

LOAD BALANCER

Prerequisites:

Before you start, you'll need:

1. An Azure Subscription.
2. Azure Portal Access.
3. A Virtual Network (VNet) and Subnet:
 - External LB: You'll need a VNet with at least one subnet.
 - Internal LB: You'll use the same VNet and subnet, or a new one.
4. VMs for Backend Pool: You'll need at least two VMs for each load balancer type to demonstrate load balancing. These VMs should be in the same region and VNet/subnet as your load balancer. For testing, it's easiest if they run a simple web server like Nginx on Linux that shows which server is responding.

Step 1: Create a Resource Group, Virtual Network, and Subnet

Create a Resource Group:

- Go to Resource groups in the Azure portal.
- Click + Create.
- Subscription: Select your subscription.
- Resource group name: MyLoadBalancerRG.
- Region: Choose a region close to you (e.g., Central India). Remember this region for all subsequent resources.
- Click Review + create, then Create.

Create a Virtual Network and Subnet:

- Go to Virtual networks in the Azure portal.
- Click + Create.
- Basics tab:
 - Subscription: Select your subscription.
 - Resource Group: Choose MyLoadBalancerRG.
 - Name: MyVNet
 - Region: Select the same region as your resource group.
- IP Addresses tab:
 - IPv4 address space: 10.0.0.0/16.
 - + Add subnet:
 - Subnet name: BackendSubnet
 - Subnet address range: 10.0.0.0/24.
 - Click Add.
- Click Review + create, then Create.

The screenshot displays the Microsoft Azure portal interface. At the top, the header shows 'Microsoft Azure' with a search bar and user information. The main content area is titled 'MyVNet-1752806953725 | Overview'. Below the title, there's a search bar and a row of action buttons: Delete, Cancel, Redeploy, Download, and Refresh. The left sidebar contains a navigation menu with 'Overview', 'Inputs', 'Outputs', and 'Template'. The main content area shows a green checkmark and the text 'Your deployment is complete'. Below this, deployment details are listed: Deployment name: MyVNet-1752806953725, Subscription: Azure for Students, Resource group: MyLoadBalancerRG, Start time: 18/07/2025, 08:19:18, and Correlation ID: 6c64dbd2-c231-4287-8eb4-364b243... A table titled 'Deployment details' shows the resource 'MyVNet' of type 'Virtual network' with a status of 'OK'. Below the table, there's a 'Next steps' section with a 'Go to resource' button. At the bottom, there's a 'Give feedback' section with a link to 'Tell us about your experience with deployment'. The right sidebar contains three recommendations: 'Cost management', 'Microsoft Defender for Cloud', and 'Free Microsoft tutorials'.

Microsoft Azure

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✓ Your deployment is complete

Deployment name : MyVNet-1752806953725 Start time : 18/07/2025, 08:19:18
Subscription : Azure for Students Correlation ID : 6c64dbd2-c231-4287-8eb4-364b243...
Resource group : MyLoadBalancerRG

Deployment details

Resource	Type	Status	Operation details
MyVNet	Virtual network	OK	Operation details

Next steps

Go to resource

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Create Two Virtual Machines (VMs) for Backend Pool:

- These VMs will act as your web servers.
- Click + Create -> Azure virtual machine.
- Basics tab for vm-web-01:
 - Virtual machine name: vm-web-01
 - Image: Ubuntu Server 24.04 LTS - Gen2
 - Size: Choose a small, cheap size like Standard B1s.
 - Username: azureuser.
 - Public inbound ports: Select None (we'll use the LB for access).
- Networking tab:
 - Virtual network: MyVNet
 - Subnet: BackendSubnet
 - Public IP: None (Load Balancer will provide public access for external LB).
 - Click Review + create, then Create. Wait for deployment to complete.

Repeat these steps to create vm-web-02 with identical settings.

