

Deploy and Test Azure Load Balancer: Boosting Application Performance and Availability.

Cloud series Part 6

➤ Azure Load Balancer:

Azure Load balancer is a cloud service that distributes incoming network traffic across backend virtual machines (VMs) or virtual machine scale sets (VMSS). This helps you to decide if it fits your organization's load balancing needs for scalable and highly available workloads. This is one of the services that make up the Load balancing and content delivery category in Azure. It operates at **layer 4** of the **open systems interconnection (OSI) model**. It's the single point of contact for clients. The service distributes inbound flows that arrive at the load balancer's frontend to backend pool instances. These flows are distributed according to configured load-balancing rules and health probes.

➤ Types of Azure Load Balancer

- Internal Load balancer.
- Public Load Balancer.

Let set the stage:

➤ Sign in to Microsoft Azure Portal

- On your browser key in to <https://portal.azure.com>
 - Log in with your Microsoft or Azure Active Directory account.
- Search bar has been provided to make the work easier for you: just input what you want to do. (e.g. NSG, Load-balancer, Availability set, and virtual machine, etc.)

Let begin by creating:

➤ Availability set:

- Search for **Availability Set** → **Create**.
- **Fill in the details**
 - ✓ Subscription
 - ✓ Resource group name
 - ✓ Instance details → Name → Region

The screenshot shows the 'Create availability set' page in the Microsoft Azure portal. The page has a blue header with the Microsoft Azure logo and a search bar. Below the header, there's a breadcrumb trail: 'Home > Availability sets > Compare Availability Set and Virtual Machine Scale Set >'. The main title is 'Create availability set'. Below the title, there's a blue box with a message: 'Enjoy more features at the same price with a VM Scale Set (VMSS). While availability sets offer high availability only, a flexible VMSS provides automatic scaling, optimization, and recovery, along with simple, central group management for up to 2,000 VMs-at no added cost. Pay only for capacity you use, while mixing VM sizes, zones, and fault domains. [Click to learn more]'. Below this, there's a paragraph explaining what an Availability Set is. The 'Project details' section is visible, showing the following information: Subscription: 'AI and Training ABCOFCLOUD', Resource group: 'Ernest-RG', and Instance details: 'Ernest-AVset'. The 'Next: Advanced' button is highlighted.

Home > Availability sets > Compare Availability Set and Virtual Machine Scale Set >

Create availability set

Enjoy more features at the same price with a VM Scale Set (VMSS). While availability sets offer high availability only, a flexible VMSS provides automatic scaling, optimization, and recovery, along with simple, central group management for up to 2,000 VMs-at no added cost. Pay only for capacity you use, while mixing VM sizes, zones, and fault domains. [Click to learn more](#)

Subscription *

Resource group *

Instance details

Name *

Region *

Fault domains

Update domains

Use managed disks ☐ ☒

[Review + create](#) [< Previous](#) [Next : Advanced >](#)

- Setting **aligned to Yes** means the virtual machines in availability set will be aligned with the underlying **fault domains** and **update domains**.

Home > Availability sets > Compare Availability Set and Virtual Machine Scale Set >

Create availability set

Enjoy more features at the same price with a VM Scale Set (VMSS). While availability sets offer high availability only, a flexible VMSS provides automatic scaling, optimization, and recovery, along with simple, central group management for up to 2,000 VMs-at no added cost. Pay only for capacity you use, while mixing VM sizes, zones, and fault domains. [Click to learn more](#)

Basics **Advanced** Tags Review + create

Proximity placement group

Proximity placement groups allow you to group Azure resources physically closer together in the same region. [Learn more about proximity placement groups](#)

Proximity placement group

[Review + create](#) [< Previous](#) [Next : Tags >](#)

Home > Availability sets > Compare Availability Set and Virtual Machine Scale Set >

Create availability set

Validation passed

Basics Advanced Tags **Review + create**

Basics

Subscription	AI and Training ABCOFCLOUD
Resource group	Ernest-RG
Region	East US
Name	Ernest-AV/set
Fault domain count	2
Update domain count	5
Use managed disks	Yes (Aligned)

Advanced

Proximity placement group	None
---------------------------	------

Create < Previous Next > Download a template for automation

- Pass all validation and click **create** to deploy it.

➤ Virtual Machines:

- Search for **Virtual Machine** → **Create**
- **Fill in the details:**
 - ✓ Subscription → Resource group → Instance details (**Do well to set in the availability set you created**)

Home > Compute infrastructure | Virtual machines >

Create a virtual machine

Basics Disks Networking Management Monitoring Advanced Tags Review + create

Create a virtual machine that runs Linux or Windows. Select an image from Azure marketplace or use your own customized image. Complete the Basics tab then Review + create to provision a virtual machine with default parameters or review each tab for full customization. [Learn more](#)

Project details

Select the subscription to manage deployed resources and costs. Use resource groups like folders to organize and manage all your resources.

Subscription * AI and Training ABCOFCLOUD

Resource group * Ernest-RG

Instance details

Virtual machine name * Ernest-LBVM1

Region * (US) East US

Availability options * Availability set

< Previous **Next: Disks >** Review + create Give feedback

- ✓ Set your size → image
- ✓ Set username and password
- ✓ Set your virtual network → Subnet

Create a virtual machine - Microsoft Azure

Home > Compute infrastructure | Virtual machines

Create a virtual machine

manage, configure and scale load balanced virtual machines. [Create as VMSS](#)

Availability set * [Create new](#)

Security type [Configure security features](#)

Image * [See all images](#) | [Configure VM generation](#)

VM architecture ☐ Arm64 ☒ x64
Arm64 is not supported with the selected image.

Run with Azure Spot discount ☐

Size * [See all sizes](#)

Enable Hibernation ☐ Hibernate does not currently support Availability Sets. [Learn more](#)

[< Previous](#) [Next : Disks >](#) [Review + create](#) [Give feedback](#)

Create a virtual machine - Microsoft Azure

Home > Compute infrastructure | Virtual machines

Create a virtual machine

Administrator account

Username * ✓

Password * ✓

Confirm password * ✓

Inbound port rules

Select which virtual machine network ports are accessible from the public internet. You can specify more limited or granular network access on the Networking tab.

