R&D Report: Internal & External Load Balancer Configuration in Azure

(Screenshots at last)

Objective

To create and verify both Internal and External Load Balancers in Microsoft Azure using two virtual machines. The report includes setup, configuration, health probes, backend pools, and final verification for both types of load balancers.

Resource Group and Network Setup

- **Resource Group**: `rg-loadbalancer`
- **Region**: Central India
- **Virtual Network (VNet)**: `vnet-lb` with address space `10.0.0.0/16`
- **Subnet**: `subnet-lb` with subnet range `10.0.1.0/24`

Virtual Machines

- **VMs Created**: `vm1`, `vm2`
- **Availability Set**: `avset-lb`
- **Web Server**: Installed IIS on Windows Server (or Apache on Linux)
- **NSG**: Inbound rule allowing TCP traffic on port 80

Part 1: External Load Balancer Setup

1. Load Balancer Configuration

- **Name**: `lb-public`
- **Type**: Public
- **SKU**: Standard
- **Public IP**: `pip-lb` (dynamic/static)

2. Backend Pool

- Name: `backend-pool`
- Associated with `avset-lb`
- Includes `vm1` and `vm2`

3. Health Probe

- **Name**: `http-probe`
- **Protocol**: HTTP
- **Port**: 80
- **Path**: /

4. Load Balancing Rule

- **Name**: `http-rule`
- **Frontend Port**: 80
- **Backend Port**: 80
- **Protocol**: TCP
- **Health Probe**: `http-probe`

5. Verification

- Accessed public IP from browser.
- Result: Default IIS web page loaded — confirmed working.

Part 2: Internal Load Balancer Setup

1. Load Balancer Configuration

- **Name**: `lb-internal`
- **Type**: Internal
- **Private IP**: `10.0.1.100`
- **Subnet**: `subnet-lb`
- **SKU**: Standard

2. Backend Pool

- Name: `backend-int`
- NIC-based pool with `vm1` and `vm2`

3. Health Probe

- **Name**: `http-probe`
- **Protocol**: HTTP
- **Port**: 80
- **Path**: /

4. Load Balancing Rule

- **Name**: `http-rule-int`

- **Frontend IP**: Internal (10.0.1.100)
- **Backend Pool**: `backend-int`
- **Port Mapping**: 80 → 80

5. Verification

- Used internal test method:

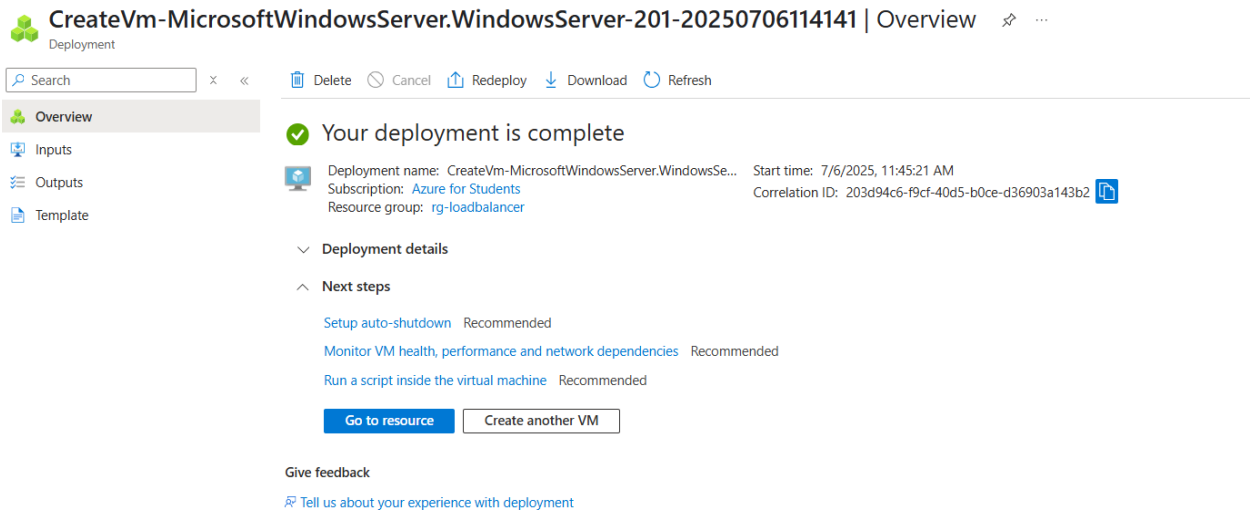
```
curl http://10.0.1.100
```

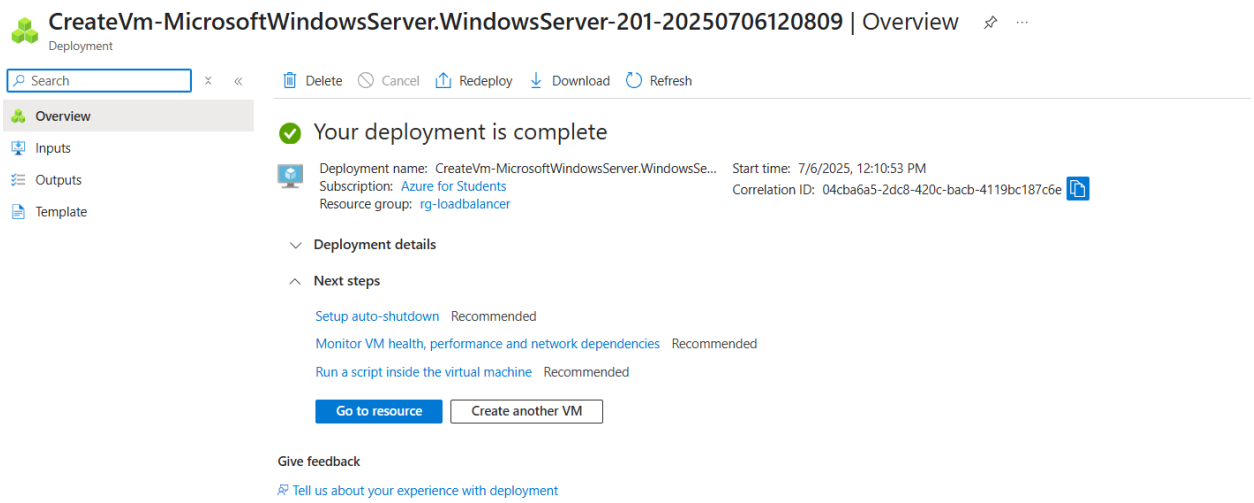
- Result: HTML response from either vm1 or vm2 — confirmed internal LB working.

