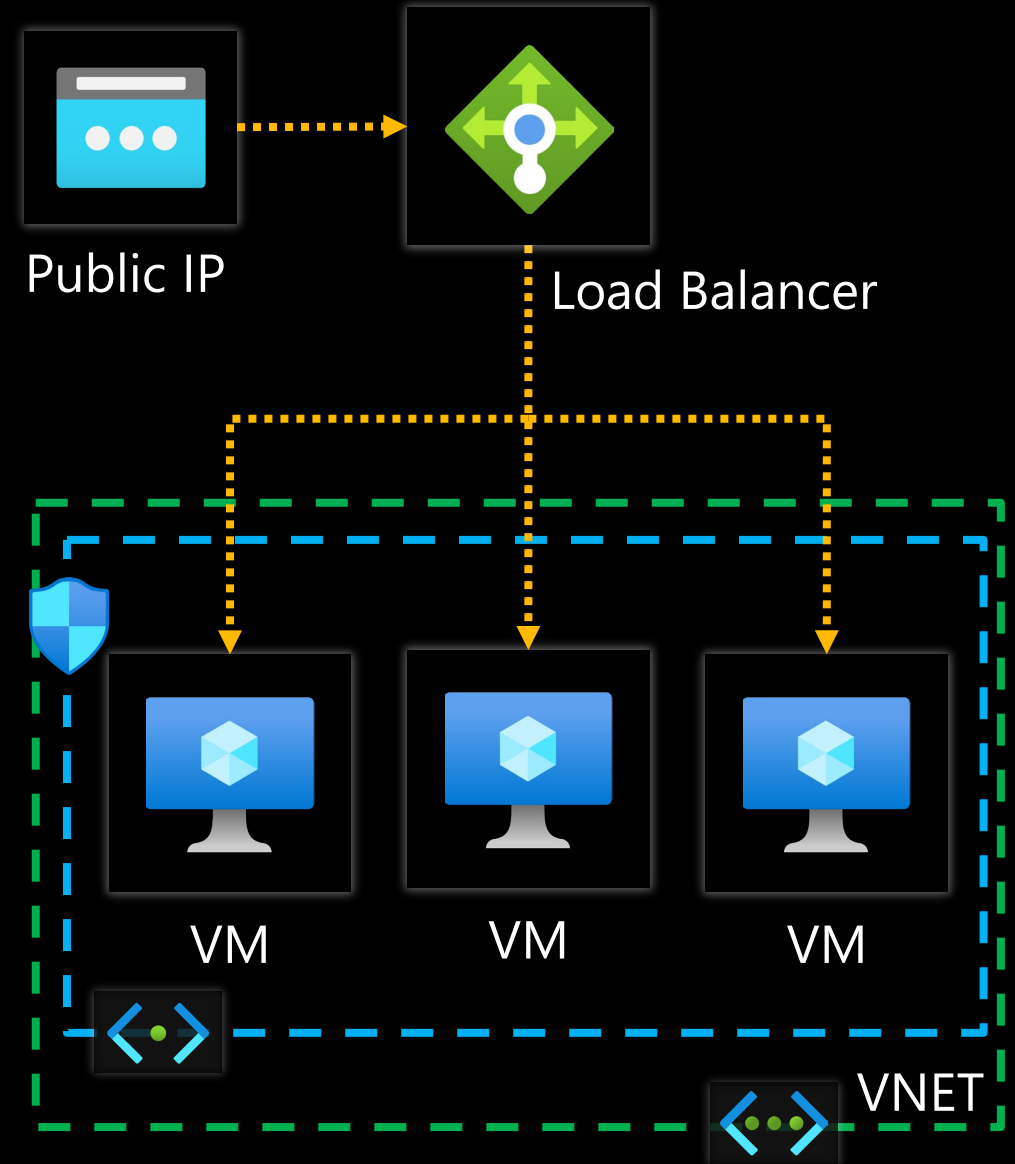
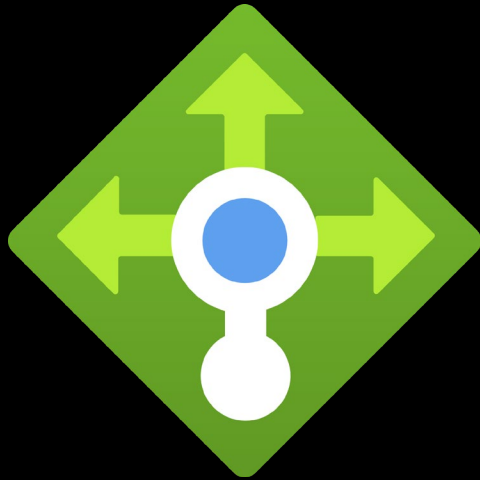