Public inbound ports * ☐ None ☒ Allow selected ports

Select inbound ports *

⚠ This will allow all IP addresses to access your virtual machine. This is only recommended for testing. Use the Advanced controls in the Networking tab to create rules to limit inbound traffic to known IP addresses.

[< Previous](#) [Next : Disks >](#) [Review + create](#) [Give feedback](#)

Create a virtual machine - Microsoft Azure

Home > Compute infrastructure | Virtual machines

Create a virtual machine

Virtual network * [Create new](#)

Subnet * [Manage subnet configuration](#)

Public IP [Create new](#)

NIC network security group ☒ None ☐ Basic ☐ Advanced

⚠ All ports on this virtual machine may be exposed to the public internet. This is a security risk. Use a network security group to limit public access to specific ports. You can also select a subnet that already has network security groups defined or remove the public IP address.

Delete public IP and NIC when VM is deleted ☐

[< Previous](#) [Next : Management >](#) [Review + create](#) [Give feedback](#)

Home > Compute infrastructure | Virtual machines >

Create a virtual machine

Validation passed

1 X Standard D2s v3 by Microsoft
[Terms of use](#) | [Privacy policy](#)

Subscription credits apply ⓘ
0.1880 USD/hr
[Pricing for other VM sizes](#)

TERMS

By clicking "Create", I (a) agree to the legal terms and privacy statement(s) associated with the Marketplace offering(s) listed above; (b) authorize Microsoft to bill my current payment method for the fees associated with the offering(s), with the same billing frequency as my Azure subscription; and (c) agree that Microsoft may share my contact, usage and transactional information with the provider(s) of the offering(s) for support, billing and other transactional activities. Microsoft does not provide rights for third-party offerings. See the [Azure Marketplace Terms](#) for additional details.

Basics

Subscription: AI and Training ABCOFCLOUD
Resource group: Ernest-RG

[< Previous](#) [Next >](#) **Create**

[Download a template for automation](#) [Give feedback](#)

- Pass all validation and click **create**
- **Network Security Group (NSG)**
- Search for **NSG**→ **create**
 - Allow **inbound rules** for port 3389 (RDP) from your IP address (**low priority**).
 - Allow inbound rule for **port 80**.
 - Associate NSG to the **subnet** shared by both **virtual machines**.

Home > **Network foundation**

Network foundation | Network security groups

Preview

Search [+ Create](#) [Manage view](#) [Refresh](#) [Export to CSV](#) [Open query](#) [Assign tags](#)

Overview

Filter for any field...

Subscription equals all Resource group equals all Location equals all [Add filter](#)

Home > Network foundation | Network security groups >

Create network security group

Basics Tags Review + create

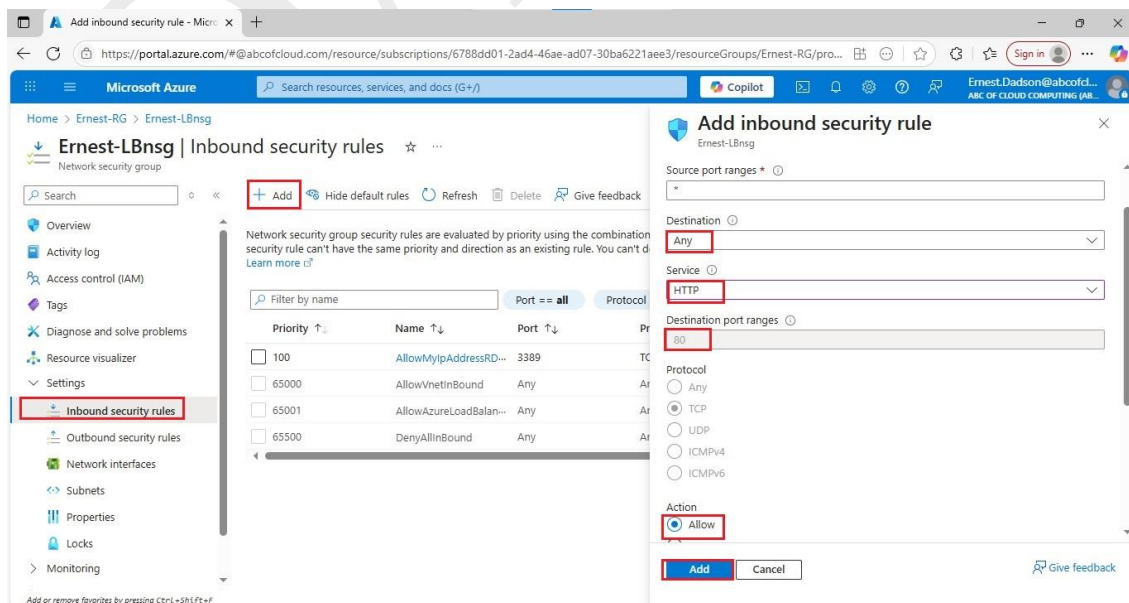
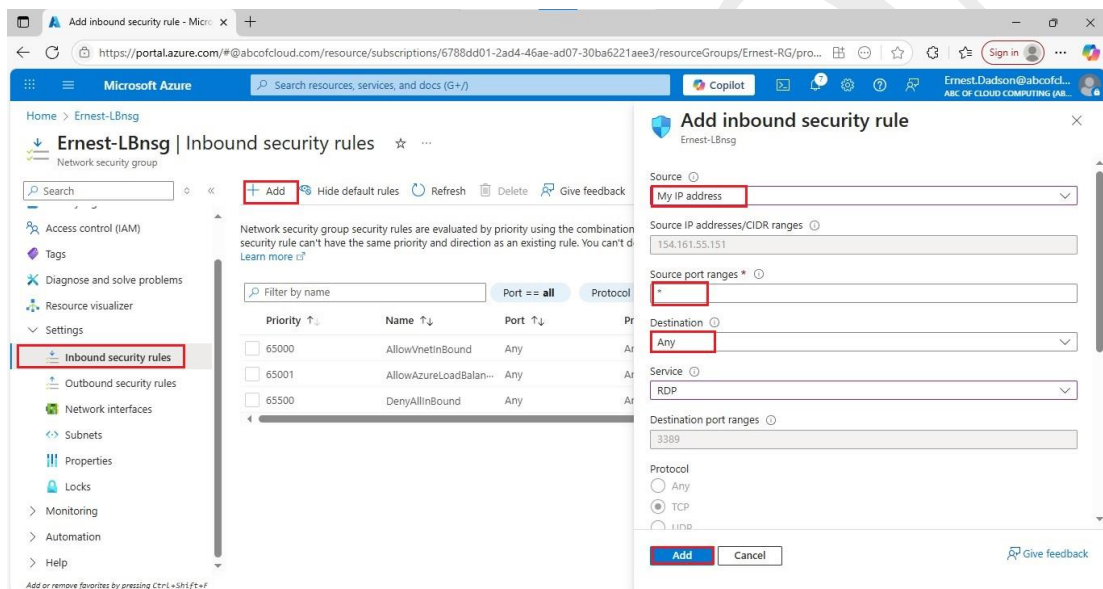
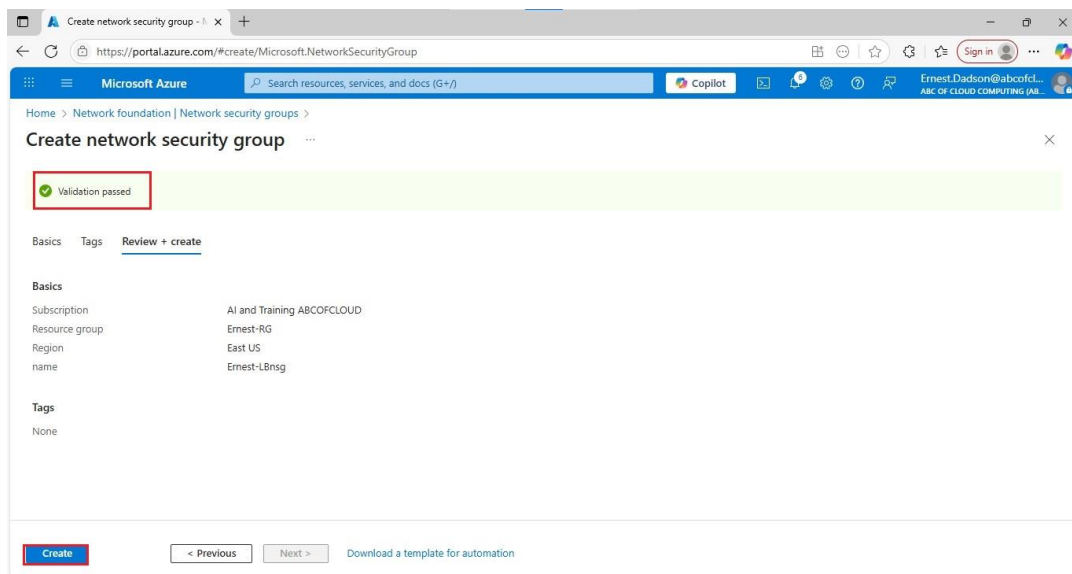
Project details