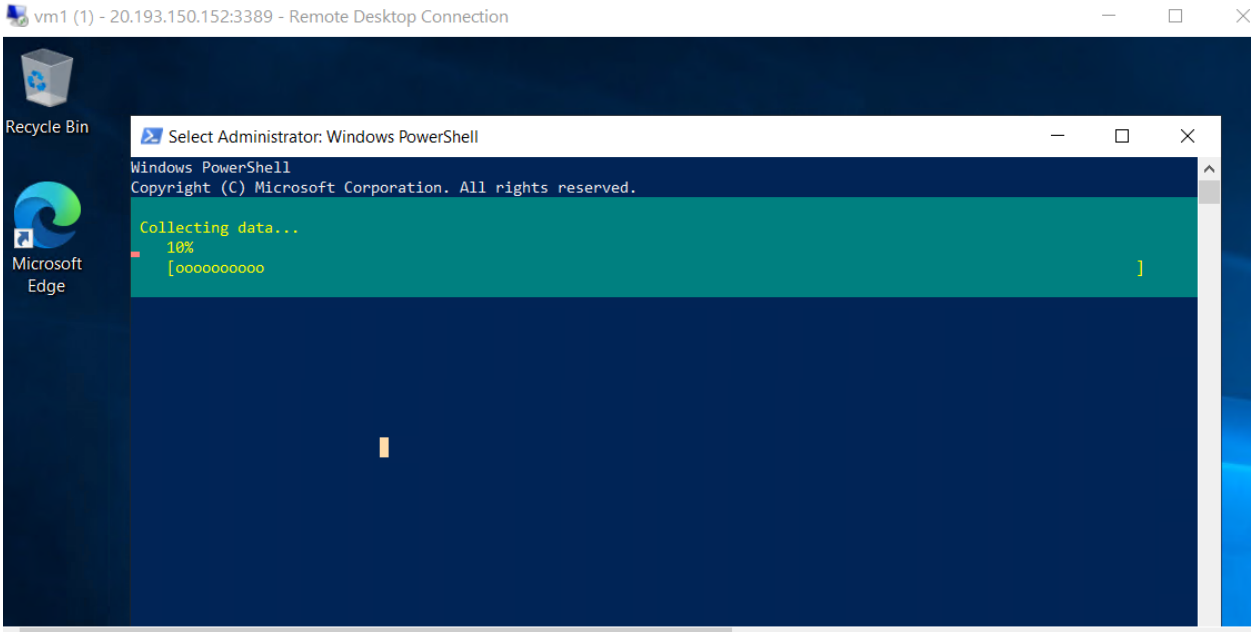
Conclusion

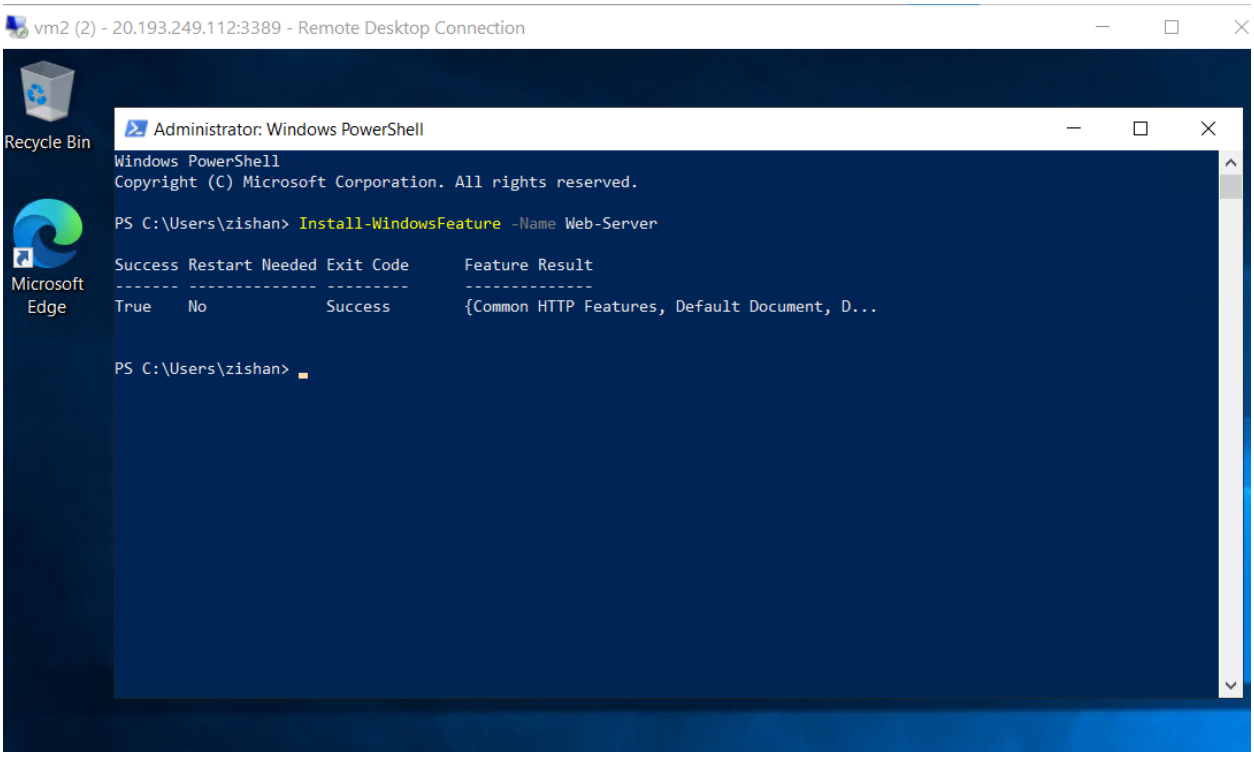
- **External Load Balancer** successfully routed traffic from the internet to VMs.
- **Internal Load Balancer** handled internal VNet traffic securely.
- Both setups confirmed healthy through probes and testing.
- VMs were reused for both setups, ensuring cost efficiency.

