

## **Placement Empowerment Program**

### ***Cloud Computing and DevOps Centre***

Set Up a Load Balancer in the Cloud

Configure a load balancer to distribute traffic across multiple VMs hosting your web application

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## ***INTRODUCTION***

A load balancer is a crucial component in modern cloud architecture, responsible for distributing incoming traffic across multiple virtual machines (VMs) hosting a web application. By ensuring efficient traffic management, load balancers enhance the performance, availability, and reliability of applications. This guide provides a step-by-step approach to configuring a load balancer in the cloud environment.

## ***OVERVIEW***

Cloud-based applications often experience fluctuating traffic levels. Without a load balancer, a single server might become overloaded, leading to poor performance or downtime. A load balancer efficiently distributes requests across multiple servers, preventing bottlenecks and ensuring optimal resource utilization.

Load balancers can operate at different levels, such as:

- **Layer 4 (Transport Layer):** Distributes traffic based on IP addresses and TCP/UDP ports.
- **Layer 7 (Application Layer):** Routes traffic based on HTTP headers, cookies, or URLs.

Cloud providers like AWS, Azure, and Google Cloud offer managed load balancing services that simplify deployment and management.

## ***OBJECTIVES***

By the end, you will:

- Understand the purpose and benefits of load balancing in the cloud.
- Learn how to configure a cloud-based load balancer.
- Distribute traffic across multiple VMs to enhance performance and availability.
- Implement security measures such as SSL termination and health checks.

## ***IMPORTANCE***

Load balancers are critical for:

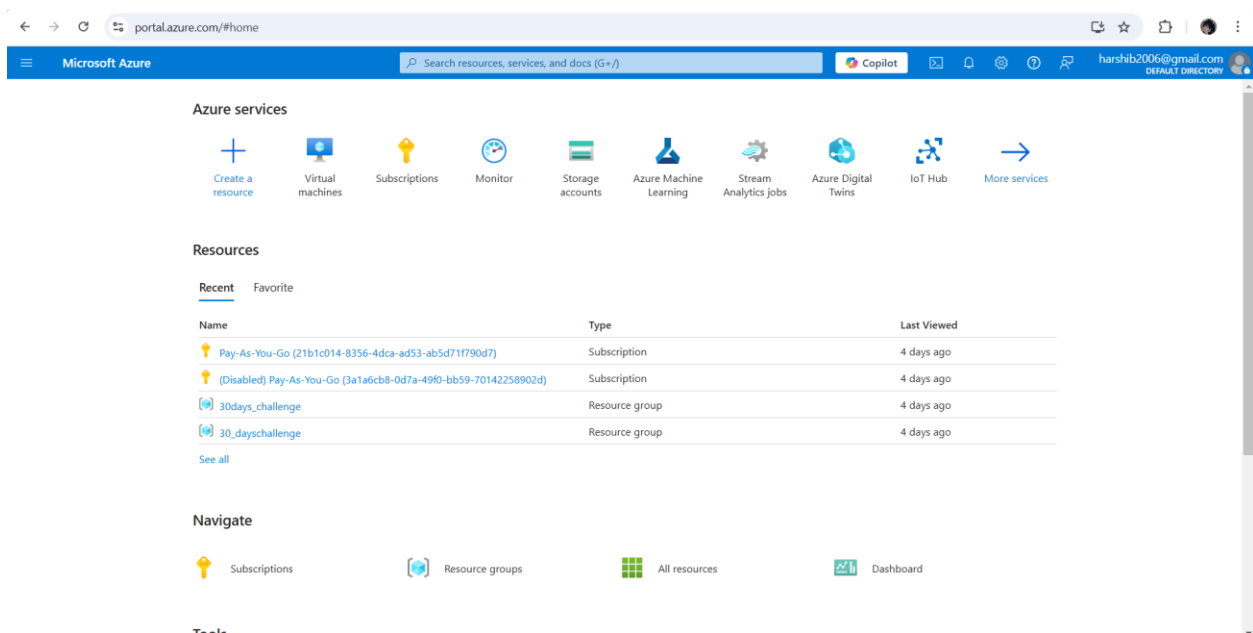
- **High Availability:** Ensuring uninterrupted service by redirecting traffic from failed instances to healthy ones.
- **Scalability:** Automatically adjusting traffic distribution as demand increases or decreases.
- **Performance Optimization:** Reducing response times by distributing requests efficiently.
- **Security Enhancement:** Protecting against DDoS attacks and ensuring secure connections via SSL/TLS termination.