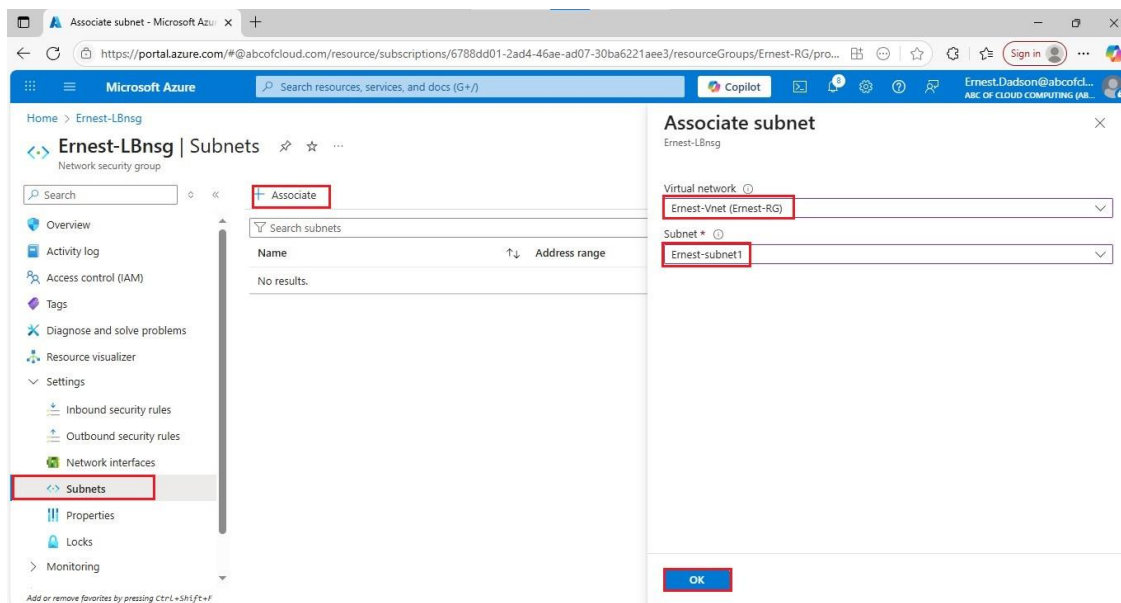
Subscription * AI and Training ABCOFCLOUD
Resource group * Ernest-RG
[Create new](#)

Instance details

Name * Ernest-LBnsrg
Region * East US

[Review + create](#) [< Previous](#) **Next: Tags >** [Download a template for automation](#)



