 0

Rules Collapse all

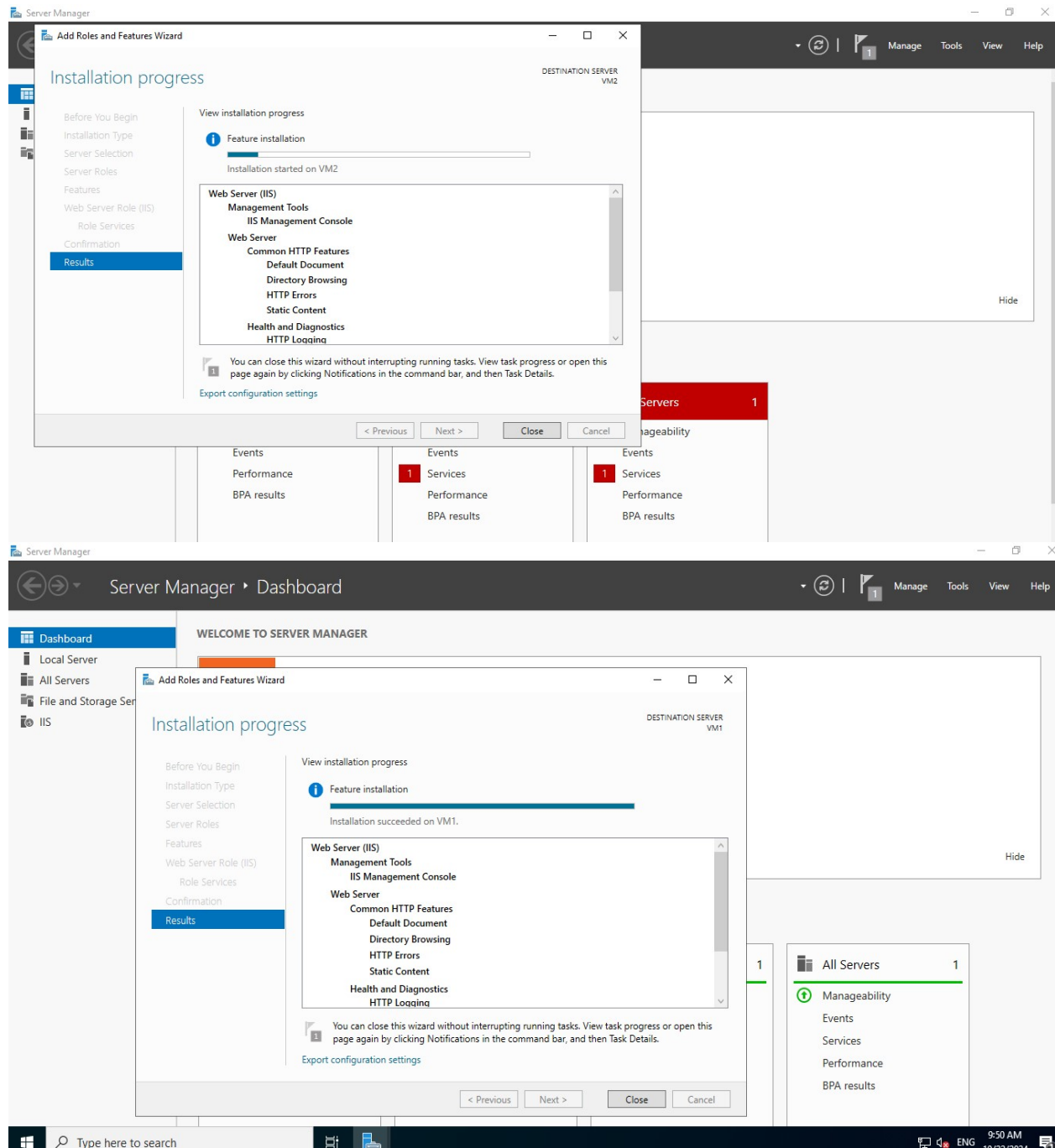
Network security group VM2-nsg (attached to networkinterface: vm2689)
Impacts 0 subnets, 1 network interfaces