# STEP-BY-STEP OVERVIEW

Here's a step-by-step guide to setting up a load balancer in Azure:

## Create a Load Balancer

### 1. Log in to the Azure portal.



### 2. Click on "Create a resource" and search for "Load Balancer".

### 3. Select "Load Balancer" and click on "Create".

The screenshot shows the Microsoft Azure Marketplace page for the 'Load Balancer' service. The page header includes the Azure logo, a search bar, and the user's profile. The main content area features the 'Load Balancer' title, a star rating of 4.6 (133 ratings), and a 'Create' button. Below this, there is a section titled 'Overview' with a description of the service and a list of configuration options. At the bottom, there are four tiles for other Microsoft products: Active Directory Health Check, AD Replication Status, Device Update for IoT Hub, and Front Door and CDN profiles. A 'Give feedback' button is located in the bottom right corner.

portal.azure.com/#view/Microsoft\_Azure\_Marketplace/GalleryItemDetailsBladeNopdl/d/Microsoft.LoadBalancer/selectionMode~/false/resourceGroupId//resourceGroupLocation//d...

Microsoft Azure

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

Copilot

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Home > Create a resource > Marketplace >

# Load Balancer

Microsoft

Load Balancer [Add to Favorites](#)

Microsoft | Azure Service

★ 4.6 (133 ratings)

Plan

Load Balancer [Create](#)

Overview Plans Usage Information + Support Ratings + Reviews

Azure load balancer is a layer 4 load balancer that distributes incoming traffic among healthy virtual machine instances. Load balancers uses a hash-based distribution algorithm. By default, it uses a 5-tuple (source IP, source port, destination IP, destination port, protocol type) hash to map traffic to available servers. Load balancers can either be internet-facing where it is accessible via public IP addresses, or internal where it is only accessible from a virtual network. Azure load balancers also support Network Address Translation (NAT) to route traffic between public and private IP addresses.

You can configure the load balancer to:

- Load balance incoming traffic across your virtual machines.
- Forward traffic to and from a specific virtual machine using NAT rules.

More products from Microsoft [See All](#)

Active Directory Health Check

AD Replication Status

Device Update for IoT Hub

Front Door and CDN profiles

[Give feedback](#)

4. Choose the subscription, resource group, and location for your load balancer.

5. Enter a name for your load balancer and select the type (e.g., "Public" or "Internal").

6. Click on "Create" to create the load balancer.

portal.azure.com/#create/MicrosoftLoadBalancer-ARM

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

Home > Create a resource > Marketplace > Load Balancer >

## Create load balancer

Validation passed

Basics Frontend IP configuration Backend pools Inbound rules Outbound rules Tags **Review + create**

**Basics**

Subscription	Pay-As-You-Go
Resource group	30_dayschallenge
Name	lb1
Region	East US
SKU	Standard
Tier	Regional
Type	Internal

**Frontend IP configuration**

Frontend IP configuration name	fip1
Frontend IP configuration address	Dynamic

**Backend pools**

Backend pool name	bpl1
-------------------	------

Create < Previous Next > Download a template for automation Give feedback

portal.azure.com/#@harshib2006gmail.onmicrosoft.com/resource/subscriptions/21b1c014-8356-4dca-ad53-ab5d71f790d7/resourcegroups/30\_dayschallenge/providers/Microsoft.N...