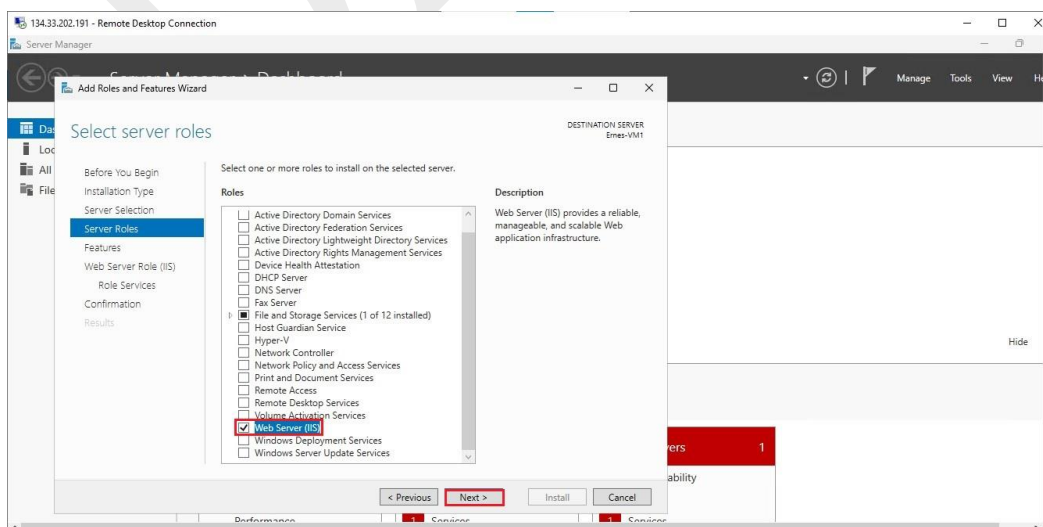


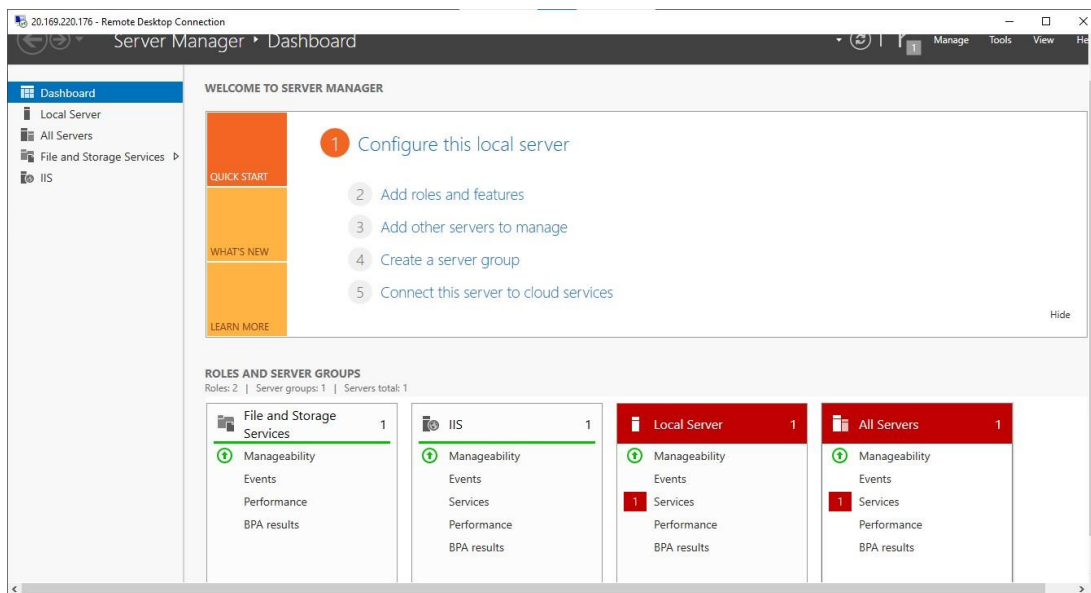
- **Two virtual Machines:** Ensure both are added to the same **availability set (for fault domain separation)**

Configure the Virtual Machine;

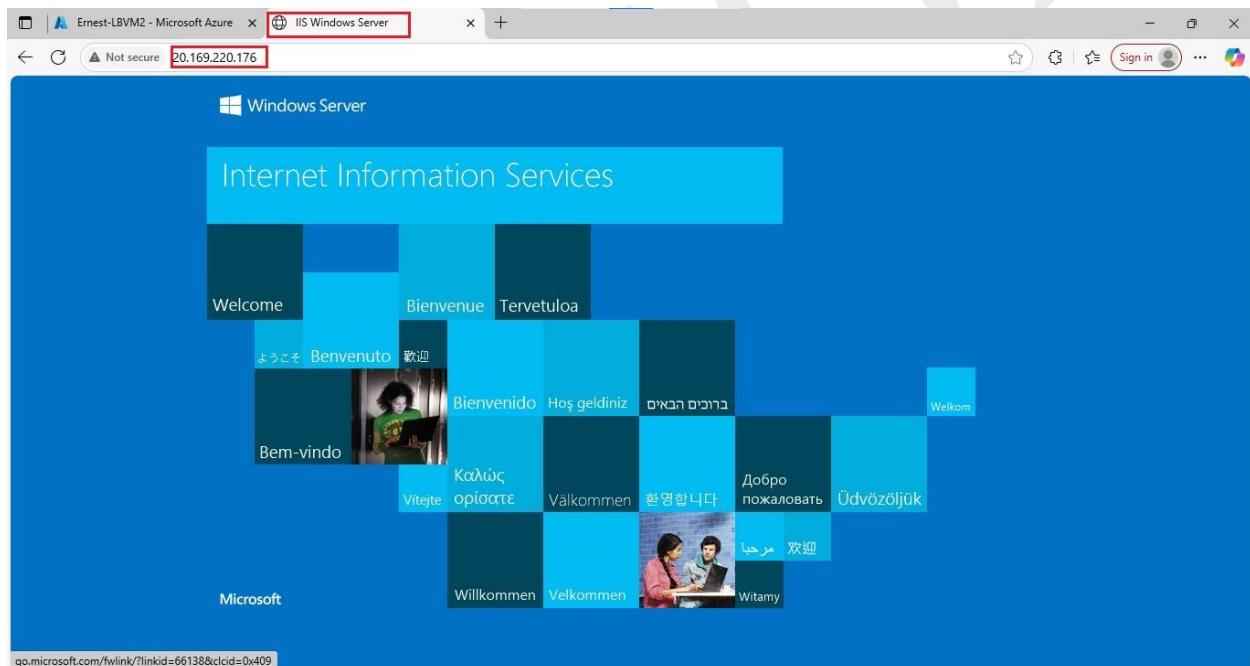
NB: Exposing **RDP (port 3389)** to the internet is not recommended in production environments. Use **VPN** or **Azure Bastion** instead. This setup is for testing purposes only.

- On the Virtual machine overview page → select **connect** → download **RDP** file.
- Connect to the virtual machine using the public IP address → Enter credentials → Click **OK**.
- **Install Web server IIS.**
 - On your server manager → Dashboard → Add roles and features.
 - Choose Web server IIS as the role you want to install.
 - Proceed and complete the wizard → click install.