# Azure Load Balancer



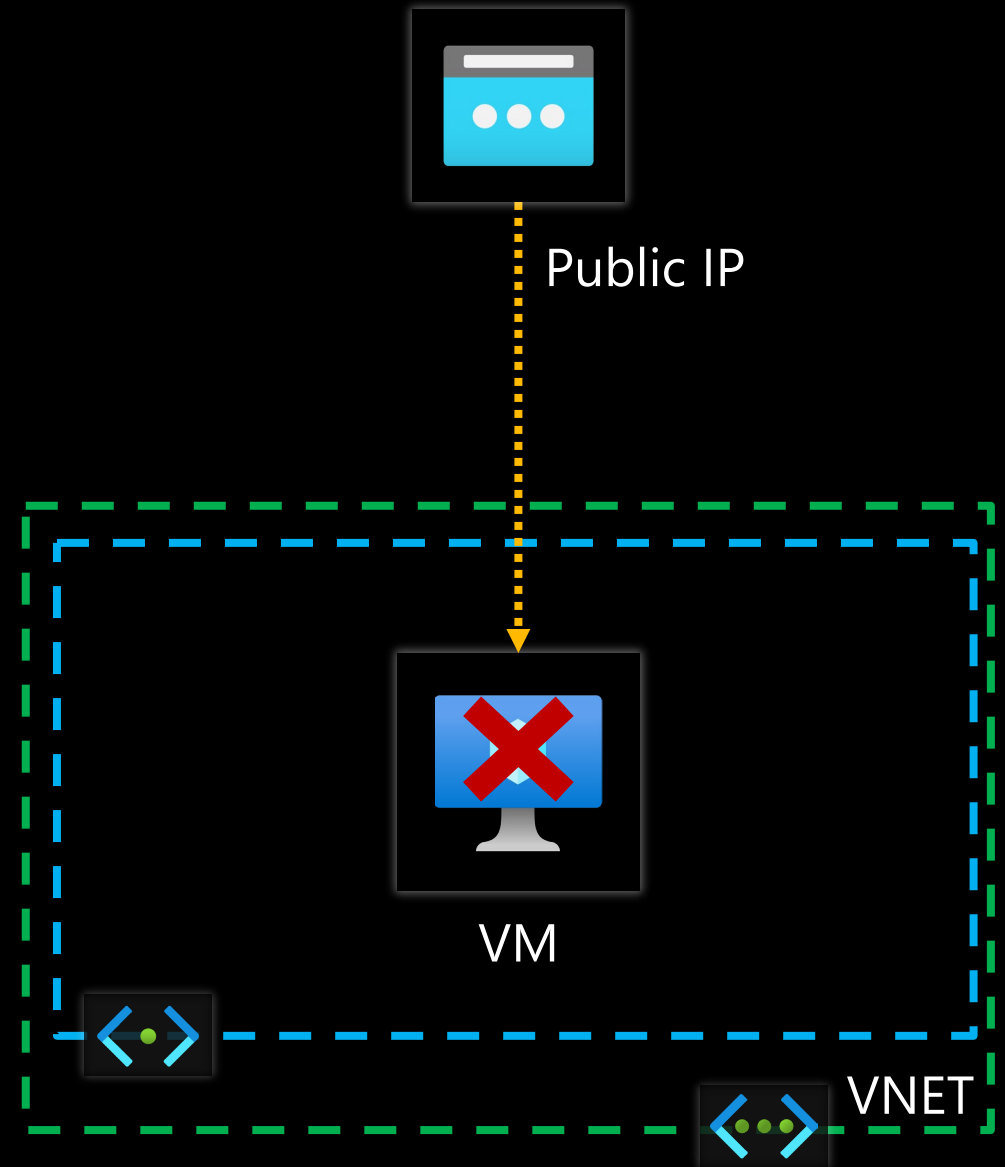
# SPOF issue

The VM is **Single Point of Failure** (SPOF).

VM down means application unavailable.

## Load Balancing Services

- Application Gateway
- Front Door and CDN profiles
- Load Balancer
- Traffic Manager

