BAIT 3273 Cloud Computing

Week 8

Core Cloud Services
Azure networking options

Lesson Objectives:

- To learn how Azure virtual network provides secure network communication among resources
- To understand what high availability and resiliency mean
- To learn how Azure Load Balancer can increase resiliency
- To understand what latency mean
- To learn how Traffic Manager helps reduce network latency and provides resiliency

Introduction

- Azure networking provides fast and secure network
- Azure Load Balancer helps improve availability and resiliency
- Traffic Manager minimizes network latency across different geographic regions

Azure Networking

Deploy site to Azure

Larger enterprise systems usually consist of multiple inter-connected applications and services that work together. Software architects and designers have adopted several strategies and patterns to make these complex systems easier to design, build, manage, and maintain. These includes:

- Loosely Coupled Architecture
- N-tier Architecture

Loosely Coupled Architectures

Cloud Computing

Service Level Agreement (SLA)

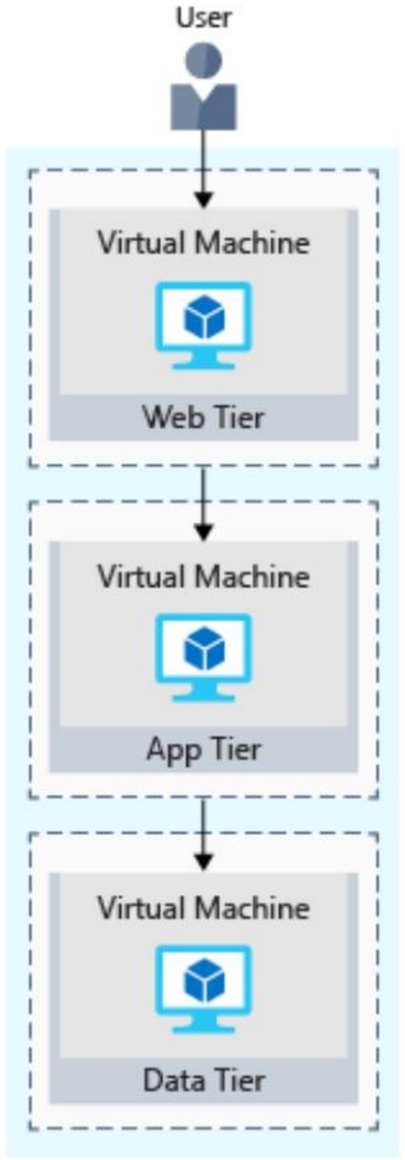
- What is SLA??

N-tier architecture

- Used to build loosely coupled system
- Break the system into two or more logical tiers
- Higher tier access services from lower tier

Typically, e-commerce web application follows three tier architecture:

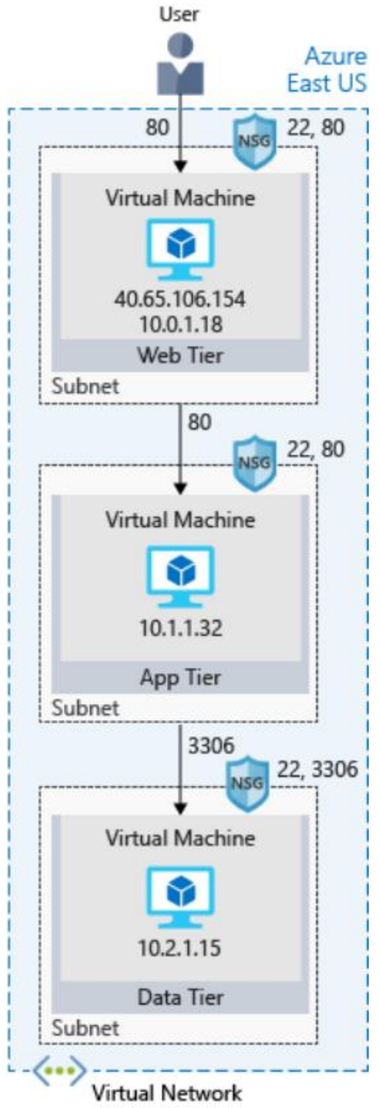
- **Web tier** – Web interface
- **Application tier** – Business logic
- **Data tier** – databases that store information