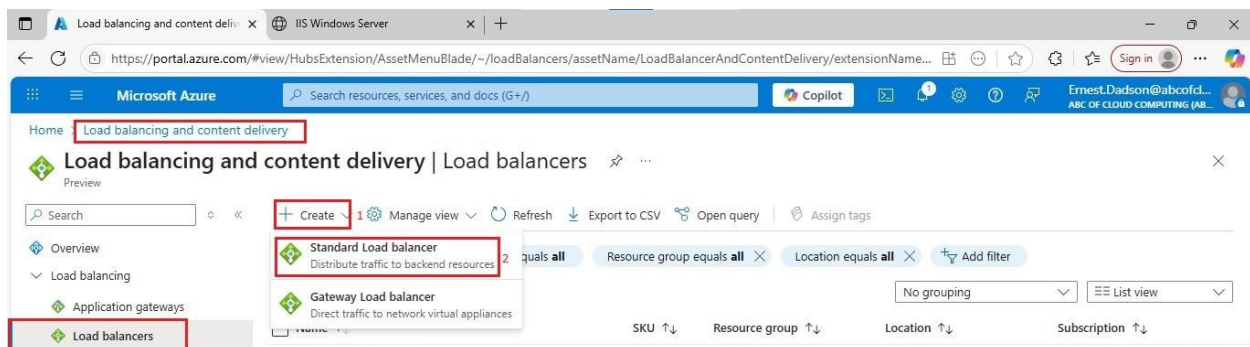


- Confirm the new html page reflect the virtual machine.



➤ Load-Balancer:

- Search for **Load balancer**→ **create**.
- **Fill the basic details:**
 - ✓ Subscription →Resource group→ Instance details.
 - ✓ SKU: Select standard ideal for workloads that require high performance and low latency.
 - ✓ Tier: Regional
 - ✓ Type: Select public load balancer.



Create load balancer

Load balancers use 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. [Learn more.](#)

Project details

Subscription *

Resource group *

[Create new](#)

Instance details

Name *

Region *

SKU * ☒ Standard (Distribute traffic to backend resources)
☐ Gateway (Direct traffic to network virtual appliances)

Type * ☒ Public
☐ Internal

[Review + create](#) [Previous](#) [Next: Frontend IP configuration >](#) [Download a template for automation](#) [Give feedback](#)

- **Frontend IP Configuration:**
 - ✓ Select + Add a frontend IP configuration.
 - ✓ Select a preferred name (e.g. Ernest-Frontend-IP)
 - ✓ Set it to IPv4
 - ✓ Select your public IP or create one.

Add frontend IP configuration

Ernest-LB

Name *

IP version ☒ IPv4
☐ IPv6

IP type ☒ IP address
☐ IP prefix

Public IP address *
[Create new](#)

Gateway Load balancer

[Save](#) [Cancel](#) [Give feedback](#)

- **Backend pool:**

- ✓ Enter your preferred name. (e.g. Ernest-backend-pool)
- ✓ Select the VNet.
- ✓ Backend pool configuration: Select NIC
- ✓ Add the two virtual machines.

NB: All IP configurations must be in the same region and VNet as the Load balance.

Home > Create load balancer > Add backend pool

Name * Ernest-backend-pool

Virtual network Ernest-Vnet (Ernest-RG)

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](#) | [X Remove](#)

Resource Name	Resource group	Type	IP configuration	IP Address	Availability set
Ernest-LBVM1	Ernest-RG	Virtual machine	ipconfig1	10.98.0.4	ERNEST-AVSET
<input type="checkbox"/> Ernest-LBVM2	Ernest-RG	Virtual machine	ipconfig1	10.98.0.5	ERNEST-AVSET

[Save](#) [Cancel](#) [Give feedback](#)

➤ **Create Inbound rules:**

- ✓ **Add a load balancing rule:** It defines how incoming traffic is distributed across multiple backend resources (e.g. virtual machine). It maps a frontend IP and port(s) to the backend pool of servers, specifying which protocol and ports to use for forwarding traffic.
 - ✓ **Add an inbound Nat rule:** It's used to forward traffic from a load balancer's frontend to specific instances within a backend pool. It allows you to map a frontend IP address and port on the load balancer to specific backend virtual machine, enabling connections to individual VM's using load balancer's public IP.
- We will create these two later.
 - Proceed to deploy the load balancer.
 - Pass all validation and create.

Home > Create load balancer

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

Load balancing rule

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. The load balancing rule uses a health probe to determine which backend instances are eligible to receive traffic.

[+ Add a load balancing rule](#)

Name ↑↓	Frontend IP configuration ↑↓	Backend pool ↑↓	Health probe ↑↓	Frontend Port ↑↓	Backend port ↑↓
Add a rule to get started					

Inbound NAT rule

An inbound NAT rule forwards incoming traffic sent to a selected IP address and port combination to a specific virtual machine.

[+ Add an inbound nat rule](#)

Name ↑↓	Frontend IP configuration ↑↓	Service ↑↓	Target ↑↓	Frontend Port ↑↓
Add a rule to get started				

[Review + create](#) [< Previous](#) [Next: Outbound rule >](#) [Download a template for automation](#) [Give feedback](#)

Home > Create load balancer

[Validation passed](#)

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

Basics

Subscription	AI and Training ABCOFCLOUD
Resource group	Ernest-RG
Name	Ernest-LB
Region	East US
SKU	Standard
Tier	Regional
Type	Public