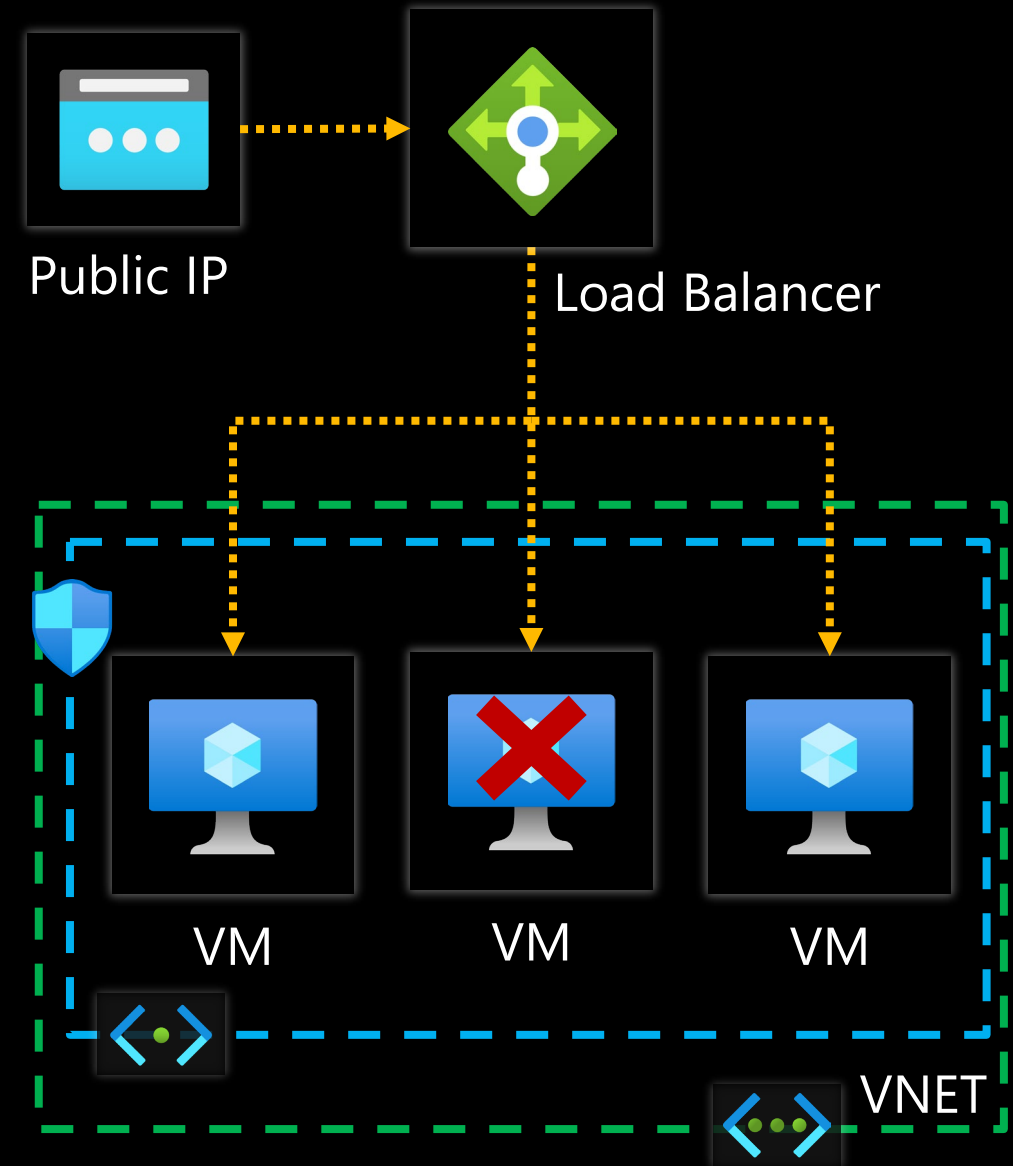


# Azure Load Balancer

The VM is **Single Point of Failure** (SPOF).

What if you can add more VMs ?  
High availability and resiliency.

1 or 2 VMs down, application is **still available**.



# Azure Load Balancer

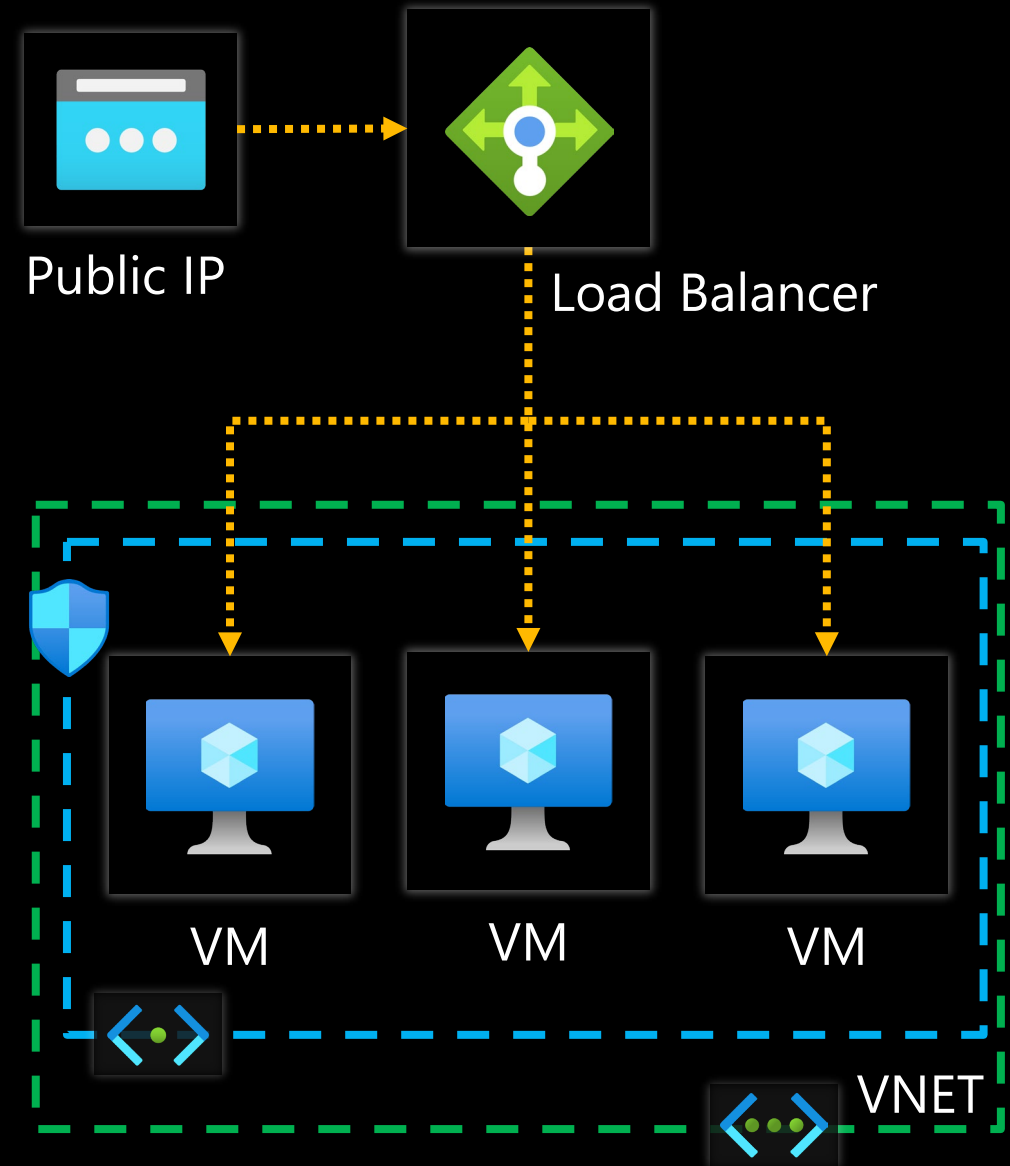
**Distributes** traffic across a group of resources like VMs or VMSS.