E-commerce site running on Azure

Azure provides many different ways to host web applications

- From fully pre-configured environments that host the code
- To Virtual machines that users configure, customize, and manage



Azure region

- Azure datacenters in a specific geographic area
- E.g. East US, West US

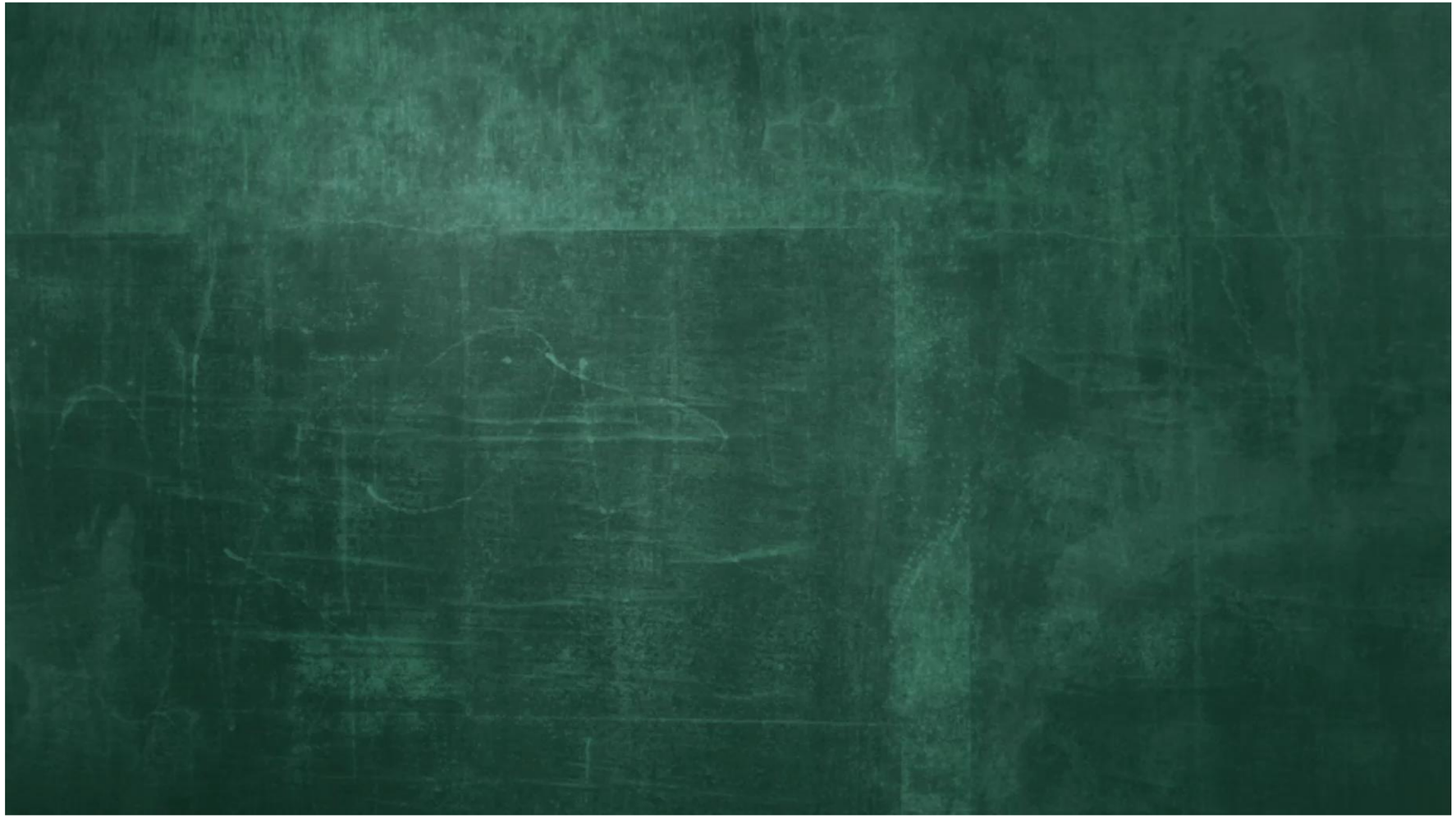
Network security group