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

Home > MicrosoftLoadBalancer-20250211145534 | Overview >

## lb1

Load balancer

Search

Overview

- Activity log
- Access control (IAM)
- Tags
- Diagnose and solve problems
- Settings
- Monitoring
- Automation
- Help

Essentials

Resource group (move)	: 30_dayschallenge	Backend pool	: bpl1 (1 virtual machine)
Location	: East US	Load balancing rule	: -
Subscription (move)	: Pay-As-You-Go	Health probe	: -
Subscription ID	: 21b1c014-8356-4dca-ad53-ab5d71f790d7	NAT rules	: 0 inbound
SKU	: Standard	Tier	: Regional
Tags (edit)	: Add tags		

See more

JSON View

### 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 Balancer supports TCP/UDP-based protocols and protocols used for real-time voice and video messaging applications. [Learn more](#)

**Balance IPv4 and IPv6 addresses**

Native dual-stack endpoints help meet regulatory requirements and address the fast-growing number of devices in mobile and IoT. [Learn more](#)

[View frontend IP configuration](#)

**Build highly reliable applications**

Load Balancer improves application uptime by routing traffic to healthy nodes. [Learn more](#)

[View health probes](#)

**Secure your networks**

Control network traffic and protect private networks using built-in network address translation (NAT). [Learn more](#)

[View inbound NAT rules](#)

## Create a Backend Pool

1. In the Azure portal, navigate to the load balancer you created.
2. Click on "Backend pools" and then click on "Add".

3. Enter a name for the backend pool and select the virtual network.

4. Click on "Add" to create the backend pool.

The screenshot shows the 'Add backend pool' form in the Microsoft Azure portal. The form is titled 'Add backend pool' and includes the following fields and options:

- Name \***: A text input field with the placeholder 'Backend pool name'.
- Virtual network**: A dropdown menu showing 'vm1-vnet'.
- Backend Pool Configuration**: Two radio buttons, 'NIC' (selected) and 'IP address'.
- IP configurations**: A section with a description: 'IP configurations associated to virtual machines and virtual machine scale sets must be in same location as the load balancer and be in the same virtual network.' Below this is a table with columns: Resource Name, Resource group, Type, IP configuration, IP Address, and Availability set. The table is currently empty.

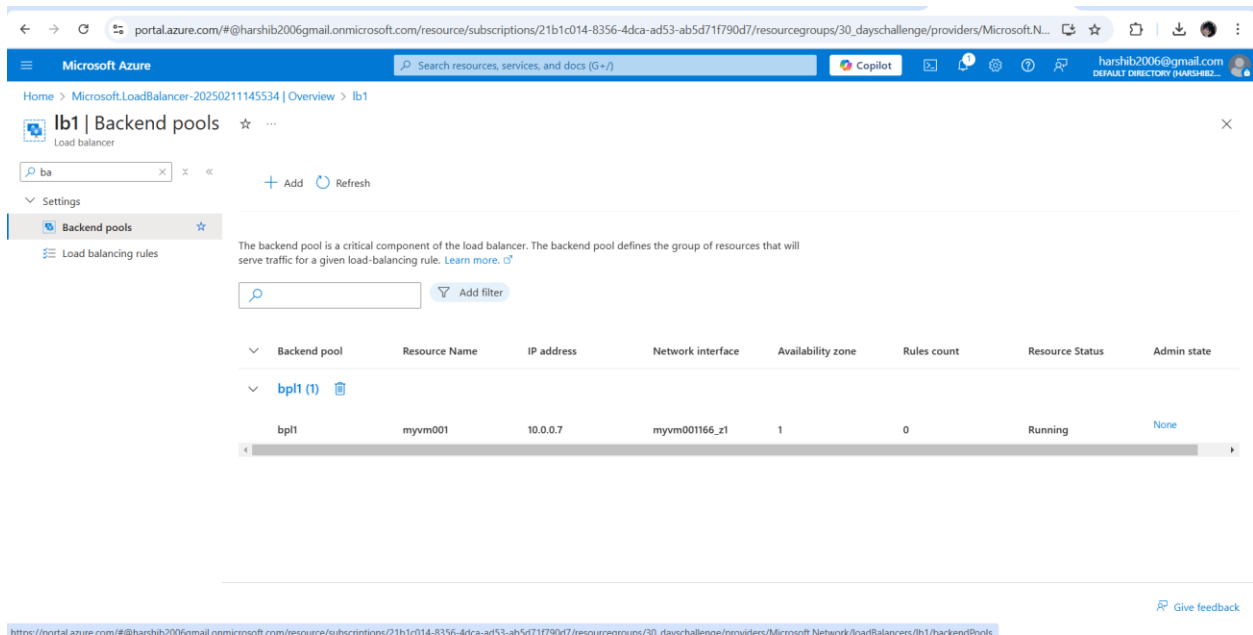
At the bottom of the form, there are buttons for 'Save', 'Cancel', and 'Give feedback'.