Operates at **Layer 4** and uses the 5 tuple:

- source IP address & source port
- destination IP address & destination port
- protocol

Traffic is denied by default with respect to **Zero Trust network access**.

Allowed by using **NSG and Outbound Rules**.



# Azure Load Balancer & availability zones

Standard (not Basic) Load Balancer supports availability zones.

Availability zone \* ⓘ

Zone-redundant ▼

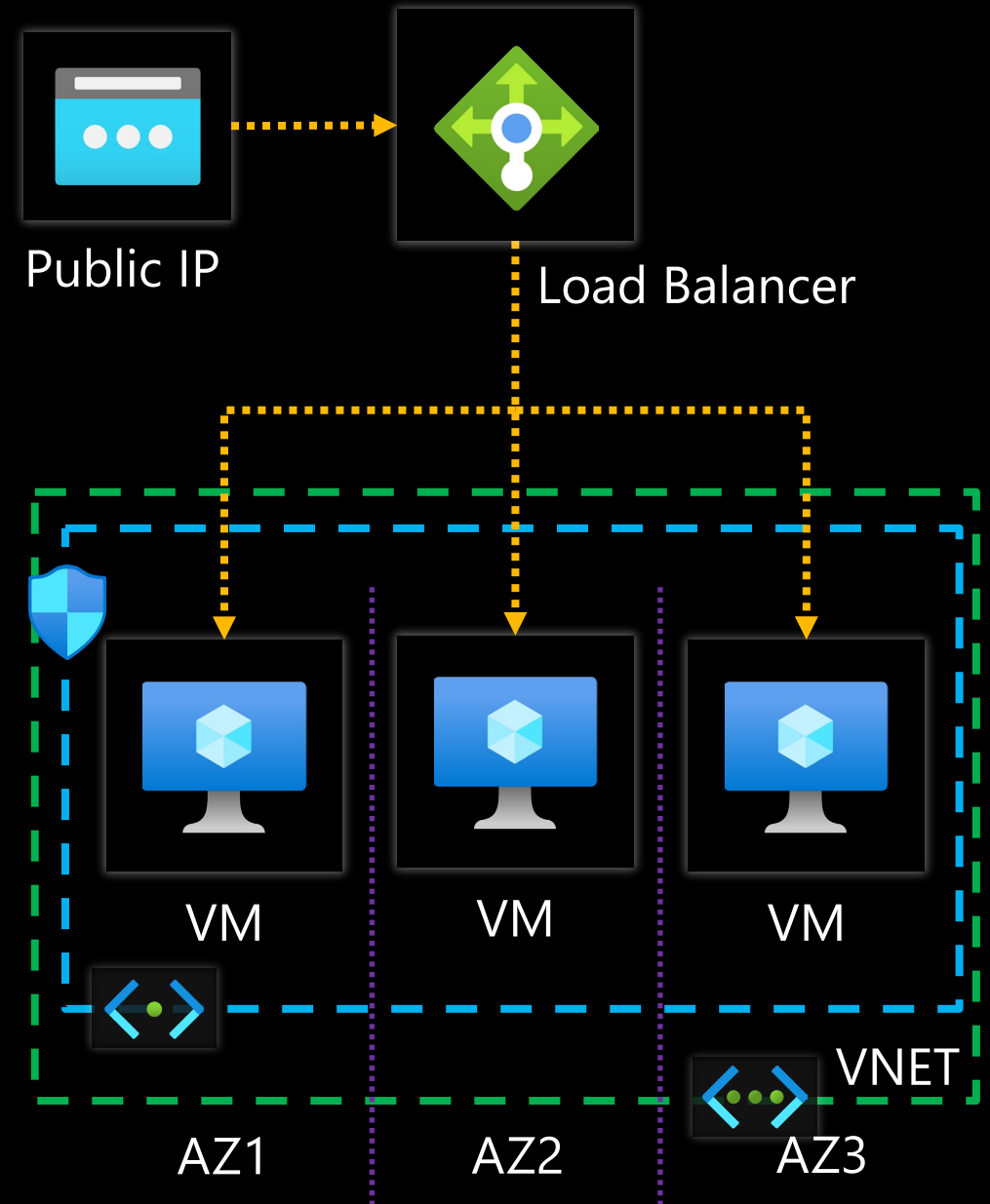
No Zone

Zone-redundant

2

1

3



# Azure Load Balancer SKU

	Basic	Standard
<b>Backend type</b>	NIC based	NIC based, IP based
<b>Health probes</b>	TCP, HTTP	TCP, HTTP, HTTPS
<b>Availability zones</b>	Not available	Zone-redundant
<b>NAT Gateway</b>	Not supported	Supported
<b>Private Link</b>	Not supported	Supported
<b>SLA</b>	Not available	99.99 %
<b>Secure by default</b>	Open by default. Network security group optional.	Closed to inbound flows unless allowed by an NSG. Internal traffic from the VNET to the internal load balancer is allowed.