- Allow or deny inbound network traffic
- Cloud-level firewall

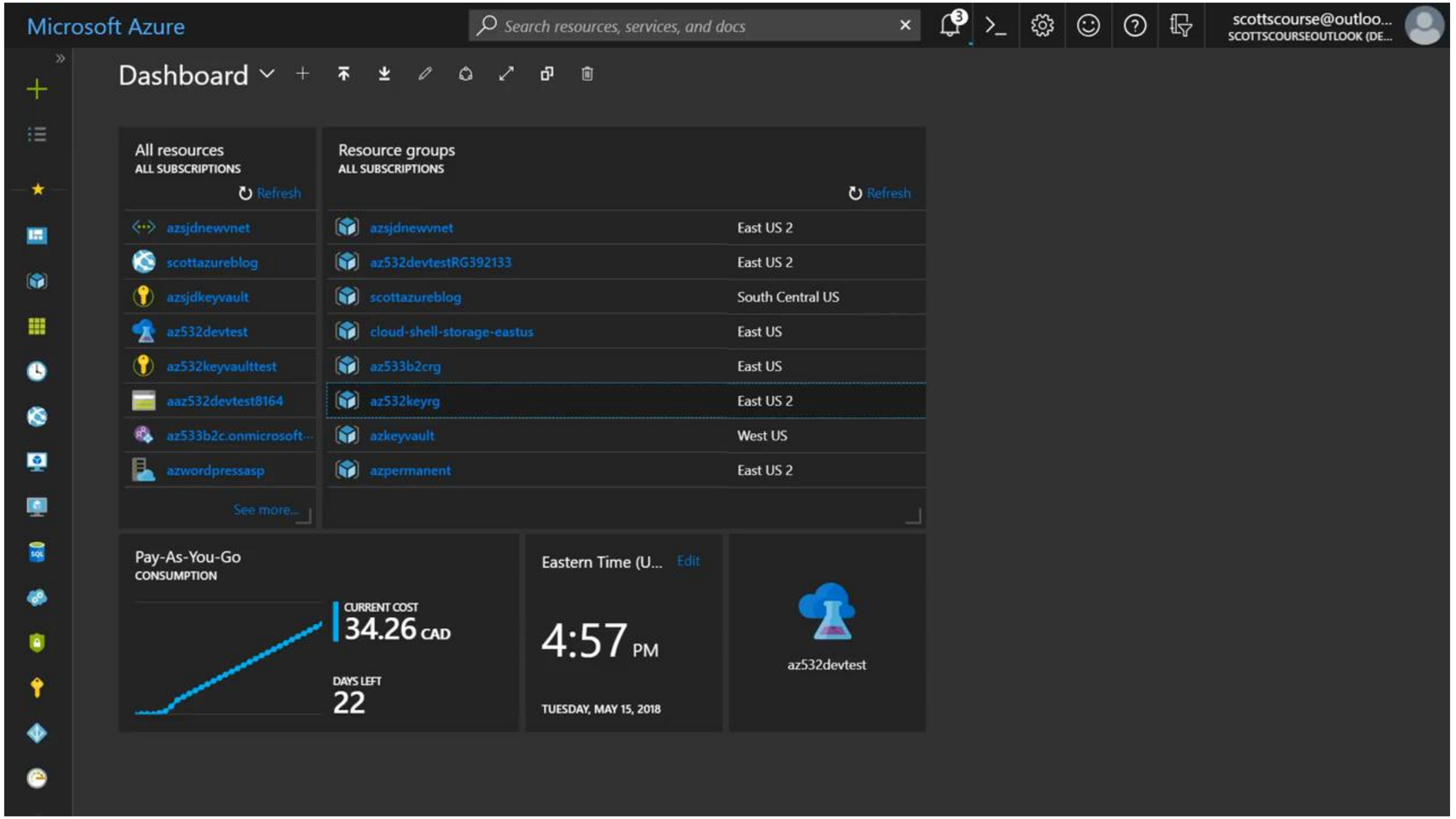
Virtual Network

- Logically isolated network
- Ensure secure network communication
- Scope is limited to single region
- Segmented into one or more subnets, that helps organize and secure resources
- Each tier has single VM, each VM is separated in different subnets
- Can be configured through software

