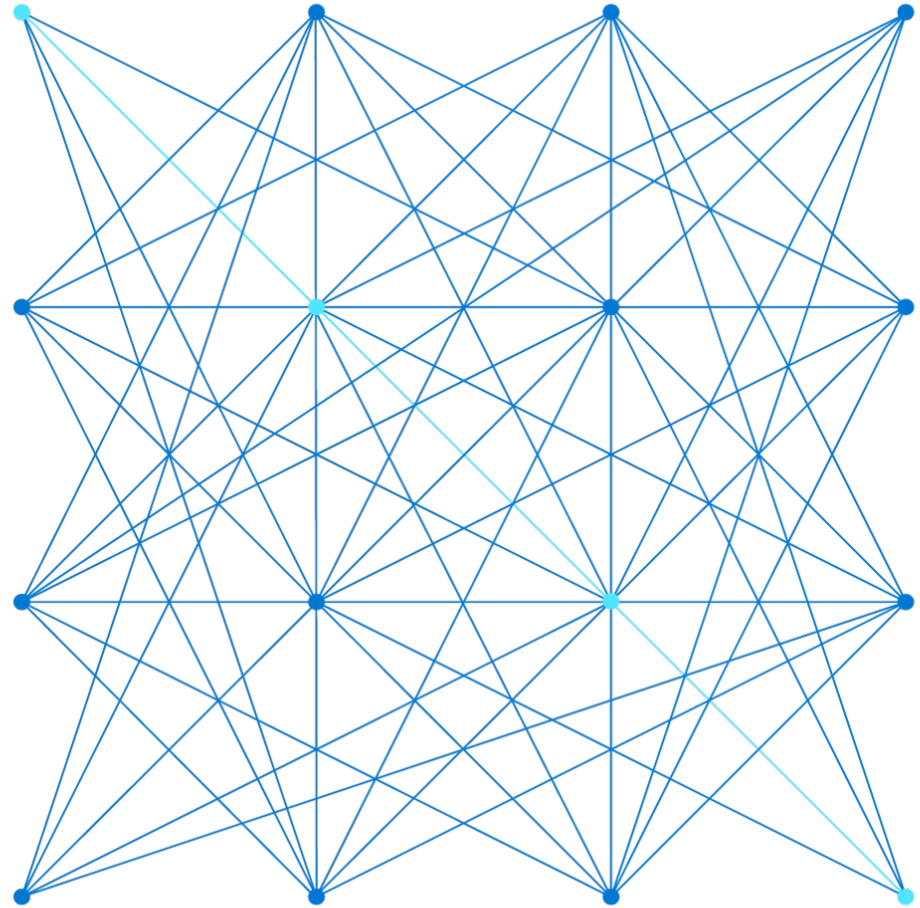


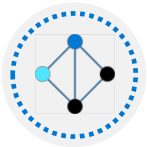
AZ-104T00A

Module 06:

Network Traffic Management



Module Overview



Lesson 01: Network Routing and Endpoints



Lesson 02: Azure Load Balancer

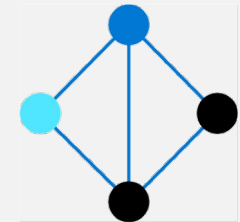


Lesson 03: Application Gateway

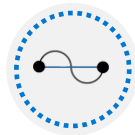


Lesson 04: Module 06 Lab and Review

Lesson 01: Network Routing and Endpoints



Network Routing and Endpoints Overview



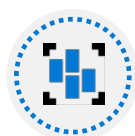
System Routes



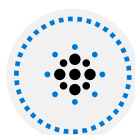
User Defined Routes



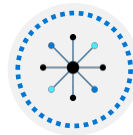
Routing Example



Create a Routing Table



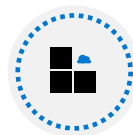
Create a Custom Route



Associate the Route Table



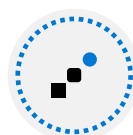
Demonstration –
Custom Routing tables



Service Endpoints



Service Endpoint Services

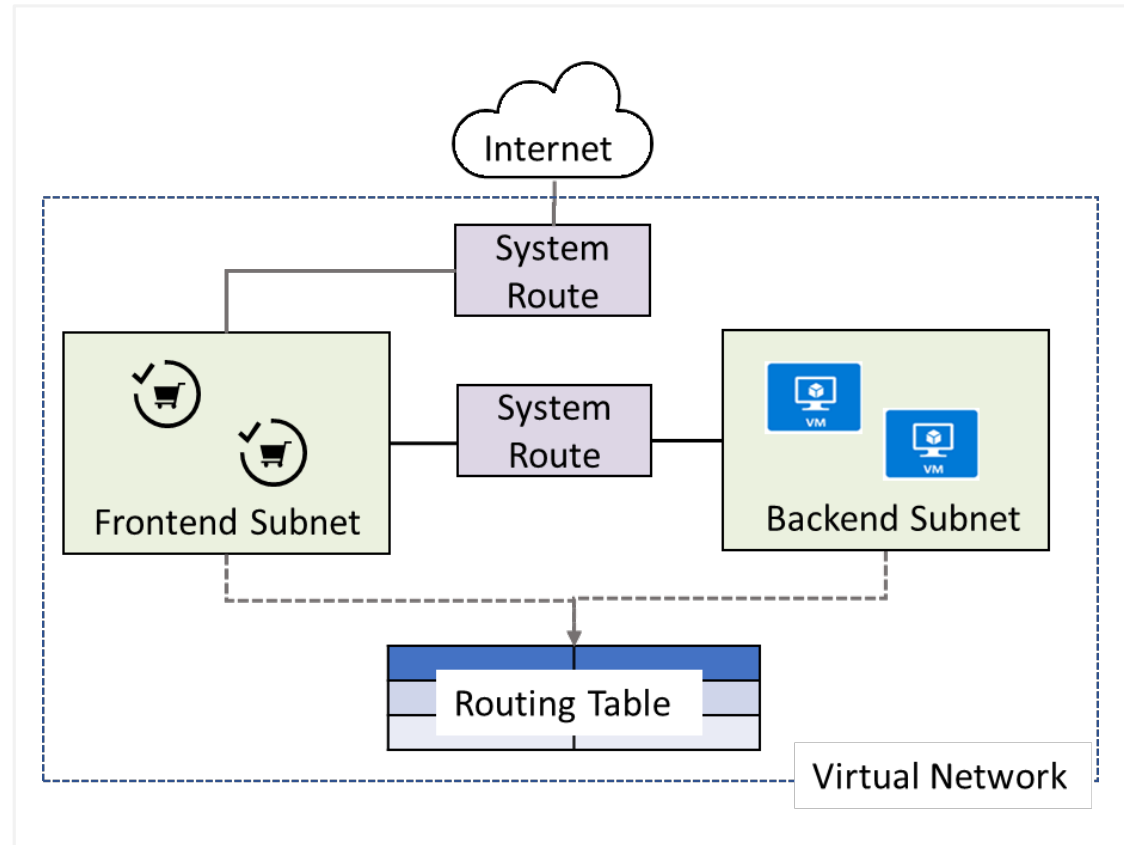


Private Link

System Routes

System routes direct network traffic between virtual machines, on-premises networks, and the Internet:

- Traffic between VMs in the same subnet
- Between VMs in different subnets in the same virtual network
- Data flow from VMs to the Internet
- Communication between VMs using a VNet-to-VNet VPN
- Site-to-Site and ExpressRoute communication through the VPN gateway

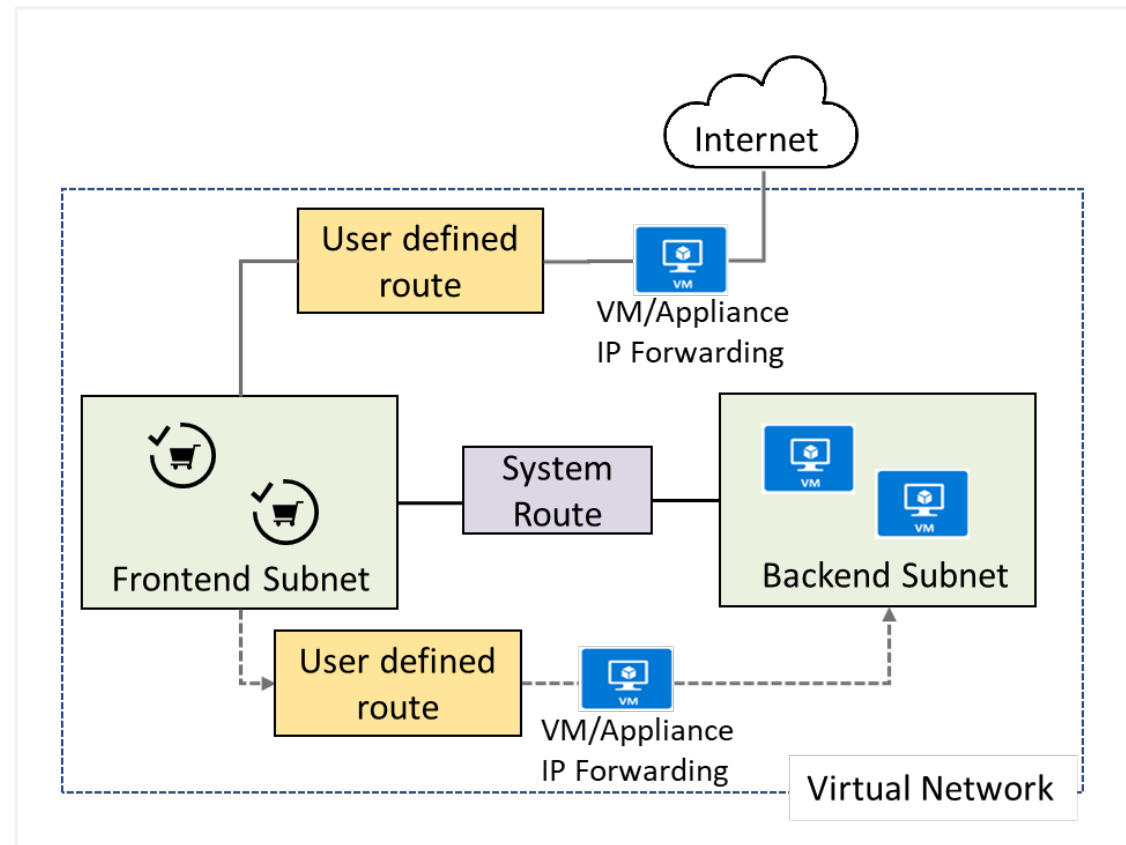


User Defined Routes

A route table contains a set of rules, called routes, that specifies how packets should be routed in a virtual network

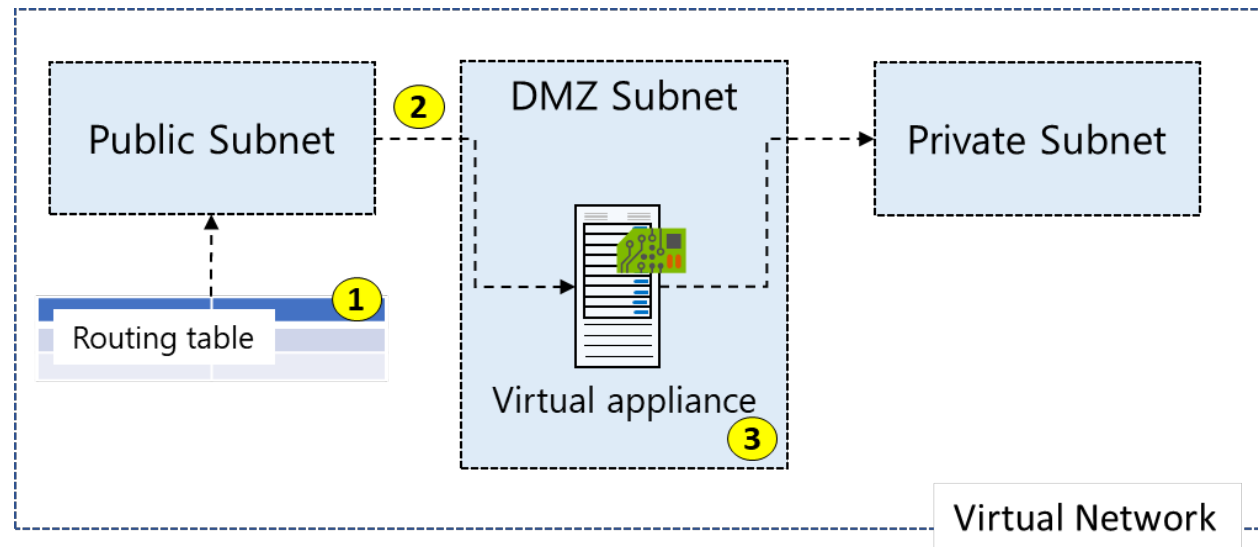
User-defined routes are custom routes that control network traffic by defining routes that specify the next hop of the traffic flow

The next hop can be a virtual network gateway, virtual network, internet, or virtual appliance



Routing Example

All traffic coming into the public subnet and headed for the private subnet must go through the virtual network appliance



1. Create a routing table

2. Add a custom route that requires all private subnet traffic be directed to a network appliance

3. Associate the new route to the public subnet

Create a Routing Table

A standard routing protocol is used to exchange routing and reachability information between two or more networks

Routes are automatically added to the route table of all subnets with virtual network gateway route propagation enabled

In most situations you will want to enable route propagation

Create route table

You can add routes to this table after it's created.