[learn.microsoft.com/en-us/azure/load-balancer/skus](https://learn.microsoft.com/en-us/azure/load-balancer/skus)

# Azure Load Balancer - pricing

[azure.microsoft.com/en-us/pricing/details/load-balancer](https://azure.microsoft.com/en-us/pricing/details/load-balancer)

## Standard Load Balancer

### Regional Tier Price

### Global Tier Price

First 5 rules

**\$0.025**/hour

**\$0.025**/hour

Additional rules

**\$0.01**/rule/hour

**\$0.01**/rule/hour

Inbound NAT rules

Free

Free

Data processed (GB)

**\$0.005** per GB

No additional charge\*

# Creating Azure Load Balancer

Should specify:

- Name & RG
- Region
- SKU
- Type
- Tier

## Create load balancer

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

### Project details

Subscription \* Microsoft-Azure-T

Resource group \* (New) rg-lb  
[Create new](#)

### Instance details

Name \* public-loadbalancer ✓

Region \* West Europe ✓

SKU \* ⓘ  
☒ Standard  
☐ Gateway  
☐ Basic

Type \* ⓘ  
☒ Public  
☐ Internal

Tier \*  
☒ Regional  
☐ Global



# Creating Load Balancer and Public IP

Public Load Balancer needs **Public IP address**.

PIP will be used for frontend configuration.

Home > Load balancing | Load Balancer >

Create load balancer ...

Basics

Frontend IP configuration

Backend pools

Inbound

A frontend IP configuration is an IP address used for inbound and/or outbound NAT, and outbound rules.

+ Add a frontend IP configuration

Name ↑↓

IP address

Add a frontend IP to get started

✖

At least 1 frontend IP needs to be added for creating a Load Balancer

Review + create

< Previous

Next : Backend pools >

Add frontend IP configuration ✕

Name \*

frontend-ip-config ✓

IP version

☒ IPv4 ☐ IPv6

IP type

☒ IP address ☐ IP prefix

Public IP address \*

(New) pip-fontend-loadbalancer ✓

Create new


Gateway Load balancer ⓘ

None ✓

Add

# Configuring Load Balancer Frontend IP

Can use **one or multiple frontend IPs** to get incoming network traffic.

 **load-balancer-app** | Frontend IP configuration

Load balancer

Search

Settings

Frontend IP configuration

Backend pools

Health probes

Load balancing rules

Inbound NAT rules

Outbound rules

+ Add

↺ Refresh


🗨 Give feedback

Filter by name...

Name ↑↓	IP address ↑↓	Rules count ↑↓
<a href="#">pip</a>	20.4.171.94 (pip-loadbalancer)	2

# Configuring Load Balancer Backend Pool

The group of virtual machines or instances in a virtual machine scale set that is serving the incoming request.



load-balancer-app | Backend pools

☆

...

Load balancer

Search

«

+ Add

↻ Refresh

Settings

Frontend IP configuration

Backend pools

Health probes

Load balancing rules

Inbound NAT rules

Outbound rules

Properties

Backend pool

Resource Name

IP address


Network...

Availability zone

Rules count

Resource Status

backend-pool (3)



backend-pool

vmss-app (instance 0)

10.0.0.4

nic-vmss

2

2

Running

backend-pool

vmss-app (instance 4)

10.0.0.8

nic-vmss

3

2

Running

backend-pool

vmss-app (instance 5)

10.0.0.9

nic-vmss

1

2

Running

# Configuring Load Balancer Backend Pool

Backend Pool could be added by using:

- Network Interface Card (NIC)
- IP address

NIC is recommended.

Add backend pool

load-balancer-app

Name \*

Backend pool name

Virtual network ⓘ

vnet-app

Backend Pool Configuration

☒ NIC

☐ 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

|


✕ Remove

Resourc...	Resourc...	Type	IP confi...	IP Addr...	Availab
------------	------------	------	-------------	------------	---------

# Configuring Load Balancer Health probe

Health probe determines if an **instance is healthy** and **can receive traffic**.

Supports **TCP, HTTP, and HTTPS**.

 **load-balancer-app** | Health probes ☆ ...  
Load balancer

Search

Settings

- Frontend IP configuration
- Backend pools
- Health probes**
- Load balancing rules
- Inbound NAT rules
- Outbound rules

+ Add ↻ Refresh 👤 Give feedback

Type to start filtering ...

Name	Protocol	Port	Path	Used By
probe-http	Http	80	/	lb-rule

## Add health probe ...

load-balancer-app

Name \*

health-probe

Protocol \*

TCP

Port \* ⓘ

80

Interval (seconds) \* ⓘ

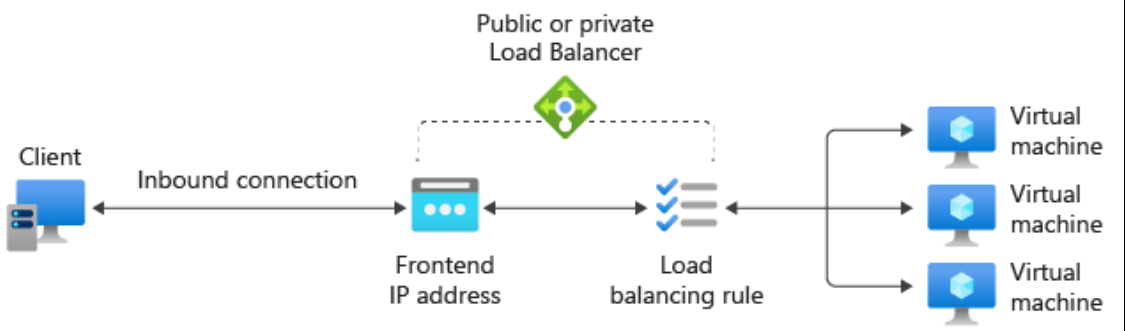
5

Used by \* ⓘ

Not used

# Configuring Load Balancer Rules

Rule defines how incoming traffic is distributed to all the instances within the backend pool.