Create port rule

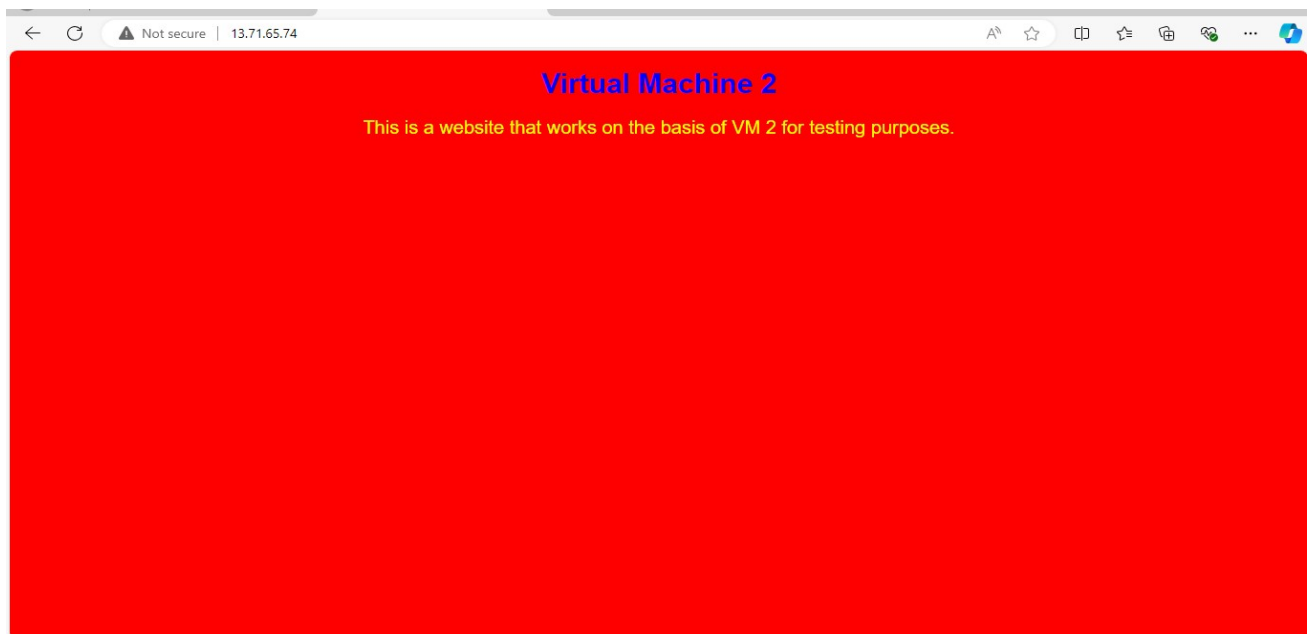
Search rules Source == all Destination == all Protocol == all Action == all

Priority ↑	Name	Port	Protocol	Source	Destination	Action
Inbound port rules (5)						
300	RDP	3389	TCP	Any	Any	Allow
310	Allow-HTTP	80	TCP	Any	Any	Allow
65000	AllowVnetInBound	Any	Any	VirtualNetwork	VirtualNetwork	Allow
65001	AllowAzureLoadBalancerInBound	Any	Any	AzureLoadBalancer	Any	Allow
65500	DenyAllInBound	Any	Any	Any	Any	Deny
Outbound port rules (3)						

Installing IIS:



Web App Output:



- 📁 Within this group, I created two virtual machines (VMs): **VM1** was deployed in Central India, while **VM2** was set up in South India.
- 📁 After deploying the VMs, I installed Web app IIS (Internet Information Services) on both the VM's to serve web applications.
- 📁 I then added code to each IIS server, making them serve content on a topic related to virtual machines.