* Name
myRouteTablePublic ✓

* Subscription
Visual Studio Enterprise ▼

* Resource group
myRGWest ▼
[Create new](#)

* Location
(US) West US ▼

Virtual network gateway route propagation
Disabled Enabled

Create [Automation options](#)

Create a Custom Route

When you create a route there are several Next hop types

In this example, any private subnet IP addresses will be sent to the virtual appliance

Other choices are Virtual network gateway, Virtual network, Internet, and None

Add route
myRouteTablePublic

Route name *
ToPrivateSubnet ✓

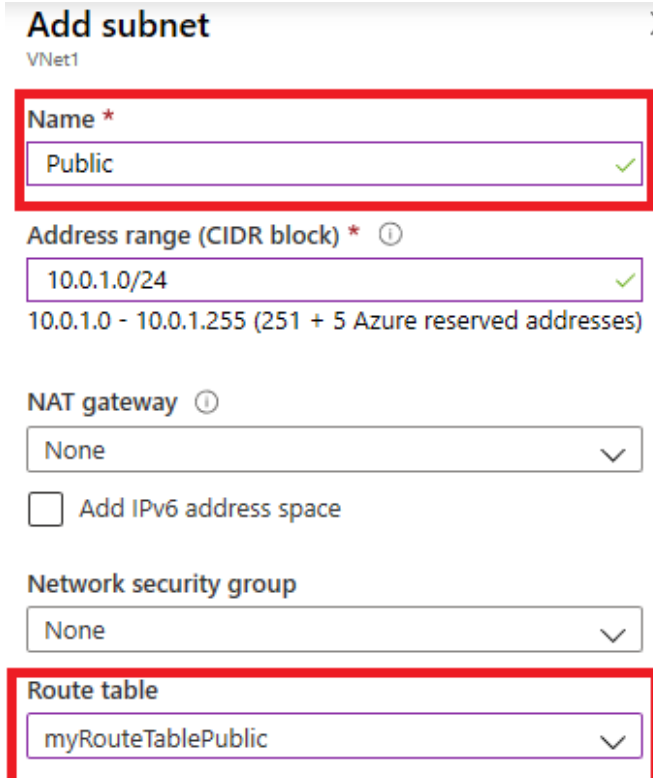
Address prefix * ⓘ
10.0.1.0/24 ✓

Next hop type ⓘ
Virtual network gateway ^
Virtual network gateway
Virtual network
Internet
Virtual appliance
None

Associate the Route Table

Each subnet can have zero or one route table associated to it

In our example, the Public subnet will be associated with the routing table



Add subnet ✕
VNet1

Name *
Public ✓

Address range (CIDR block) * ⓘ
10.0.1.0/24 ✓
10.0.1.0 - 10.0.1.255 (251 + 5 Azure reserved addresses)

NAT gateway ⓘ
None ▾
☐ Add IPv6 address space

Network security group
None ▾

Route table
myRouteTablePublic ▾

Service Endpoints

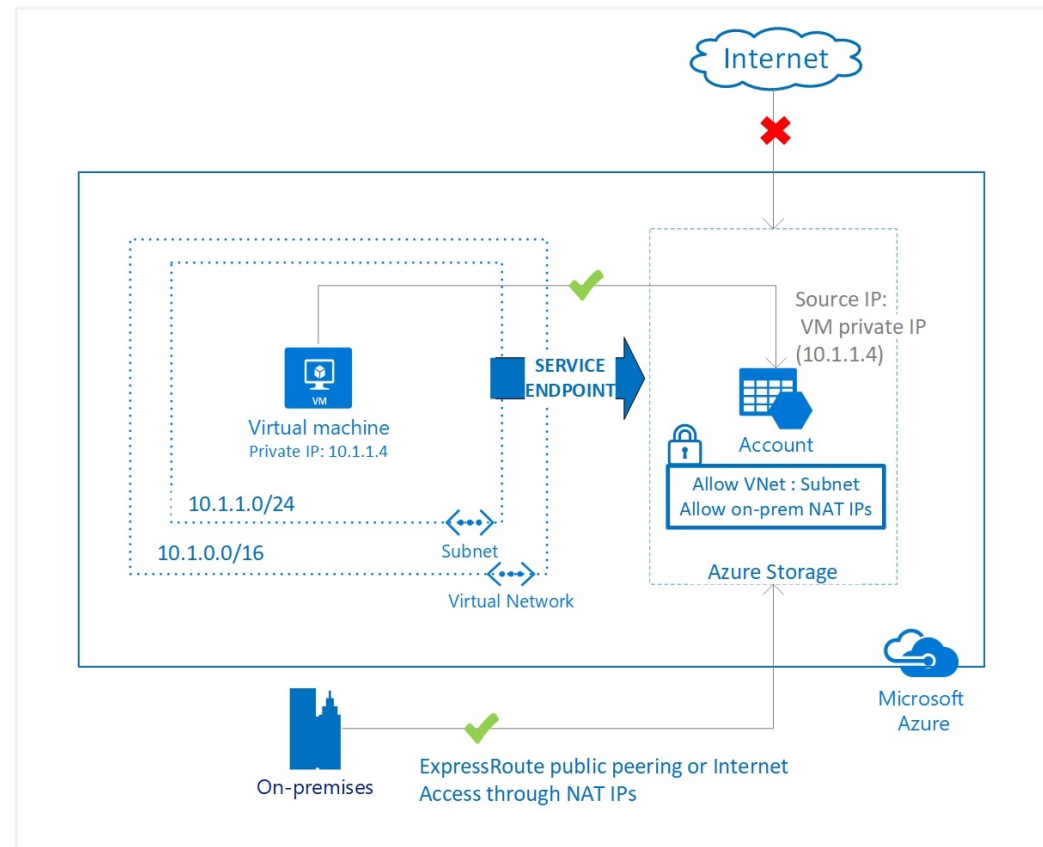
Endpoints limit network access to specific subnets and IP addresses

Improved security for your Azure service resources

Optimal routing for Azure service traffic from your virtual network

Endpoints use the Microsoft Azure backbone network

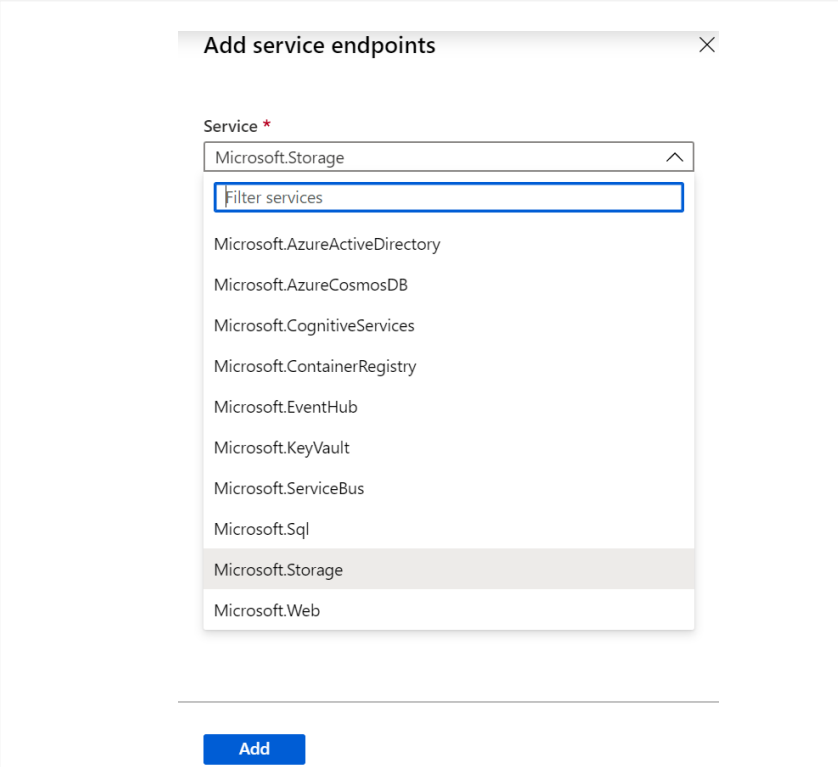
Simple to set up with less management overhead