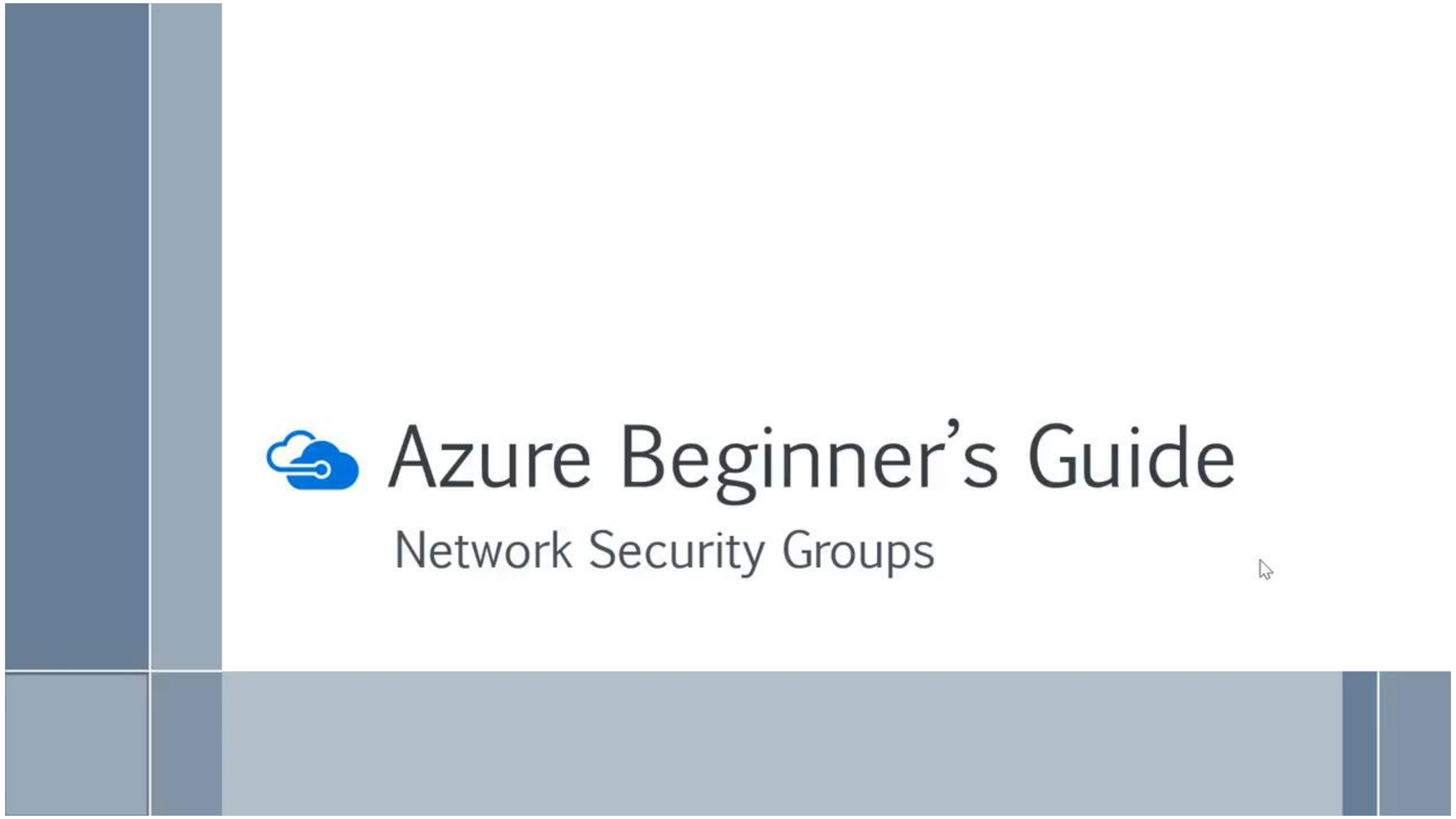
Virtual Network



Create Azure Virtual Network



Network security groups



Summary for deploying site to Azure

- N tier architecture can access services only from a lower tier
- Virtual networks enable users to group and isolate related systems
- Network security groups control inbound network traffic to Azure resources

Check your knowledge

1. What is an Azure *region*?

- ○ One or more Azure data centers within a specific geographical location.
- ○ A way of breaking networks into smaller networks.
- ○ Firewall rules which define the flow of traffic in and out of Azure.

2. Which of the following is true about virtual networks?

- ○ You configure virtual networks through software.
- ○ A virtual network accepts network traffic on all ports. You configure the firewall through virtual machines.
- ○ Virtual networks are always reachable from the internet.

Answer

1. What is an Azure *region*?

- (●) One or more Azure data centers within a specific geographical location. ✓

  Azure regions help you deliver your apps and services closest to your users. West US and North Europe are examples.

