





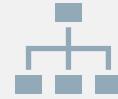


# Microsoft Azure Fundamentals

VIJAY SAINI

# Microsoft Azure Fundamentals

## Section: Introduction



Course Structure



Core Azure Identity services



About Az-900 Certificate Exam



Important Tips

# *Exam AZ-900: Microsoft Azure Fundamentals*

Designed for candidates looking to demonstrate foundational-level knowledge of cloud services

The exam can be taken by both technical and non-technical candidates

This exam doesn't have any prerequisites

This exam measures your ability to understand the concepts of cloud concepts; core Azure services; security, privacy, compliance, and trust; and Azure pricing and support

# *Importance of AZ-900 Exam*

## **Build Team:**

Which resource group you want me to deploy to the database server?

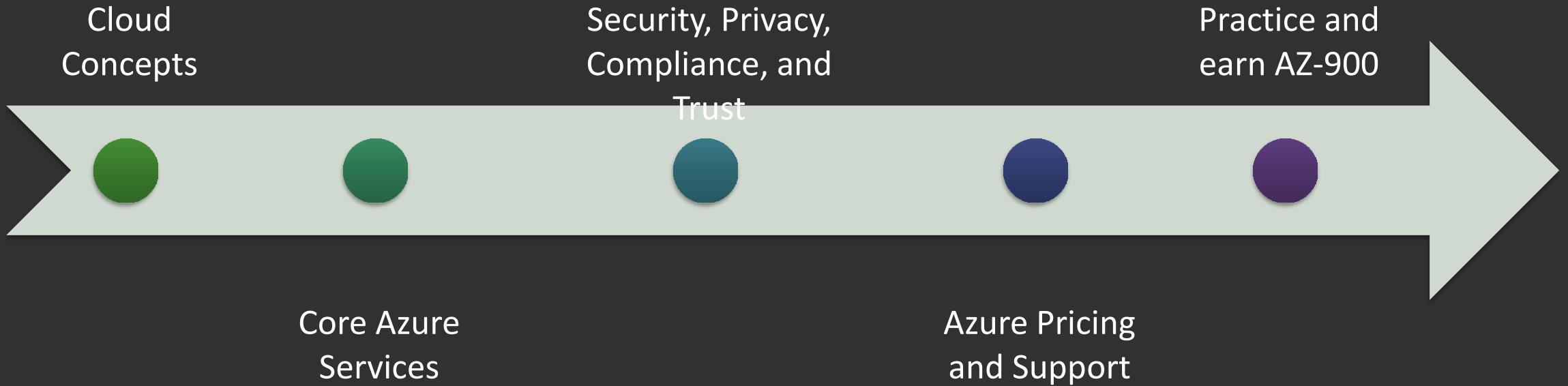
## **Planning team:**

Why are Azure resources not tagged properly? This is impacting their cost calculation for the quarter.

## **Sales team:**

Use the latest version of image and build us an environment for the demonstration of our product to customer. Don't forget to create guest user account for customer in azure AD.

# Course Structure



# *Important*

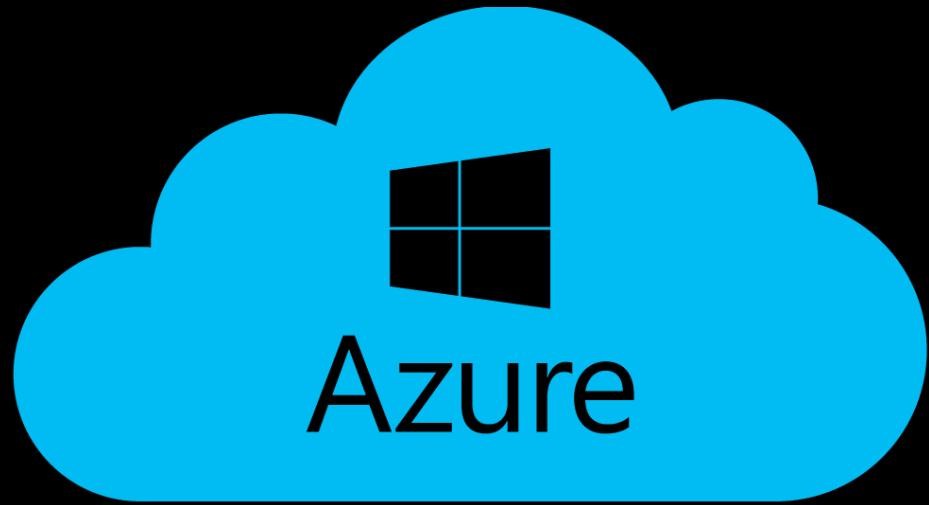
- ★ The course structure strictly follows the examination structure
- ★ Don't skip quizzes
- ★ We will cover a lot of Azure Services at the introductory level
- ★ More theory
- ★ Content in the slides
- ★ Please provide your review on the course

# Official Documentation

- <https://docs.microsoft.com/en-in/azure>

Thank You





# Section 1 : Understand Cloud Concepts

What is Cloud

Why Cloud

Cloud Deployment  
Models

Cloud Service  
Models

Cloud Key  
Terminology

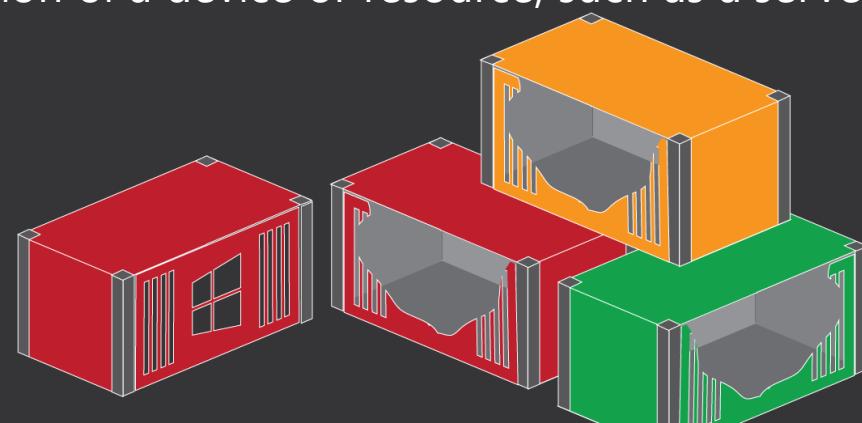
# Computing and Virtualization

## Computing:

The process of utilizing computer technology to complete a task. Computing may involve computer hardware and/or software, but must involve some form of a computer system.

## Virtualization:

In computing, virtualization means to create a virtual version of a device or resource, such as a server, storage device, network, or even an operating system.



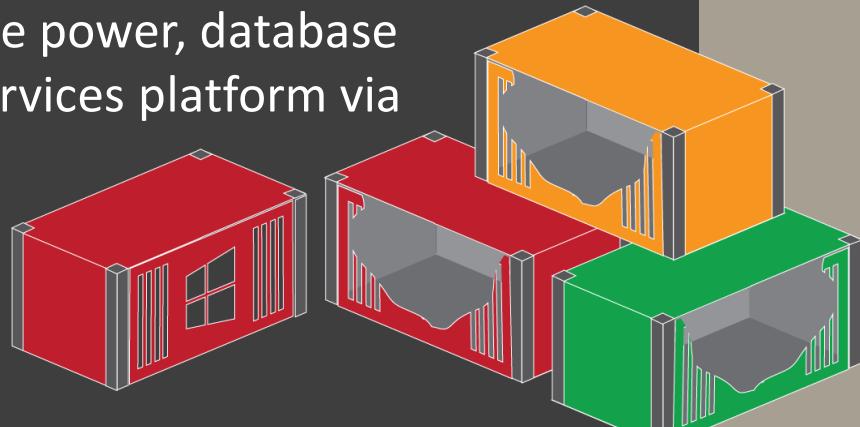
# What is Cloud Computing?

## **Microsoft says:**

Cloud computing is the delivery of computing services including servers, storage, databases, networking, software, analytics, intelligence, and more over the Internet (“the cloud”) to offer faster innovation, flexible resources, and economies of scale.

## **AWS says:**

Cloud computing is the on-demand delivery of compute power, database storage, applications, and other IT resources through a cloud services platform via the Internet with pay-as-you-go pricing.



# What is Cloud Computing

## NIST Definition:

Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (for example, networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction.

This cloud model is composed of five essential characteristics, three service models, and four deployment models.

Source: <https://nvlpubs.nist.gov/nistpubs/Legacy/SP/nistspecialpublication800-145.pdf>

# Cloud Computing

As per NIST, Essential Characteristics of Cloud Computing:

- On-demand self-service
- Broad network access
- Resource pooling
- Rapid elasticity
- Measured service

# As per NIST, Cloud Computing

## Deployment Models:

Private cloud

Community cloud

Public cloud

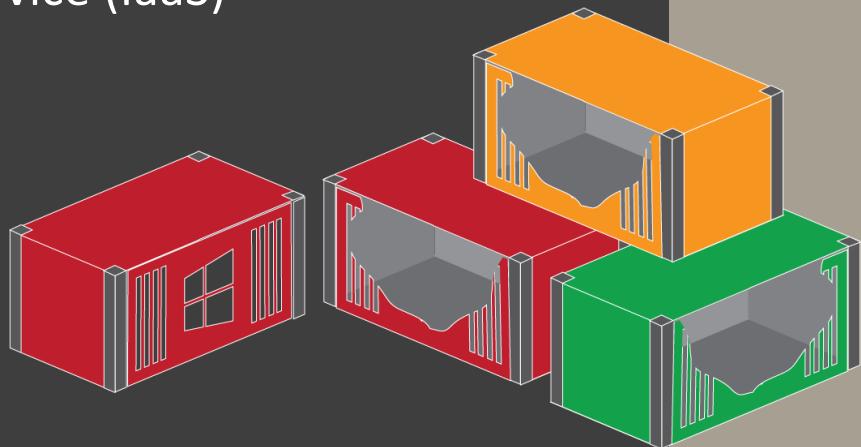
Hybrid cloud

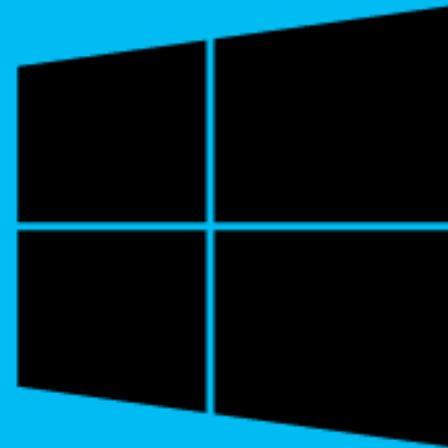
## Service Models:

Software as a Service (SaaS)

Platform as a Service (PaaS)

Infrastructure as a Service (IaaS)





Azure

# Advantages of Cloud

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- ✈ Cost
- ✈ Agility
- ✈ Service quality
- ✈ Integration of latest technology – IOT and ML
- ✈ High availability
- ✈ Reliability with real time failover
- ✈ Disaster recovery
- ✈ Ease of management

# CapEx Versus OpEx

## Capital Expense (CapEx)

It is a spending of money on physical infrastructure upfront to create a benefit in the long term.

**Example:** Server costs, storage costs, network costs, backup and archive costs.

## Operating Expense (OpEx)

It is an expense required for the day-to-day functioning of a business. OpEx is spending money on services or products now and being billed for them now. There's no upfront cost.

**Example:** Lease/rent storage in a data center, leasing software.

- Operating expenses and capital expenses are treated quite differently for accounting and tax purposes.
- CapEx stability or OpEx flexibility

# CapEx Versus OpEx





# Azure Data Center



Azure Data Center

# Economies of Scale

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Ability to do things more efficiently or at a lower-cost per unit when operating at a larger scale.

# Disadvantages of Cloud

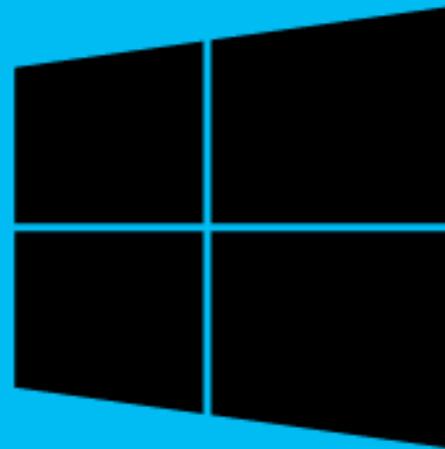
- ★ Fear of change when there's no going back
- ★ Fear of data security
- ★ Fear of losing control

# Test Your Knowledge

Question: Which term from the list below would be viewed as benefits of using cloud services?

- A.) Unpredictable costs
- B.) Elasticity
- C.) Local reach only

Answer: B



Azure

# Cloud Deployment Models

A cloud deployment model defines **where your data is stored** and **how your customers interact with it—how do they get to it—and where do the applications run?**

- Private cloud
- Public cloud
- Hybrid cloud
- Community Cloud



# Private Cloud

Services offered over the Internet or over a private internal network to only select users, not the general public. It is a cloud-based infrastructure used by stand-alone organizations.

A private cloud hosting solution resides on the company's intranet or hosted data center where all of your data is protected behind a firewall.

Private clouds are perfect for organizations that have high-security requirements, high management demands, and availability requirements.

**Advantages:** More flexibility, improved security, high scalability



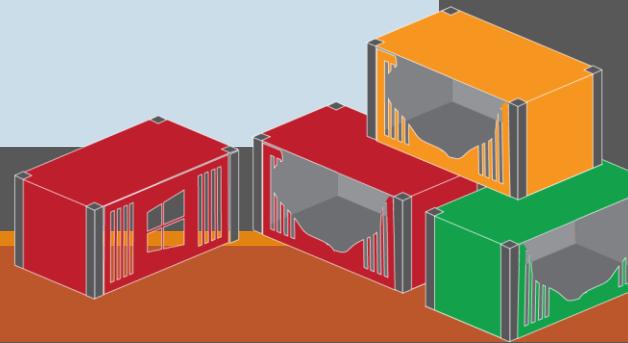
# Public Cloud

Services offered over the public Internet and available to anyone who wants to purchase them.

Infrastructure is shared by multiple businesses and owned and operated by a service provider, offering fast provisioning.

The cloud resources are owned and operated by a third-party cloud service provider and delivered over the Internet. Microsoft Azure is an example of a public cloud.

**Advantages:** Lower costs, no maintenance, near-unlimited scalability, high reliability

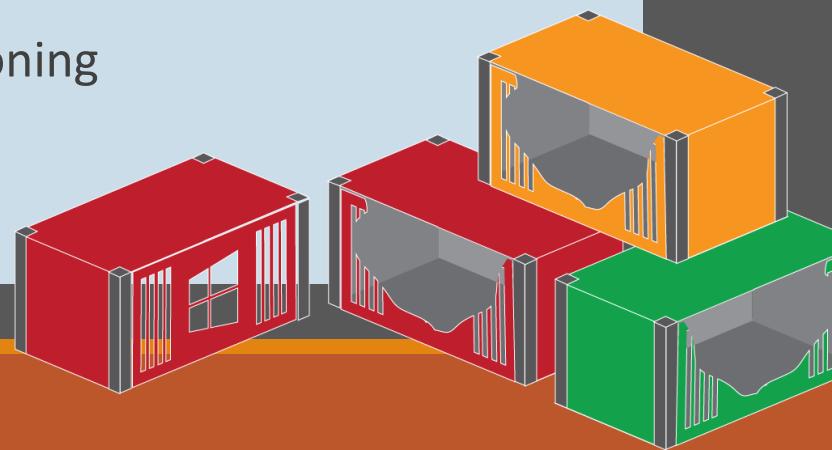


# Hybrid Cloud

Often called “the best of both worlds”, hybrid clouds combine on-premises infrastructure, or private clouds, with public clouds so organizations can reap the advantages of both.

Connect dedicated servers, private and public clouds to tap the power of each and run workloads where they perform best.

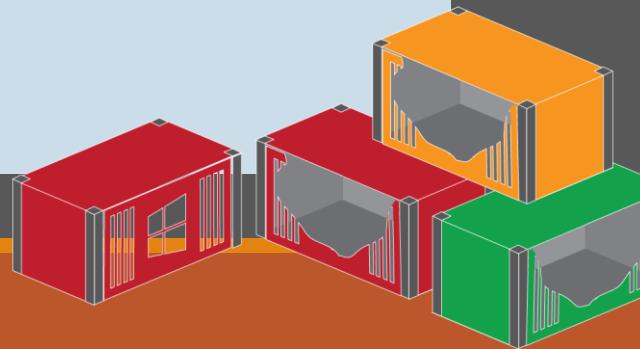
**Advantages:** Control, flexibility, cost-effectiveness, ease—transitioning



# Community Cloud

It is a mutually shared model between organizations that belong to a particular community such as banks, government organizations, or commercial enterprises.

Examples include universities cooperating in certain areas of research, or police departments within a county or state sharing computing resources.



# Choosing a Cloud Deployment Model

To determine cloud deployment model, we must consider:

- ✈ User experience
- ✈ Security
- ✈ Responsibilities

# Test Your Knowledge

Question 1.) Suppose you have two types of applications: legacy applications that require specialized mainframe hardware and newer applications that can run on commodity hardware.

Which cloud deployment model would be best for you?

- A.) Public cloud
- B.) Private cloud
- C.) Hybrid cloud

Answer: C

Explanation: Hybrid cloud—benefit of both private cloud (you need for running your legacy application) and public cloud (which you can utilize for running your newer application).

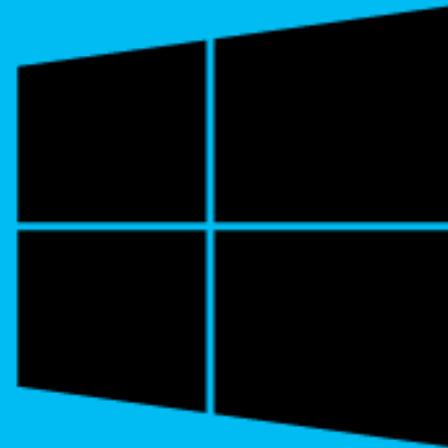
# Test Your Knowledge: Understanding Cloud Concepts

Question 2.) Which cloud model provides the greatest degree of ownership and control?

- A.) Public
- B.) Private
- C.) Hybrid

Answer: B

Explanation: Private cloud models is the correct answer. Both public and hybrid clouds have an infrastructure that is managed by another party. As such, there is less control over the infrastructure.