The screenshot displays the Microsoft Azure portal interface. At the top, the header shows 'Microsoft Azure' with a search bar and user information 'devs.sambit@gmail.com'. The main content area is titled 'CreateVm-canonical.ubuntu-24_04-lts-server-20250718083153 | Overview'. A green checkmark icon indicates 'Your deployment is complete'. Below this, deployment details are shown: 'Deployment name: CreateVm-canonical.ubuntu-24_04-lts-serv...', 'Subscription: Azure for Students', and 'Resource group: MyLoadBalancerRG'. A table lists the resources created:

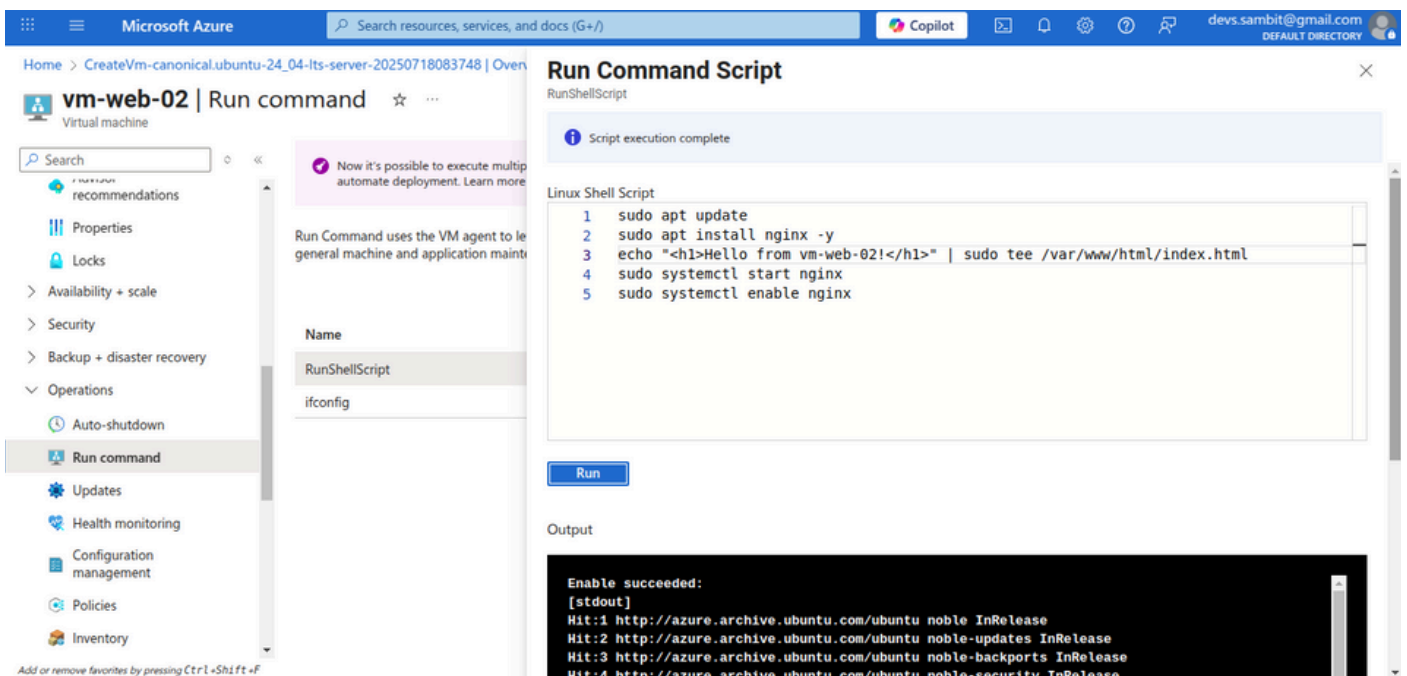
Resource	Type	Status	Operation details
vm-web-01	Microsoft.Compute/virtu...	OK	Operation details
vm-web-01736	Microsoft.Network/netw...	Created	Operation details
vm-web-01-nsg	Microsoft.Network/netw...	OK	Operation details

Below the table, 'Next steps' are recommended: 'Setup auto-shutdown', 'Monitor VM health, performance and network dependencies', and 'Run a script inside the virtual machine'. On the right sidebar, there are sections for 'Cost Management', 'Microsoft Defender for Cloud', and 'Free Microsoft tutorials'.