Service Endpoint Services

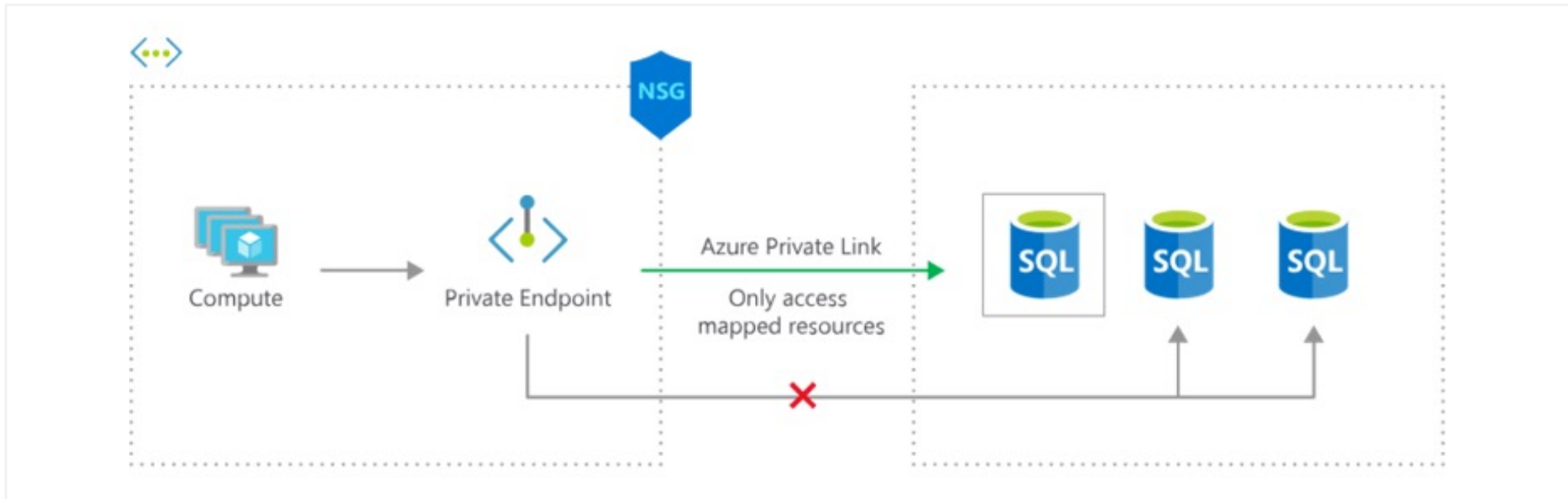
There are many types of service endpoints

Adding service endpoints can take up to 15 minutes to complete



The screenshot shows a dialog box titled "Add service endpoints" with a close button (X) in the top right corner. Below the title, there is a section labeled "Service *" with a search bar containing the text "Filter services". Below the search bar, a list of services is displayed, including Microsoft.AzureActiveDirectory, Microsoft.AzureCosmosDB, Microsoft.CognitiveServices, Microsoft.ContainerRegistry, Microsoft.EventHub, Microsoft.KeyVault, Microsoft.ServiceBus, Microsoft.Sql, Microsoft.Storage (highlighted), and Microsoft.Web. At the bottom of the dialog, there is a blue button labeled "Add".

Private Link

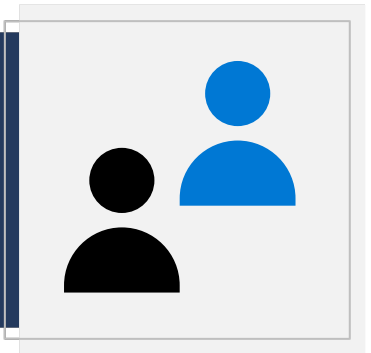


Private connectivity to services on Azure. Traffic remains on the Microsoft network, with no public internet access

Integration with on-premises and peered networks

In the event of a security incident within your network, only the mapped resource would be accessible