Azure

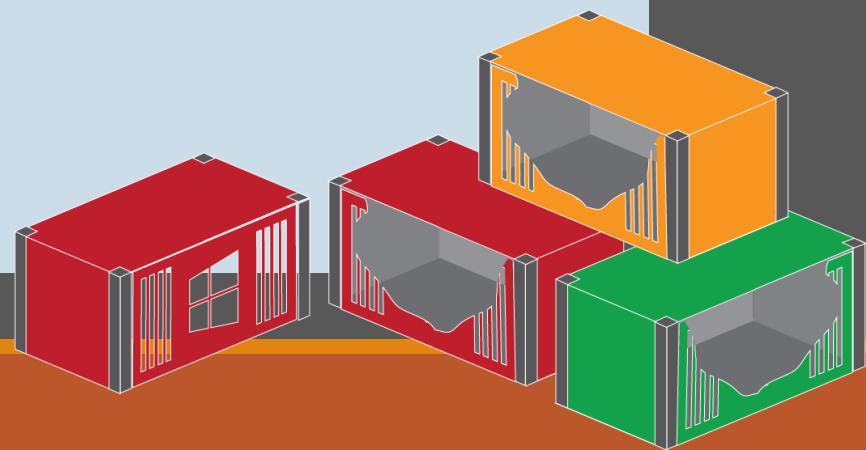


# Microsoft Azure Fundamentals

VIJAY SAINI

# Types of Cloud Services

- ★ Software as a Service (SaaS)
- ★ Platform as a Service (PaaS)
- ★ Infrastructure as a Service (IaaS)



# Types of Cloud Services

## Infrastructure as a Service (IaaS)

IaaS is the lowest level of cloud solution.

The cloud computing service provider such as Azure or AWS, manages the infrastructure, while you purchase, install, configure, and manage your own software—operating systems, middleware, and applications.

Example: Virtual Machines, networks, and storage, and more, on rent basis.



# Types of Cloud Services

## Platform as a Service (PaaS)

With PaaS, apart from simply providing infrastructure, providers also offer a computing platform and solution stack as a service.

This service is used in developing, testing, and maintaining of software. PaaS is the same as IaaS but also provides additional tools such as DBMS, BI services, and so on.

PaaS services are mostly used by companies that need to develop, test, collaborate, and deploy cloud solutions for particular applications

**Examples:** Azure WebApps, Salesforce, Azure SQL database



# Types of Cloud Services

## Software as a Service

SaaS providers provide fully functional web-based applications on demand to customers. The applications are mainly targeted at business users and can include web conferencing, ERP, CRM, email, time management, project tracking, among others.

This service makes the users connect to the applications through the Internet on a subscription basis.

**Example:** Office365 , Google Applications, Salesforce, Citrix



# Management responsibilities



# Test Your Knowledge : Understanding Cloud Concepts

Question 1: As an end user, you want to create and deploy an application in cloud as quickly as possible without having to worry about managing the underlying infrastructure. Which service model is recommended for you?

- A.) SaaS
- B.) PaaS
- C.) IaaS

Answer: B

In PaaS model, user has to worry only about the application and data and other management responsibilities are with the cloud service provider.

# Test Your Knowledge : Understanding Cloud Concepts

Question 2: You are an IT company providing a supply chain software solution that is a multi-tier application and has very complex architecture. You want to be able to quickly migrate your solution to public cloud. Which service model is ideal for your needs?

- A.) SaaS
- B.) PaaS
- C.) IaaS

**Answer: C**

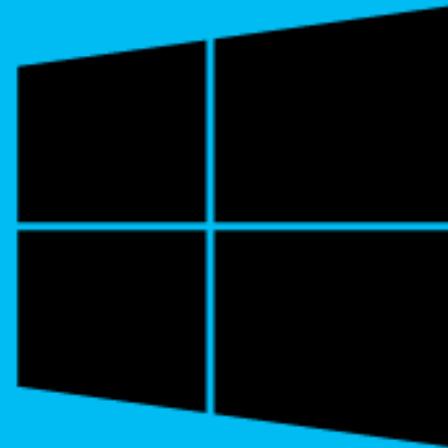
IaaS will provide maximum flexibility and control among other service models to deploy your application quickly (lift and shift migration).

# Cloud Computing Summary

Cloud computing provides a modern alternative to the traditional on-premises datacenter. Public cloud vendors provide and manage all computing infrastructure and the underlying management software.

These vendors provide a wide variety of cloud services. A cloud service in this case might be a virtual machine, a web server, or cloud-hosted database engine. As a cloud provider customer, you lease these cloud services on an as-needed basis.

In doing so, you convert the capital expense of hardware maintenance into an operational expense.

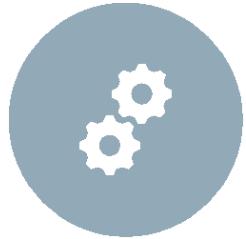


Azure

Thank You



# Section 2 : Understand Core Azure Services



Core Azure  
Architectural  
Components



Core Products  
Available in Azure



Solutions Available  
on Azure



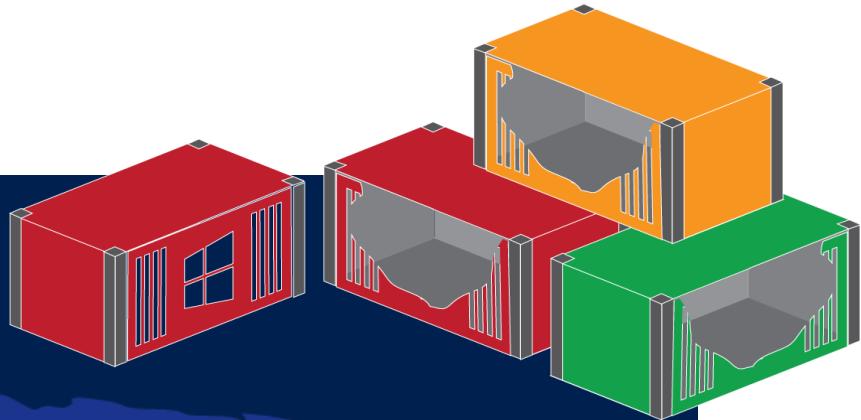
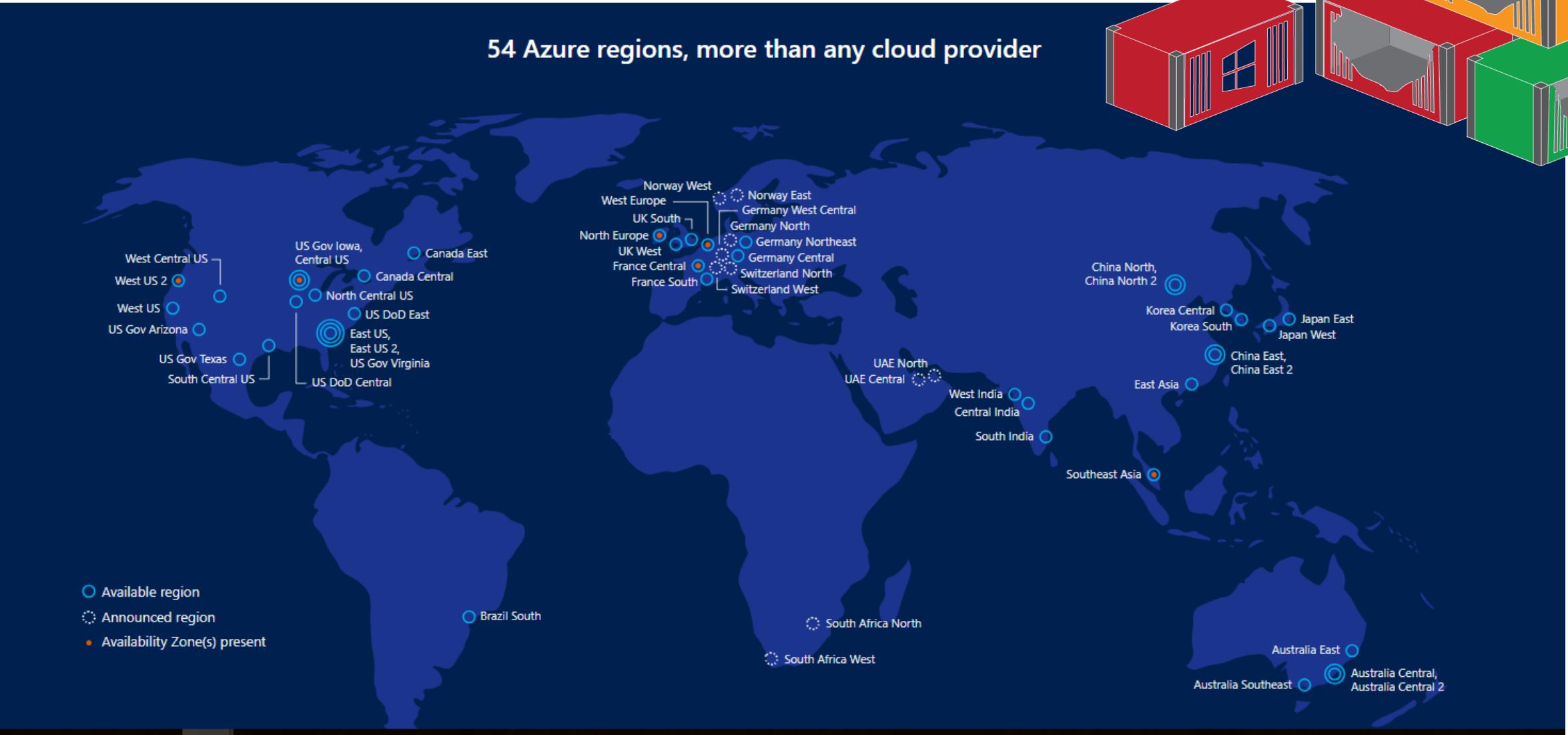
Azure Management  
Tools

# Azure Architecture

## What is a region?

A region is a geographical area on the planet containing at least one, but potentially multiple, datacenters that are nearby and networked together with a low-latency network. Azure intelligently assigns and controls the resources within each region to ensure that workloads are appropriately balanced.

# Azure Regions



<https://azure.microsoft.com/en-in/global-infrastructure/regions/>

<https://thenextweb.com/microsoft/2018/06/07/microsoft-just-dropped-864-servers-into-the-sea-to-run-an-underwater-data-center/>

<https://youtu.be/AvvJc4Uw3aA>

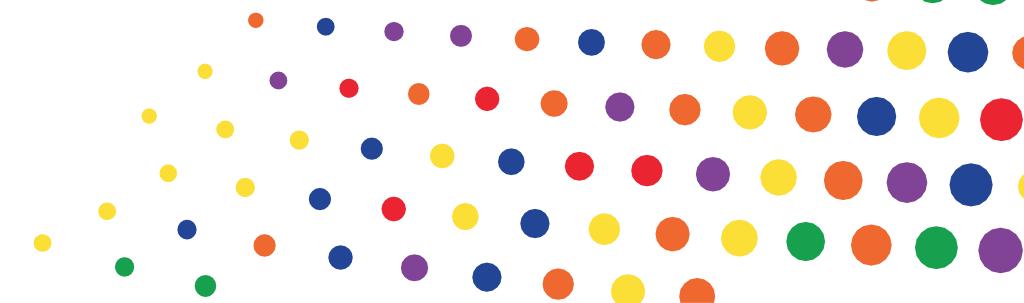
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## Microsoft just dropped 864 servers into the sea to run an underwater data center

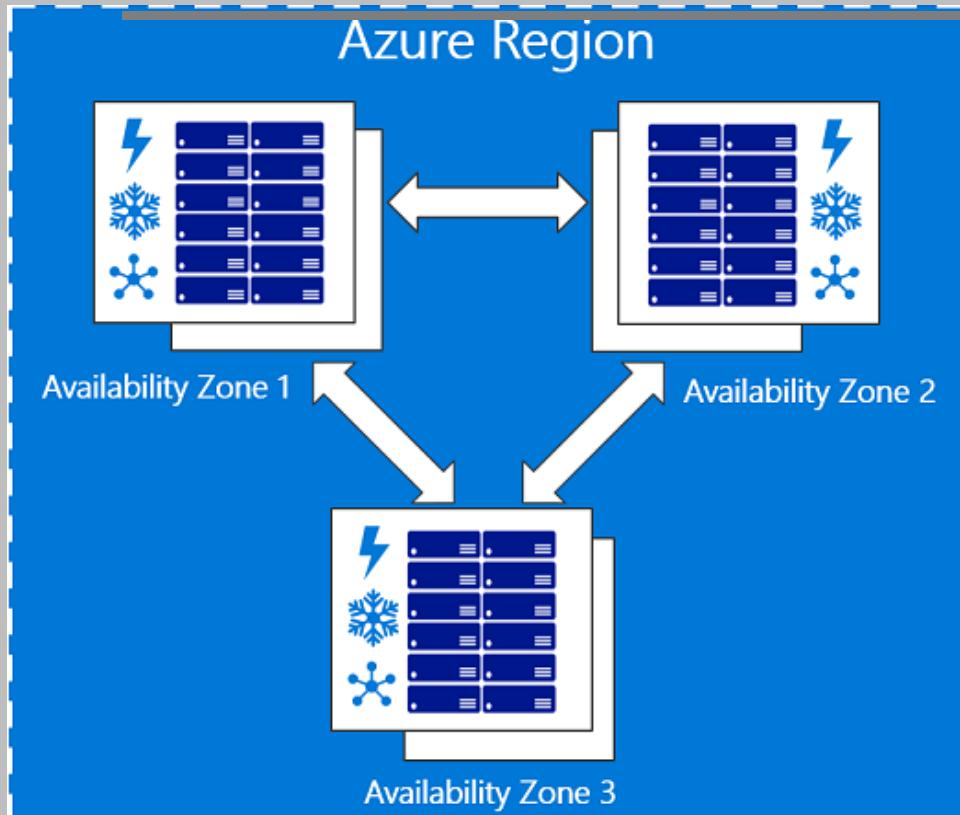


Credit: Microsoft

# Azure Architecture



# Availability Zone



Availability Zones is a high-availability offering that protects your applications and data from datacenter failures.

To ensure resiliency, there's a minimum of three separate zones in all enabled regions. The physical separation of Availability Zones within a region protects applications and data from datacenter failures.

<https://docs.microsoft.com/en-us/azure/availability-zones/az-overview>

# Availability Zone

Availability Zones are physically separate datacenters within an Azure region.

Each Availability Zone is made up of one or more datacenters equipped with independent power, cooling, and networking.

If one zone goes down, the other continues working.

Availability Zones are connected through high-speed, private, fiber-optic networks.

# Resource Group

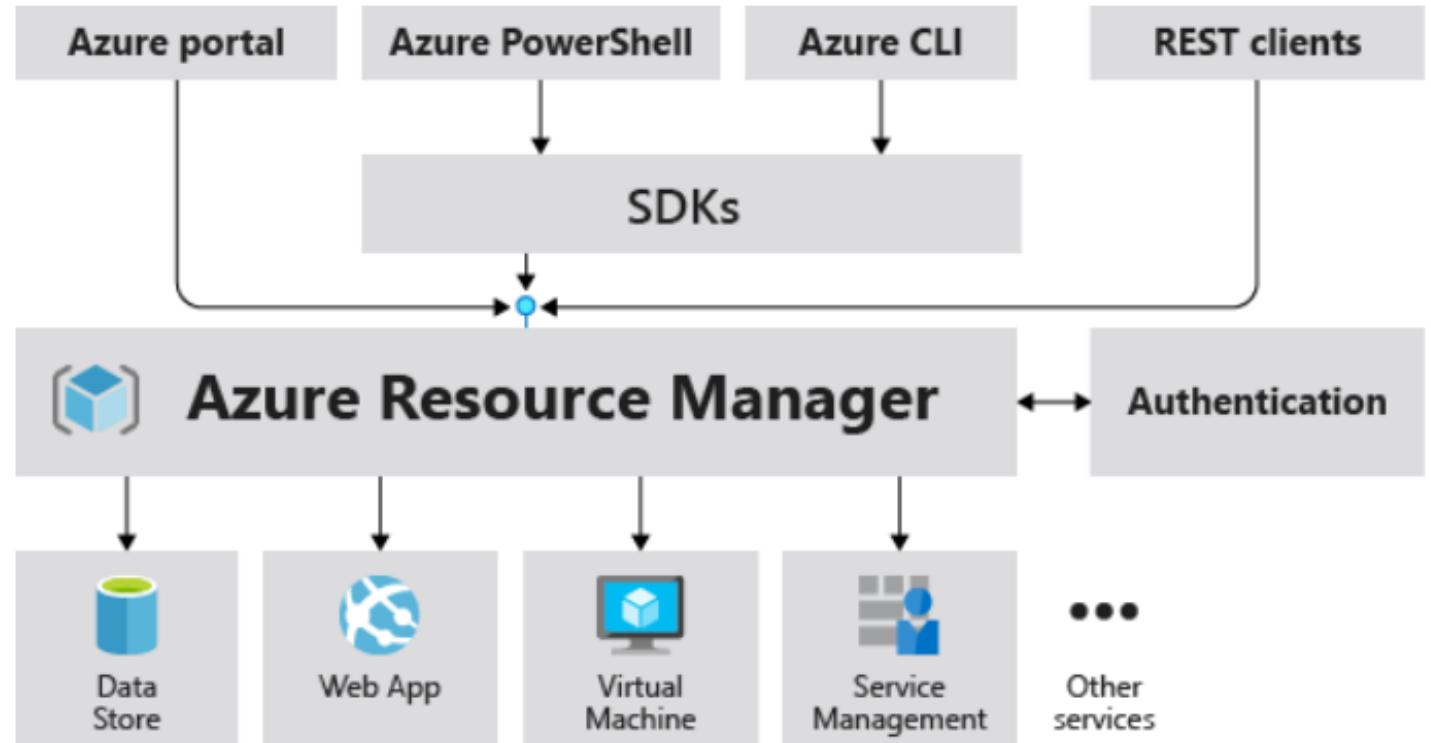
An Azure resource group is a **container** that holds related resources for an Azure solution.

The resource group can include all the resources for the solution, or only resources that you want to manage as a group.

# Resource

A manageable item that is available through Azure.

Virtual machines, storage accounts, web apps, databases, and virtual networks are examples of resources.



# Test Your Knowledge : Understand Core Azure Services

Q1. Deploying an app can be done directly to what level of physical granularity?

- A.) Region
- B.) Datacenter
- C.) Server rack

Answer: A

# Test Your Knowledge : Understand Core Azure Services

Q2. To use Azure datacenters that are made available with power, cooling, and networking capabilities independent from other datacenters in a region, choose a region that supports \_\_\_\_\_?

- A.) Geography distribution
- B.) Service-Level Agreements (SLAs)
- C.) Availability Zones

Answer: C

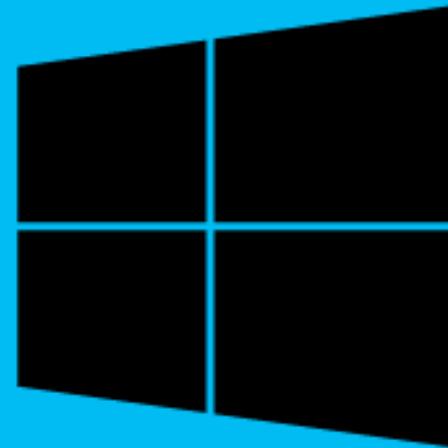


# Test Your Knowledge: Understand Core Azure Services

Q3. Application availability refers to what?