- ( ) A way of breaking networks into smaller networks.
- ( ) Firewall rules which define the flow of traffic in and out of Azure.

2. Which of the following is true about virtual networks?

- (●) You configure virtual networks through software. ✓

  Software enables you to treat a virtual network just like your own network. Azure maintains the physical hardware for you.

- ( ) A virtual network accepts network traffic on all ports. You configure the firewall through virtual machines.
- ( ) Virtual networks are always reachable from the internet.

Scale with Azure Load Balancer

Azure load balancer ensure users' site is running 24/7 and can handle large number of users visit at the same time.

High availability

- Refers to a service that is up and running for a long time without interruption
- E.g. Five nines availability (99.999% up time)

Resiliency

- The ability of the system to keep running under abnormal conditions.
- E.g. Natural disasters, DDoS attack, system maintenance

Load balancer

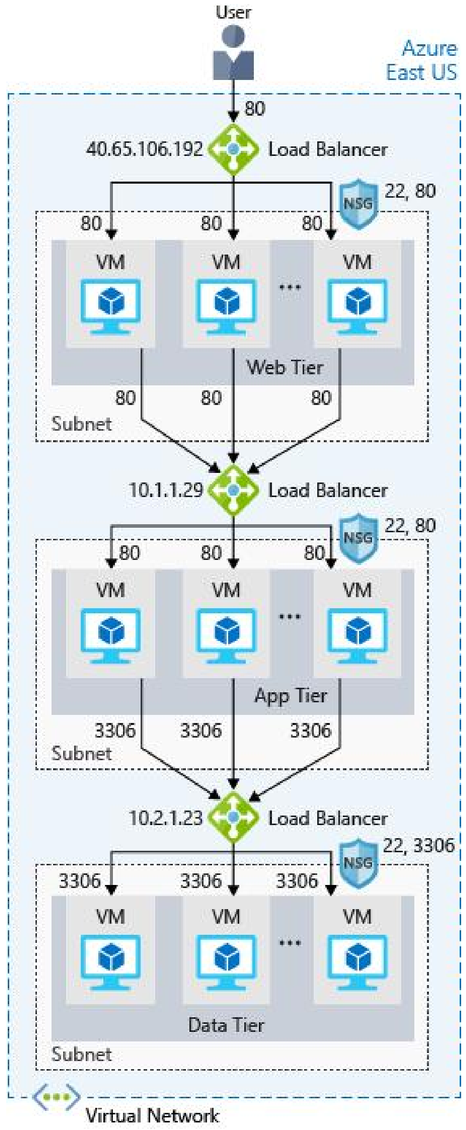
- Distribute traffic equally between each system in the pool
- Helps achieve high availability and resiliency
- Only directs traffic to available servers