Creating Application Gateway:

[Home](#) > [Load balancing | Application Gateway](#) >

Create application gateway

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 * ⓘ AbhiRam
[Create new](#)

Instance details

Application gateway name * appgateway1 ✓

Region * Central India

Tier ⓘ WAF V2

Enable autoscaling ☒ Yes ☐ No

Minimum instance count * ⓘ 0

Maximum instance count 8 ✓

Availability zone * ⓘ Zones 1, 2

IP address type ⓘ ☒ IPv4 only ☐ Dual stack (IPv4 & IPv6)

HTTP2 ⓘ ☐ Disabled ☒ Enabled

WAF Policy * ⓘ
[Create new](#)

[Previous](#) [Next : Frontends >](#)

[Home](#) > [Load balancing | Application Gateway](#) >

Create application gateway

Application gateway name * appgateway1 ✓

Region * Central India

Tier ⓘ WAF V2

Enable autoscaling ☒ Yes ☐ No

Minimum instance count * ⓘ 0

Maximum instance count 8 ✓

Availability zone * ⓘ Zones 1, 2

IP address type ⓘ ☒ IPv4 only ☐ Dual stack (IPv4 & IPv6)

HTTP2 ⓘ ☐ Disabled ☒ Enabled

WAF Policy * ⓘ (new) policy1
[Create new](#)

Configure virtual network

Virtual network * ⓘ VM1-vnet
[Create new](#)

Subnet * ⓘ Subnet1 (10.0.1.0/24)
[Manage subnet configuration](#)

[Previous](#) [Next : Frontends >](#)

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Home > Load balancing | Application Gateway >

Create application gateway

✓ Basics

✓ Frontends

Backends

Configuration

Tags

Review + create

A backend pool is a collection of resources to which your application gateway can send traffic. A backend pool can contain virtual machines, virtual machine scale sets, app services, IP addresses, or fully qualified domain names (FQDN). [U?](#)

Add a backend pool

Backend pool	Targets
No results	

Add a backend pool.

A backend pool is a collection of resources to which your application gateway can send traffic. A backend pool can contain virtual machines, virtual machines scale sets, IP addresses, domain names, or an App Service.

Name *

backend1

Add backend pool without targets

Yes No

Backend targets

1 item

Target type	Target
Virtual machine	vm1256_z1 (10.0.0.4)
IP address or FQDN	

Previous

Next: Configuration >

https://portal.azure.com/

Add Cancel

Microsoft Azure

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Copilot

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Home > Load balancing | Application Gateway >

Create application gateway

✓ Basics

✓ Frontends

✓ Backends

Configuration

Tags

Review + create

Create routing rules that link your frontend(s) and backend(s). You can also add more backend pools, add a second frontend IP configuration if

Frontends

+ Add a frontend IP

Public (new) newip1

Routing

Add a routing rule

Add a routing rule

Configure a routing rule to send traffic from a given frontend IP address to one or more backend targets. A routing rule must contain a listener and at least one backend target.

Rule name *

Abhi

Priority *

3

*Listener

*Backend targets

A listener "listens" on a specified port and IP address for traffic that uses a specified protocol. If the listener criteria are met, the application gateway will apply this routing rule. [U?](#)

Listener name *

listener1

Frontend IP *

Public IPv4

Protocol

☒ HTTP ☐ HTTPS

Port *

80

Listener type

☒ Basic ☐ Multi site

Custom error pages

Show customized error pages for different response codes generated by Application Gateway. This section lets you configure Listener-specific error pages. [Learn more](#) [U?](#)

Please verify that the url(s) being added here is reachable from your application gateway using the [connection troubleshoot](#) tool to prevent any deployment error.

Bad Gateway - 502

Enter Html file URL

Forbidden - 403

Enter Html file URL

[Show more status codes](#)

Previous

Next: Tags >

Add Cancel

Add Backend setting



[← Discard changes and go back to routing rules](#)

Backend settings name *	<input type="text" value="setting1"/>	✓
Backend protocol	<input checked="" type="radio"/> HTTP <input type="radio"/> HTTPS	
Backend port *	<input type="text" value="80"/>	✓

Additional settings

Cookie-based affinity ⓘ	<input type="radio"/> Enable <input checked="" type="radio"/> Disable	
Connection draining ⓘ	<input type="radio"/> Enable <input checked="" type="radio"/> Disable	
Request time-out (seconds) * ⓘ	<input type="text" value="20"/>	
Override backend path ⓘ	<input type="text" value="/http"/>	✓

Host name

By default, the Application Gateway sends the same HTTP host header to the backend as it receives from the client. If your backend application/service requires a specific host value, you can override it using this setting.