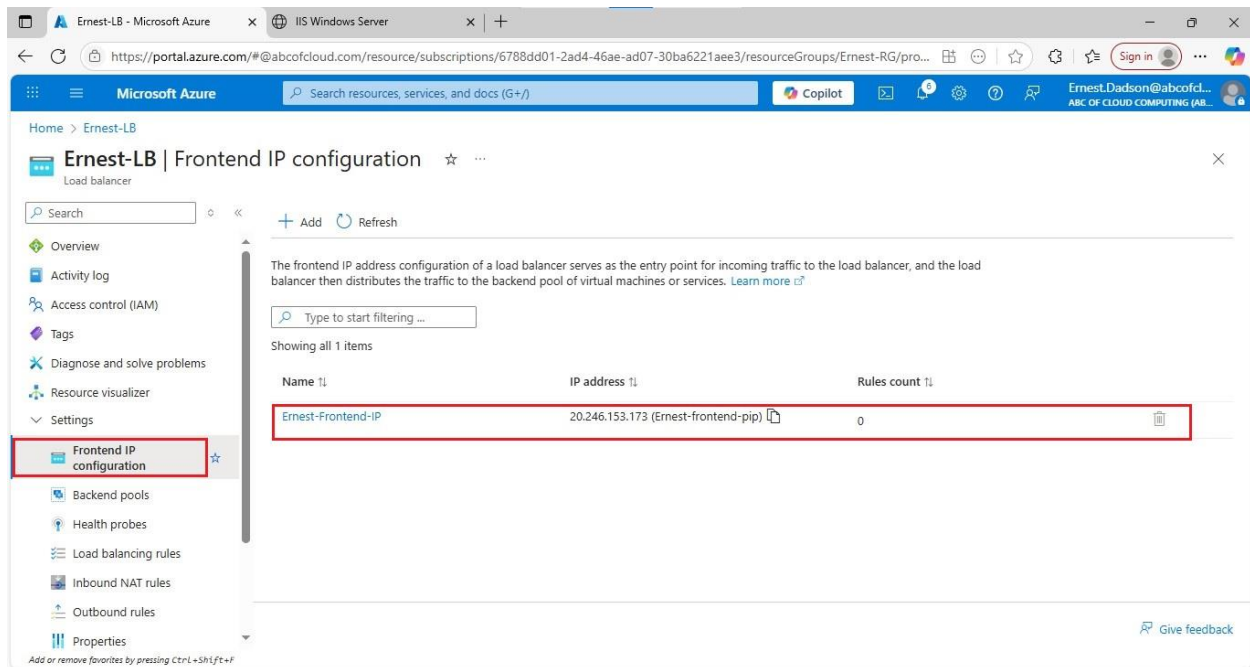
Frontend IP configuration

Frontend IP configuration name	Ernest-Frontend-IP
Frontend IP configuration IP address	To be created

[Create](#) [< Previous](#) [Next >](#) [Download a template for automation](#) [Give feedback](#)

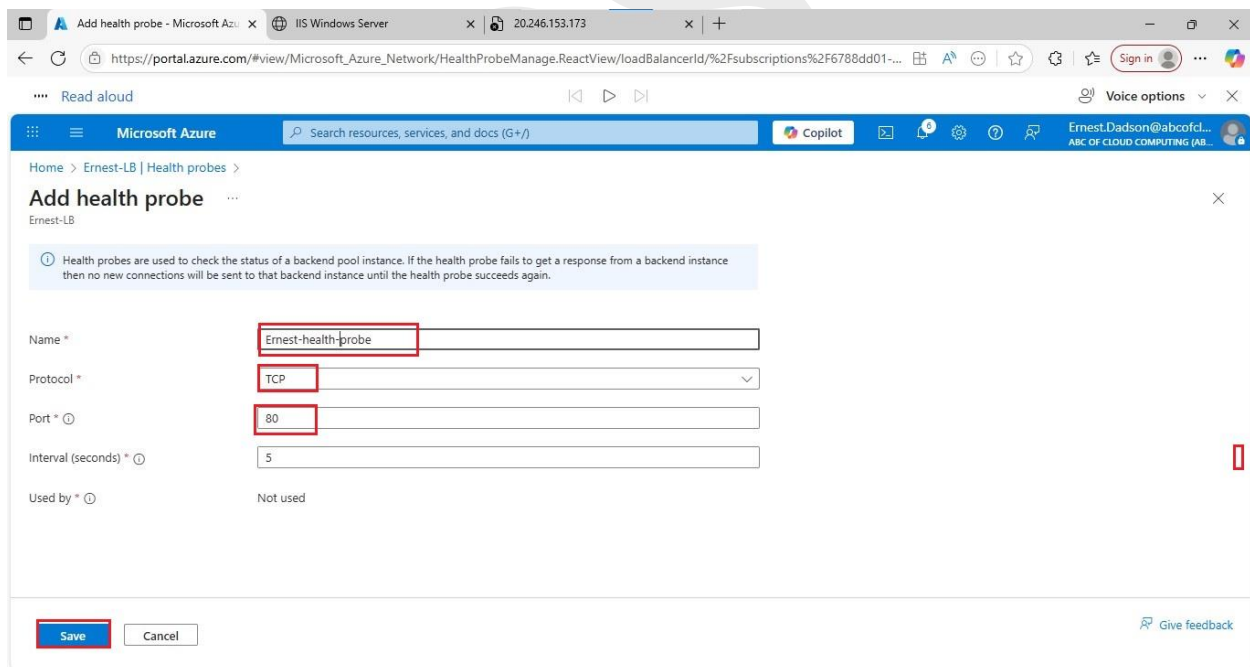
Open the Load balancer.

- Select your configured frontend IP from the drop-down menu.
- Select your backend pool from the drop-down menu.
 - ✓ Protocol: Select TCP
 - ✓ Port :80
 - ✓ Backend port: 80



➤ Health Probe:

- Create new one.
 - ✓ Name → Protocol (TCP) → Port (80) → Save.



Let add load balancing rule and an inbound NAT rule.

- Fill in the details
 - ✓ Name → IP version (IPv4) → Frontend IP address → Backend pool → Protocol → Port (80) → Health probe → Session persistence (None) → Idle timeout → Leave other options as default → **Save.**

Add load balancing rule

Ernest-LB

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.](#)

Name *

IP version * ☒ IPv4 ☐ IPv6

Frontend IP address *

Backend pool *

Protocol ☒ TCP ☐ UDP

Add load balancing rule

Ernest-LB

Protocol ☒ TCP ☐ UDP

Port *

Backend port *

Health probe *

Session persistence

Idle timeout (minutes) *

➤ Add an inbound NAT Rule:

- Fill in the details:

- ✓ Name → Type (VM) → Target virtual machine (select your target VM from the dropdown menu) → Network IP configuration (VM private IP) → Frontend IP address (select from the dropdown menu) → frontend port (5000) → service tag (custom) → Backend port (3389).
- ✓ Leave the rest to default and select save.