Install Nginx on Both VMs:

- Once both VMs are deployed, navigate to vm-web-01 in the Azure portal.
- Under "Operations", click Run command and select RunShellScript.
- Enter the following script to install Nginx and create a custom index.html:
 - **sudo apt update**
 - **sudo apt install nginx -y**
 - **echo "<h1>Hello from vm-web-01!</h1>" | sudo tee /var/www/html/index.html**
 - **sudo systemctl start nginx** Now you have the backend infrastructure ready!
 - **sudo systemctl enable nginx**
- Click Run.
- Repeat this process for vm-web-02, changing the index.html content:
 - **echo "<h1>Hello from vm-web-02!</h1>" | sudo tee /var/www/html/index.html**

Now you have the backend infrastructure ready.



Part 1: Creating and Verifying an External (Public) Load Balancer:

This Load Balancer will expose your web servers to the internet.

Create the External Load Balancer:

- In the Azure portal search bar, type Load balancers and select it.
- Basics Tab:
 - Resource group: MyLoadBalancerRG
 - Name: MyExternalLB
 - SKU: Select Basic.
 - Type: Select Public.
 - Tier: Select Regional.
- Frontend IP Configuration:
 - Click + Add a frontend IP configuration.
 - Name: FrontEndPublicIP
 - IP version: IPv4
 - IP type: IP address
 - Public IP address: Click Create new.
 - Name: MyPublicLBIP
 - SKU: Basic.
 - Availability zone: No zone.
- Backend Pools:
 - Click + Add a backend pool.
 - Name: BackendPoolExternal
 - Backend Pool Configuration: Network Interface.
 - IP configurations: Click + Add.
 - Select the network interfaces for vm-web-01 and vm-web-02.

- Inbound Rules:
 - Click + Add a load balancing rule.
 - Name: HTTP_Rule
 - Frontend IP address: FrontEndPublicIP
 - Backend pool: BackendPoolExternal
 - Protocol: TCP
 - Port: 80 (HTTP traffic)
 - Backend port: 80
- Health probe: Click Create new.
 - Name: HTTP_Probe
 - Protocol: HTTP
 - Port: 80
 - Interval: 5 (seconds)
 - Click OK.
- Click Review + create.

The screenshot shows the Microsoft Azure portal interface. At the top, the header includes the Microsoft Azure logo, a search bar, and user information (devs.sambit@gmail.com). The main content area displays the 'Overview' page for a deployment named 'CreateLoadBalancerBladeV2-20250718091939'. A green checkmark indicates 'Your deployment is complete'. Below this, deployment details are listed: Deployment name, Subscription (Azure for Students), Resource group (MyLoadBalancerRG), Start time (18/07/2025, 09:31:59), and Correlation ID. A table titled 'Deployment details' shows the status of individual resources: NicUpdate-db86f8 (OK), NicUpdate-3d743b (OK), MyExternalLB (Created), and MyPublicLBIP (OK). On the right sidebar, there are links for 'Cost management', 'Microsoft Defender for Cloud', 'Free Microsoft tutorials', and 'Work with an expert'.

Deployment Summary:

- Deployment Name:** CreateLoadBalancerBladeV2-20250718091939
- Subscription:** Azure for Students
- Resource Group:** MyLoadBalancerRG
- Start Time:** 18/07/2025, 09:31:59
- Correlation ID:** cffd4f5a-bab4-4c54-beb1-6a2d6da59...

Resource	Type	Status	Operation details
NicUpdate-db86f8	Deployment	OK	Operation details
NicUpdate-3d743b	Deployment	OK	Operation details
MyExternalLB	Load balancer	Created	Operation details
MyPublicLBIP	Public IP address	OK	Operation details

Next steps: [Go to resource](#)

Verifying the External Load Balancer:

1. Get the Public IP:

- Once the Load Balancer deployment is complete, go to the MyExternalLB resource in the Azure portal.
- In the "Overview" section, find the Frontend IP configuration and note down the Public IP address.