## Add load balancing rule

load-balancer-app

Name \*

lb-rule-01

IP Version \*

☒ IPv4

☐ IPv6

Frontend IP address \* ⓘ

pip (20.4.171.94) ▼

Backend pool \* ⓘ

backend-pool ▼

Protocol

☒ TCP

☐ UDP

Port \*

80

Backend port \* ⓘ

80

Health probe \* ⓘ

probe-http (HTTP:80) ▼

[Create new](#)

Session persistence ⓘ

None ▼

Idle timeout (minutes) \* ⓘ

4

Enable TCP Reset

☐

Enable Floating IP ⓘ

☐

Outbound source network address translation (SNAT) ⓘ

☒ (Recommended) Use outbound rules to provide backend pool members access to the internet. [Learn more.](#) ↗

☐ Use default port allocation to provide backend pool members with a minimal set of SNAT ports. This is not recommended because it can cause SNAT port exhaustion. [Learn more.](#) ↗

## load-balancer-app | Load balancing rules

Search

### Settings

Frontend IP configuration

Backend pools

Health probes

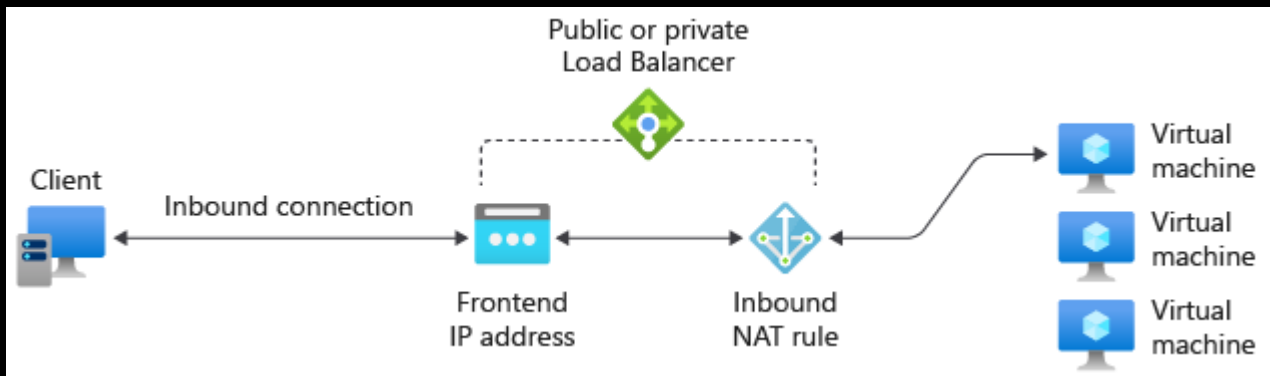
Load balancing rules

[Add](#) [Refresh](#) [Delete](#)

<input type="radio"/>	Name ↑↓	Protocol ↑↓	Backend pool ↑↓	Health probe ↑↓
<input type="radio"/>	lb-rule	TCP/80	backend-pool	probe-http

# Load Balancer Inbound NAT Rules

An inbound NAT rule **forwards incoming traffic** to a specific virtual machine.



## Add inbound NAT rule

load-balancer-app

Name \*

inbound-nat-rule-rdp ✓

Type ⓘ

- ☐ Azure virtual machine  
☒ Backend pool

Target backend pool

backend-pool ✓

Frontend IP address \* ⓘ

pip (20.4.171.94) ✓

Frontend port range start \* ⓘ

8080 ✓

Current number of machines in backend pool

3

Maximum number of machines in backend pool \* ⓘ

150 ✓

Backend port \*

3389 ✓

Protocol

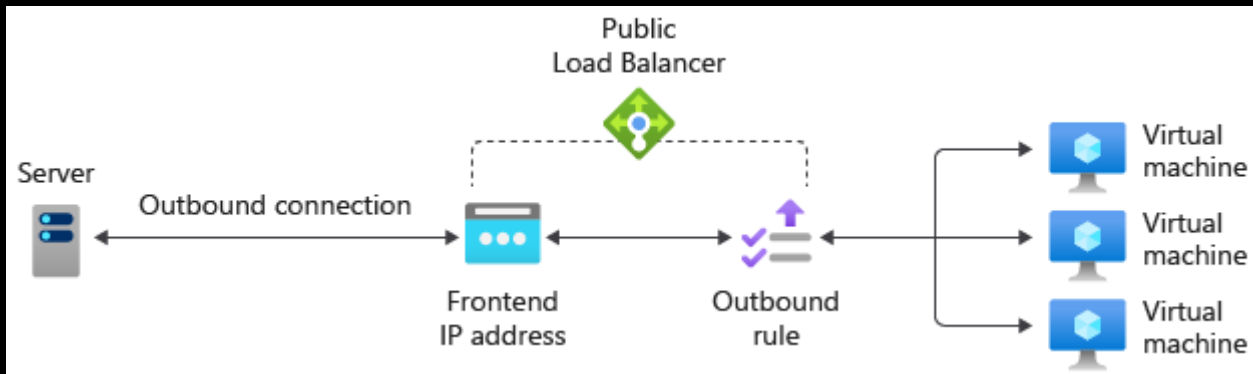
- ☐ TCP  
☒ UDP

Enable Floating IP ⓘ

☐

# Load Balancer Outbound Rules

Outbound **traffic is disabled** by default.  
Configures **outbound Network Address Translation (NAT)** for all VMs in the backend pool.  
Enables instances in the backend to communicate (outbound) to **the internet or other endpoints**.  
Can reuse the same Public IP for inbound and outbound.