The screenshot shows the 'Create load balancer' form in the Microsoft Azure portal, specifically the 'Backend pools' tab. The form is titled 'Create load balancer' and includes the following elements:

- Navigation tabs**: 'Basics', 'Frontend IP configuration', 'Backend pools' (selected), 'Inbound rules', 'Outbound rules', 'Tags', and 'Review + create'.
- Description**: A paragraph explaining that a backend pool is a collection of resources to which the load balancer can send traffic, and it can contain virtual machines, virtual machine scale sets, and containers.
- Add a backend pool**: A button to add a new backend pool.
- Backend pools table**: A table with columns: Name, Virtual network, Resource Name, Network interface, IP address, Availability zone, and Admin state. The table contains one entry with the name 'bpl1'.
- Footer**: Buttons for 'Review + create', '< Previous', 'Next : Inbound rules >', and a link to 'Download a template for automation'.

## Add Virtual Machines to the Backend Pool

# 1. Navigate to the backend pool you created.



The screenshot shows the Microsoft Azure portal interface. The top navigation bar includes the 'Microsoft Azure' logo, a search bar, and a user profile. The main content area is titled 'lb1 | Backend pools' and includes a search bar with the text 'ba'. Below the search bar, there is a table of backend pools. The table has columns for 'Backend pool', 'Resource Name', 'IP address', 'Network interface', 'Availability zone', 'Rules count', 'Resource Status', and 'Admin state'. One backend pool is listed: 'bpl1' with resource name 'myvm001', IP address '10.0.0.7', network interface 'myvm001166\_z1', availability zone '1', rules count '0', and status 'Running'. The 'Admin state' is 'None'.

Backend pool	Resource Name	IP address	Network interface	Availability zone	Rules count	Resource Status	Admin state
bpl1 (1)	myvm001	10.0.0.7	myvm001166_z1	1	0	Running	None

## 2. Click on "Virtual machines" and then click on "Add".

## 3. Select the virtual machines you want to add to the backend pool.

## 4. Click on "Add" to add the virtual machines.



portal.azure.com/#view/Microsoft\_Azure\_Network/RegionalLBBackendPoolManagementView/loadBalancerId/%2Fsubscriptions%2F21b1c014-8356-4dca-ad53-ab5d71f790d7%2Fre...

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

Home > lb1 | Backend pools >

**bp11** ...

IP address

**IP configurations**

IP configurations associated to virtual machines and virtual machine scale sets must be in same location as the load balancer and be in the same virtual network.

+ Add | X Remove

Resource Name	Resource group	Type	IP configuration	IP Address	Availability set
myvm001	30_dayschallenge	Virtual machine	ipconfig1	10.0.0.7	-

**Used by**

The list of load balancing rules, inbound NAT rules, and outbound rules using this backend pool.

Name	Type
------	------

Save Cancel Give feedback

## Create a Health Probe

1. Navigate to the load balancer.
2. Click on "Health probes" and then click on "Add".

portal.azure.com/#@harshib2006gmail.onmicrosoft.com/resource/subscriptions/21b1c014-8356-4dca-ad53-ab5d71f790d7/resourcegroups/30\_dayschallenge/providers/Microsoft.N...