Azure Load Balancer

- Take care of the maintenance for users
- Supports inbound and outbound scenarios
- Low latency and high throughput
- Scale to millions of flows

Can be used with:

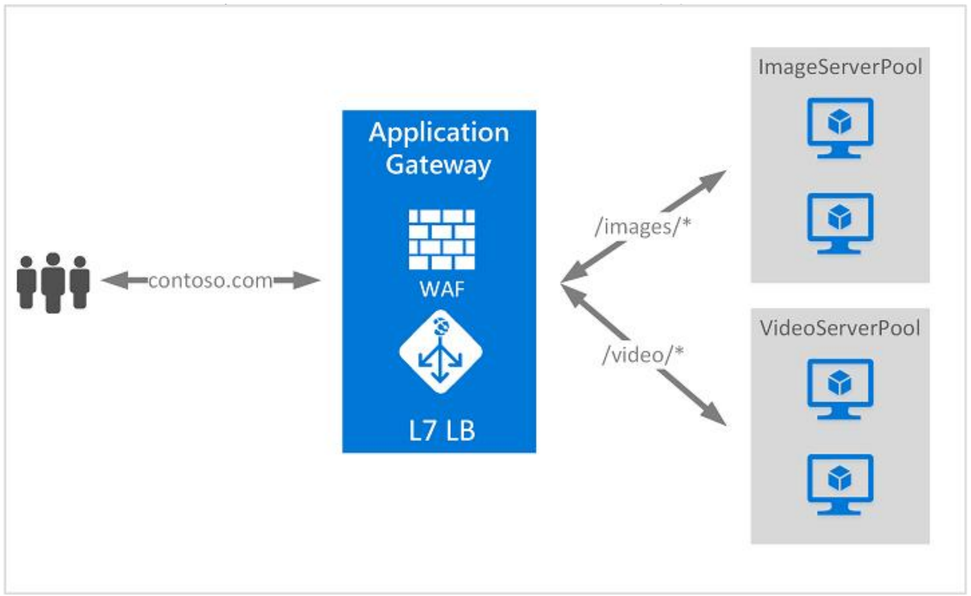
- Incoming internet traffic
- Internal traffic
- Port forwarding
- Outbound connectivity



Azure Load Balancer

Azure Application Gateway

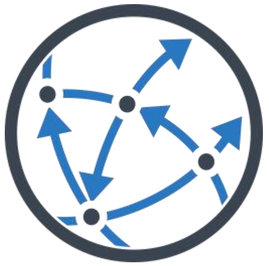
- Load balancer designed for web application



Pros:

- **Cookie affinity** – To keep session on backend server
- **SSL termination** – To avoid encryption or decryption overhead
- **Web application firewall** – To detect malicious attack
- **URL rule-based routes** – To route traffic based on URL patterns, source and destination IP address, and port
- **Rewrite HTTP headers** – Enable important security scenarios or scrub sensitive information