Lesson 02: Azure Load Balancer



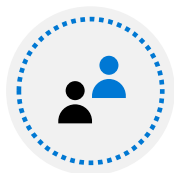
Azure Load Balancer Overview



Azure Load Balancer



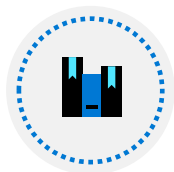
Backend Pools



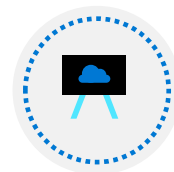
Public Load Balancer



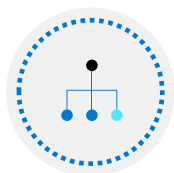
Load Balancer Rules



Internal Load Balancer



Session Persistence

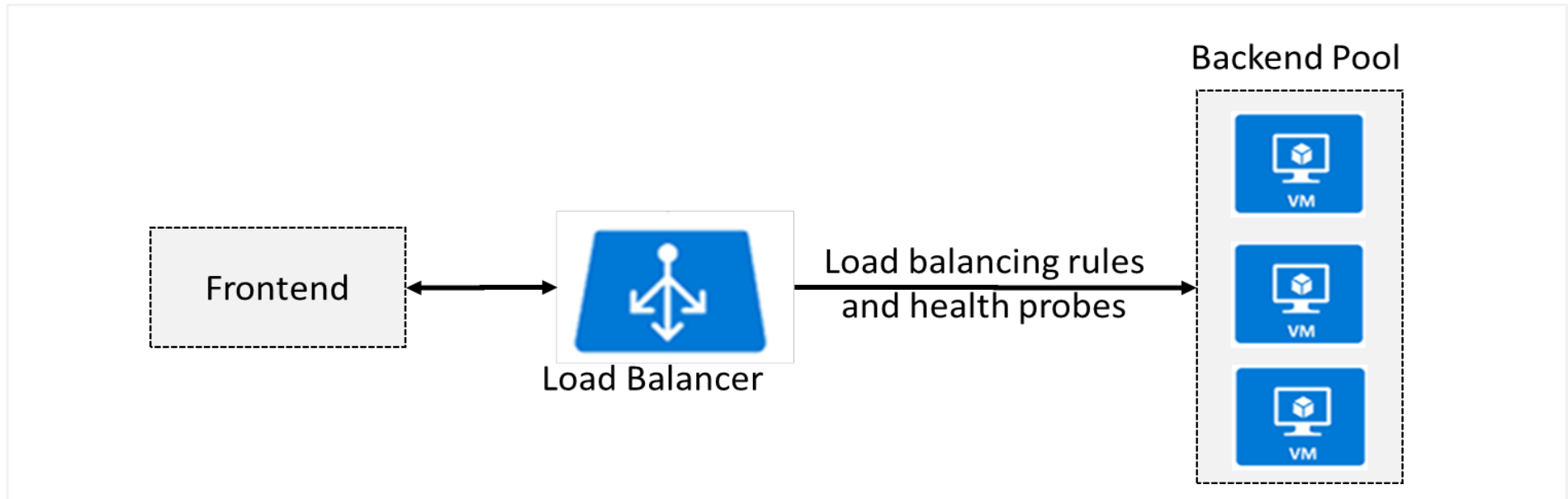


Load Balancer SKUs



Health Probes

Azure Load Balancer

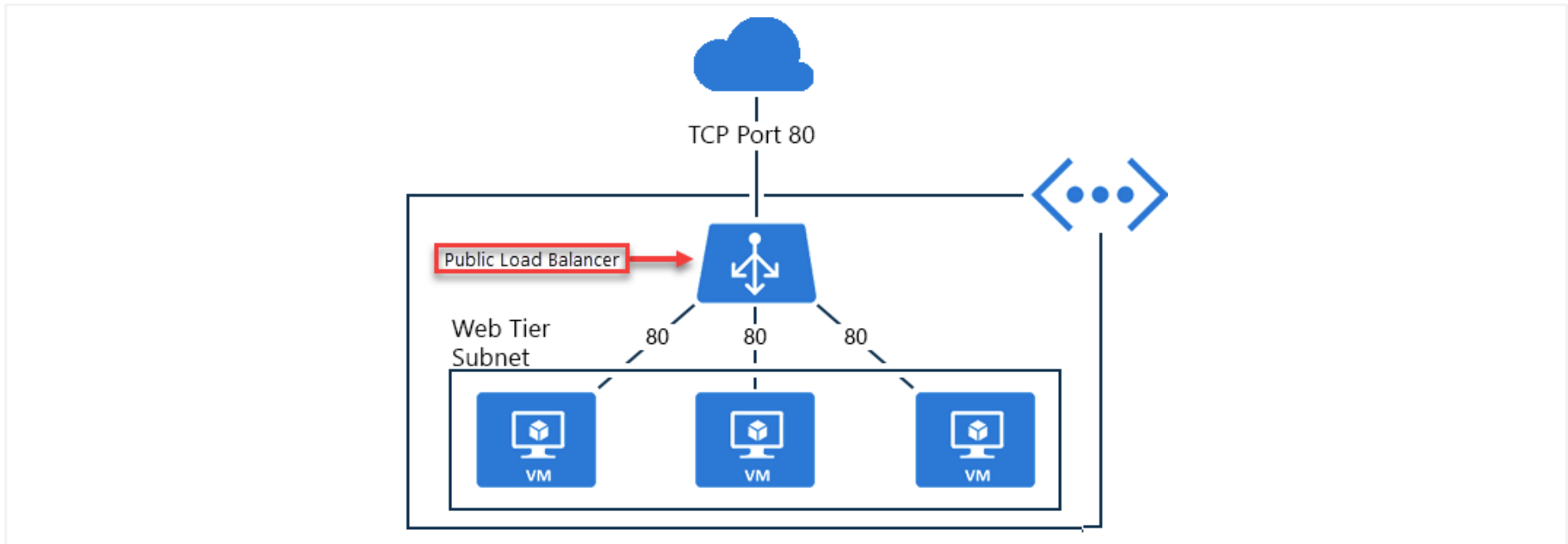


Distributes inbound traffic to backend resources using load-balancing rules and health probes

Can be used for both inbound/outbound scenarios

Two types: Public and Internal

Public Load Balancer



Maps public IP addresses and port number of incoming traffic to the VM's private IP address and port number, and vice versa

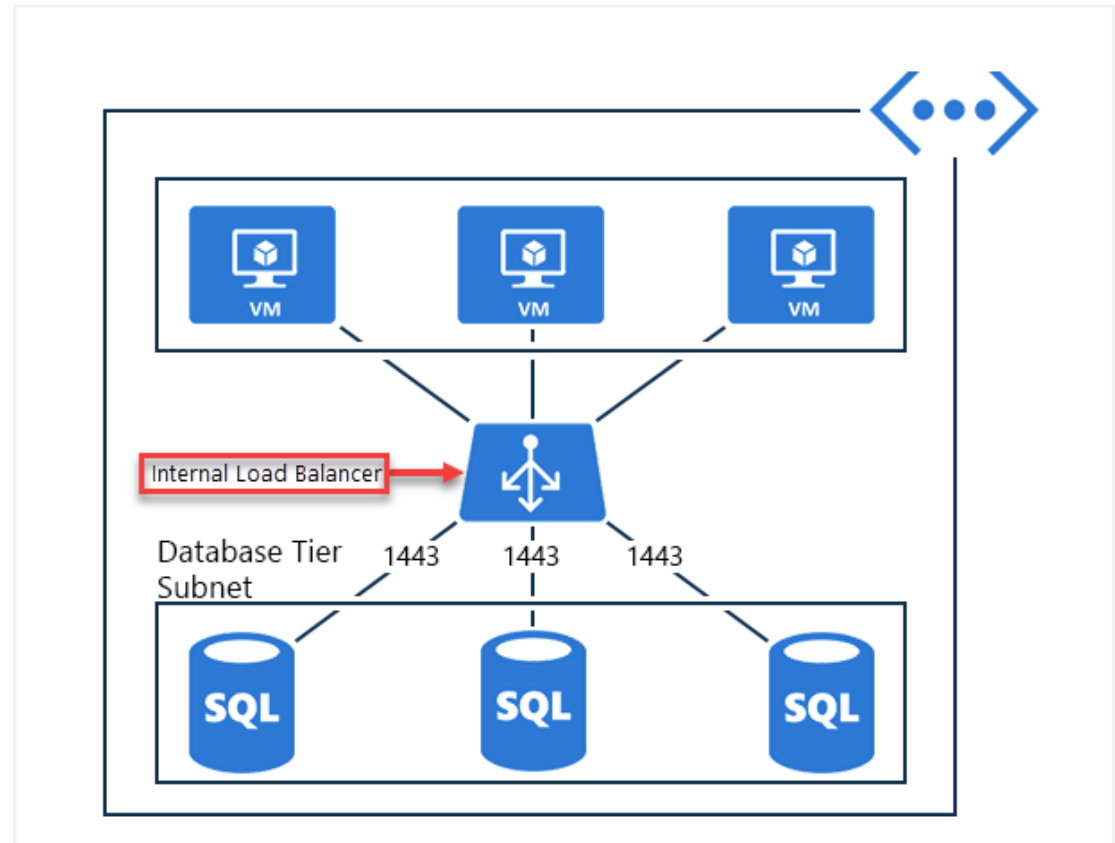
Apply load balancing rules to distribute traffic across VMs or services

Internal Load Balancer

Directs traffic only to resources inside a virtual network or that use a VPN to access Azure infrastructure

Frontend IP addresses and virtual networks are never directly exposed to an internet endpoint

Enables load balancing within a virtual network, for cross-premises virtual networks, for multi-tier applications, and for line-of-business applications



Load Balancer SKUs

Load balancer supports both Basic and Standard (newer) SKUs

SKUs are not mutable

Only Standard Load Balancer rules can span two virtual networks

No charge for the Basic Load Balancer SKU

Instance details

Name * ✓

Region * ▼

Type * ⓘ ☒ Internal ☐ Public

SKU * ⓘ ☒ Basic ☐ Standard

Configure virtual network.