Override with new host name	<input type="radio"/> Yes <input checked="" type="radio"/> No
Create custom probes	<input type="radio"/> Yes <input checked="" type="radio"/> No

Add

Cancel

[Home](#) > [Load balancing | Application Gateway](#) >

Create application gateway

✓ Validation passed

✓ Basics ✓ Frontends ✓ Backends ✓ Configuration ✓ Tags **6 Review + create**

Basics

Subscription	Azure subscription 1
Resource group	AbhiRam
Name	appgateway1
Region	Central India
Tier	WAF_v2
Enable autoscaling	Enabled
Minimum instance count	0
Maximum instance count	8
WAF status	Enabled
WAF mode	Detection
Availability zone	Zones 1, 2
HTTP2	Enabled
Virtual network	VM1-vnet
Subnet	Subnet1 (10.0.1.0/24)
Subnet address space	10.0.1.0/24
Web application firewall	(new) policy1

Frontends

Create

Previous

Next

[Download a template for automation](#)

Microsoft Azure

Search resources, services, and docs (G+)

Home > Load balancing | Application Gateway >

Create application gateway

Validation passed

Basics

Frontends

Backends

Configuration

Tags

Review + create

Basics

Subscription

Azure subscription 1

Resource group

AbhiRam

Name

appgateway2

Region

South India

Tier

WAF_v2

Enable autoscaling

Enabled

Minimum instance count

0

Maximum instance count

8

WAF status

Enabled

WAF mode

Detection

Availability zone

None

HTTP2

Enabled

Virtual network

VM2-vnet

Subnet

subnet2 (10.0.1.0/24)

Subnet address space

10.0.1.0/24

Web application firewall

(new) policy2

Frontends

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Download a template for automation

https://portal.azure.com/#

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Home > Load balancing | Application Gateway >