load-balancer-app | Outbound rules

Load balancer

Search

+ Add Refresh Give feedback

Name	Frontend	Backend	Protocols	Ports Per Instance
OutboundRule	pip	backend-pool (3 insta...	All	1024

### OutboundRule

load-balancer-app

Name OutboundRule

IP Version \* ☒ IPv4 ☐ IPv6

Frontend IP address \* ⓘ 1 selected

Protocol ☒ All ☐ TCP ☐ UDP

Idle timeout (minutes) ⓘ  Max: 100

TCP Reset ⓘ ☐ Enabled ☒ Disabled

Backend pool \* ⓘ backend-pool (3 instances)

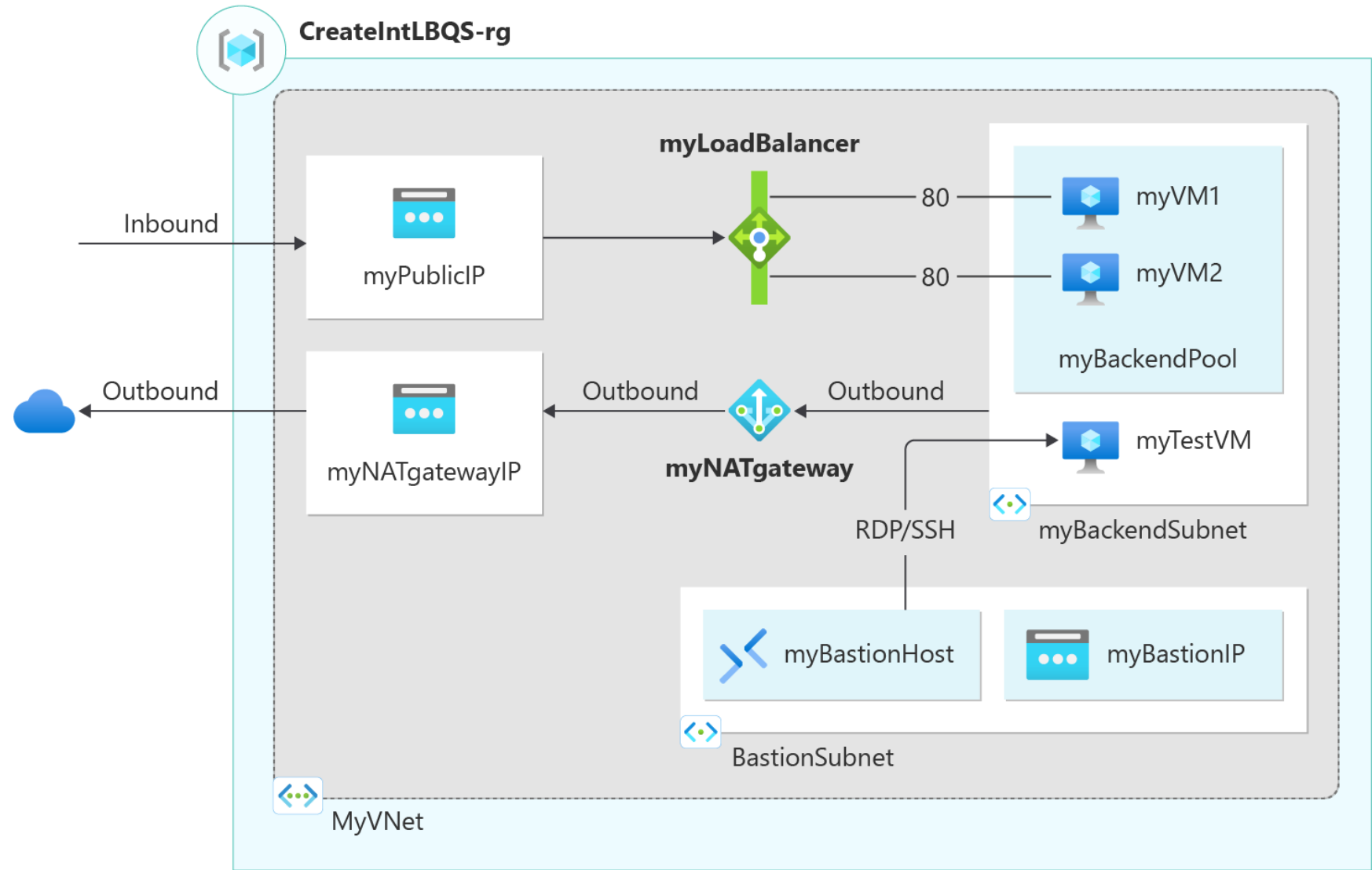
Port allocation ⓘ Manually choose number of outbound ports