Microsoft Azure portal interface showing the "Add inbound NAT rule" configuration for Ernest-LB. The configuration includes:

- Name: Ernest-LBVM-Nat
- Type: Azure virtual machine
- Target virtual machine: ERNEST-LBVM1
- Network IP configuration: ipconfig1 (10.98.0.4)
- Frontend IP address: Ernest-Frontend-IP (20.246.153.173)

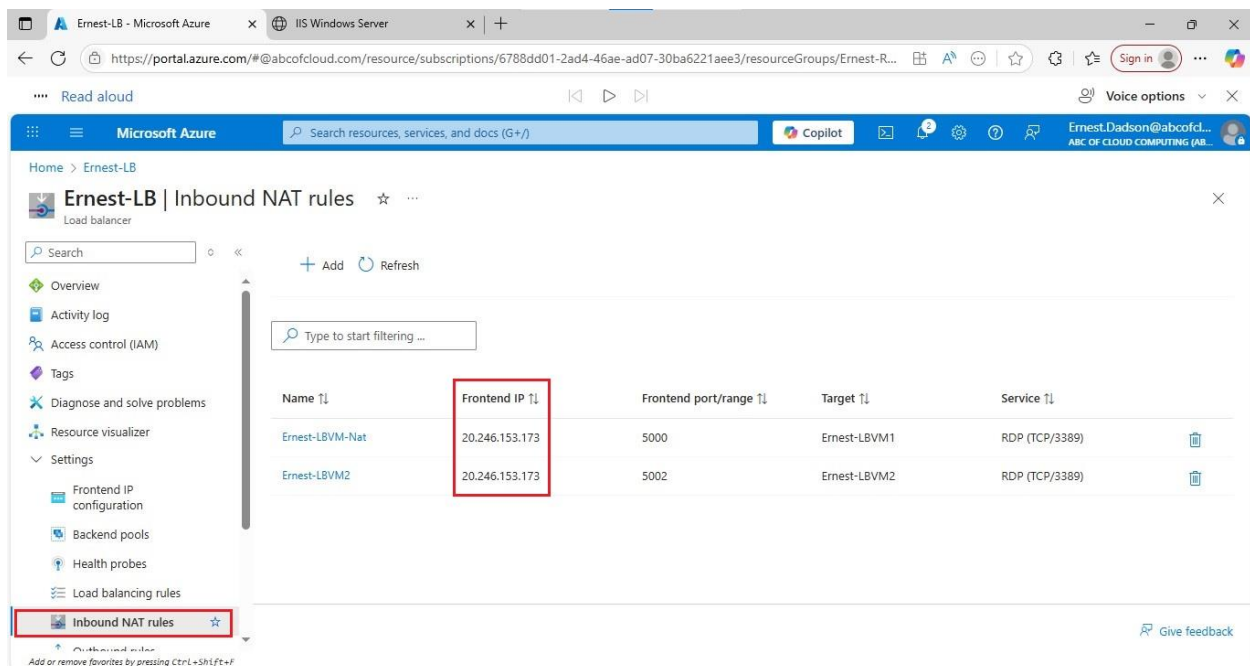
Buttons: Save, Cancel, Give feedback

Microsoft Azure portal interface showing the "Add inbound NAT rule" configuration for Ernest-LB. The configuration includes:

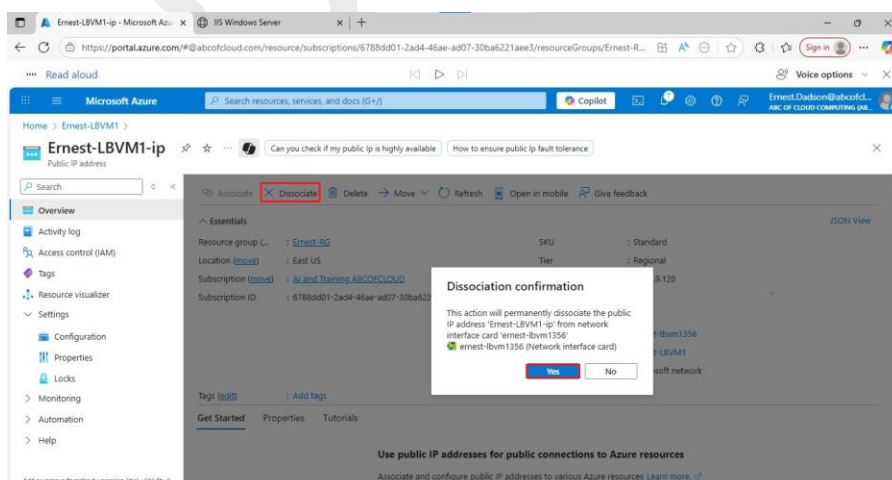
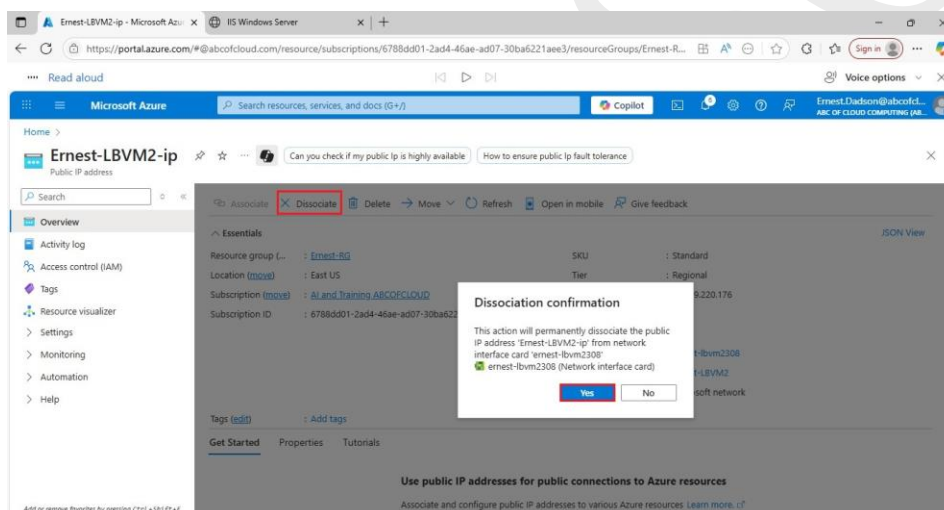
- Frontend IP address: Ernest-Frontend-IP (20.246.153.173)
- Frontend Port: 5000
- Service Tag: Custom
- Backend port: 3389
- Protocol: TCP
- Enable TCP Reset: ☐
- Idle timeout (minutes): 4
- Enable Floating IP: ☐