appgateway1 | Application gateway

Search

web application firewall

Backend pools

Backend settings

Frontend IP configurations

Private link

SSL settings

Listeners

Rules

Rewrites

Health probes

Properties

Locks

Monitoring

Automation

Help

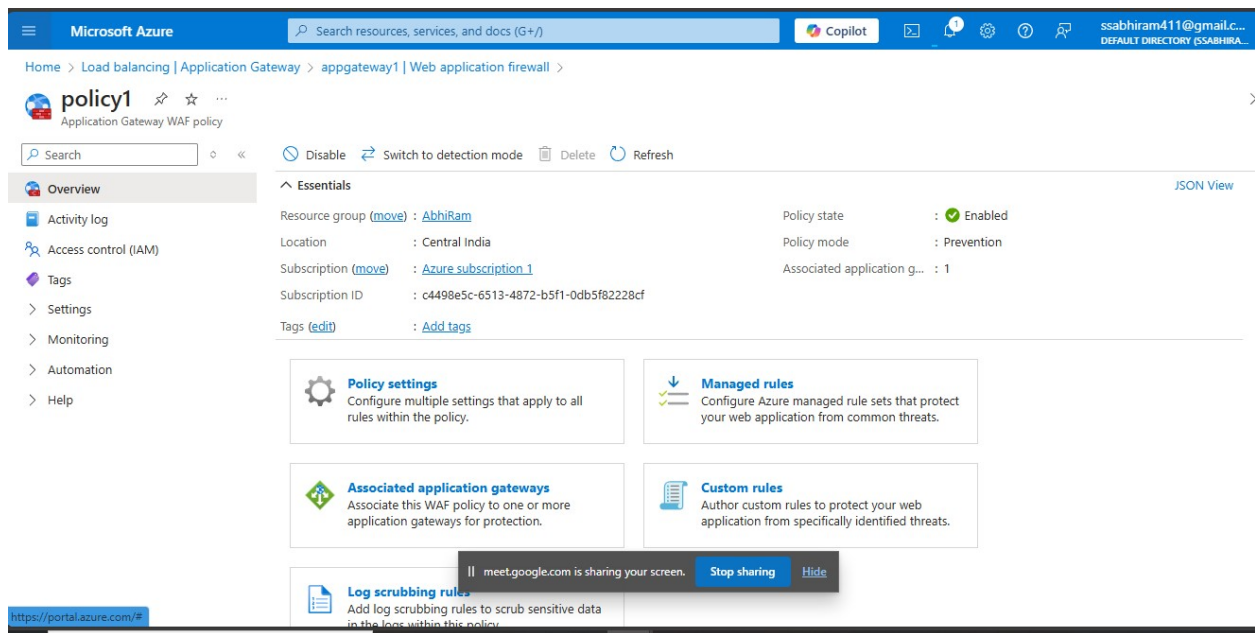
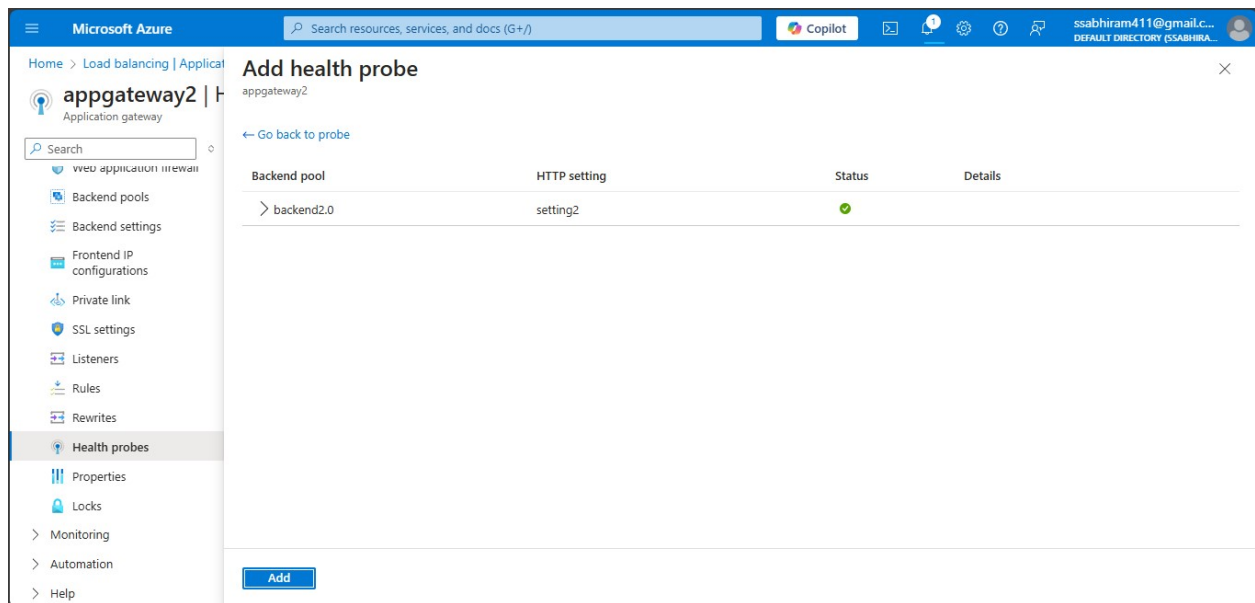
Add health probe

appgateway1

Go back to probe

Backend pool	HTTP setting	Status	Details
> backend1	setting1	✓	

Add



- 🧩 I set up Application Gateway 1 in Central India and connected it to VM1, allowing it to manage incoming traffic and provide load balancing.
- 🧩 I also created Application Gateway 2 in South India and connected it to VM2, ensuring proper traffic management for this region.
- 🧩 After configuring the application gateways, I performed a health check on both VMs to ensure they were operational and that the application gateways were routing traffic correctly.