- A.) The service level agreement of the associated resource
- B.) Application support for an availability zone
- C.) The overall time that a system is functional and working

Answer: C



Azure

# Azure Compute Services

Services for hosting and running application workload:

- ★ Azure Virtual Machines—both Linux and Windows
- ★ Virtual Machine Scale Sets
- ★ App services (web apps, mobile apps, logic apps, API apps, and function apps)
- ★ Azure Container Service
- ★ Azure Kubernetes Service (AKS)

## WEBSCALE - Scaling

Virtual machine scale set

Search (Ctrl+J)

Save Discard Refresh

Overview

Activity log

Access control (IAM)

Tags

Diagnose and solve problems

Settings

Instances

Scaling

Storage

Operating system

Security

Delete warning i The very last or default recurrence rule cannot be deleted. Instead, you can disable autoscale to turn off autoscale.

Scale mode  Scale based on a metric  Scale to a specific instance count

i It is recommended to have at least one scale in rule. New rules can be created by click hyperlink [Add a rule](#).

### Rules

Scale out

When	WEBSCALE	(Average) Percentage CPU > 80	Increase count by 2
<a href="#">+ Add a rule</a>			

### Instance limits

Minimum <span style="color: #0070C0;">i</span>	1	✓
Maximum <span style="color: #0070C0;">i</span>	10	✓
Default <span style="color: #0070C0;">i</span>	1	✓

### Schedule

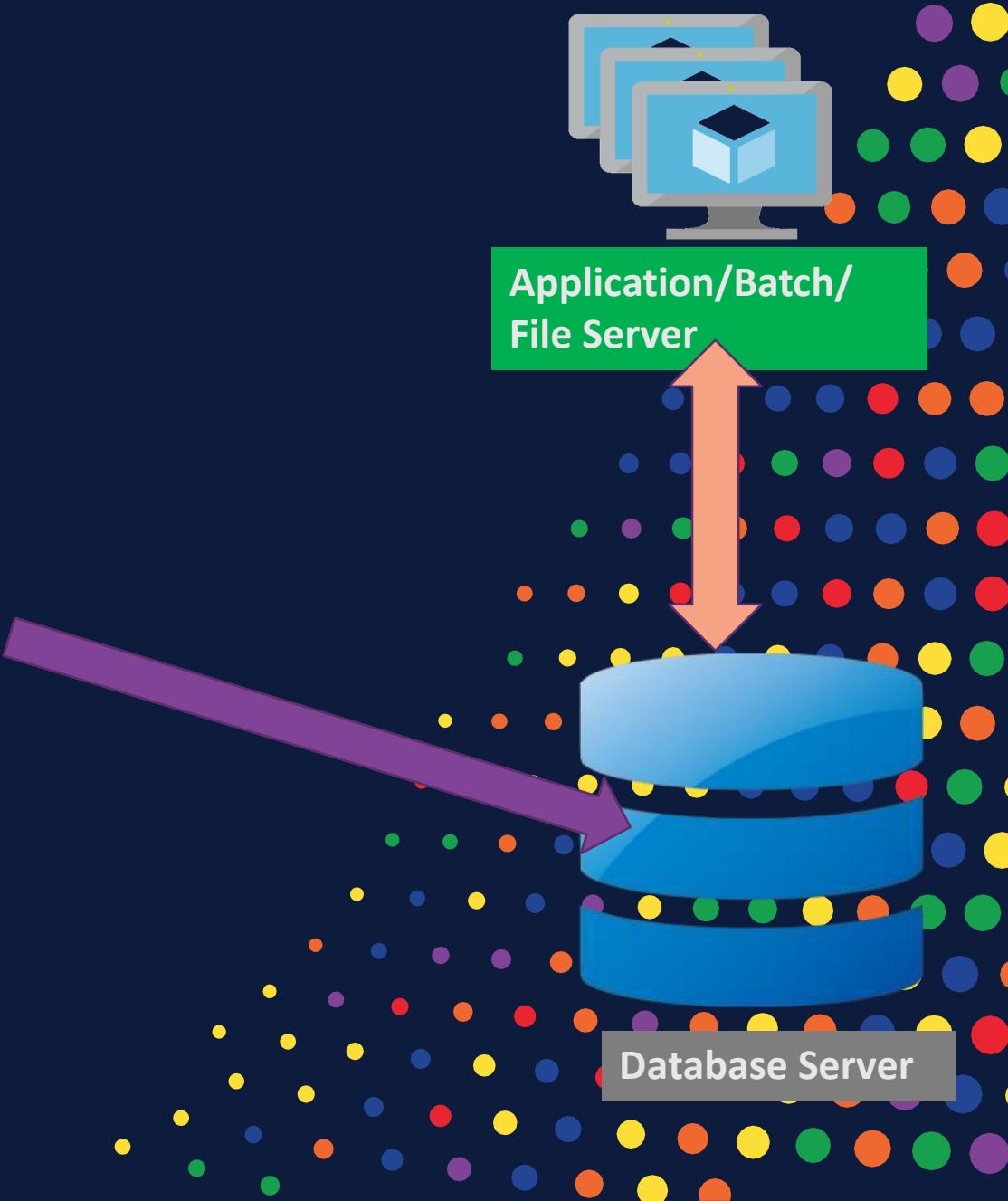
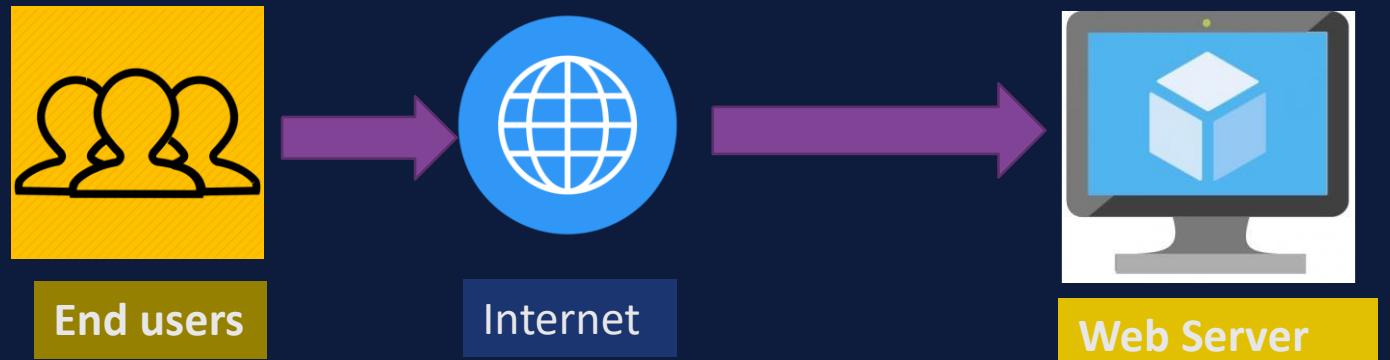
Specify start/end dates  Repeat specific days

# Network Services

Services for networking both within Azure and between Azure and on-premises datacenters:

- ★ Azure Virtual Network
- ★ Azure Load Balancer
- ★ VPN Gateway
- ★ Application Gateway
- ★ Azure Content Delivery Network

# A Simple Application Architecture



# Virtual Network

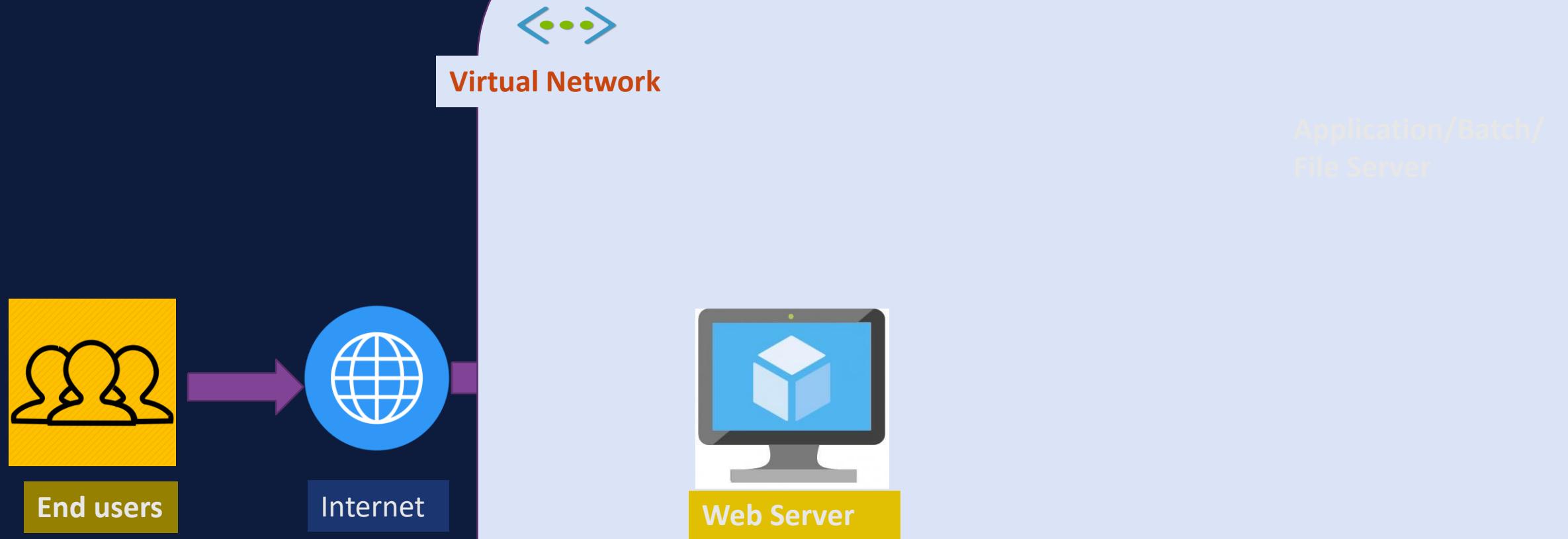
An Azure Virtual Network (VNet) is a representation of your own network in the cloud.

It is a logical isolation of the Azure cloud dedicated to your subscription.

You can use VNets to provision and manage virtual private networks (VPNs).

# A Simple Application Architecture

## - VNET



# A Simple Application Architecture

## - Multiple Web Servers



# Load Balancer

With Azure Load Balancer, you can scale your applications and create high availability for your services.

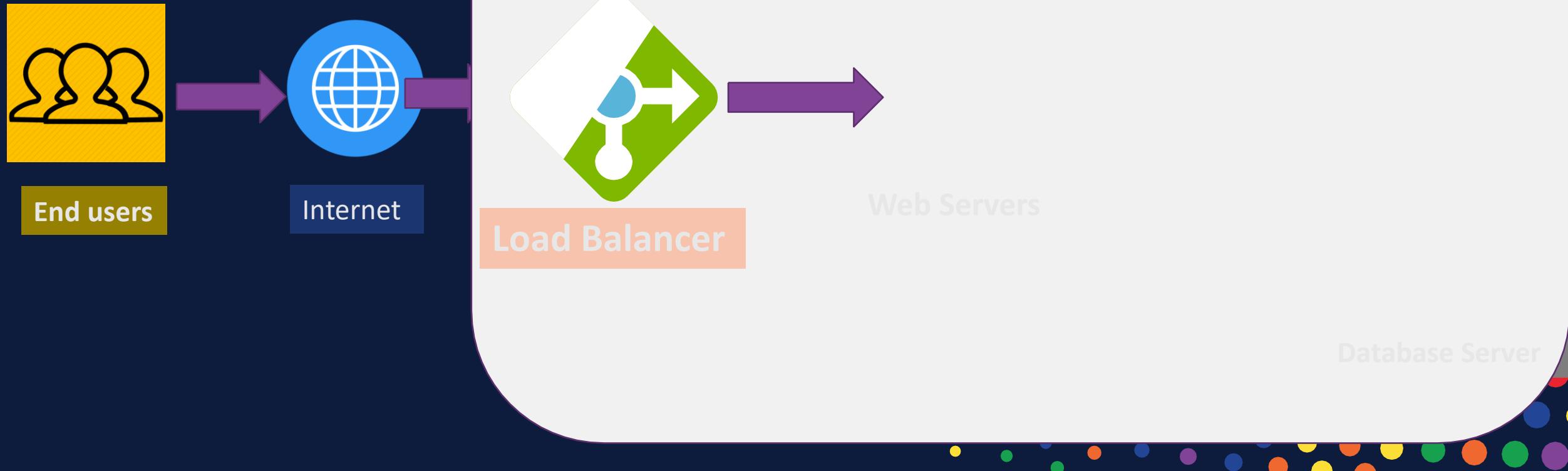
Azure load balancer is a layer-4 load balancer that distributes incoming traffic among healthy virtual machine instances. Load balancers uses a hash-based distribution algorithm.

We can configure the load balancer to perform the following:

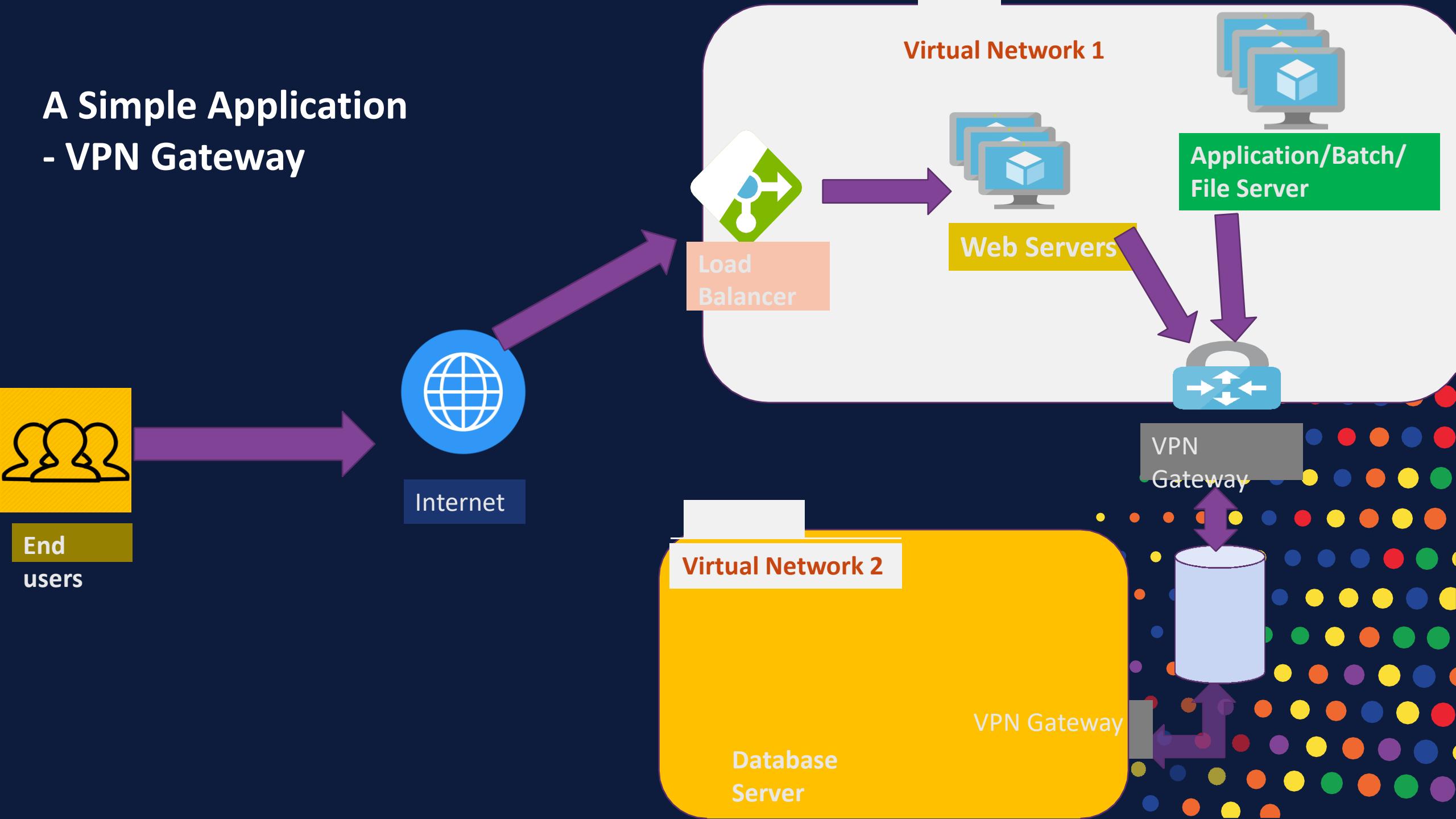
- Load balance incoming traffic across your virtual machines
- Forward traffic to and from a specific virtual machine using NAT rules

# A Simple Application Architecture

## - Load Balancer



# A Simple Application - VPN Gateway



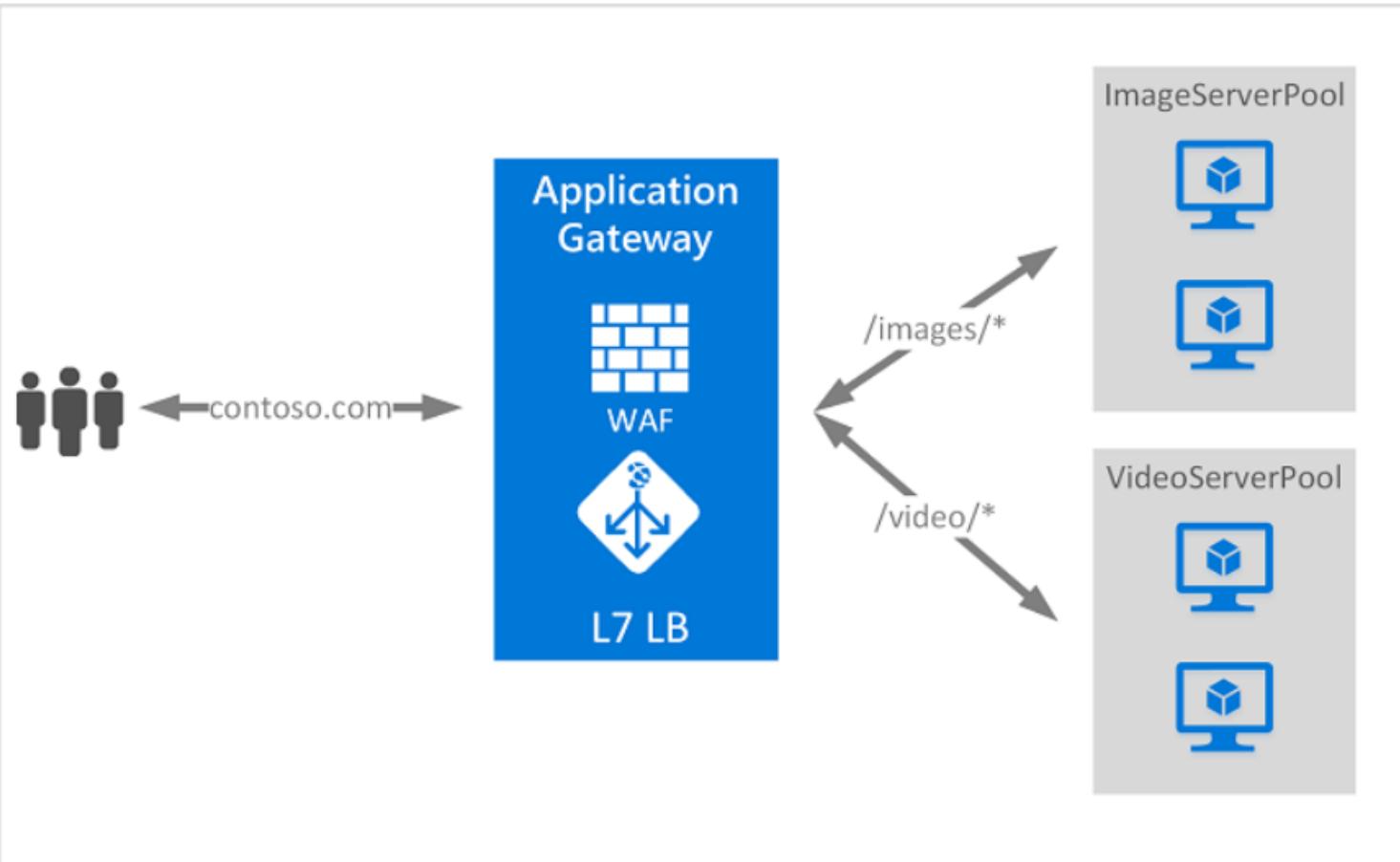
# VPN Gateway

- A VPN gateway is a specific type of virtual network gateway that is used to send encrypted traffic between an Azure virtual network and an on-premises location over the public Internet.
- You can also use a VPN gateway to send encrypted traffic between Azure virtual networks over the Microsoft network.
- Each virtual network can have only one VPN gateway.