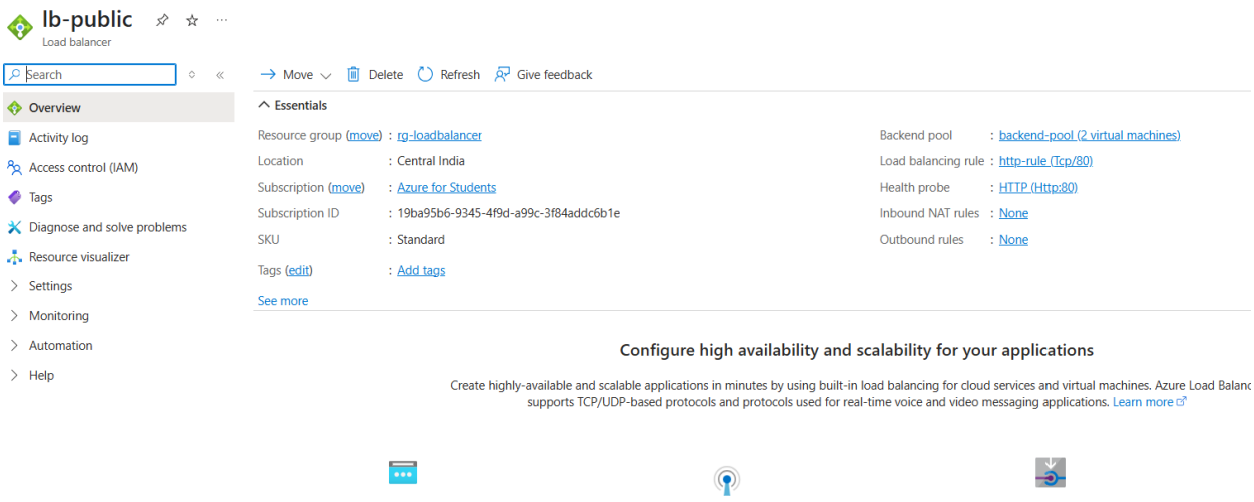
External SS

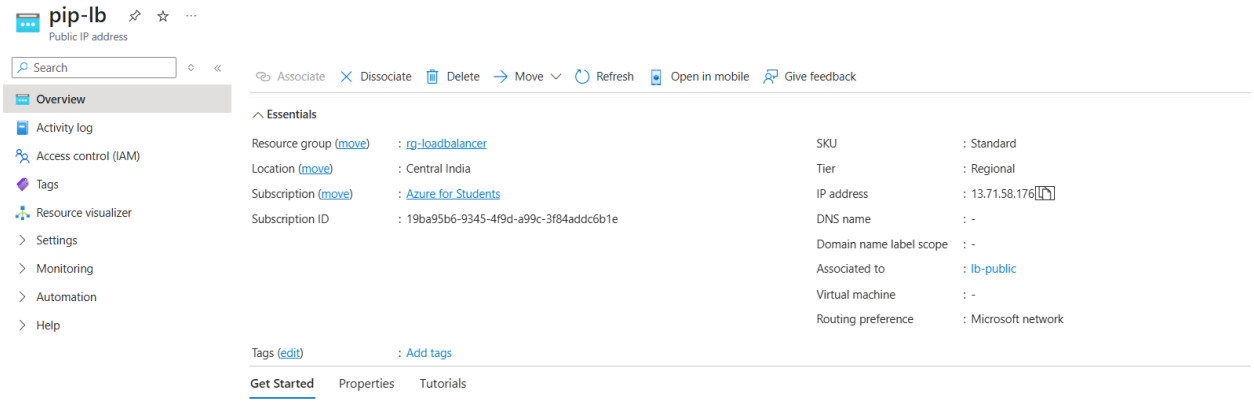


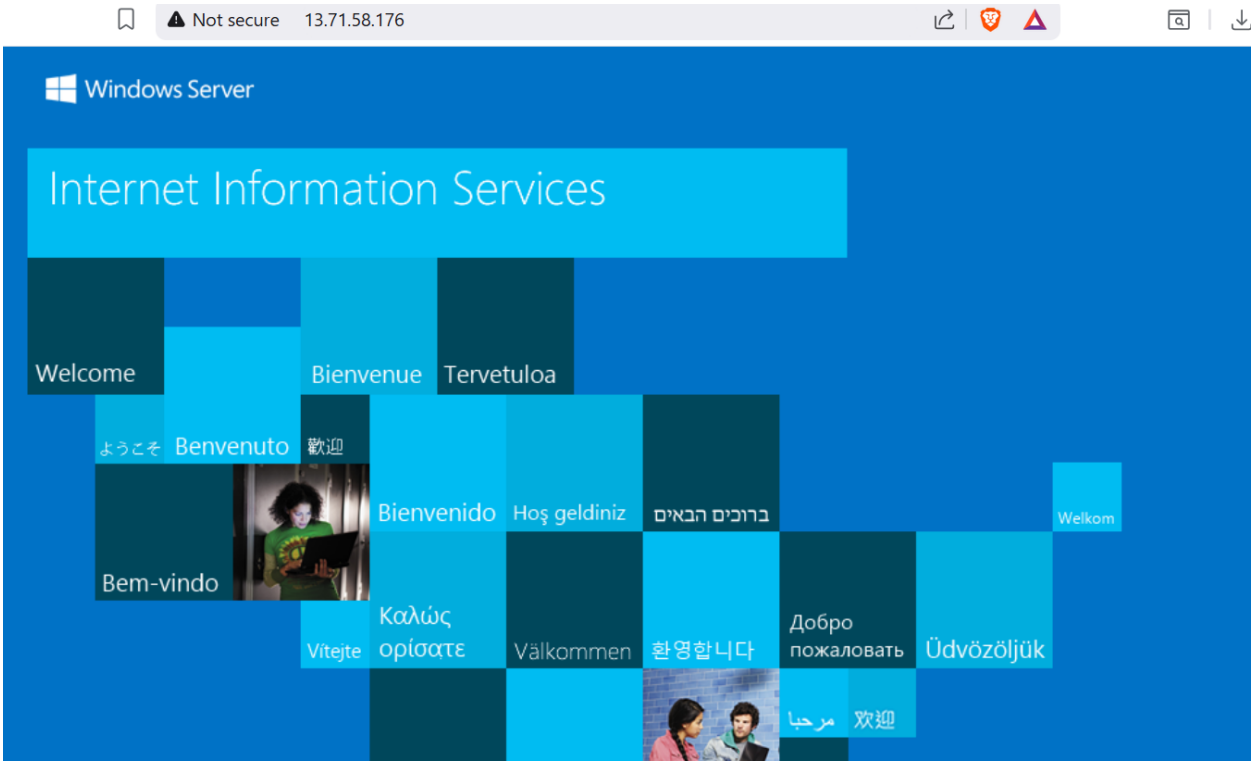

CreateVm-MicrosoftWindowsServer.WindowsServer-201-20250706120809 | Overview
Deployment
Search
Overview
Inputs
Outputs
Template
Delete
Cancel
Redeploy
Download
Refresh
Your deployment is complete
Deployment name: CreateVm-MicrosoftWindowsServer.WindowsSe...
Subscription: Azure for Students
Resource group: rg-loadbalancer
Start time: 7/6/2025, 12:10:53 PM
Correlation ID: 04cba6a5-2dc8-420c-bacb-4119bc187c6e
Deployment details
Next steps
Setup auto-shutdown Recommended
Monitor VM health, performance and network dependencies Recommended
Run a script inside the virtual machine Recommended
Go to resource
Create another VM
Give feedback
Tell us about your experience with deployment


vm1 (1) - 20.193.150.152:3389 - Remote Desktop Connection
Recycle Bin
Microsoft Edge
Select Administrator: Windows PowerShell
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.
Collecting data...
10%
[ooooooooo]