Virtual network * ⓘ ▼

Subnet * ▼
[Manage subnet configuration](#)

IP address assignment * ☐ Static ☒ Dynamic

Backend Pools

SETTINGS

Backend pools

* Name

cesbackendpool

Associated to ⓘ

Unassociated

Unassociated

Availability set

Single virtual machine

Virtual machine scale set

SKU	Backend pool endpoints
Basic SKU	VMs in a single availability set or VM scale set
Standard SKU	Any VM in a single virtual network, including a blend of VMs, availability sets, and VM scale sets

To distribute traffic, a back-end address pool contains the IP addresses of the virtual NICs that are connected to the load balancer

Load Balancer Rules

Maps a frontend IP and port combination to a set of backend IP addresses and port combination

Rules can be used in combination with NAT rules

A NAT rule is explicitly attached to a VM (or network interface) to complete the path to the target

Add load balancing rule ✕

lb01

Name *
lbr01 ✓

IP Version *
☒ IPv4 ☐ IPv6

Frontend IP address * ⓘ
10.1.0.4 (LoadBalancerFrontEnd) ▼

Protocol
☒ TCP ☐ UDP

Port *
80

Backend port * ⓘ
80

Backend pool ⓘ
bep01 ▼

Health probe ⓘ
hp01 (HTTP:80) ▼

Session persistence ⓘ
None ▼

Idle timeout (minutes) ⓘ
 4

Floating IP (direct server return) ⓘ
☒ Disabled ☐ Enabled

Session Persistence

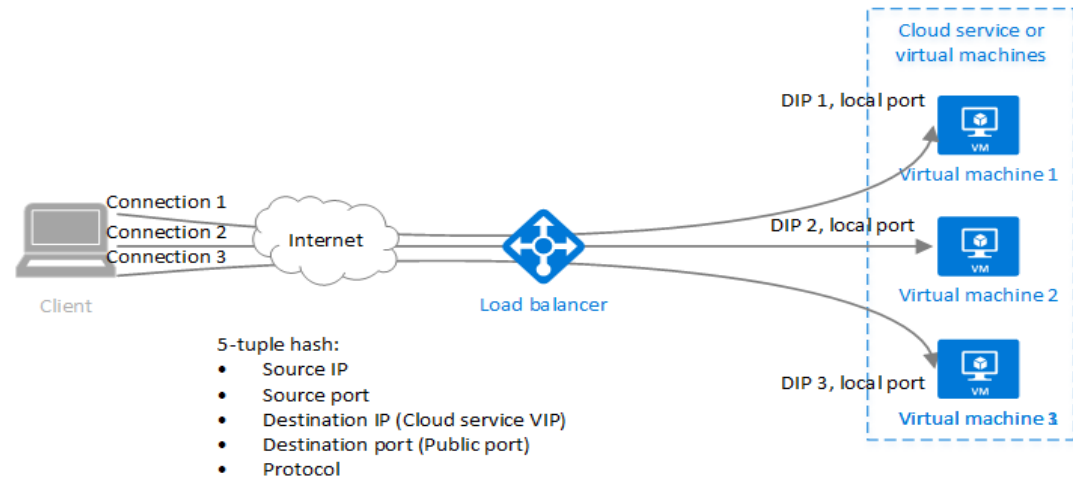
Session persistence ⓘ

None

None

Client IP

Client IP and protocol



Session persistence specifies how client traffic is handled

None (default) requests can be handled by any virtual machine

Client IP requests will be handled by the same virtual machine

Client IP and protocol specifies that successive requests from the same address and protocol will be handled by the same virtual machine

Health Probes

Allows the load balancer to monitor the status of an app

Dynamically adds or removes VMs from the load balancer rotation based on their response to health checks