# Azure Application Gateway

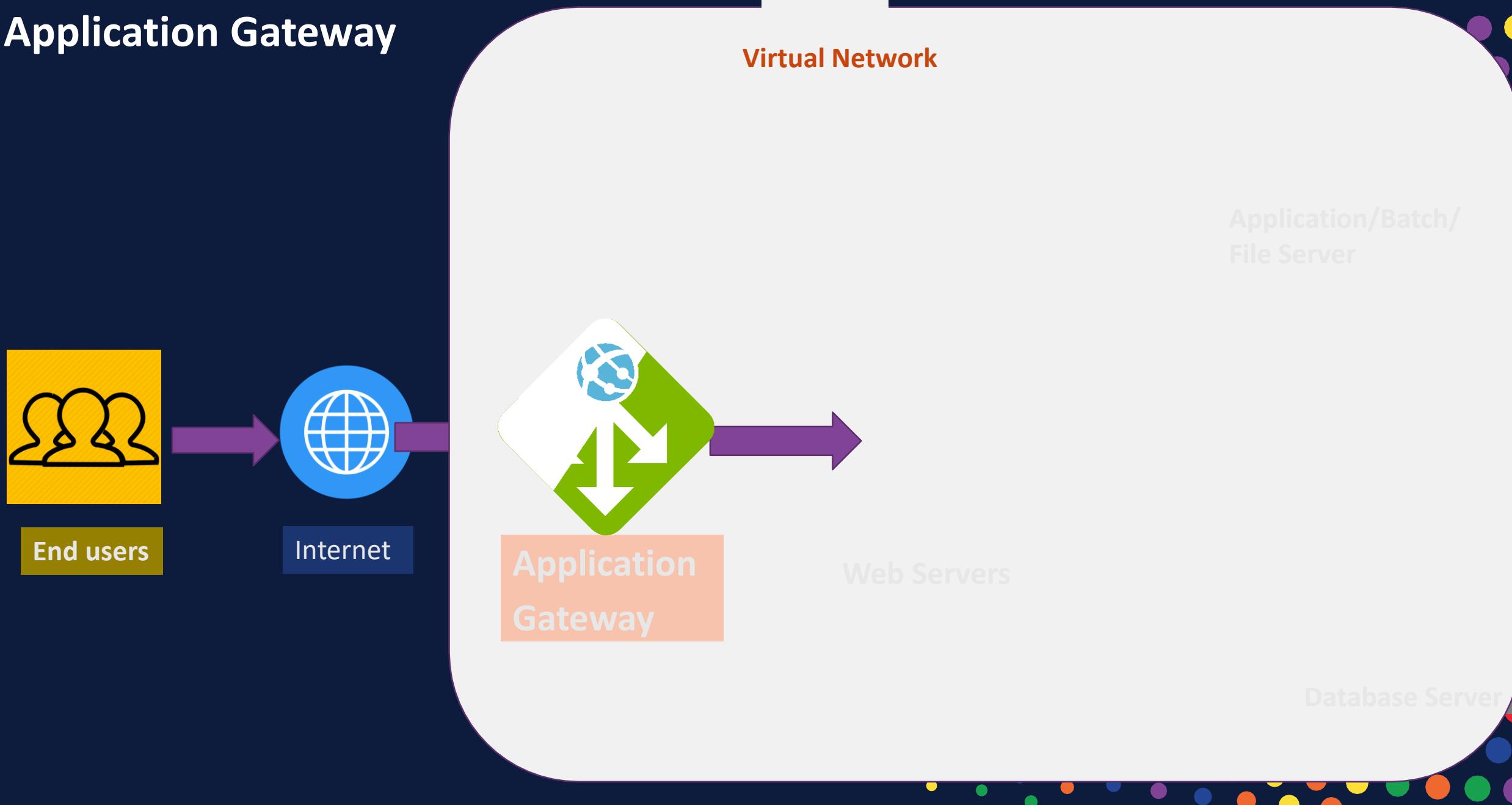
Azure Application Gateway is a web traffic load balancer that enables you to manage traffic to your web applications.

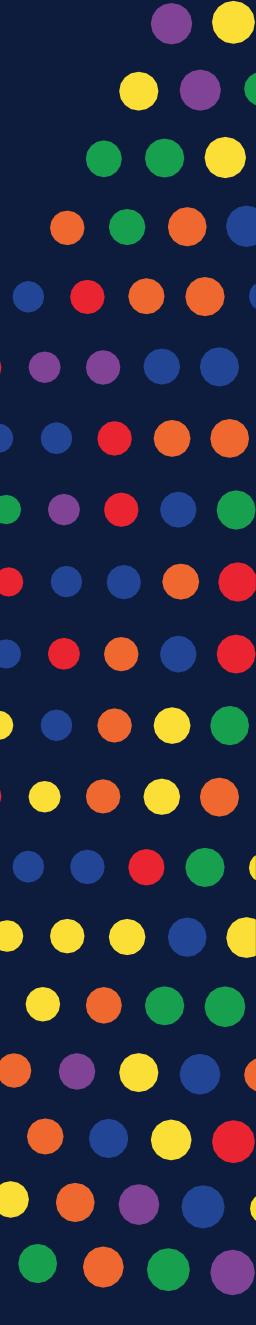
You can make routing decisions based on additional attributes of an HTTP request, such as URI path or host headers.



# A Simple Application Architecture

## - Application Gateway

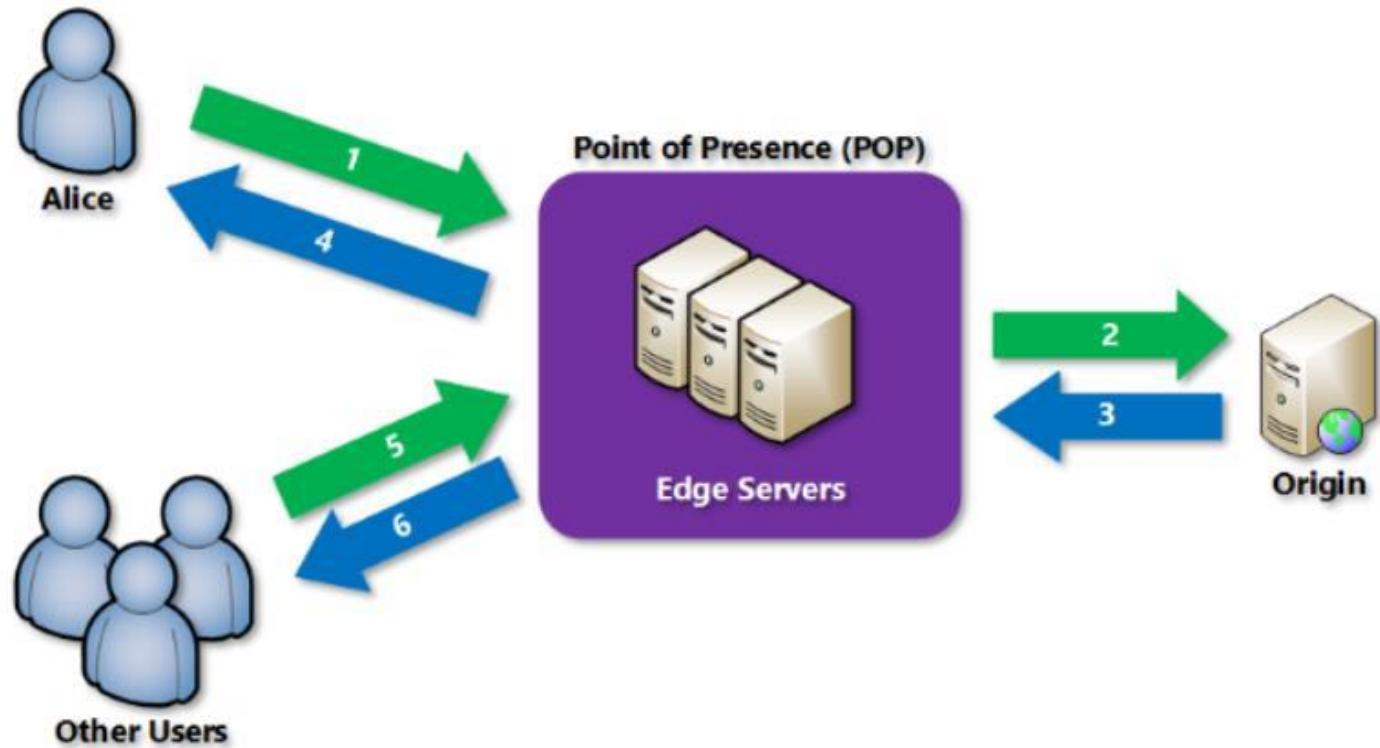




# Azure CDN

A content delivery network (CDN) is a distributed network of servers that can efficiently deliver web content to users.

CDNs store cached content on edge servers in point-of-presence (POP) locations that are close to end users, to minimize latency.





Data is The New Oil

# Types of Data:

- ★ Structured data
- ★ Semi-structured data
- ★ Unstructured data



# Types of Data

## Structured Data

Structured data is data that adheres to a schema, so all of the data has the same fields or properties.

Example: A database table.

Sr. Number	Employee Name	Monthly Salary
1	Vijay	\$30,000
2	Pooja	\$30,000
3	Mark	\$50,000
4	James	\$15,000

# Types of Data

## Semi-Structured Data

Semi-structured data doesn't fit neatly into tables, rows, and columns. Instead, semi-structured data uses *tags* or *keys* that organize and provide a hierarchy for the data.

Example: JSON file, XML file.

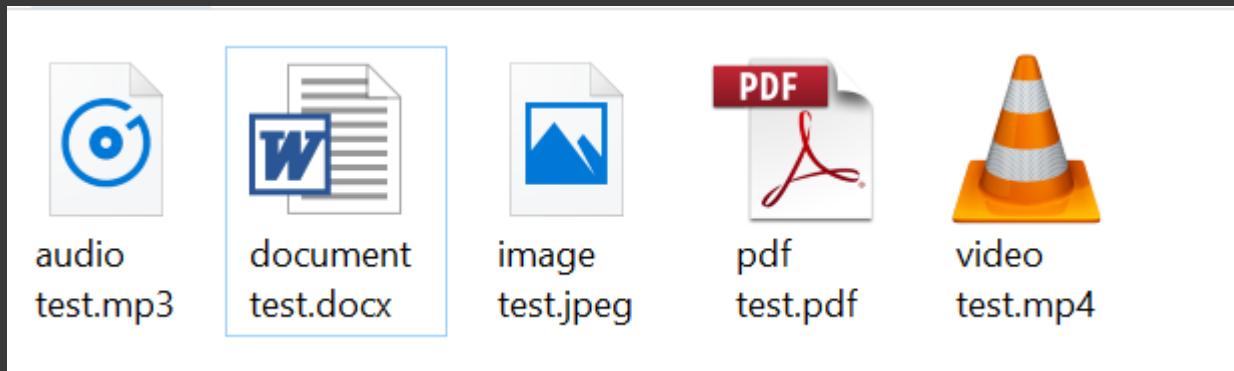
```
student_certifications = @{
    "Student1" = @("AZ-900", "AZ-103");
    "Student2" = @("ITIL 4 Foundation", "AZ-900");
    "Student3" = @("AWS Solution Architect");
    "Student4" = @("AZ-900", "AZ-103", "AZ-200", "AZ-300")
}
```

# Types of Data

## Unstructured Data

Unstructured data encompasses data that has no designated structure to it. This lack of structure also means that there are no restrictions on the kinds of data it can hold.

Example: email, video file, pdf.



# Example:

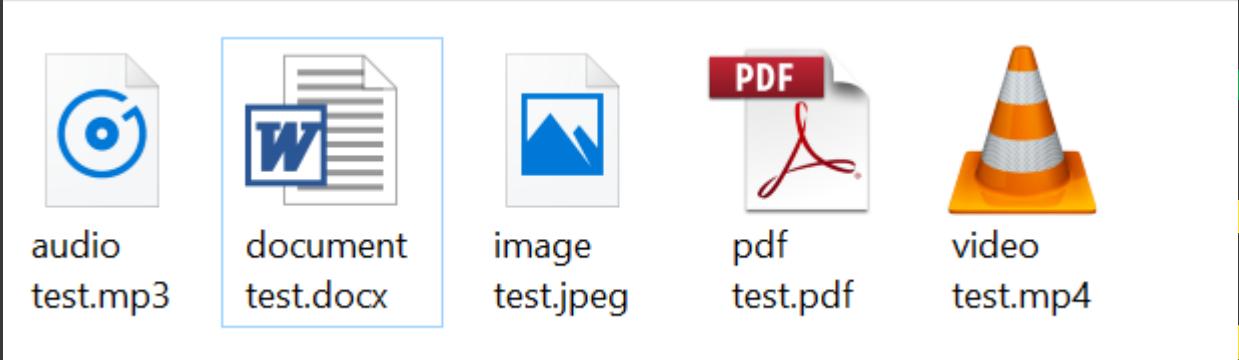
## Structured Data

Sr. Number	Employee Name	Monthly Salary
1	Vijay	\$30,000
2	Pooja	\$30,000
3	Mark	\$50,000
4	James	\$15,000

## Semi-Structured Data

```
student_certifications = @{
    "Student1" = @("AZ-900", "AZ-103");
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    "Student3" = @("AWS Solution Architect");
    "Student4" = @("AZ-900", "AZ-103", "AZ-200", "AZ-300")
}
```

## Un-Structured Data



# Azure Data Services

## Azure SQL Database

Azure SQL Database is a relational database as a service (DaaS) based on the latest stable version of the Microsoft SQL Server database engine.

SQL Database is a high-performance, reliable, fully managed, and secure database.

# Azure Database Services

Products available for databases:

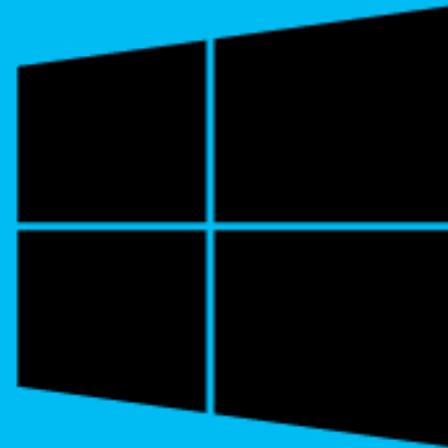
- ★ Azure SQL Database
- ★ Azure Database for MySQL, Azure Database for PostgreSQL
- ★ Cosmos DB
- ★ Azure database migration service

# Azure Data Services

## Azure Cosmos DB

Azure Cosmos DB is a globally distributed database service. It supports schema-less data that lets you build highly responsive and Always On applications to support constantly changing data.

You can use it to build data-driven applications and websites in the programming language of your choice without needing to manage infrastructure.



Azure

# Azure Storage Services

Services for storing and managing unstructured data:

- ✈ Blob storage
- ✈ Disk storage
- ✈ File storage
- ✈ Archive storage

# Azure Storage Services

## Blob Storage

Azure Blob Storage is a service for storing large amounts of **unstructured object** data, such as text or binary data.

No restrictions on the kinds of data it can hold.

You can use Blob Storage to expose data publicly to the world, or to store application data privately.

# Azure Storage Services

## File Storage

Azure Files offers fully managed file shares in the cloud that are accessible via the industry standard Server Message Block (SMB) protocol.

Azure file shares can be mounted concurrently by any number of cloud or on-premises VMs of Windows, Linux, and macOS at a time.

Typical usage scenarios would be to share files anywhere in the world, diagnostic data, or application data sharing.

# Azure Storage Services

## Disk Storage

Disk storage provides disks for virtual machines, applications, and other services to access and use as they need.

A disk can be attached to only 1 VM at a time.

**Persistent, highly-secure, cost-effective SSD option.**

Lift and shift of applications that read and write data to persistent disks.



# Azure Storage Services

## Archive Storage

Optimized for storing data that is rarely accessed and stored for at least 180 days with flexible latency requirements.

# Azure Data Services

Benefits of using Azure to store data:

- Automated backup and recovery

- Replication across the globe

- Support for data analytics

- Encryption capabilities

- Storage tiers



# Test Your Knowledge

Q1.) Suppose you work at a startup with limited funding. Why might you prefer Azure data storage over an on-premises solution?

- A.) To ensure you run on a specific brand of hardware, which will let you form a marketing partnership with that hardware vendor.
- B.) The Azure pay-as-you-go billing model lets you avoid buying expensive hardware.
- C.) To get exact control over the location of your data store.

Answer: B

# Test Your Knowledge

Q2.) Which of the following situations would yield the most benefits from relocating an on-premises data store to Azure?

- A.) Unpredictable storage demand that increases and decreases multiple times throughout the year.
- B.) Long-term, steady growth in storage demand.
- C.) Consistent, unchanging storage demand.

Answer: A

# Test Your Knowledge

- Q3.) A newly released mobile app using Azure data storage has just been mentioned by a celebrity on social media, seeing a huge spike in user volume. To meet the unexpected new user demand, what feature of pay-as-you-go storage will be most beneficial?
- A.) The ability to provision and deploy new infrastructure quickly
  - B.) The ability to predict the service costs in advance
  - C.) The ability to meet compliance requirements for data storage

Answer: A

# Test Your Knowledge

Q4.) You plan to map a network drive from several computers that run Windows 10 to Azure Storage. You need to create a storage solution in Azure for the planned mapped drive. What should you create?

- A.) An Azure SQL database
- B.) Virtual machine data disk
- C.) Files service in a storage account
- D.) Blobs service in a storage account

Answer C

An Azure SQL database cannot be mapped to a VM. Virtual machine data disk can be used by one VM only at a time. It cannot be used as a shared resource. Blobs storage cannot be mapped/mounted to a VM. Hence, the Files service in a storage account is the best solution for mapping a network drive from several computers.