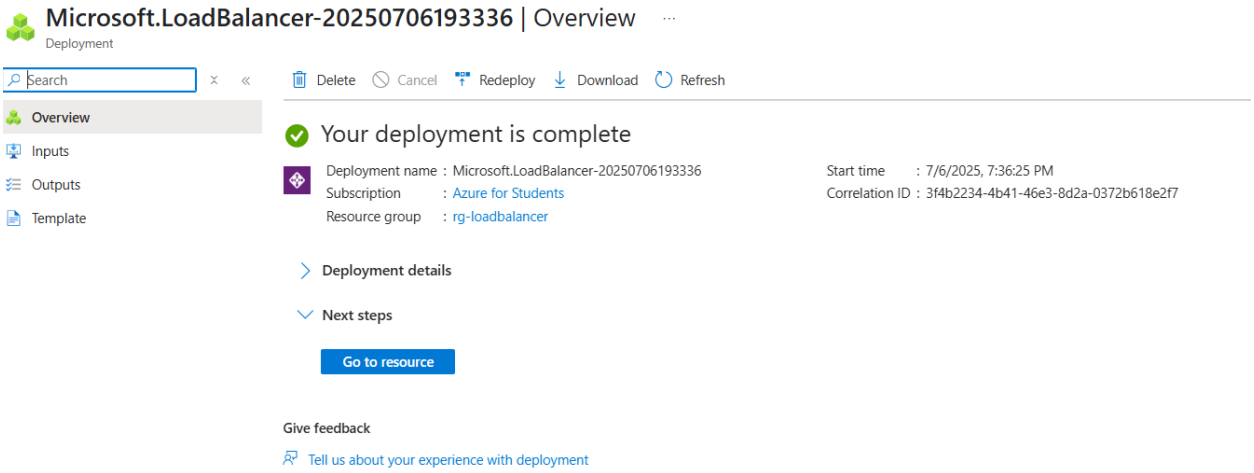

vm2 (2) - 20.193.249.112:3389 - Remote Desktop Connection
Recycle Bin
Microsoft Edge
Administrator: Windows PowerShell
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.
PS C:\Users\zishan> Install-WindowsFeature -Name Web-Server
Success Restart Needed Exit Code Feature Result
------- -------------- --------- --------------
True No Success {Common HTTP Features, Default Document, D...
PS C:\Users\zishan>