Azure Application Gateway



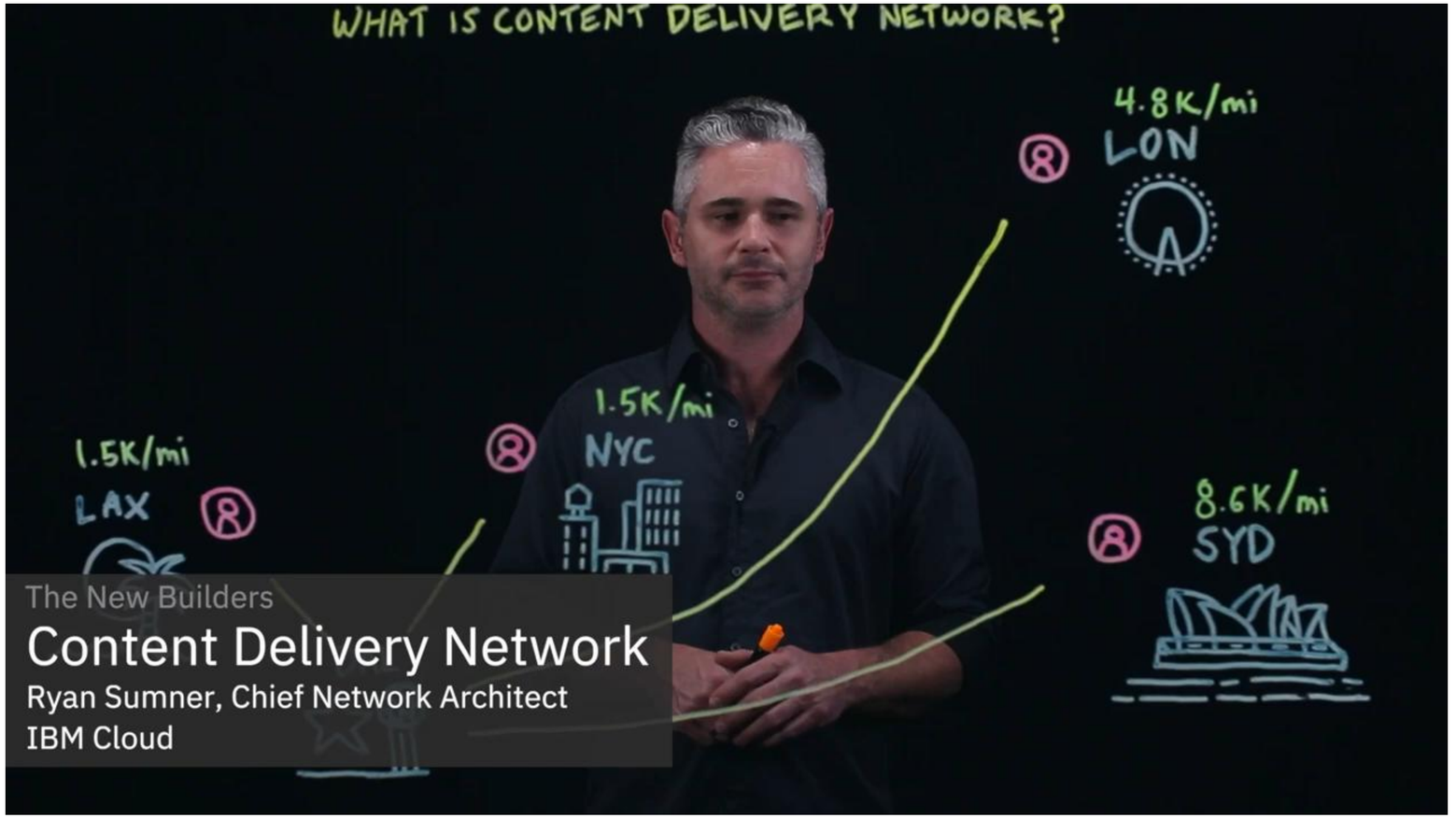
Content Delivery Network

- Distributed network of server
- Deliver content to users
- Minimize latency

Domain Name System

- Is a way to map user-friendly names to their IP addresses.
- Hosting service for DNS domains running on Azure infrastructure.
- Users can bring own DNS server or use Azure DNS

Content Delivery Network



Summary for scaling with Azure Load Balancer

- Load Balancer helps improve users' site availability and resiliency
- Load balancer distributes traffic to another available system when users perform maintenance
- DNS work as a phonebook that maps user-friendly names to their IP addresses

Check your knowledge

1. Which is true about Azure Load Balancer?

- ○ You must use Azure Load Balancer if you want to distribute traffic among your virtual machines running in Azure.
- ○ Azure Load Balancer works with internet-facing traffic only.
- ○ Azure Load Balancer distributes traffic among similar systems, making your services more highly available.

Answer

1. Which is true about Azure Load Balancer?

- ○ You must use Azure Load Balancer if you want to distribute traffic among your virtual machines running in Azure.
- ○ Azure Load Balancer works with internet-facing traffic only.
- ◉ Azure Load Balancer distributes traffic among similar systems, making your services more highly available. ✓

If one system is unavailable, Azure Load Balancer stops sending traffic to it. It then directs traffic to one of the responsive servers.