HTTP custom probe (preferred) pings every 15 seconds

TCP custom probe tries to establish a successful TCP session

Add health probe

✕

lb01

Name *

hp01

✓

Protocol ⓘ

HTTP

✓

Port * ⓘ

80

Path * ⓘ

/

Interval * ⓘ

5

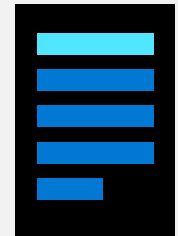
seconds

Unhealthy threshold * ⓘ

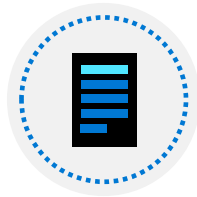
2

consecutive failures

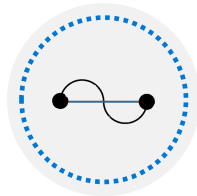
Lesson 03: Azure Application Gateway



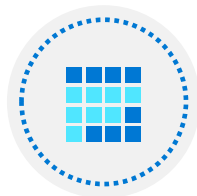
Application Gateway Overview



Application Gateway

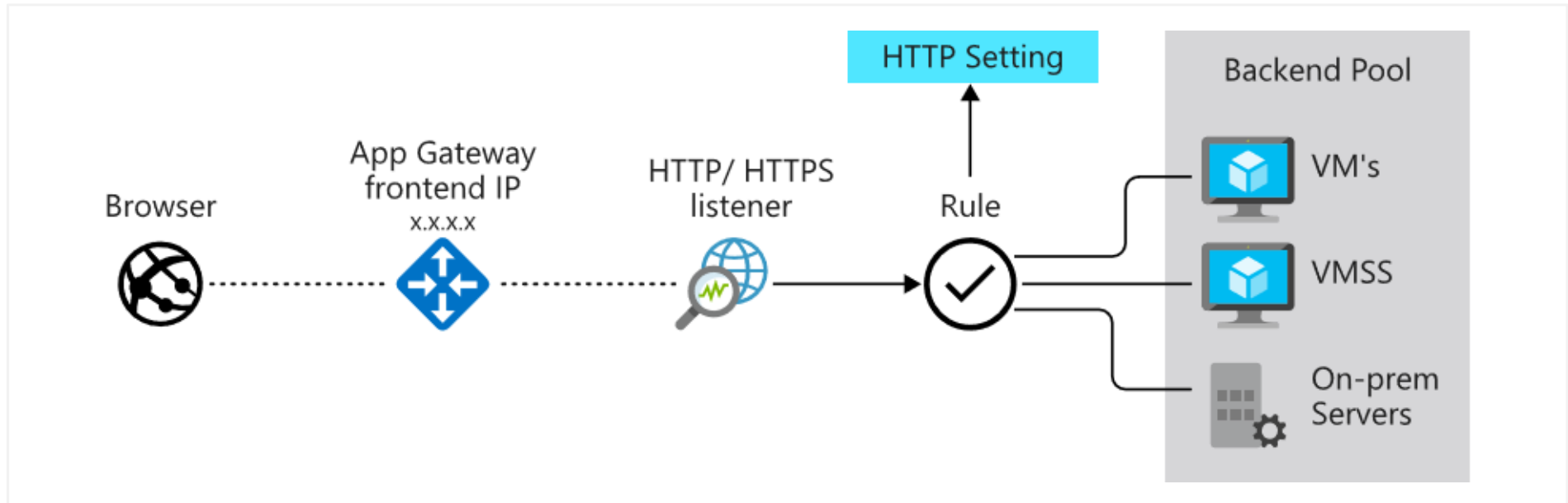


Application Gateway Routing



Application Gateway Configuration

Application Gateway



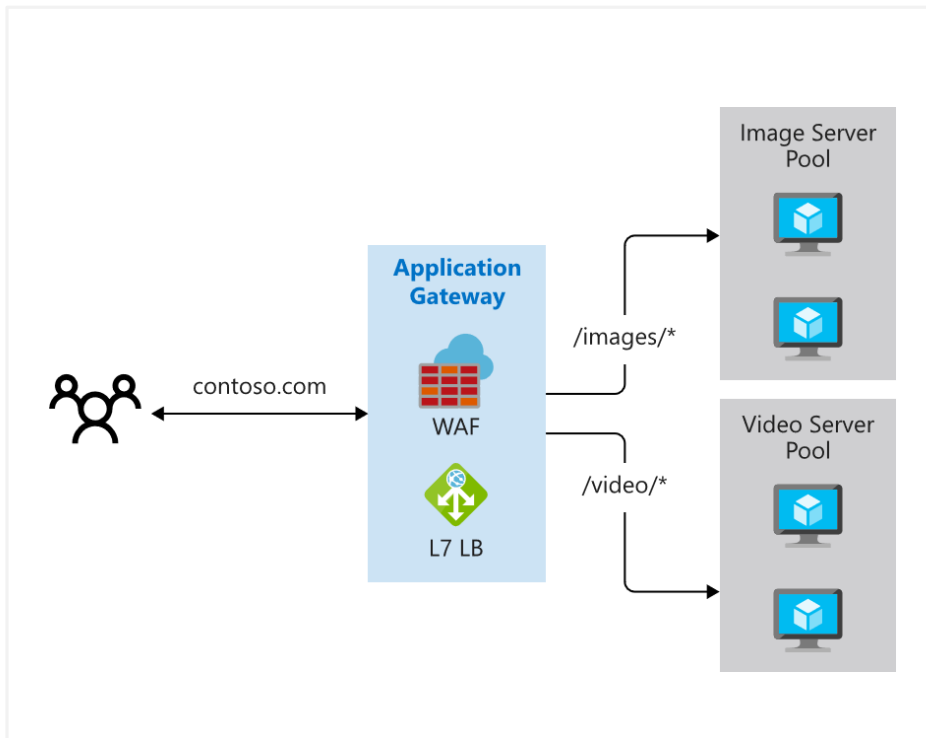
Manages web
app requests

Routes traffic to a pool of web servers
based on the URL of a request

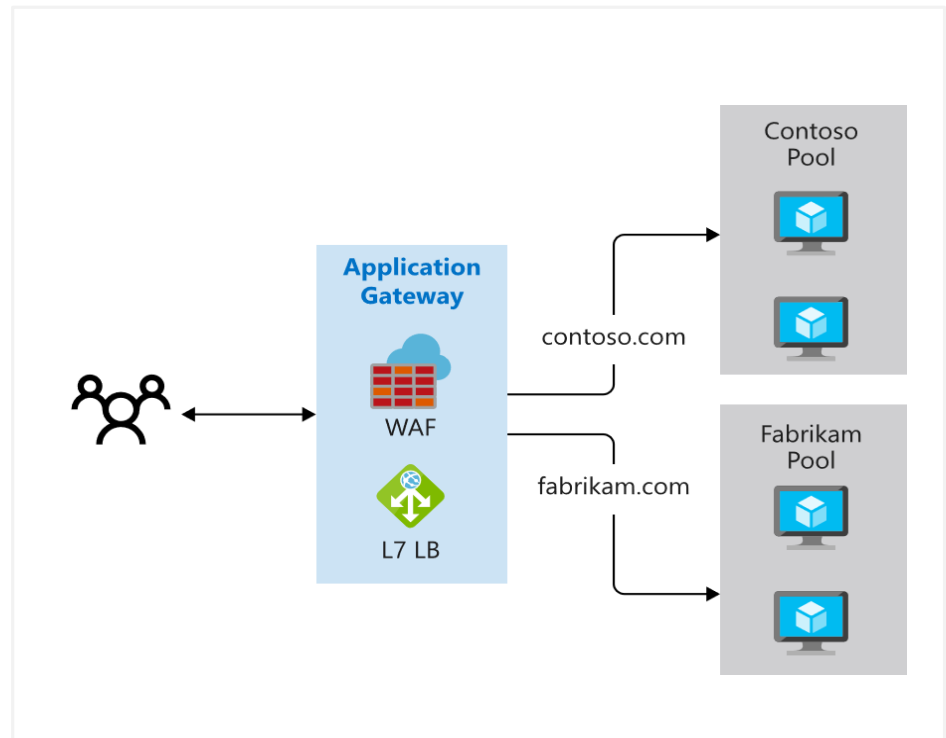
The web servers can be Azure virtual
machines, Azure virtual machine scale
sets, Azure App Service, and even
on-premises servers