2. Test from your Local Machine:

- Open a web browser on your local computer.
- Paste the Public IP address of your MyExternalLB into the address bar and press Enter.
- You should see "Hello from vm-web-01!" or "Hello from vm-web-02!".
- Refresh your browser multiple times. You should see the message alternate between "Hello from vm-web-01!" and "Hello from vm-web-02!", indicating that the load balancer is distributing traffic between your backend VMs.



Hello from vm-web-02!

Part 2: Creating and Verifying an Internal (Private) Load Balancer:

This Load Balancer will distribute traffic within your virtual network, not directly from the internet. Type Load balancers, select it and click + Create.

- Basics Tab:
 - Resource group: MyLoadBalancerRG
 - Name: MyInternalLB
 - SKU: Select Basic.
 - Type: Select Internal.
 - Tier: Select Regional.
- Frontend IP Configuration:
 - Click + Add a frontend IP configuration.
 - Name: FrontEndPrivateIP
 - IP version: IPv4
 - Virtual network: MyVNet
 - Subnet: BackendSubnet
 - Assignment: Dynamic
- Backend Pools:
 - Click **+ Add a backend pool**.
 - Name: BackendPoolInternal
 - Virtual network: MyVNet
 - Backend Pool Configuration: Network Interface (default).
 - IP configurations: Click + Add.
 - Select the network interfaces for vm-web-01 and vm-web-02. (Yes, the same VMs can be in multiple backend pools for different LBs, as long as the ports/protocols don't conflict).

- Inbound Rules (Load Balancing Rule):
 - Click ****+ Add a load balancing rule`**.
 - Name: Internal_HTTP_Rule
 - Frontend IP address: FrontEndPrivateIP
 - Backend pool: BackendPoolInternal
 - Protocol: TCP
 - Port: 80
 - Backend port: 80
 - Health probe: Select the existing HTTP_Probe
 - Click Add.
- Click Review + create.

The screenshot displays the Microsoft Azure portal interface. The main heading is 'CreateLoadBalancerBladeV2-20250720091939 | Overview'. Below this, a green checkmark indicates 'Your deployment is complete'. The deployment details show the name 'CreateLoadBalancerBladeV2-2025072...', subscription 'Azure for Students', and resource group 'MyLoadBalancerRG'. The start time is '20/07/2025, 09:23:47' and the correlation ID is 'bf81aaeb-5ffd-467f-a14b-0897ca5ea...'. A table lists the resources deployed:

Resource	Type	Status	Operation details
NicUpdate-9c57e0	Deployment	OK	Operation details
NicUpdate-1d960a	Deployment	OK	Operation details
MyInternalLB	Load balancer	OK	Operation details

Below the table, there is a 'Next steps' section with a 'Go to resource' button. On the right side, a 'Deployment succeeded' notification states: 'Deployment 'CreateLoadBalancerBladeV2-20250720091939' to resource group 'MyLoadBalancerRG' was successful.' Below this, there are three promotional cards: 'Cost management' (Get notified to stay within your budget), 'Microsoft Defender for Cloud' (Secure your apps and infrastructure), and 'Free Microsoft tutorials' (Start learning today). At the bottom left, a small note says 'Add or remove favorites by pressing Ctrl+Shift+F'.

Verifying the Internal Load Balancer:

Since an internal load balancer uses a private IP, you cannot access it directly from your local machine (internet). You need a client VM within the same VNet to test it.

1. Create a Client VM:

- Go to Virtual machines and create a new VM (e.g., vm-client).
- Place it in the same Resource Group (MyLoadBalancerRG), Virtual Network (MyVNet), and Subnet (BackendSubnet) as your web servers.
- Crucially, for this client VM, you will need a Public IP address and allow RDP (port 3389 for Windows) or SSH (port 22 for Linux) inbound rules in its NSG so you can connect to it from your local machine. This is temporary for testing.
- Size: Standard B1s or B2s.
- Once deployed, connect to vm-client via RDP/SSH.