Trafficmanager:

The screenshot shows the 'Overview' page of the 'trafficmanager1' profile in the Azure portal. The left sidebar contains navigation links: Home, Overview (selected), Activity log, Access control (IAM), Tags, Diagnose and solve problems, Settings (Configuration, Real user measurements, Traffic view, Endpoints, Properties, Locks), Monitoring, Automation, and Help. The main content area has a top bar with actions: Enable profile, Disable profile, Refresh, Move, and Delete profile. Below this is the 'Essentials' section with a 'JSON View' link. It displays key information: Resource group (AbhiRam), Status (Enabled), Subscription (Azure subscription 1), Subscription ID (c4498e5c-6513-4872-b5f1-0db5f82228cf), DNS name (http://trafficmanager1.trafficmanager.net), Monitor status (Inactive), and Routing method (Priority). At the bottom, there is a 'Search endpoints' search bar and a table with columns: Name, Status, Monitor status, Type, Priority. The table currently shows 'No results'.

Adding Endpoint After Connecting With The DNS:

The screenshot shows the 'endpoint1' configuration page in the Azure portal. The breadcrumb trail is: Home > Load balancing | Traffic Manager > trafficmange | Endpoints >. The page title is 'endpoint1'. Below the title are 'Save', 'Discard', and 'Delete' buttons. The configuration fields are: Status (dropdown menu set to 'Enabled'), Monitor status (Degraded), Type (External endpoint), Target (4.213.199.23), Priority (1), Custom Header settings (Configure in this format, host:contoso.com,customheader:contoso), and Health Checks (dropdown menu set to 'Enable. Health check will determine if traffic can be served to the endpoint.'). A warning icon and text are present below the Custom Header settings: 'Do NOT input sensitive customer data in this field (i.e. APIKeys, Secrets, and Auth tokens etc.).'.

Checking End Point Online :

The screenshot shows the Microsoft Azure portal interface. The top navigation bar includes the Microsoft Azure logo, a search bar, and a Copilot button. The user's profile is visible in the top right corner. The main content area displays the 'traficmange' Traffic Manager profile. The left sidebar contains a navigation menu with options like Overview, Activity log, Access control (IAM), Tags, Diagnose and solve problems, Settings, Configuration, Real user measurements, Traffic view, Endpoints, Properties, Locks, Monitoring, Alerts, and Metrics. The 'Overview' section is selected, showing the 'Essentials' tab. The 'Essentials' tab displays the following information:

- Resource group (move): [AbhiRam](#)
- Status: Enabled
- Subscription (move): [Azure subscription 1](#)
- Subscription ID: c4498e5c-6513-4872-b5f1-0db5f82228cf
- Tags (edit): [Add tags](#)
- DNS name: <http://traficmange.trafficmanager.net>
- Monitor status: Online
- Routing method: Priority

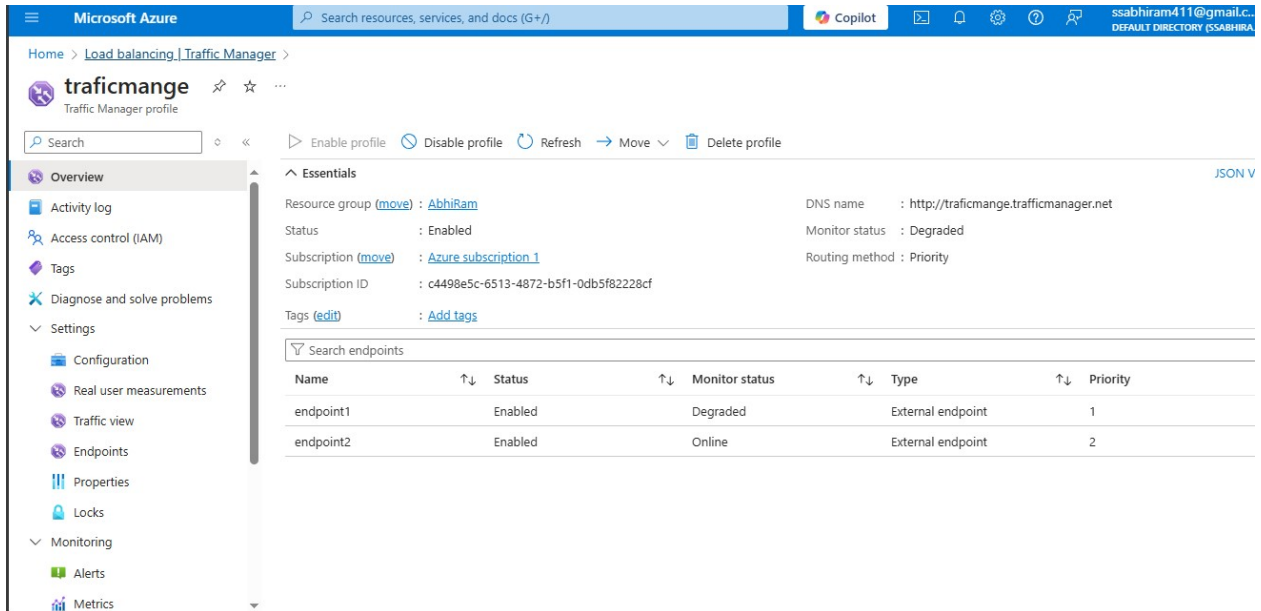
Below the essentials, there is a table titled 'Search endpoints' with the following data:

Name	↑↓	Status	↑↓	Monitor status	↑↓	Type	↑↓	Priority	↑↓
endpoint1		Enabled		Online		External endpoint		1	
endpoint2		Enabled		Online		External endpoint		2	

Web app 1 Output Comes:



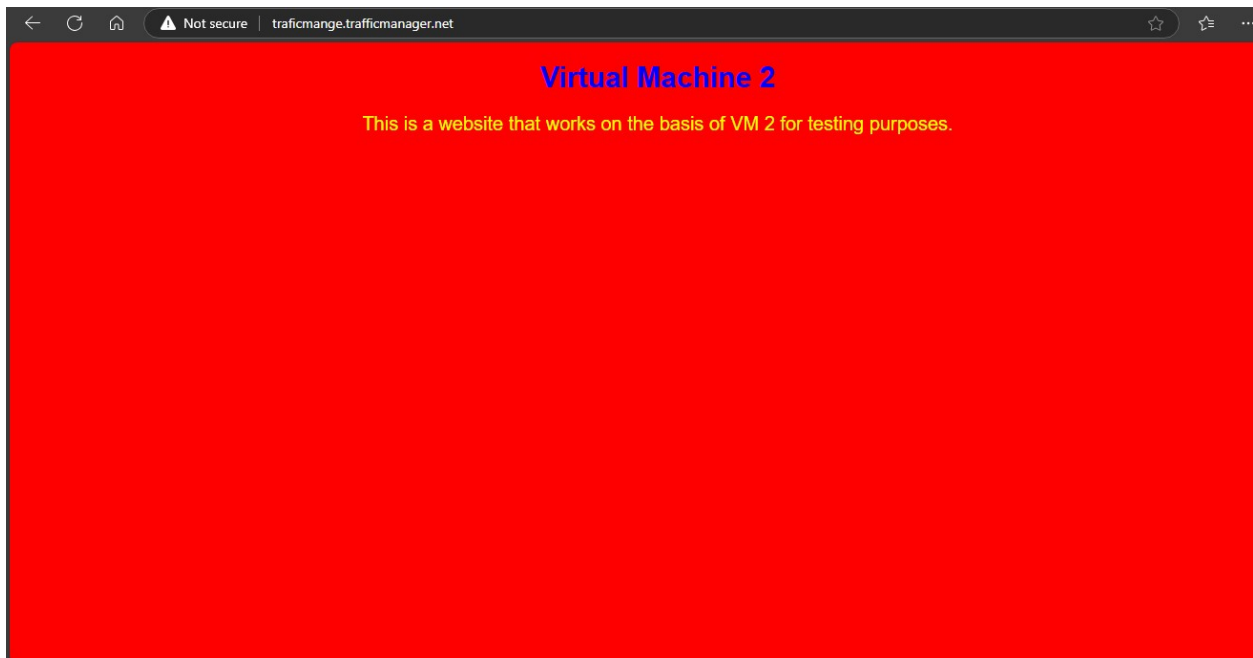
Endpoint 1 Get Degraded:



The screenshot shows the Microsoft Azure portal interface for a Traffic Manager profile named 'traficmange'. The profile is in a 'Degraded' state. The 'Endpoints' table lists two endpoints: 'endpoint1' (Status: Enabled, Monitor status: Degraded, Type: External endpoint, Priority: 1) and 'endpoint2' (Status: Enabled, Monitor status: Online, Type: External endpoint, Priority: 2).