Outbound ports Choose by \* Select how to choose ports

Available frontend ports 63992



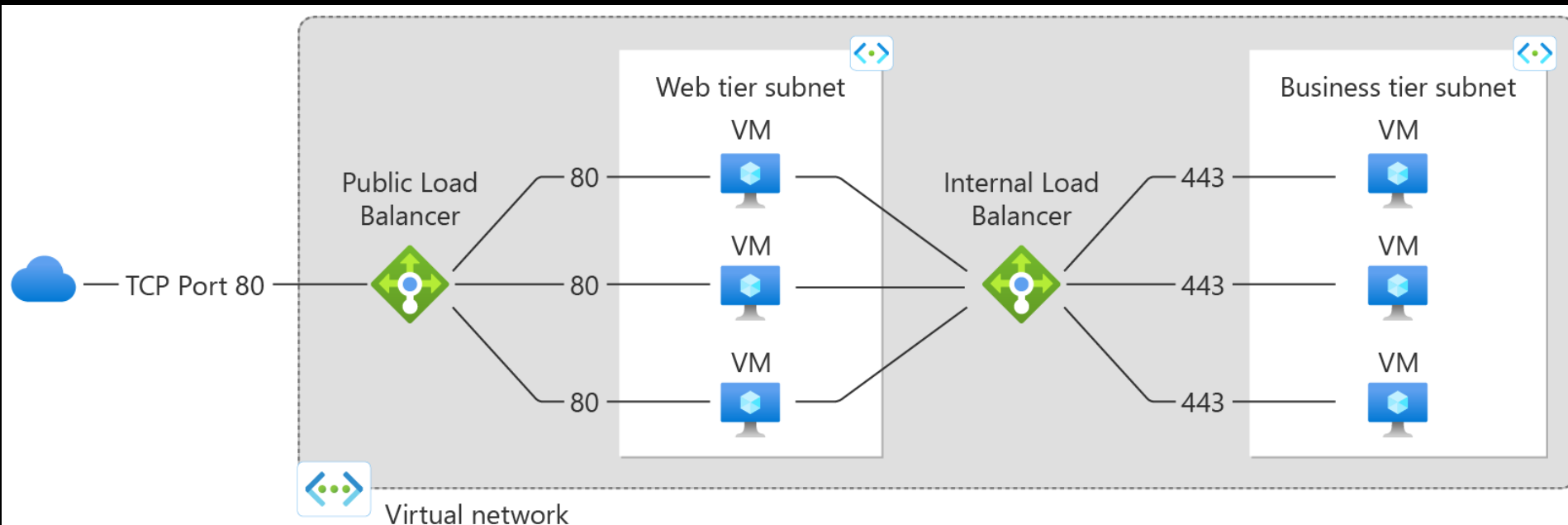
# Azure Public Load Balancer



# Public and internal Load Balancer

Public Load Balancers are used to load balance internet traffic to your VMs. They have a **public IP address(es)**.

Internal load balancers are used to load balance traffic inside a virtual network. They have a **private IP address within a subnet**.



Type \* ⓘ  
○ Public  
● Internal

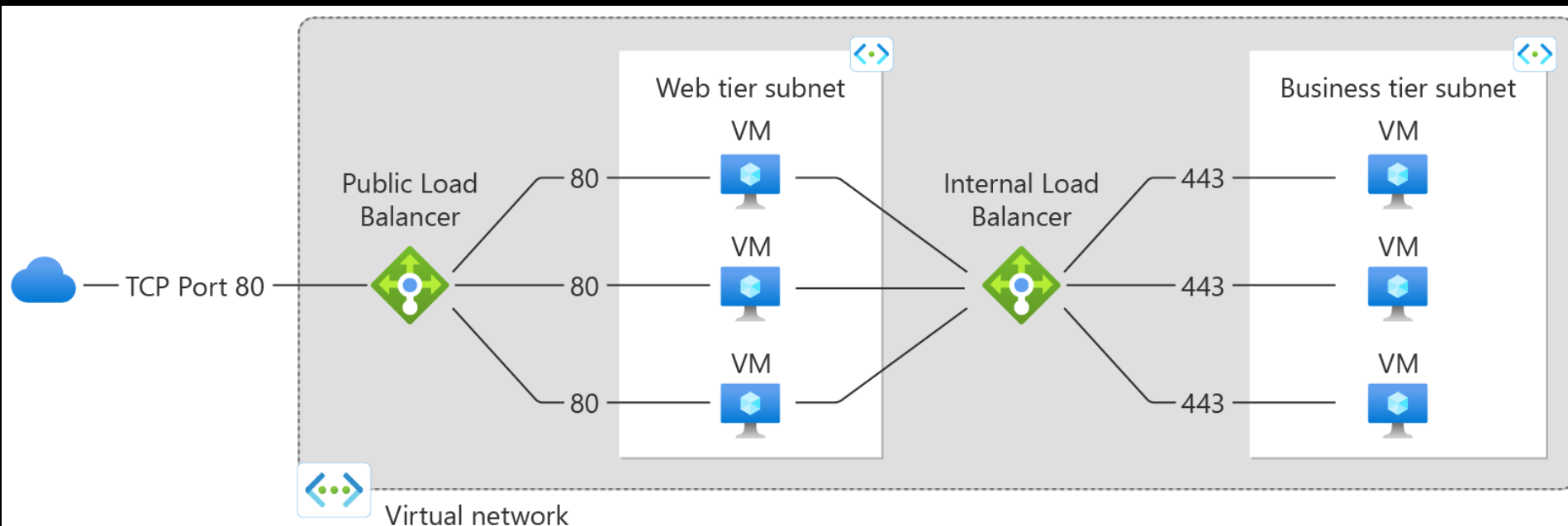
# Internal (private) Load Balancer (ILB)

Exposed with private IP address within the virtual network. Doesn't use Public IP.

It couldn't provide outbound access to its backend resources.

=> Need to use **Nat Gateway**.

Could be accessed by resources within the **same or peered network and on-premises**.



# Azure Internal Load Balancer