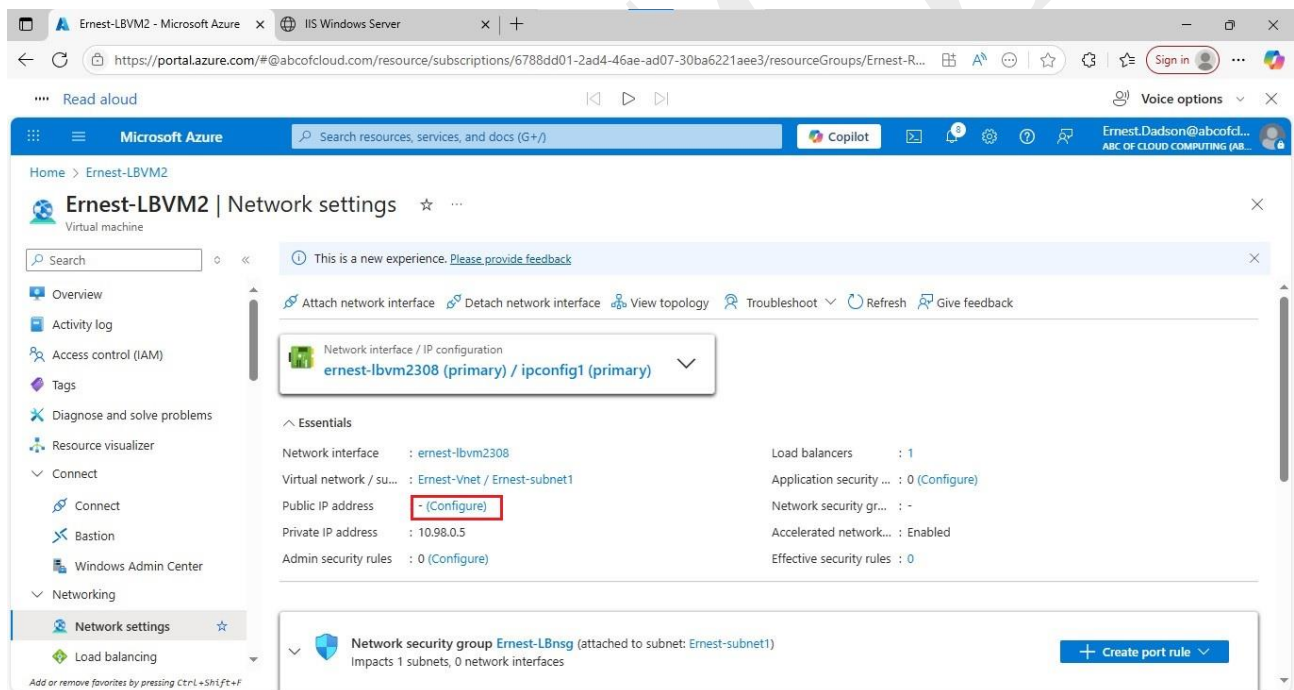
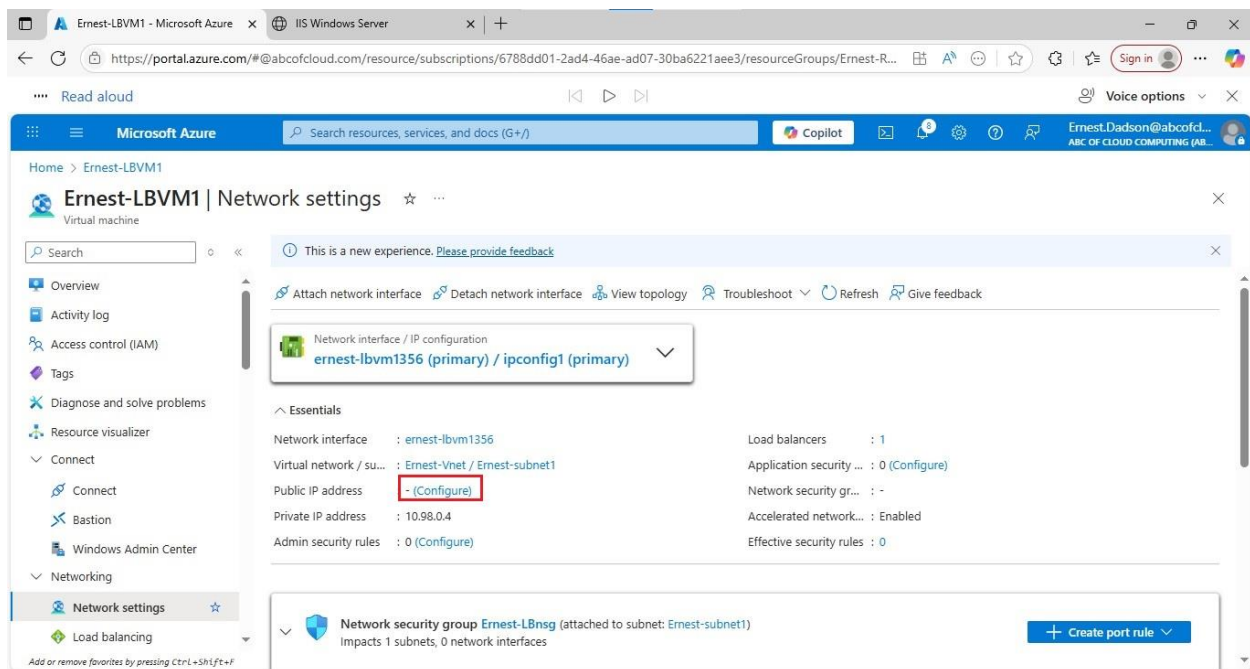
Buttons: Save, Cancel, Give feedback

- Repeat for the 2nd virtual Machine.



Once completed, disassociate the public IPs from both Virtual machines. The load balancer will route traffic.





Successfully connected to both virtual machines via the load balancer and test web access on port 80.