Reduce latency with Azure Traffic Manaaer

Network Latency

- Time taken for data to be transmitted over the network
- Measured in milliseconds
- Distance, type of connection, and apps design can affect latency

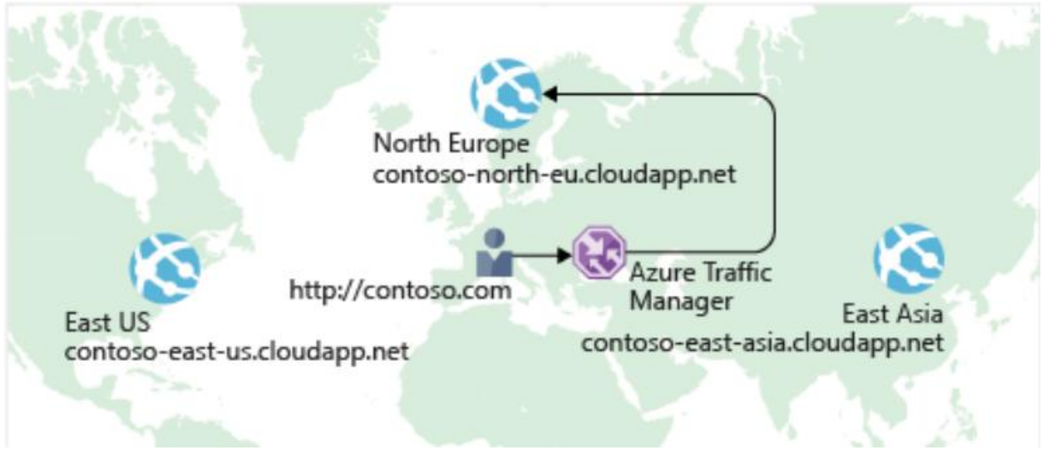
In order to reduce latency, the sites need to be **scaled out to different regions.**

Azure consist of many datacenters in different regions around the world. Users can save the cost of replicating their applications by using Azure.

Network Latency

Azure Traffic Manager

- Uses DNS server closest to the user to direct user traffic to globally distributed endpoints.
- Direct the client web browser to the preferred endpoint
- Traffic can be routed in several different ways
- Can be connected to on-premises network



Azure Traffic Manager

Load Balancer vs. Traffic Manager

Load Balancer	Traffic Manager
Distribute traffic within the same region, make users services more highly available and resilient	Work at DNS level, direct the traffic to the endpoint in the region closest to your user.
When Load Balancer detects an unresponsive VM, it directs the traffic to other VMs that is responsive in the pool.	When Traffic Manager finds an unresponsive endpoint, it directs the traffic to the next nearest endpoint that is responsive.

ummary for Reducing latency with Azure Traffic Manager

- Geographical distance is one of the biggest factors affecting latency
- Traffic Manager directs traffic to the users by choosing the server that is closest to the user to reduce latency

Check your knowledge

1. What is network latency?

- ○ The amount of data that can fit on the connection.
- ○ The distance data must travel to reach its destination.
- ○ The time it takes for data to travel over the network.

2. How does Azure Traffic Manager reduce latency?

- ○ It chooses only the fastest networks between endpoints.
- ○ It uses the DNS server that's closest to the user.
- ○ It caches content, similar to how content delivery networks work.

Answer

1. What is network latency?

- ○ The amount of data that can fit on the connection.
- ○ The distance data must travel to reach its destination.
- ◉ The time it takes for data to travel over the network. ✓

  Latency measures the time it takes for data to reach its destination. Latency is typically measured in milliseconds.

2. How does Azure Traffic Manager reduce latency?

- ○ It chooses only the fastest networks between endpoints.
- ◉ It uses the DNS server that's closest to the user. ✓

  Choosing the server that's closest to the user is a good way to reduce latency.

- ○ It caches content, similar to how content delivery networks work.

Summary

- User sites can be used anywhere around the world
- Makes users site more high available and resilient.
- Enable traffic to be directed to the domain that is nearest to the users

Thanks!