# Microsoft Azure Fundamentals

Vijay Saini

# Azure Management Tools

- ★ Azure Portal
- ★ Azure PowerShell
- ★ Azure CLI
- ★ Azure Cloud Shell
- ★ Azure Advisor



# Azure Management Tools

## Azure PowerShell

```
New-AzVm  
  -ResourceGroupName "myResourceGroup"  
  -Name "testVM"  
  -Image "win2016datacenter"  
  -Credential $cred  
  -Location "East US"
```

## Azure CLI

```
az vm create \  
  --resource-group azure_demo-rg \  
  --name testVM \  
  --image win2016datacenter \  
  --admin-username demouser \  
  --admin-password myPassword  
  --location eastus
```

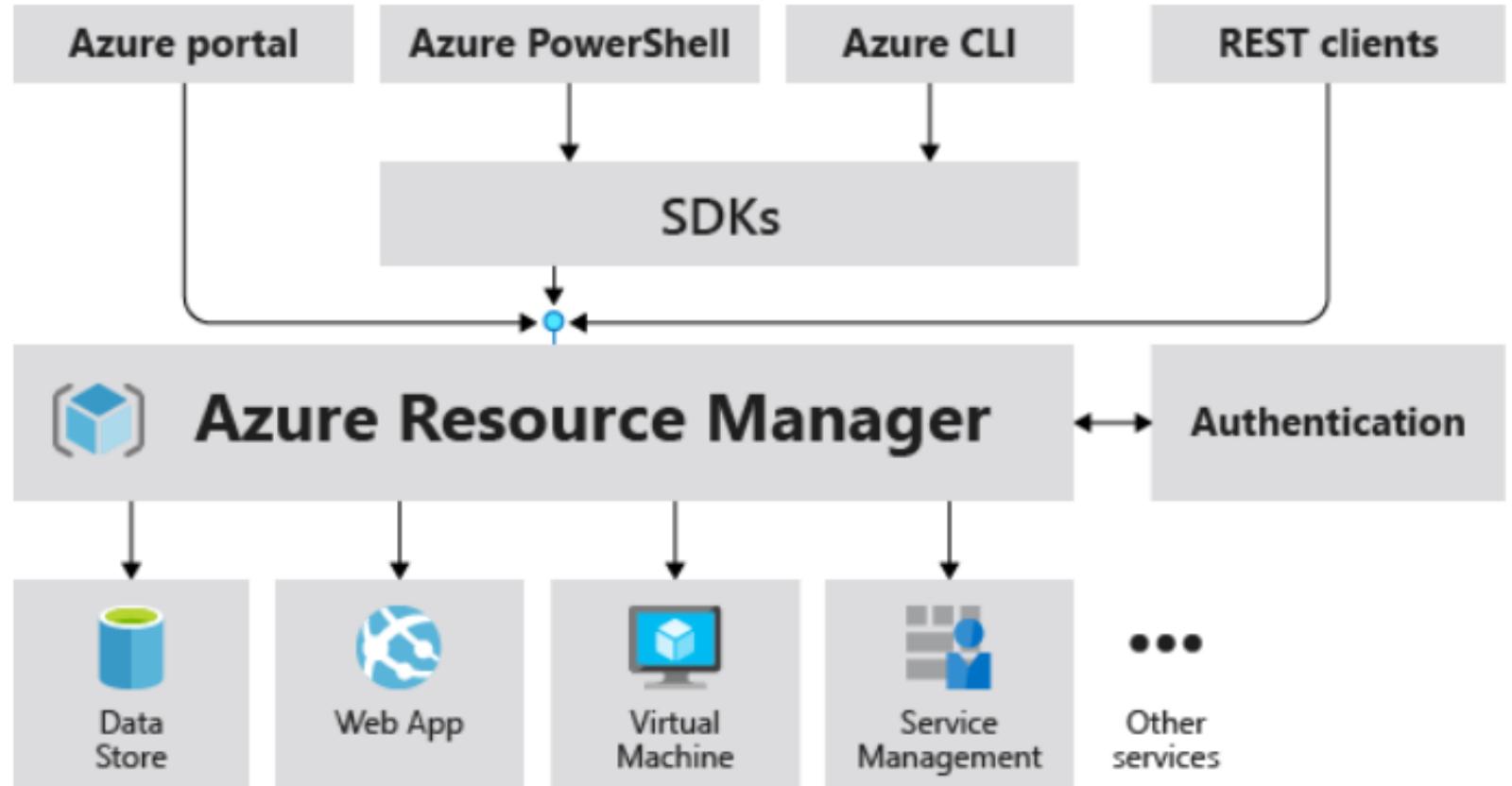
# Azure Management Tools

## Important Tips :

Azure PowerShell and Azure CLI are cross platform, so you can use them on Windows, Linux, and MacOS without any problem

Azure Portal supports all modern browsers and is not dependent on any OS

Azure CloudShell is not dependent on any OS; it executes directly from Azure Portal



# Azure Advisor

Azure Advisor is a free service built into Azure that provides recommendations on high availability, security, performance, and cost. Advisor analyzes your deployed services and looks for ways to improve your environment across those four areas.

# Azure Advisor

Home > Advisor

## Advisor

Search (Ctrl+I) Feedback Download as CSV Download as PDF

We're updating recommendations for your subscriptions. This could take some time... [View details →](#)

**Subscriptions:** All 7 selected – Don't see a subscription? [Open Directory + Subscription settings](#)

All subscriptions All types Active

**High Availability**

7 Recommendations

0 High impact, 6 Medium impact, 1 Low impact

2088 Impacted resources

**Security**

21 Recommendations

11 High impact, 7 Medium impact, 3 Low impact

1258 Impacted resources

**Performance**

1 Recommendation

1 High impact, 0 Medium impact, 0 Low impact

101 Impacted resources

**Cost** 1,802,618 USD savings/yr \*

4 Recommendations

3 High impact, 1 Medium impact, 0 Low impact

1459 Impacted resources

**Tips & tricks**

PDF Download recommendations as PDF

CSV Download recommendations as CSV

# Test Your Knowledge

Q1.) You have an Azure environment. You need to create a new WebApp from an Android laptop. You use PowerShell in Azure Cloud Shell.

Will this work?

- A. Yes
- B. No

Q2.) An Azure administrator plans to run a PowerShell script that creates Azure resources. Administrator is running the script from a computer that runs macOS and has PowerShell Core 6.0 installed.

Does this meet the goal?

- A. Yes
- B. No

Answer: Yes for both question



# Test Your Knowledge

Q3.) Upon enabling, Azure Advisor makes your system highly available and secure.  
True or False?

Answer: False, Azure Advisor only gives recommendation. Implementation of those is left with you.

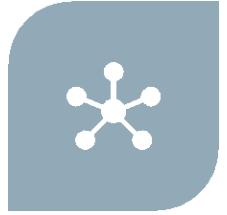
Thank You





# Microsoft Azure Fundamentals

VIJAY SAINI



SECURING NETWORK  
CONNECTIVITY



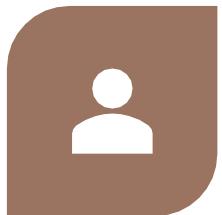
CORE AZURE IDENTITY  
SERVICES



SECURITY TOOLS &  
FEATURES



AZURE GOVERNANCE  
METHODOLOGIES

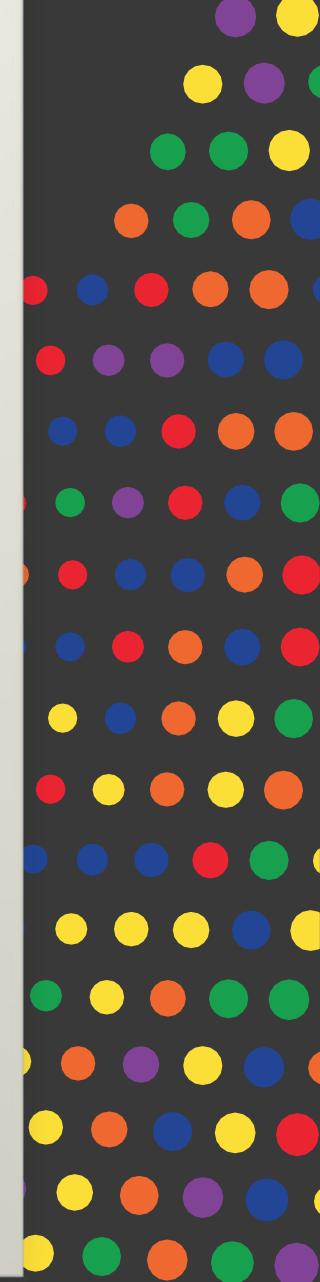
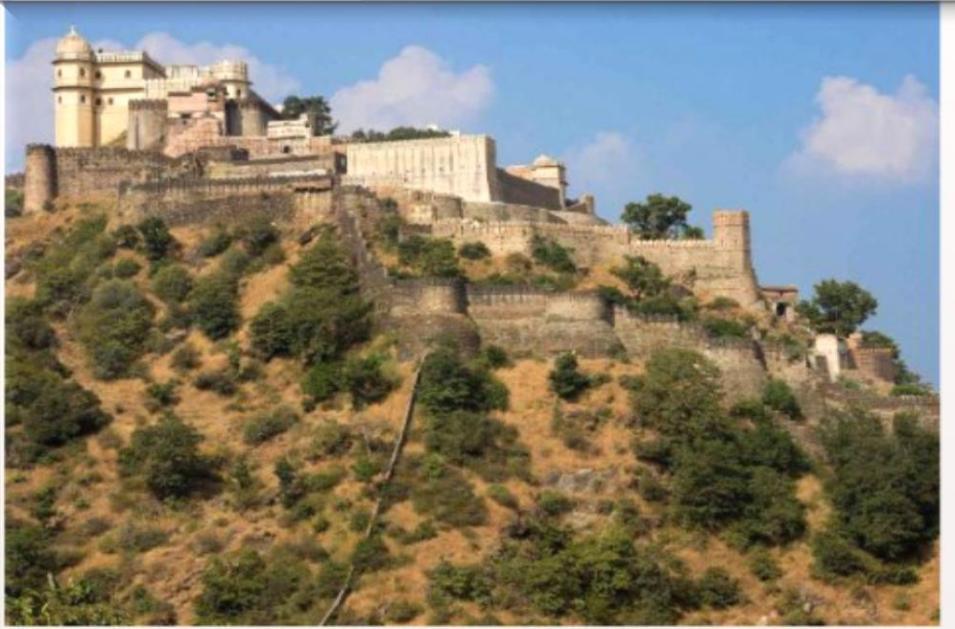


MONITORING AND  
REPORTING OPTIONS



PRIVACY, COMPLIANCE  
AND DATA  
PROTECTION  
STANDARDS

# Section 3 : Understand Security, Privacy, Compliance, and Trust









# Kumbhalgarh Fort, Rajasthan, India

Built during the course of the 15th century by Rana Kumbha.

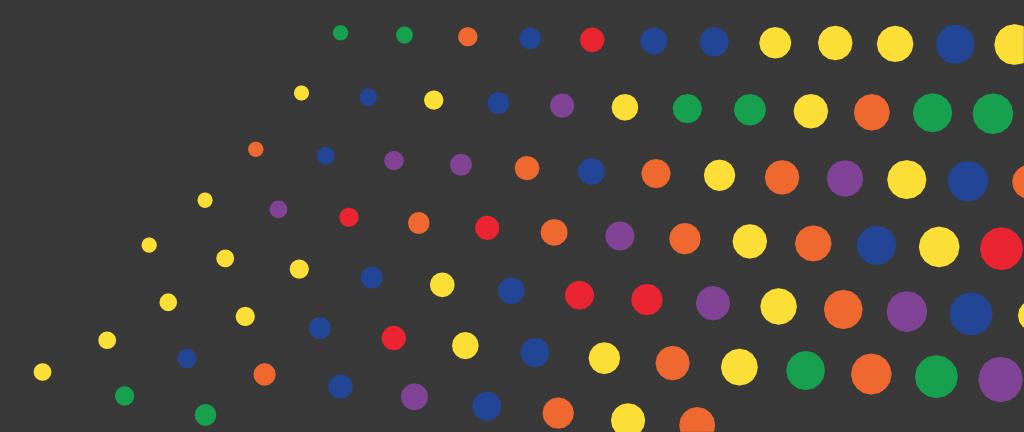
The wall that surrounds the ancient fort of Kumbhalgarh is one of the best-kept secrets in India, and perhaps the world. Protecting a massive fort that contains over 300 ancient temples, the wall was constructed half a millennium ago in tandem with Kumbhalgarh Fort itself.

## Information and Picture Credit:

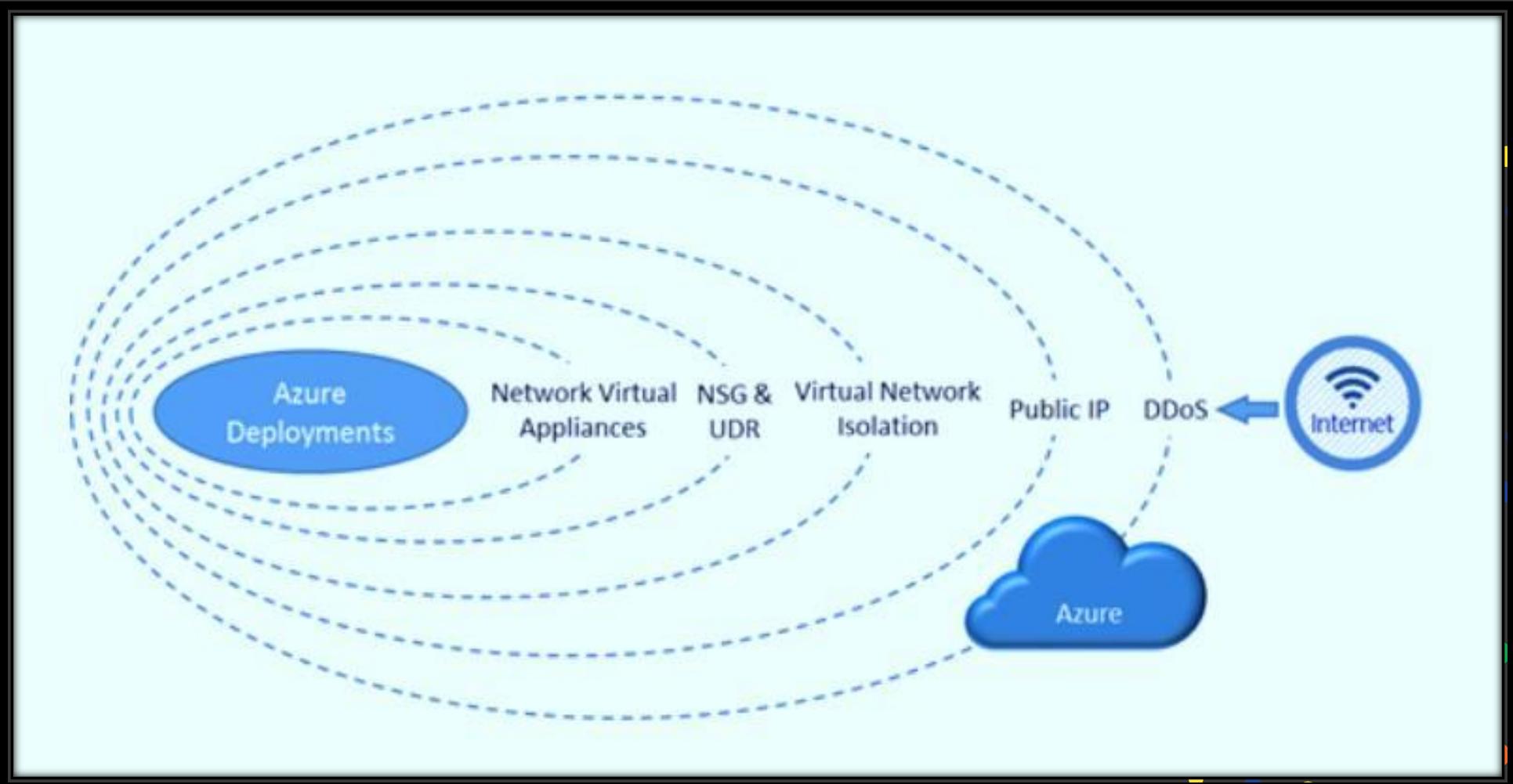
[https://funalive.com/articles/the-great-wall-of-india-kumbhalgarh-fort\\_ExL.html](https://funalive.com/articles/the-great-wall-of-india-kumbhalgarh-fort_ExL.html)

<https://www.ohmyrajasthan.com/kumbhalgarh-fort-rajasthan>

# Securing Network Connectivity



# *A layered approach to securing Azure*





# Azure Network Security Groups (NSG)

NSG contains a list of security rules that allow or deny network traffic to resources connected to Azure Virtual Networks (VNet).