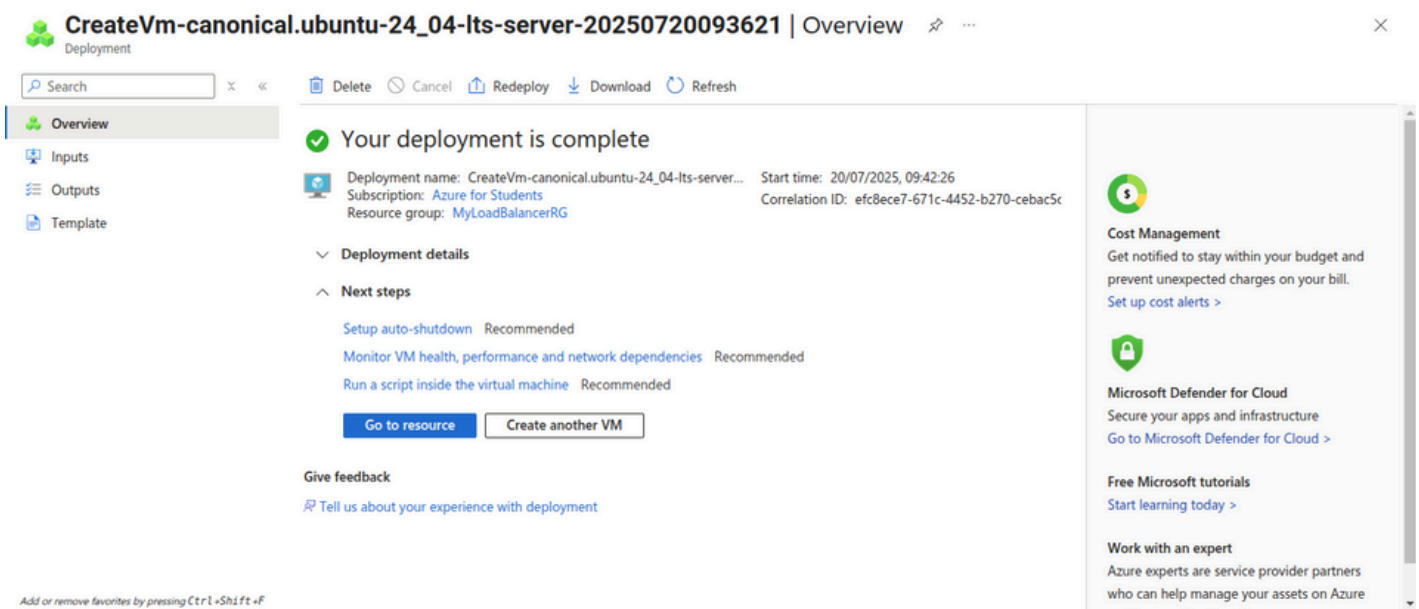
2. Get the Internal LB's Private IP:

- In MyInternalLB resource, find the Frontend IP configuration and note down its Private IP address.

3. Test from the Client VM:

- From within your vm-client (connected via RDP/SSH):
- If Linux: Open a terminal and use curl:
- **curl http://<Private_IP_of_MyInternalLB>**

Run the curl command or refresh the browser multiple times. You should see the messages alternate between vm-web-01 and vm-web-02, confirming the internal load balancing.



CONCLUSION

- **LB Types:** Understood and implemented public (External) and private (Internal) load balancing.
- **Core Components:** Configured frontends, backend pools, health probes, and load balancing rules.
- **Networking Essentials:** Mastered NSG rules for LB traffic, health probes, and VM access.
- **Backend Readiness:** Ensured Nginx was running/listening and UFW wasn't blocking on web servers.
- **Troubleshooting Acumen:** Gained practical skills in diagnosing and resolving complex cloud networking issues.

Submitted by:

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References:

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