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

Home > lb1

**lb1 | Health probes** ☆ ...

Load balancer

hea + Add Refresh Give feedback

Overview

Settings

**Health probes** ☆

Properties

Monitoring

Diagnostic settings

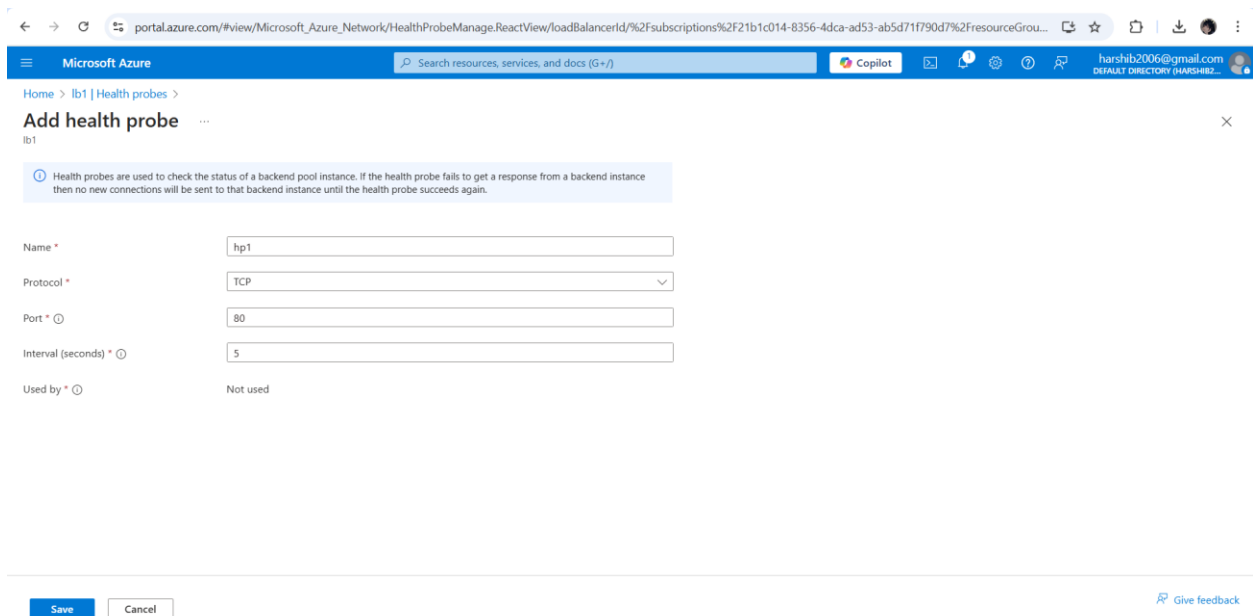
Help

Resource health

Type to start filtering ...

No results.

3. Enter a name for the health probe and select the protocol (e.g., "HTTP" or "TCP").
4. Configure the health probe settings (e.g., interval, timeout, and unhealthy threshold).
5. Click on "Add" to create the health probe.



The screenshot shows the 'Add health probe' form in the Microsoft Azure portal. The form is titled 'Add health probe' and is for a load balancer named 'lb1'. It includes a description: 'Health probes are used to check the status of a backend pool instance. If the health probe fails to get a response from a backend instance then no new connections will be sent to that backend instance until the health probe succeeds again.' The form fields are: Name (hp1), Protocol (TCP), Port (80), Interval (seconds) (5), and Used by (Not used). At the bottom, there are 'Save' and 'Cancel' buttons, and a 'Give feedback' link.

portal.azure.com/#view/Microsoft\_Azure\_Network/HealthProbeManage.ReactView/loadBalancerId/%2Fsubscriptions%2F21b1c014-8356-4dca-ad53-ab5d71f790d7%2FresourceGrou...

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

Home > lb1 | Health probes >

Add health probe ...

lb1

Health probes are used to check the status of a backend pool instance. If the health probe fails to get a response from a backend instance then no new connections will be sent to that backend instance until the health probe succeeds again.