NSGs can be associated to subnets, individual VMs (classic), or individual network interfaces (NIC) attached to VMs

# NSG

Network security groups > test

< security group

Ctrl+/

Move Delete Refresh

Resource group (change) : azurecourse  
Location : East US 2  
Subscription (change) : Pay-As-You-Go  
Subscription ID : 7d6c0936-9492-47f3-bd75-380ef00cabdd  
Tags (change) : Click here to add tags

Custom security rules : 0 inbound, 0 outbound  
Associated with : 0 subnets, 0 network interfaces

#### Inbound security rules

Priority	Name	Port	Protocol	Source	Destination	Action
65000	AllowVnetInBound	Any	Any	VirtualNetwork	VirtualNetwork	<input checked="" type="checkbox"/> Allow
65001	AllowAzureLoadBalancerInBound	Any	Any	AzureLoadBalancer	Any	<input checked="" type="checkbox"/> Allow
65500	DenyAllInBound	Any	Any	Any	Any	<input checked="" type="checkbox"/> Deny

#### Outbound security rules

Priority	Name	Port	Protocol	Source	Destination	Action
65000	AllowVnetOutBound	Any	Any	VirtualNetwork	VirtualNetwork	<input checked="" type="checkbox"/> Allow
65001	AllowInternetOutBound	Any	Any	Any	Internet	<input checked="" type="checkbox"/> Allow
65500	DenyAllOutBound	Any	Any	Any	Any	<input checked="" type="checkbox"/> Deny

# A Simple Application Architecture



End users

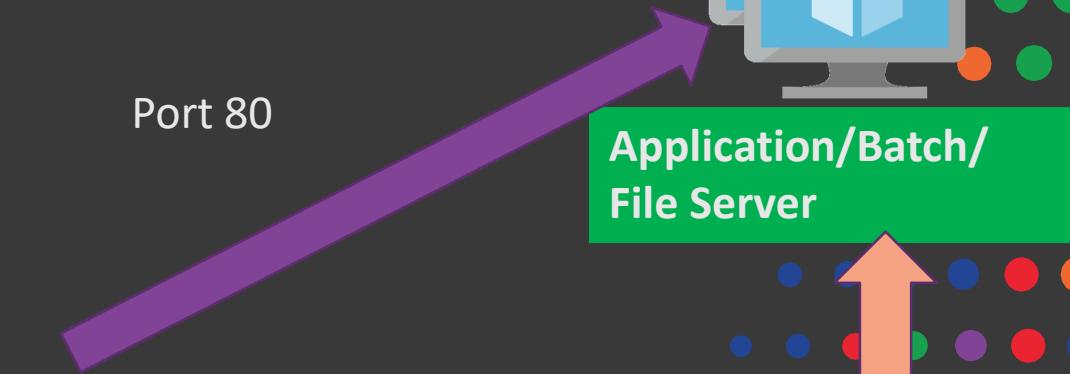


Internet

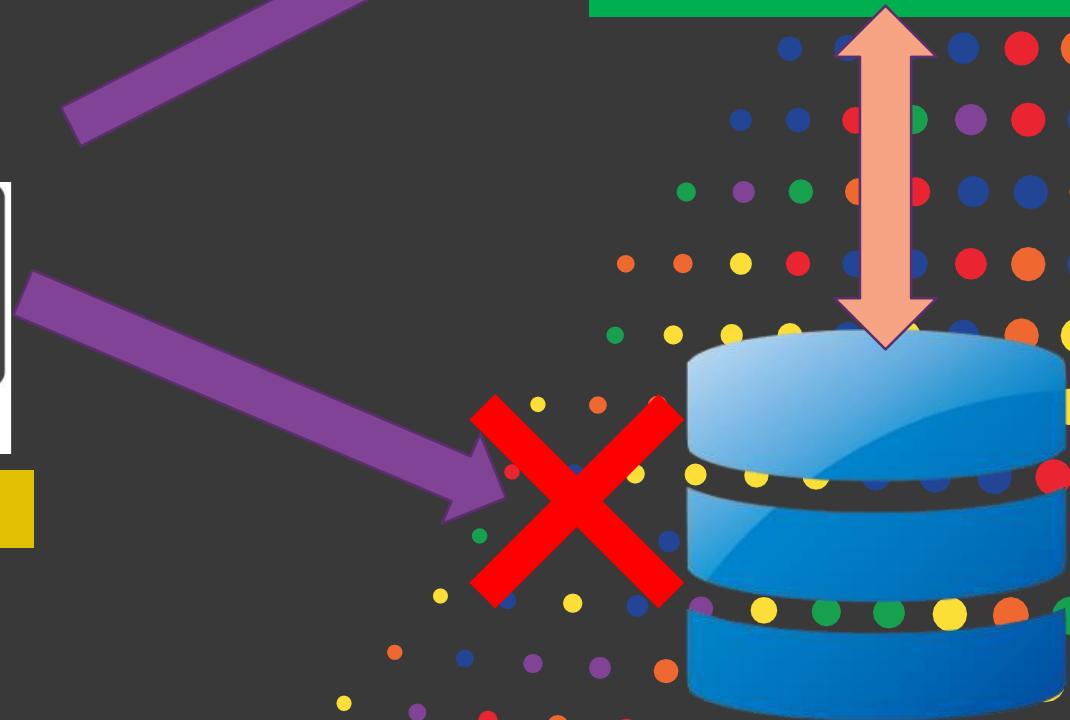


Web Server

Port 80



Application/Batch/  
File Server



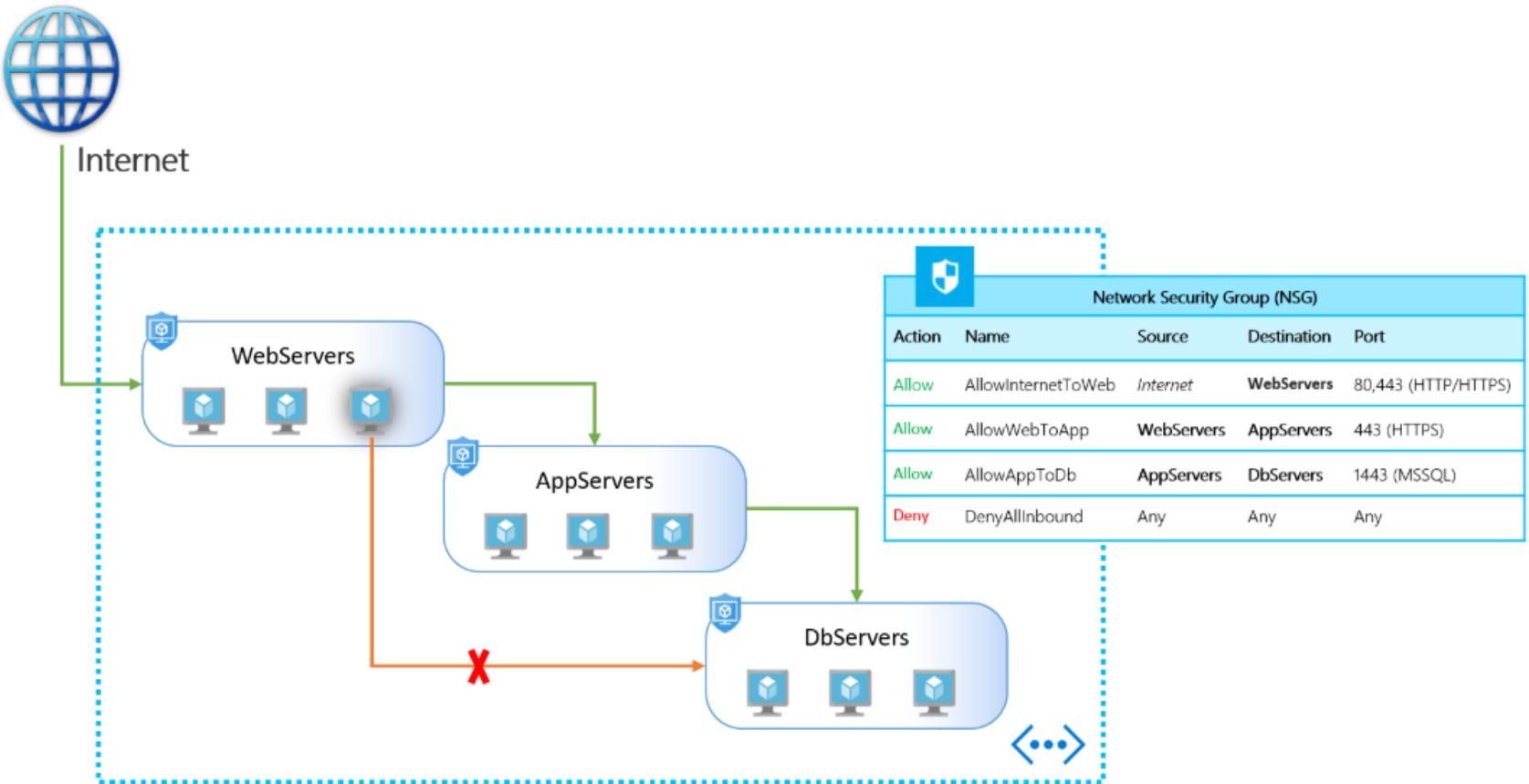
Database Server

# Azure Application Security Groups (ASG)

ASGs enable you to define fine-grained network security policies based on workloads, centralized on applications, instead of explicit IP addresses.

ASGs provide the capability to group VMs and secure applications by filtering traffic from trusted segments of your network.

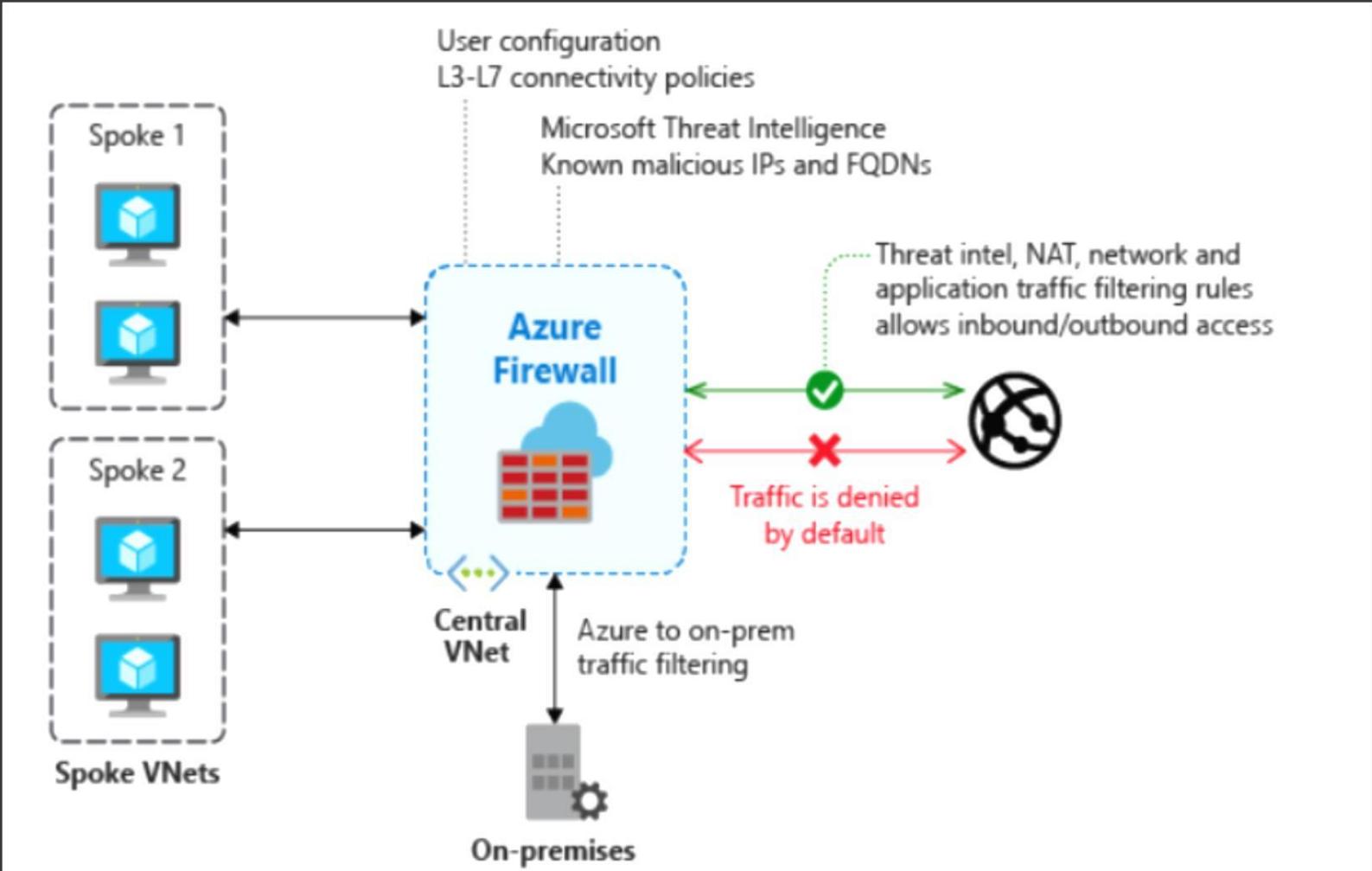
# ASG

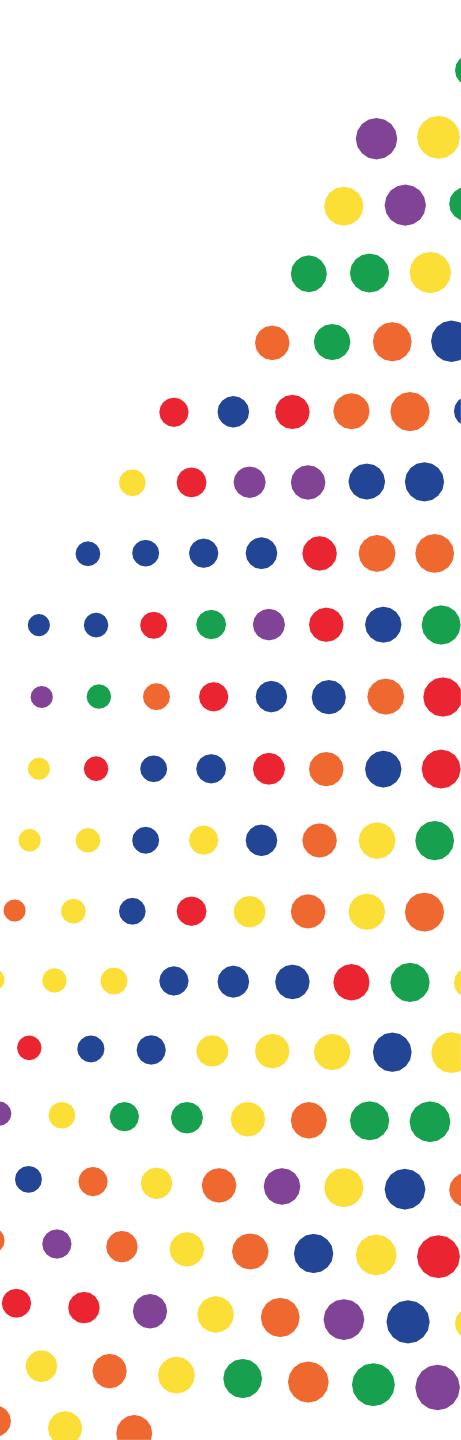


# Azure Firewall

Azure Firewall is a managed, cloud-based network security service that protects your Azure Virtual Network resources.

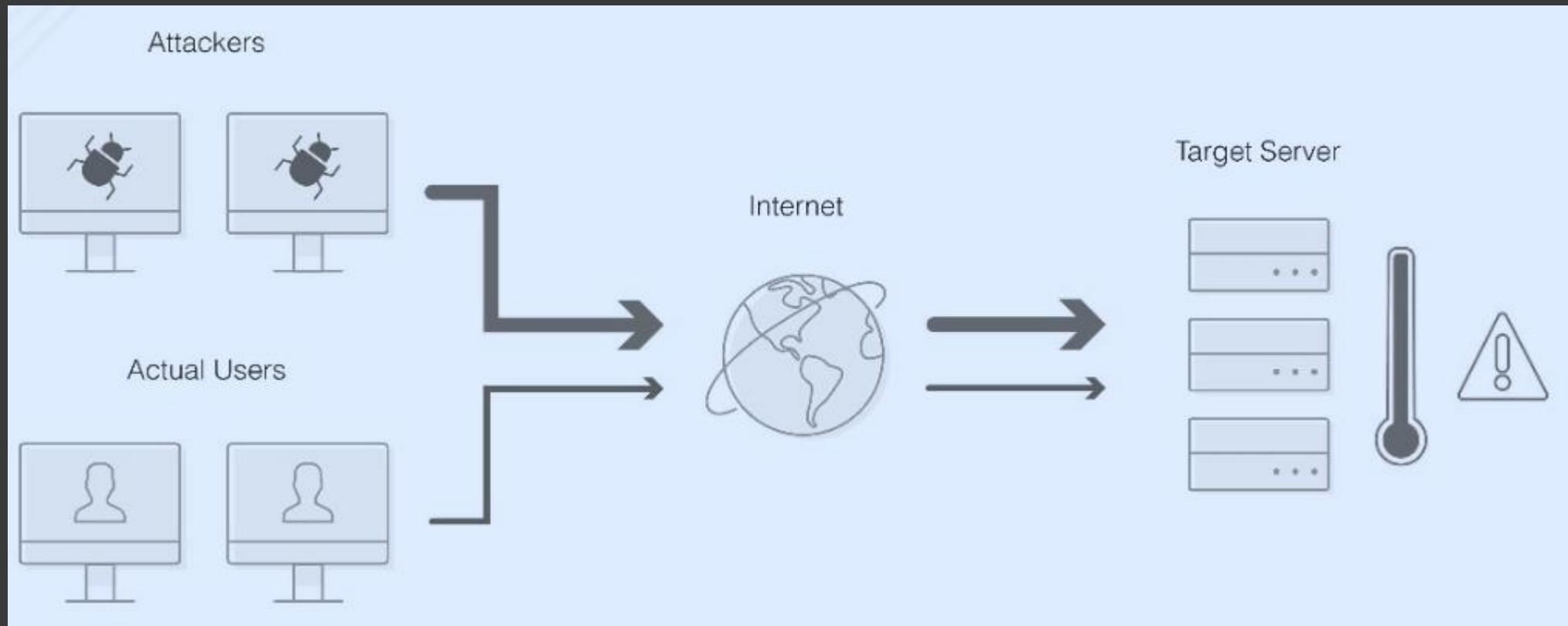
It's a fully stateful firewall as a service with built-in high availability and unrestricted cloud scalability.





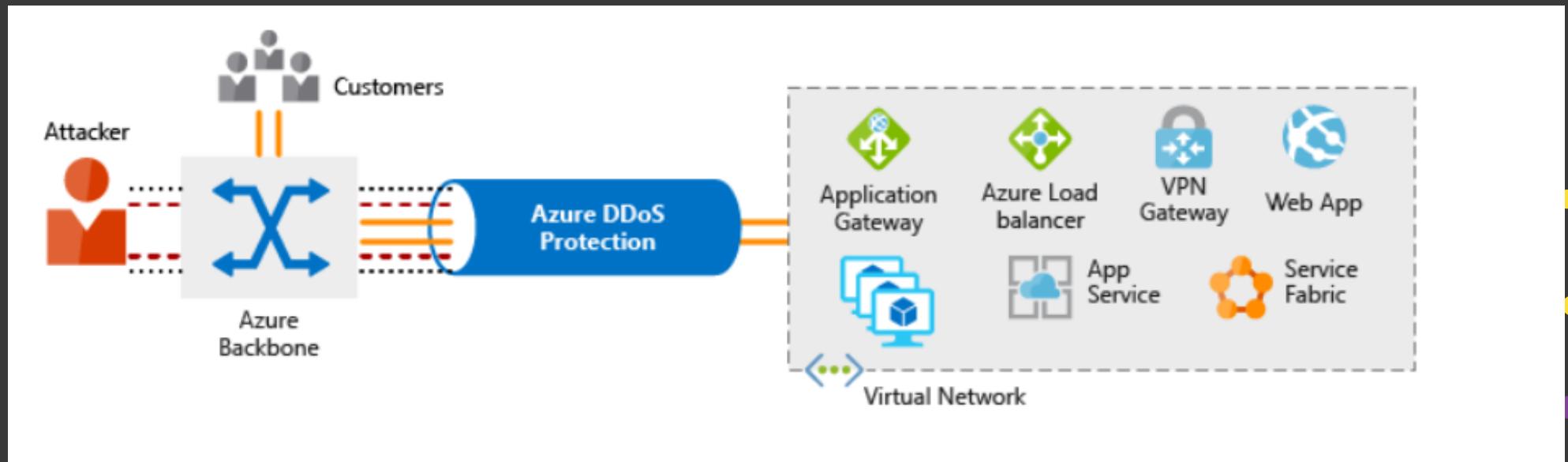
# DDoS Attack

## Distributed Denial-of-Service (DDoS) attack



# Azure DDoS Protection

Azure DDoS protection, combined with application design best practices, provides defense against DDoS attacks such as volumetric attacks, protocol attacks, resource (application) layer attacks.