Application Gateway Routing

Path-based routing



Multiple-site routing



Application Gateway Components

Frontend IP

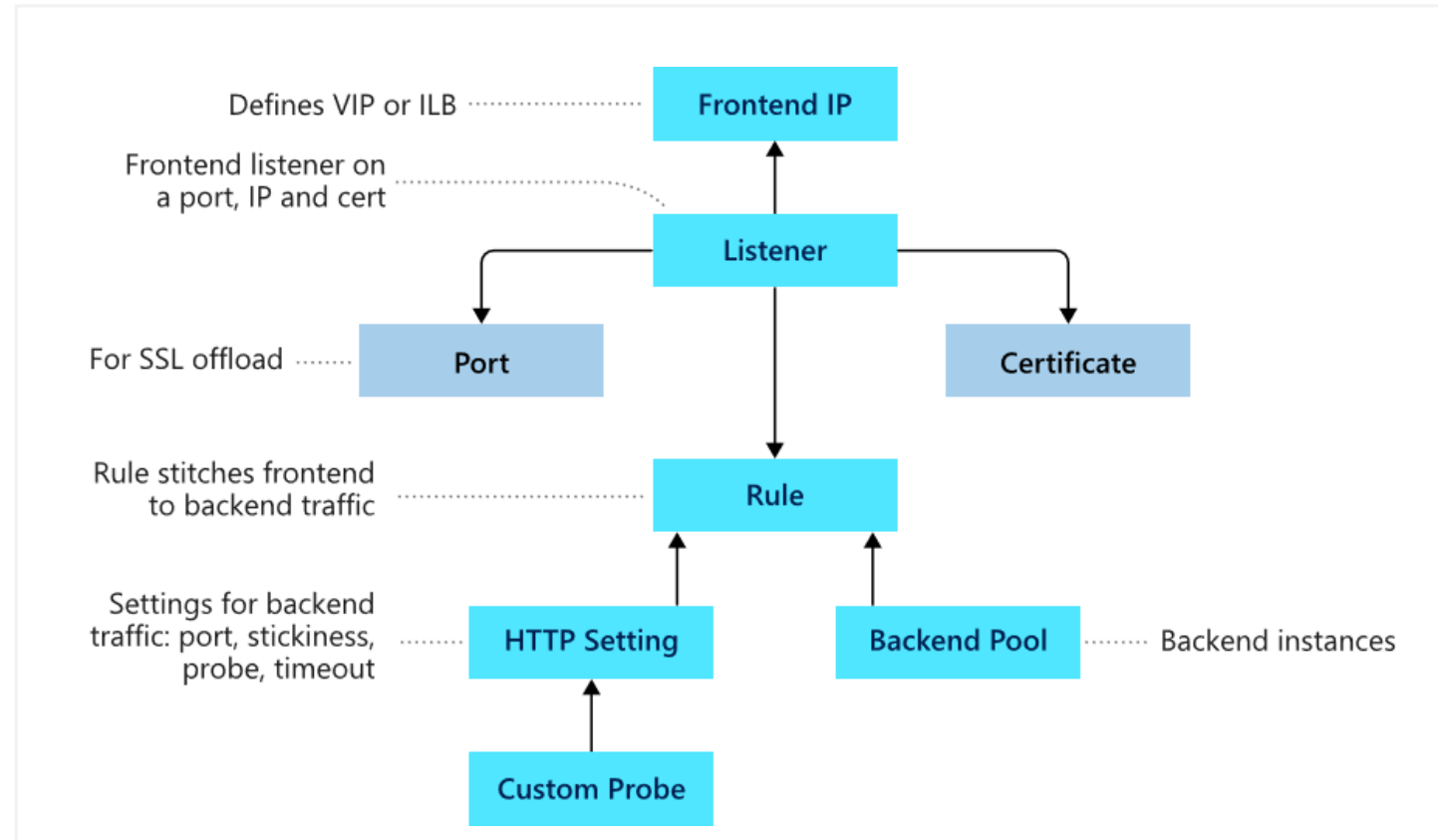
Listeners

Routing rules

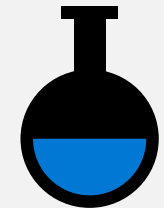
Backend pools

Web application
firewall (optional)

Health probes



Lesson 04: Module 06 Lab and Review



Lab 06 – Implement traffic management

Scenario

You are tasked with implementing a hub spoke topology for network traffic. The topology should include an Azure Load Balancer and Azure Application Gateway.

Objectives

Task 1:

Provision the lab environment

Task 2:

Configure the hub and spoke network topology

Task 3:

Test transitivity of virtual network peering

Task 4:

Configure routing in the hub and spoke topology

Task 5:

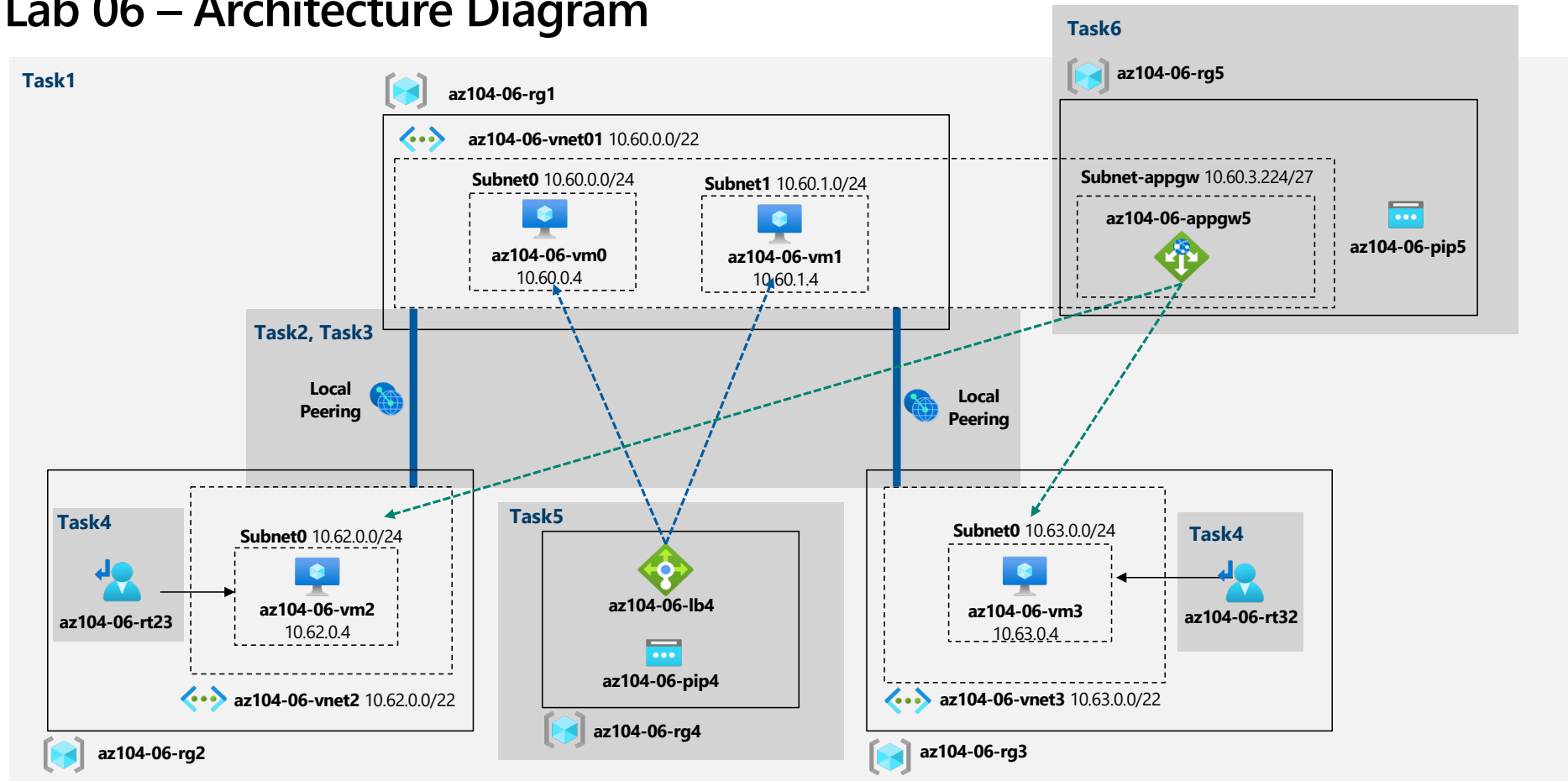
Implement Azure Load Balancer

Task 6:

Implement Azure Application Gateway

Next slide for an architecture diagram 

Lab 06 – Architecture Diagram



Module Review

Module Review Questions



Microsoft Learn Modules (docs.microsoft.com/Learn)

Manage and control traffic flow in your Azure deployment with routes

Improve application scalability and resiliency by using Azure Load Balancer

Load balance your web service traffic with Application Gateway

Enhance your service availability and data locality by using Azure Traffic Manager

End of presentation