Name \* hp1

Protocol \* TCP

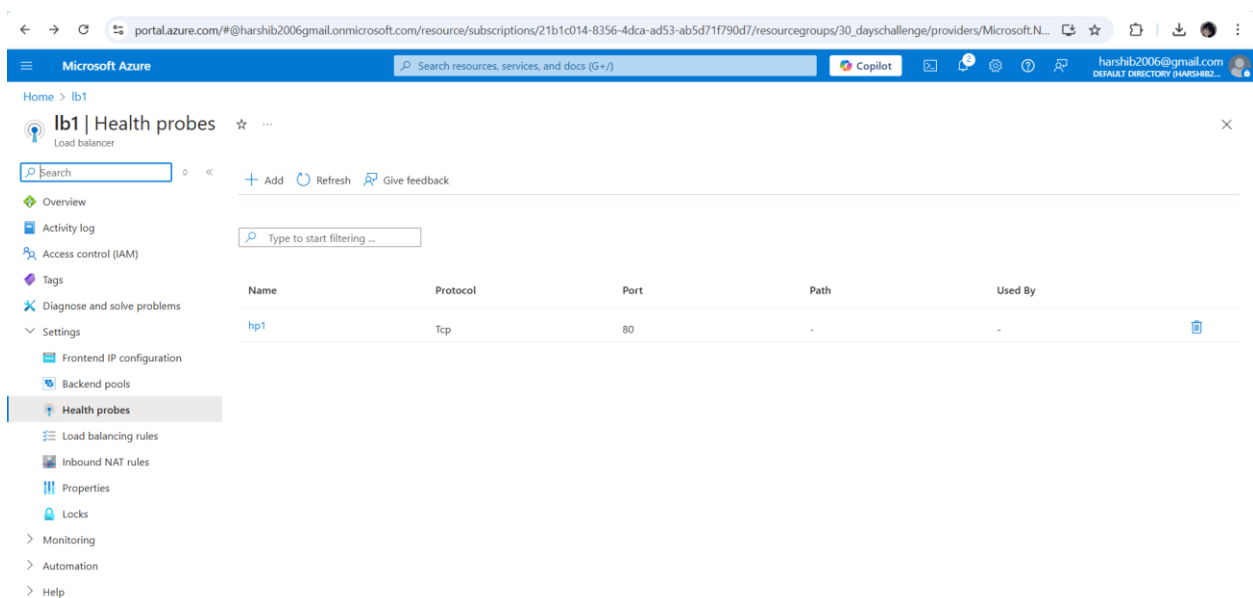
Port \* 80

Interval (seconds) \* 5

Used by \* Not used

Save Cancel

Give feedback



The screenshot shows the 'lb1 | Health probes' page in the Microsoft Azure portal. The page title is 'lb1 | Health probes' and it is for a load balancer named 'lb1'. It includes a search bar, a list of actions (Add, Refresh, Give feedback), and a table of health probes. The table has columns: Name, Protocol, Port, Path, and Used By. There is one health probe named 'hp1' with Protocol 'Tcp', Port '80', Path '-', and Used By '-'. The left sidebar shows the navigation menu with 'Health probes' selected.

portal.azure.com/#@harshib2006gmail.onmicrosoft.com/resource/subscriptions/21b1c014-8356-4dca-ad53-ab5d71f790d7/resourcegroups/30\_dayschallenge/providers/Microsoft.N...

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

Home > lb1

lb1 | Health probes ☆ ...

Load balancer

Search

+ Add Refresh Give feedback

Overview

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Access control (IAM)

Tags

Diagnose and solve problems

Settings

Frontend IP configuration

Backend pools

Health probes

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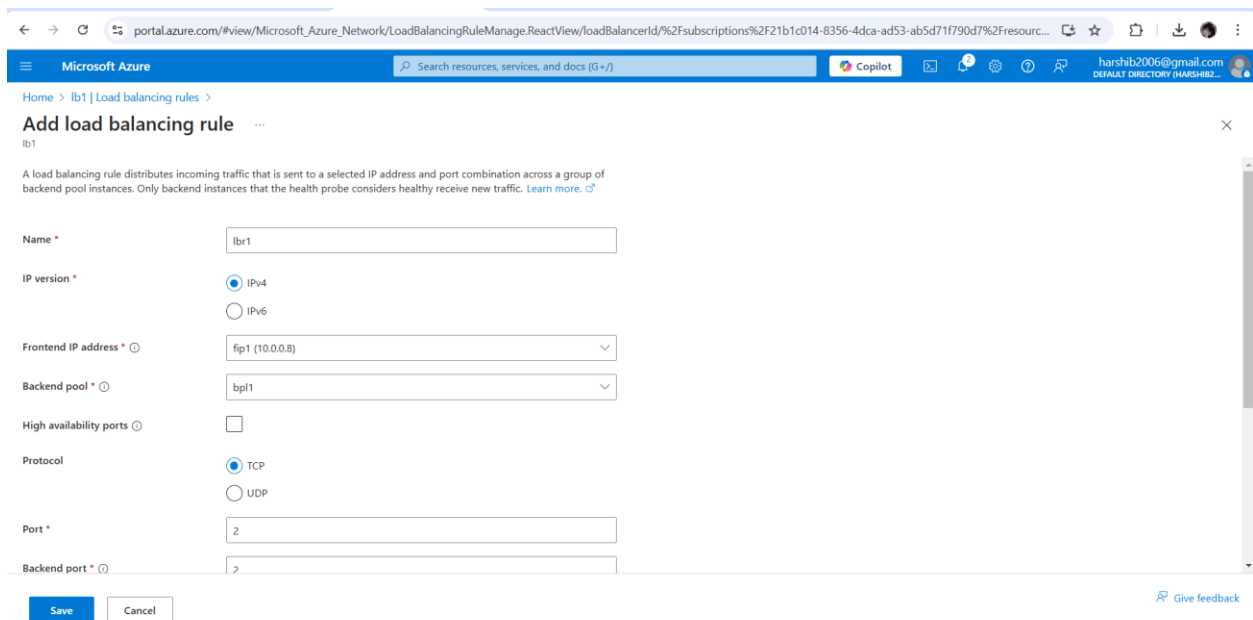
Automation