# Azure DDoS Protection

**Available in 2 tiers:**

**Basic:**

Automatically enabled as part of the Azure platform. Always-on traffic monitoring, and real-time mitigation of common network-level attacks, provide the same defenses utilized by Microsoft's online services.

**Standard:**

Provides additional mitigation capabilities over the Basic service tier that are tuned specifically to Azure Virtual Network resources.

# Azure DDoS Protection

## Azure DDoS Protection Service offerings

Feature	Basic	Standard
Always on monitoring	🛡️	🛡️
Automatic mitigation for L3/L4 attacks	🛡️	🛡️
L7 Protection with Application Gateway Web application firewall	🛡️	🛡️
Globally deployed	🛡️	🛡️
Protection policies tuned to your VNet		🛡️
Logging, alerting, and telemetry		🛡️
Resource cost scale protection		🛡️

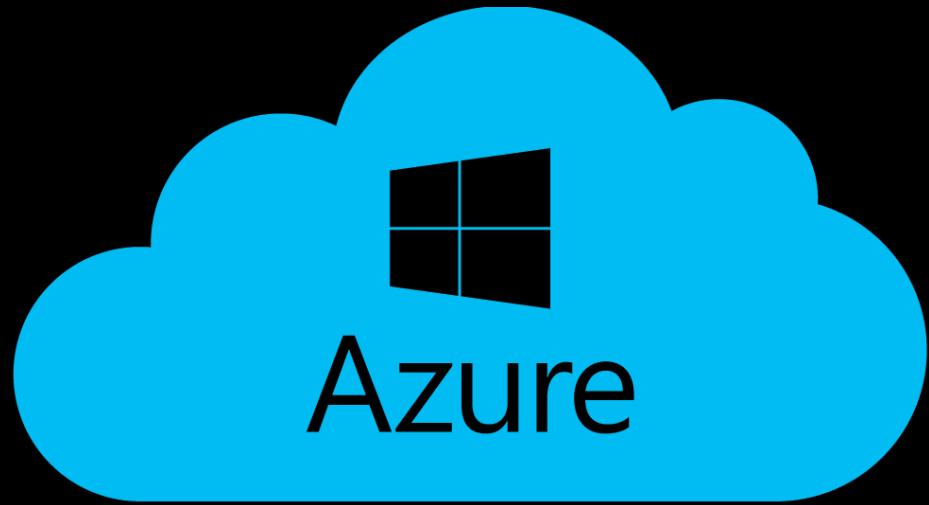
<https://azure.microsoft.com/en-au/blog/azure-ddos-protection-service-preview/>

# Shared Responsibility Model

## Responsibility Zones

Responsibility	SaaS	PaaS	IaaS	On-prem	
Data governance & rights management	Customer	Customer	Customer	Customer	Always retained by customer
Client endpoints	Customer	Customer	Customer	Customer	Always retained by customer
Account & access management	Customer	Customer	Customer	Customer	Always retained by customer
Identity & directory infrastructure	Microsoft	Microsoft	Customer	Customer	Varies by Service Type
Application	Microsoft	Microsoft	Customer	Customer	Varies by Service Type
Network controls	Microsoft	Microsoft	Customer	Customer	Varies by Service Type
Operating system	Microsoft	Microsoft	Customer	Customer	Varies by Service Type
Physical hosts	Microsoft	Microsoft	Microsoft	Customer	Transfers to Cloud Provider
Physical network	Microsoft	Microsoft	Microsoft	Customer	Transfers to Cloud Provider
Physical data center	Microsoft	Microsoft	Microsoft	Customer	Transfers to Cloud Provider

Microsoft     Customer



# Authentication and Authorization

## Authentication.

Authentication is the process of establishing the identity of a person or service looking to access a resource. It involves the act of challenging a party for legitimate credentials, and provides the basis for creating a security principal for identity and access control use. It establishes if they are who they say they are.

## Authorization

Authorization is the process of establishing what level of access an authenticated person or service has. It specifies what data they're allowed to access and what they can do with it.

# Azure Active Directory

Azure Active Directory (Azure AD) is Microsoft's cloud-based identity and access management service, which helps your employees sign in and access resources in:

External resources, such as Microsoft Office 365, the Azure portal, and thousands of other SaaS applications.

Internal resources, such as apps on your corporate network and intranet, along with any cloud apps developed by your own organization.

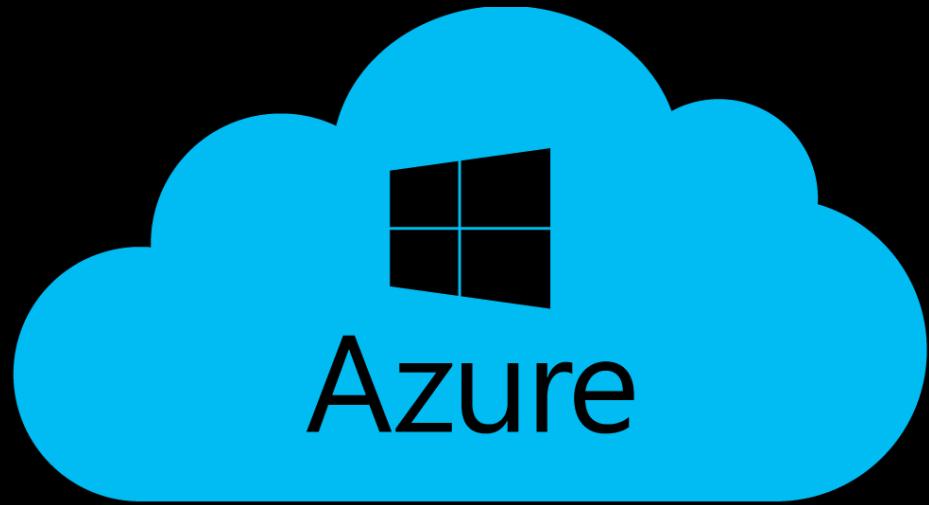
# Azure AD provides services such as:

- ★ Authentication
- ★ Single-Sign-On
- ★ Application management
- ★ Business to business (B2B) identity services
- ★ Business-to-Customer (B2C) identity services
- ★ Device Management



# Azure Multi-Factor Authentication

Azure Multi-Factor Authentication (MFA) provides additional security for your identities by requiring two or more elements for full authentication.



# Azure Security Center

Azure Security Center is a monitoring service that provides threat protection across all of your services, both in Azure and on-premises.

Azure Security Center is a unified infrastructure security management system that strengthens the security posture of your data centers, and provides advanced threat protection across your hybrid workloads in the cloud.

# What Azure Security Center can do:

Provide security recommendations based on your configurations, resources, and networks

Monitor security settings across on-premises and cloud workloads

Continuously monitor all your services, and perform automatic security assessments

Use machine learning to detect and block malware

Analyze and identify potential inbound attacks

Provide just-in-time access control for ports



# Azure Security Center

Available in two tiers

Free:

Limited to assessments and recommendations of Azure resources only

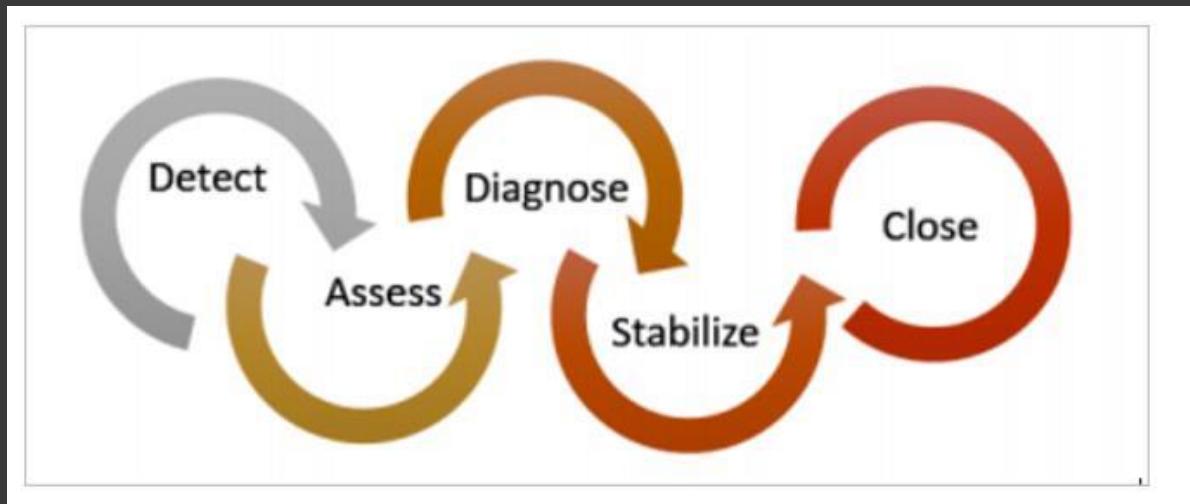
Standard:

Full suite of security-related services including continuous monitoring, threat detection, just-in-time access control for ports, and more



# Azure Security Center -Usage Scenarios

1.) Use Security Center for incident response



2.) Use Security Center recommendations to enhance security

# Advanced Threat Protection (ATP)

Azure Advanced Threat Protection (Azure ATP) is a cloud-based security solution that identifies, detects, and helps you investigate advanced threats, compromised identities, and malicious insider actions directed at your organization.

Azure ATP is capable of detecting known malicious attacks and techniques, security issues, and risks against your network.

# Advanced Threat Protection (ATP)

Azure ATP consists of several components.

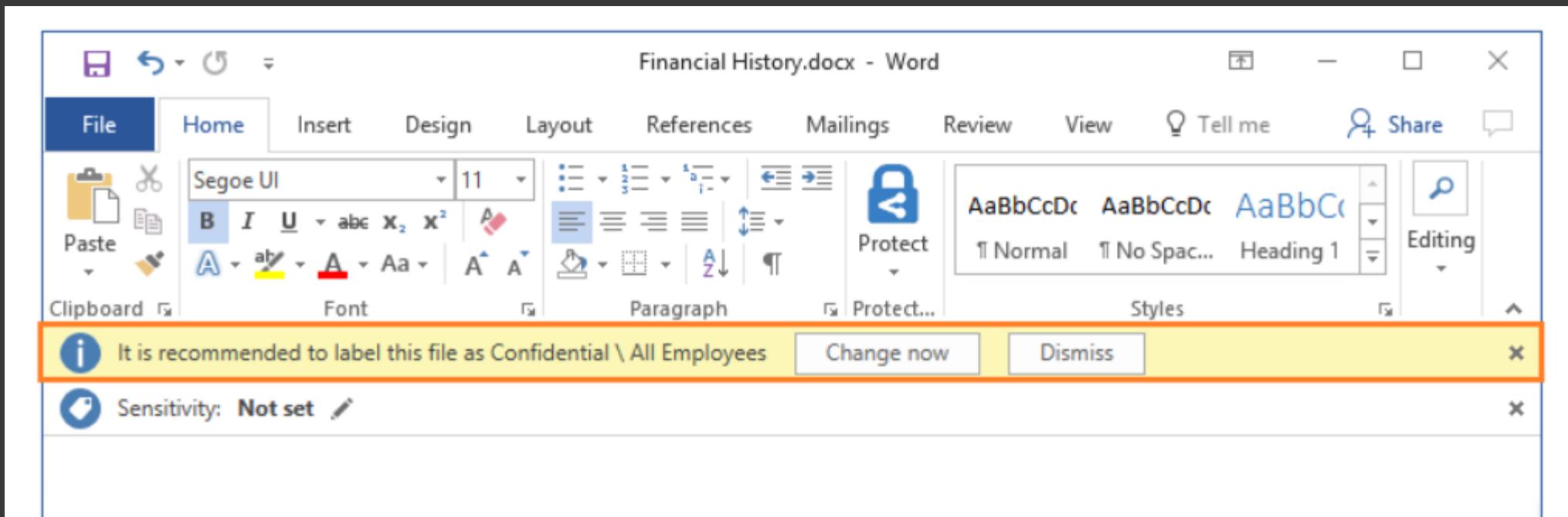
- ★ Azure ATP portal <https://portal.atp.azure.com>)
- ★ Azure ATP sensor
- ★ Azure ATP cloud service

# Advanced Threat Protection (ATP) -Advantages

- Monitor and profile user behavior and activities
- Identify suspicious activities and advanced attacks
- Investigate alerts and user activities
- Protect user identities and reduce the attack surface

# Azure Information Protection(AIP)

A cloud-based solution that helps organizations classify and optionally protect documents and emails by applying labels.

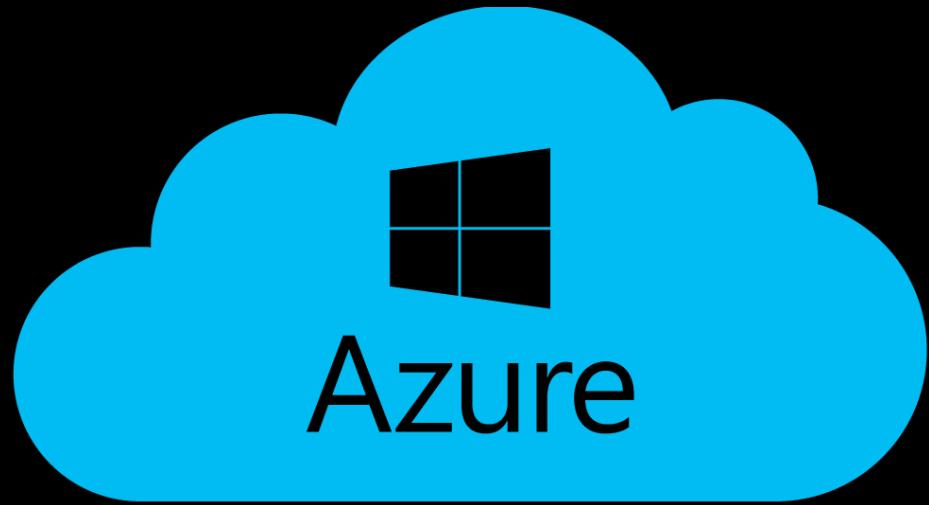


# Azure Key Vault

Safeguard cryptographic keys and other secrets used by cloud apps and services

Azure Key Vault helps solve the following problems:

- ★ Secrets management
- ★ Key management
- ★ Certificate management

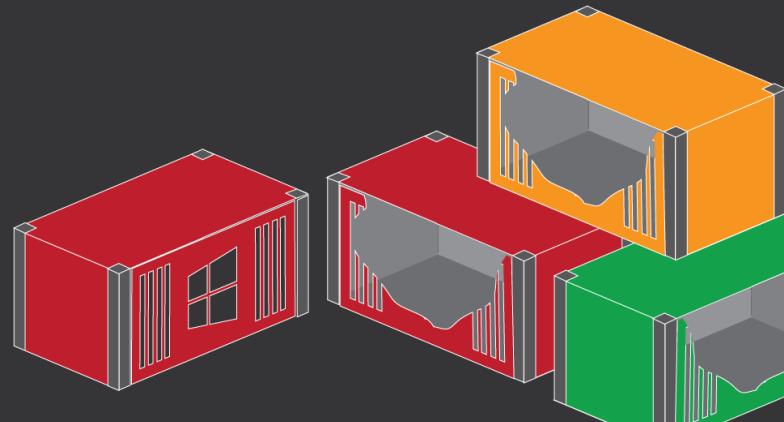


# IT Governance

Good IT governance involves planning your initiatives and setting priorities on a strategic level to help manage and prevent issues.

You need good governance when:

- ★ You have multiple engineering teams working in Azure
- ★ You have multiple subscriptions in your tenant
- ★ You have regulatory requirements which must be enforced

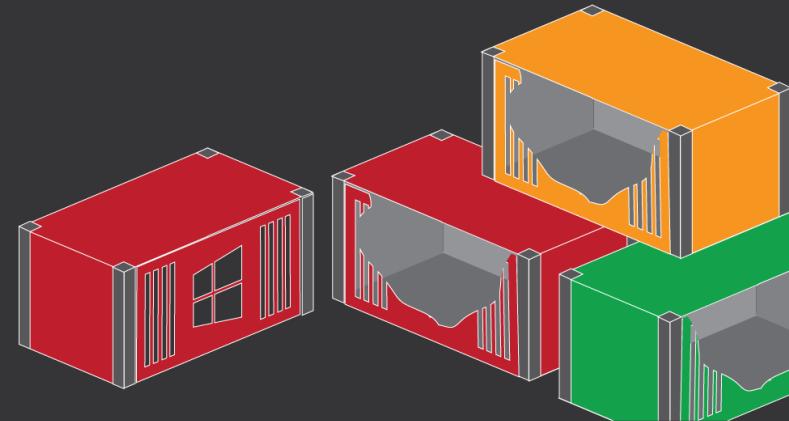


- ★ You want to ensure standards are followed for all IT allocated resources

# Need of Good Governance

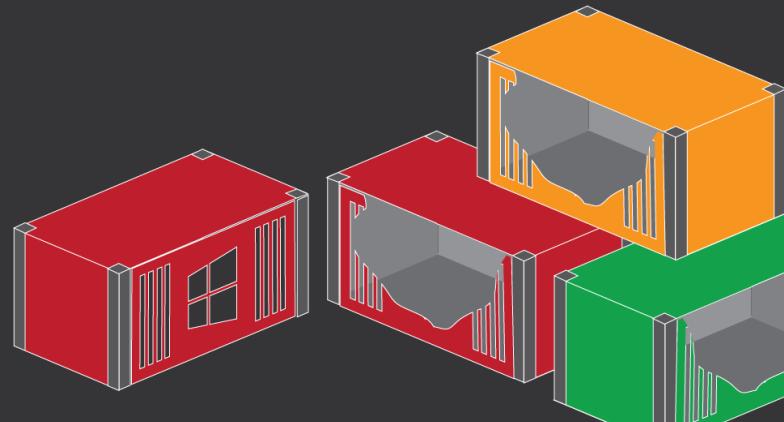
Your organization need to enforce:

- All VMs created should be of D series
- All resources should be tagged properly
- All resources should be created only in selected regions closer to your customers



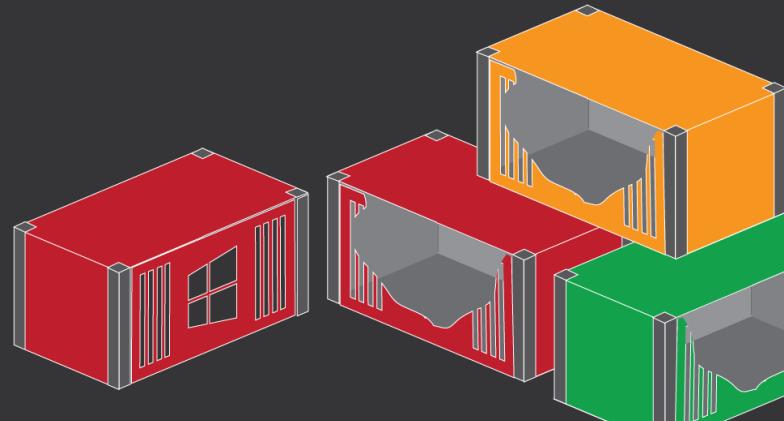
# Good Governance

- ❖ Azure Policies
- ❖ Initiatives
- ❖ Role-Based Access Control (RBAC)
- ❖ Lock
- ❖ Azure Blueprints



# Azure Policy

Azure Policy is an Azure service you use to create, assign, and manage policies. These policies enforce different rules and effects over your resources so that those resources stay compliant with your corporate standards and service-level agreements.