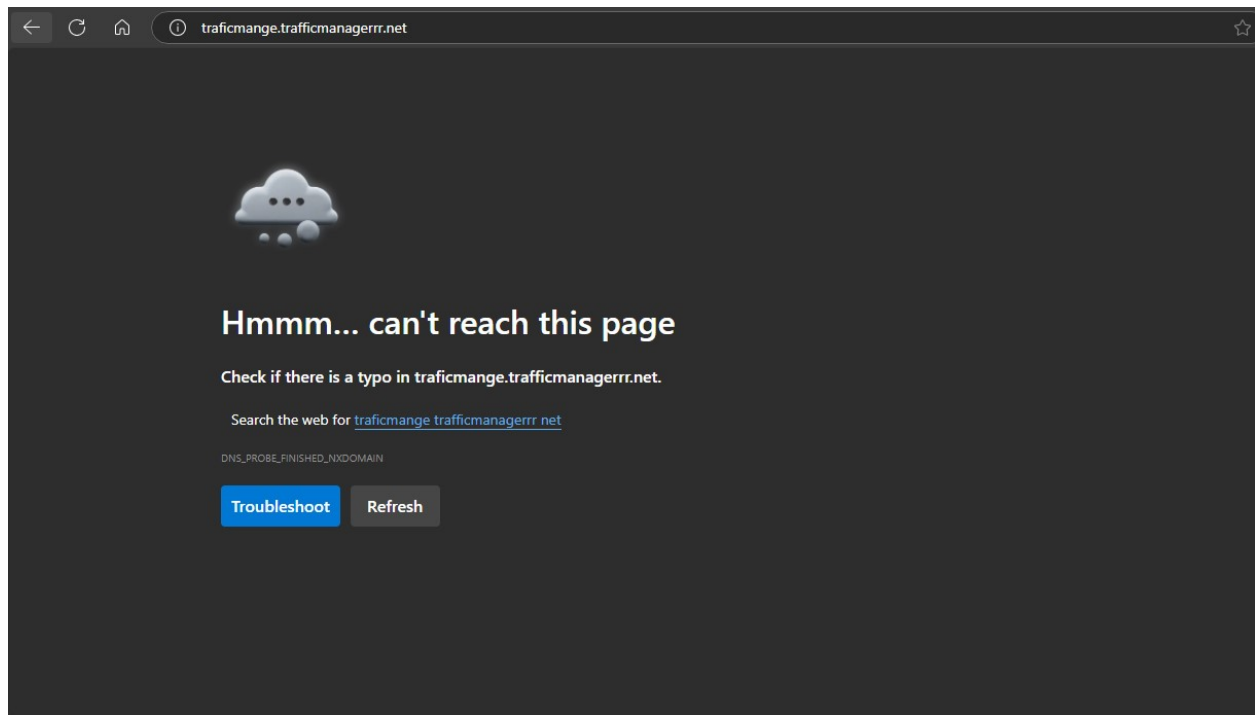
Name	Status	Monitor status	Type	Priority
endpoint1	Enabled	Degraded	External endpoint	1
endpoint2	Enabled	Online	External endpoint	2

Web App 2 Output Occurs:



The screenshot shows a web browser window with a red background. The text 'Virtual Machine 2' is displayed in blue, and the text 'This is a website that works on the basis of VM 2 for testing purposes.' is displayed in yellow.

Error in the URL:



- Following this, I created a Traffic Manager to enable global load balancing across regions.
- I linked the IP addresses of Application Gateway 1 and Application Gateway 2 as endpoints in the Traffic Manager, allowing it to distribute traffic based on user location or health status.
- Before linking the endpoints, I configured a DNS to associate with the IP addresses of the application gateways, ensuring that user requests are correctly routed.
- Finally, I tested the entire setup by simulating traffic through the Traffic Manager to ensure that the requests were properly directed to the appropriate application gateway and Web application, confirming that the configuration was functioning as expected.