Help

Name	Protocol	Port	Path	Used By
hp1	Tcp	80	-	-

## Create a Load Balancing Rule

1. Navigate to the load balancer.
2. Click on "Load balancing rules" and then click on "Add".



The screenshot shows the Microsoft Azure portal interface for adding a new load balancing rule. The breadcrumb navigation indicates the path: Home > lb1 | Load balancing rules > Add load balancing rule. The form is titled 'Add load balancing rule' and includes a sub-header 'lb1'. A descriptive text states: 'A load balancing rule distributes incoming traffic that is sent to a selected IP address and port combination across a group of backend pool instances. Only backend instances that the health probe considers healthy receive new traffic. [Learn more.](#)'

The form fields are as follows:

- Name \***: A text input field containing 'lbr1'.
- IP version \***: Radio buttons for 'IPv4' (selected) and 'IPv6'.
- Frontend IP address \***: A dropdown menu showing 'fip1 (10.0.0.8)'.
- Backend pool \***: A dropdown menu showing 'bpl1'.
- High availability ports**: An unchecked checkbox.
- Protocol**: Radio buttons for 'TCP' (selected) and 'UDP'.
- Port \***: A text input field containing '2'.
- Backend port \***: A text input field containing '2'.

At the bottom of the form, there are 'Save' and 'Cancel' buttons. A 'Give feedback' link is located in the bottom right corner.

3. Enter a name for the load balancing rule and select the frontend IP configuration.
4. Select the backend pool and health probe.
5. Configure the load balancing rule settings (e.g., protocol, port, and session persistence).
6. Click on "Add" to create the load balancing rule.

Microsoft Azure portal interface showing the "Load balancing rules" page for a load balancer named "lb1". The page displays a table with one rule, "lbr1", configured with TCP/2 protocol, backend pool "bpl1", and health probe "hp1". A notification banner at the top right states "Saved load balancer rule" and "Successfully saved load balancer rule 'lbr1'".

Name	Protocol	Backend pool	Health probe	Health status
lbr1	TCP/2	bpl1	hp1	<a href="#">View details</a>

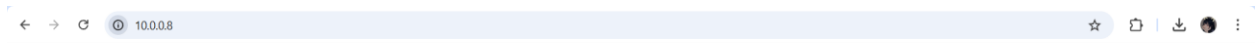
## Test the Load Balancer

1. Navigate to the load balancer.
2. Click on "Frontend IP configuration" and note the public IP address.

Microsoft Azure portal interface showing the "Frontend IP configuration" page for the load balancer "lb1". The page displays a table with one configuration, "fip1", assigned the public IP address "10.0.0.8".

Name	IP address	Rules count
fip1	10.0.0.8	1

3. Open a web browser and navigate to the public IP address.



4. Verify that the load balancer is distributing traffic across the virtual machines.

That's it! You have now set up a load balancer in Azure to distribute traffic across multiple virtual machines hosting your web application.

## ***OUTCOME***

After successfully setting up the load balancer, your web application will:

- Distribute traffic effectively, reducing load on individual VMs.
- Improve uptime and fault tolerance.
- Enhance user experience with better response times.
- Be more resilient against traffic spikes and failures.

By leveraging cloud-based load balancing, businesses can ensure a seamless, scalable, and highly available web application infrastructure.