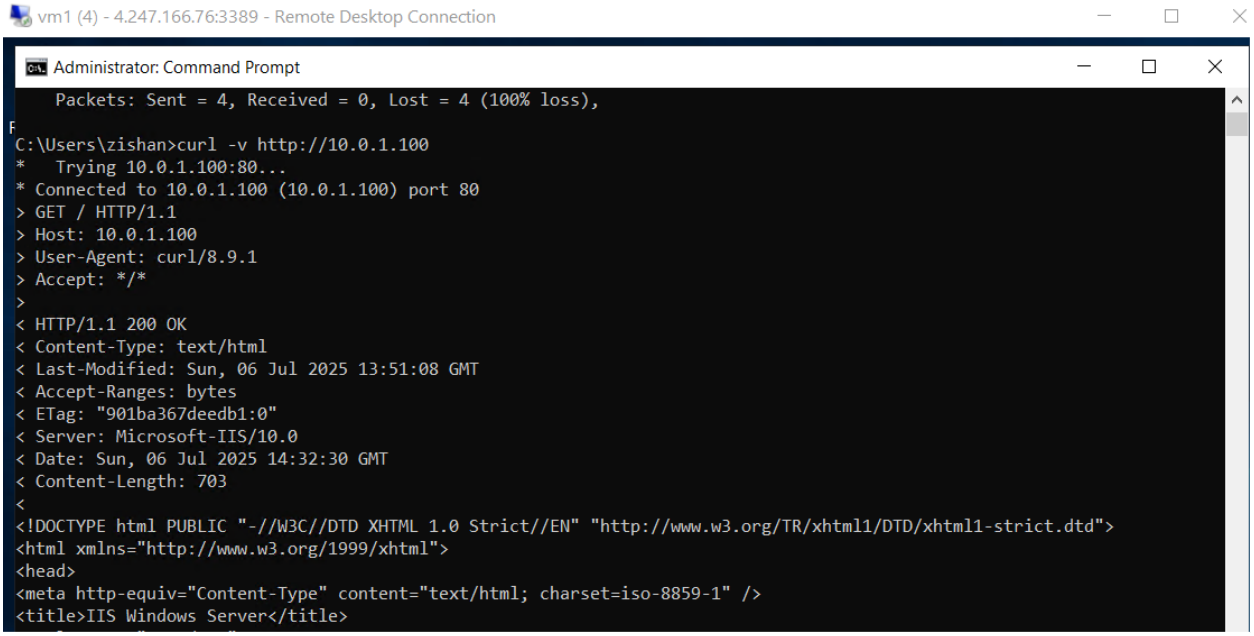

lb-public
Load balancer
Search
Overview
Activity log
Access control (IAM)
Tags
Diagnose and solve problems
Resource visualizer
Settings
Monitoring
Automation
Help
Move
Delete
Refresh
Give feedback
Essentials
Resource group (move) : rg-loadbalancer
Location : Central India
Subscription (move) : Azure for Students
Subscription ID : 19ba95b6-9345-4f9d-a99c-3f84addc6b1e
SKU : Standard
Tags (edit) : Add tags
See more
Backend pool : backend-pool (2 virtual machines)
Load balancing rule : http-rule (Tcp/80)
Health probe : HTTP (Http:80)
Inbound NAT rules : None
Outbound rules : None
Configure high availability and scalability for your applications
Create highly-available and scalable applications in minutes by using built-in load balancing for cloud services and virtual machines. Azure Load Balanc
supports TCP/UDP-based protocols and protocols used for real-time voice and video messaging applications. Learn more


pip-lb
Public IP address
Search
Overview
Activity log
Access control (IAM)
Tags
Resource visualizer
Settings
Monitoring
Automation
Help
Associate
Dissociate
Delete
Move
Refresh
Open in mobile
Give feedback
Essentials
Resource group (move) : rg-loadbalancer
Location (move) : Central India
Subscription (move) : Azure for Students
Subscription ID : 19ba95b6-9345-4f9d-a99c-3f84addc6b1e
SKU : Standard
Tier : Regional
IP address : 13.71.58.176
DNS name : -
Domain name label scope : -
Associated to : lb-public
Virtual machine : -
Routing preference : Microsoft network
Tags (edit) : Add tags
Get Started
Properties
Tutorials


Not secure 13.71.58.176
Windows Server
Internet Information Services
Welcome
Bienvenue
Tervetuloa
ようこそ
Benvenuto
歡迎
Bienvenido
Hoş geldiniz
ברוכים הבאים
Welkom
Bem-vindo
Vítejte
Καλώς ορίσατε
Välkommen
환영합니다
Добро пожаловать
Üdvözöljük
مرحبا
欢迎

Internal SS


Microsoft.LoadBalancer-20250706193336 | Overview
Deployment
Search
Overview
Inputs
Outputs
Template
Delete
Cancel
Redeploy
Download
Refresh
Your deployment is complete
Deployment name : Microsoft.LoadBalancer-20250706193336
Subscription : Azure for Students
Resource group : rg-loadbalancer
Start time : 7/6/2025, 7:36:25 PM
Correlation ID : 3f4b2234-4b41-46e3-8d2a-0372b618e2f7
Deployment details
Next steps
Go to resource
Give feedback
Tell us about your experience with deployment


vm1 (4) - 4.247.166.76:3389 - Remote Desktop Connection
Administrator: Command Prompt
Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
C:\Users\zishan>curl -v http://10.0.1.100
* Trying 10.0.1.100:80...
* Connected to 10.0.1.100 (10.0.1.100) port 80
> GET / HTTP/1.1
> Host: 10.0.1.100
> User-Agent: curl/8.9.1
> Accept: */*
>
< HTTP/1.1 200 OK
< Content-Type: text/html
< Last-Modified: Sun, 06 Jul 2025 13:51:08 GMT
< Accept-Ranges: bytes
< ETag: "901ba367deedb1:0"
< Server: Microsoft-IIS/10.0
< Date: Sun, 06 Jul 2025 14:32:30 GMT
< Content-Length: 703
<
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<html xmlns="http://www.w3.org/1999/xhtml">
<head>
<meta http-equiv="Content-Type" content="text/html; charset=iso-8859-1" />
<title>IIS Windows Server</title>