# Policy Effects

Requests to create or update a resource through Azure Resource Manager are evaluated by Azure Policy first. Policy creates a list of all assignments that apply to the resource and then evaluates the resource against each definition.

Policy Effect	What happens?
Deny	The resource creation/update fails due to policy.
Disabled	The policy rule is ignored (disabled). Often used for testing.
Append	Adds additional parameters/fields to the requested resource during creation or update. A common example is adding tags on resources such as Cost Center or specifying allowed IPs for a storage resource.
Audit, AuditIfNotExists	Creates a warning event in the activity log when evaluating a non-compliant resource, but it doesn't stop the request.
DeployIfNotExists	Executes a template deployment when a specific condition is met. For example, if SQL encryption is enabled on a database, then it can run a template after the DB is created to set it up a specific way.



# Azure Policy



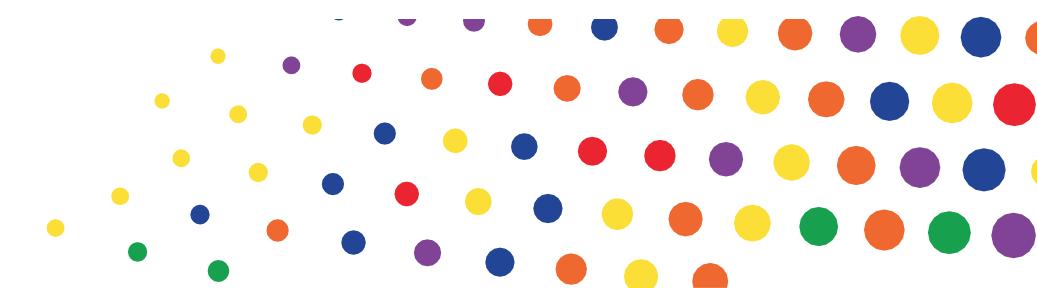
Here are some of the most common policy definitions you can apply.

Policy definition	Description
Allowed Storage Account SKUs	This policy definition has a set of conditions/rules that determine whether a storage account that is being deployed is within a set of SKU sizes. Its effect is to deny all storage accounts that do not adhere to the set of defined SKU sizes.
Allowed Resource Type	This policy definition has a set of conditions/rules to specify the resource types that your organization can deploy. Its effect is to deny all resources that are not part of this defined list.
Allowed Locations	This policy enables you to restrict the locations that your organization can specify when deploying resources. Its effect is used to enforce your geographic compliance requirements.
Allowed Virtual Machine SKUs	This policy enables you to specify a set of VM SKUs that your organization can deploy.
Not allowed resource types	Prevents a list of resource types from being deployed.



## Examples of Built-In Policies

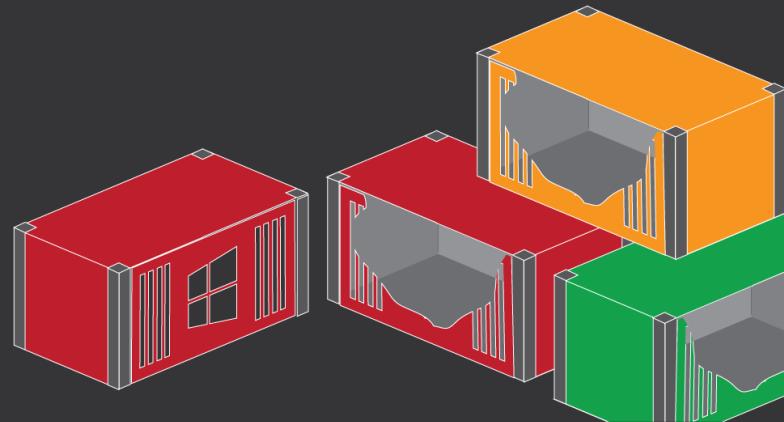
- Require SQL Server 12.0
- Allowed Storage Account SKUs
- Allowed Locations
- Allowed Virtual Machine SKUs
- Apply tag and its default value
- Not allowed resource types



# Initiatives

An initiative definition is a set or group of policy definitions to help track your compliance state for a larger goal.

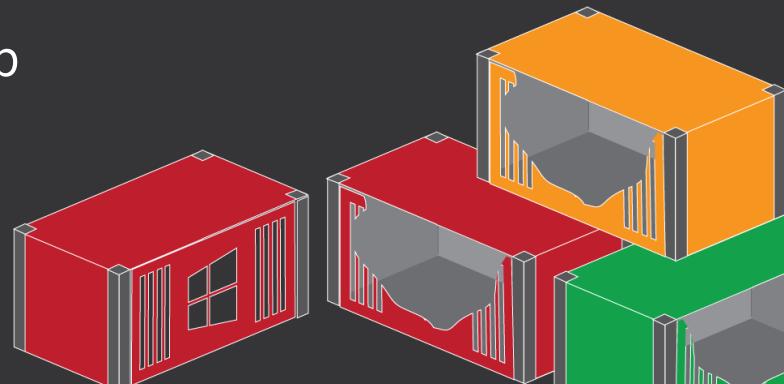
Even if you have a single policy, it is recommended to use initiatives if you anticipate increasing the number of policies over time.



# Role-Based Access Control (RBAC)

The following are examples of when you might use RBAC. When you want to:

- ◆ Allow one user to manage VMs in a subscription, and another user to manage VNet
- ◆ Allow a database administrator (DBA) group to manage SQL databases in a subscription
- ◆ Allow a user to manage all resources in a resource group, such as VMs, websites, and subnets
- ◆ Allow an application to access all resources in a resource group



# Locks

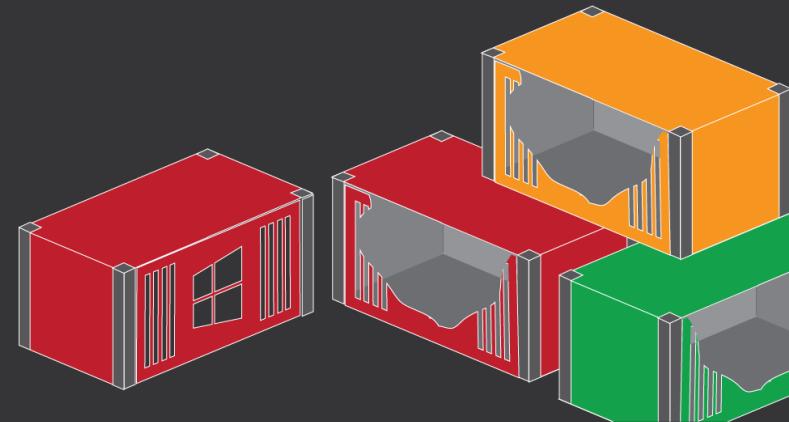
Locks help you prevent accidental deletion or modification of your Azure resources.

You may need to lock a subscription, resource group, or resource to prevent other users in your organization from accidentally deleting or modifying critical resources.

You can set the lock level to

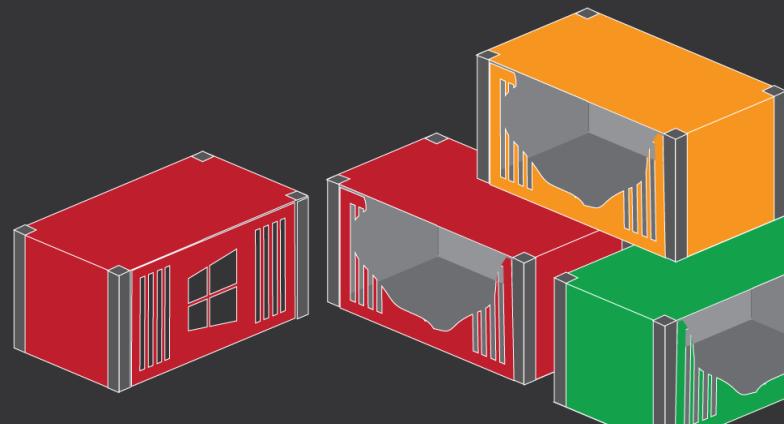
Delete

ReadOnly



# Azure Blueprints

Azure Blueprints enables cloud architects and central information technology groups to define a repeatable set of Azure resources that implements and adheres to an organization's standards, patterns, and requirements.



# Azure Blueprints

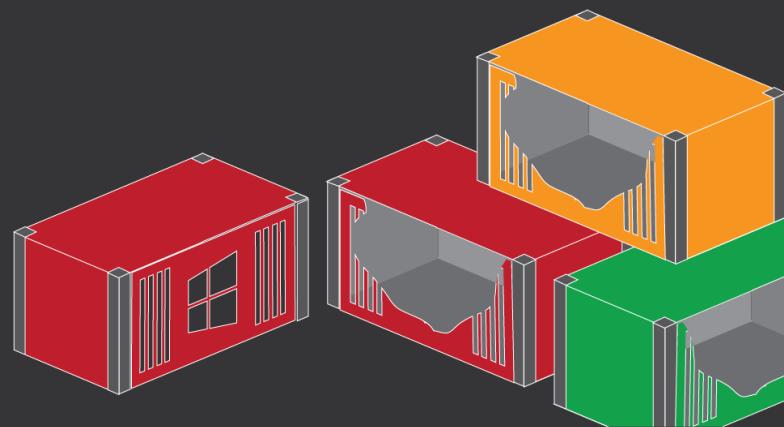
Azure Blueprints is a declarative way to orchestrate the deployment of various resource templates and other artifacts, such as the following:

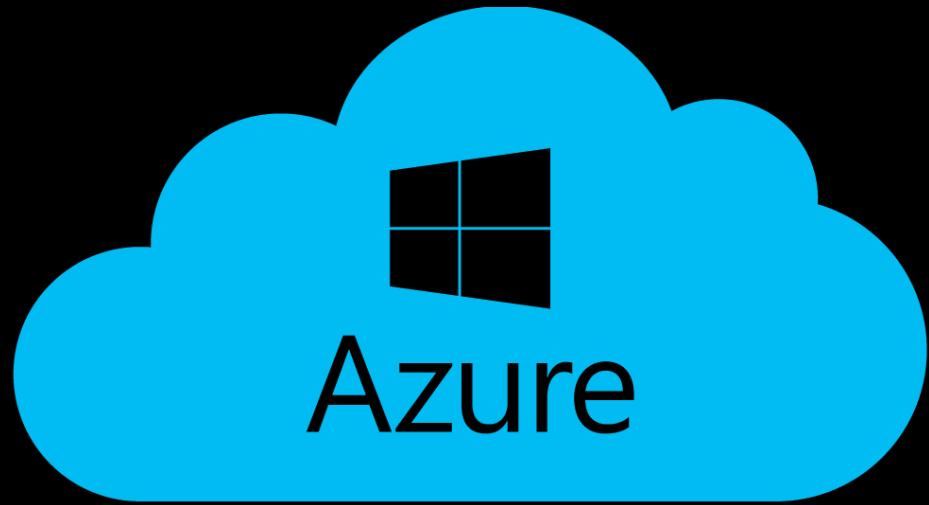
- Role assignments

- Policy assignments

- Azure Resource Manager templates

- Resource groups

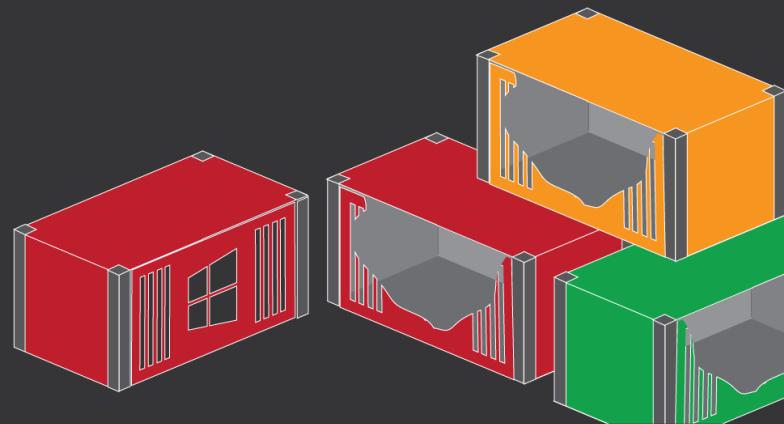




# Azure Monitor

Azure Monitor maximizes the availability and performance of your applications by delivering a comprehensive solution for collecting, analyzing, and acting on telemetry from your cloud and on-premises environments.

It helps you understand how your applications are performing and proactively identifies issues affecting them and the resources they depend on.



# Azure Monitor

Can collect data from different sources, such as the following:

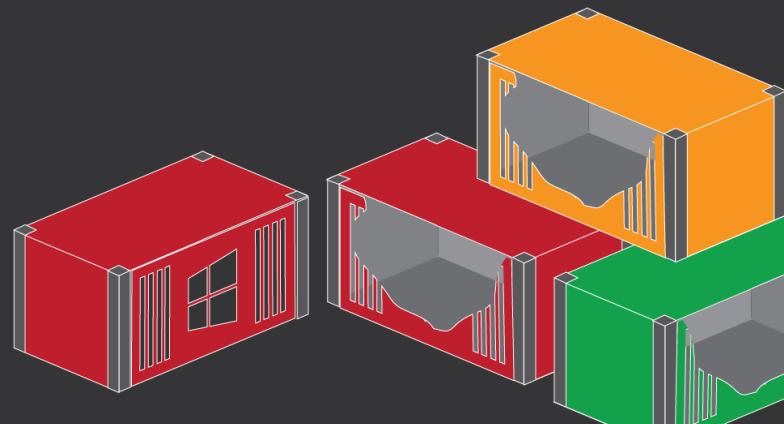
Application monitoring data

Guest OS monitoring data

Azure resource monitoring data

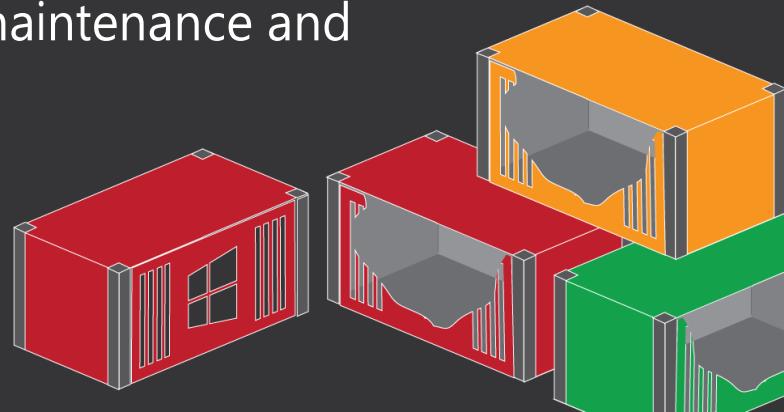
Azure subscription monitoring data

Azure tenant monitoring data



# Azure Service Health

- ★ Azure Service Health is a suite of experiences that provides personalized guidance and support when issues with Azure services affect you.
- ★ It can notify you, help you understand the impact of issues, and keep you updated as the issue is resolved.
- ★ Azure Service Health can also help you prepare for planned maintenance and changes that could affect the availability of your resources.



# Azure Service Health

Azure Service Health is composed of the following:

## Azure Status

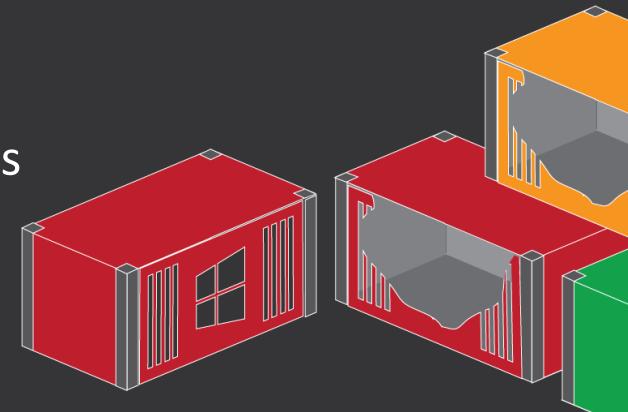
provides a global view of the health state of Azure services

## Service Health

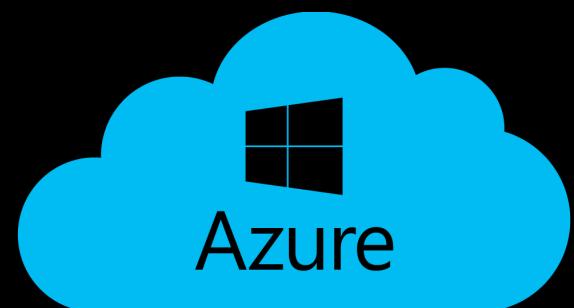
customizable dashboard that tracks the state of your Azure services

## Resource Health

diagnose and obtain support when an Azure service issue affects your resources

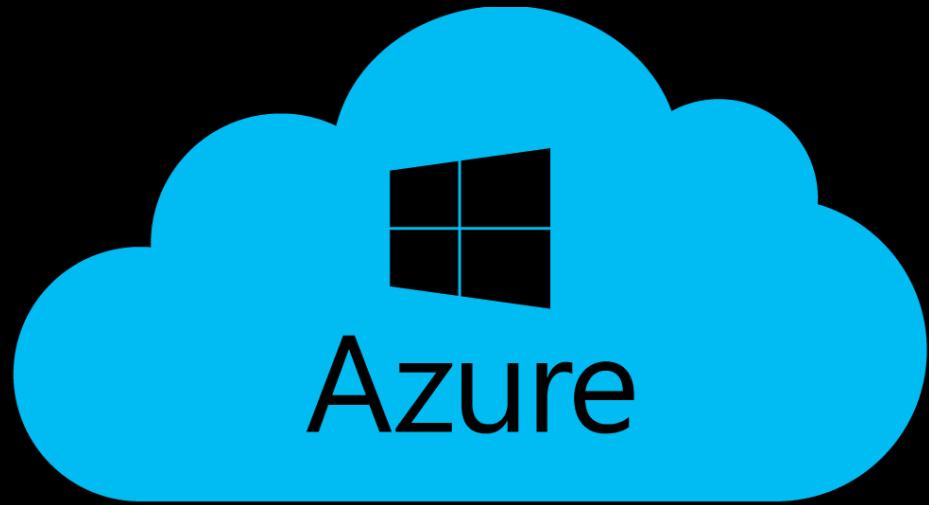


# Azure Monitor Versus Azure Service Health



Thank You





# Section 4: Understand Azure Pricing and Support

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AZURE  
SUBSCRIPTIONS



PLANNING AND  
MANAGEMENT OF  
COSTS



THE SUPPORT  
OPTIONS AVAILABLE  
WITH AZURE



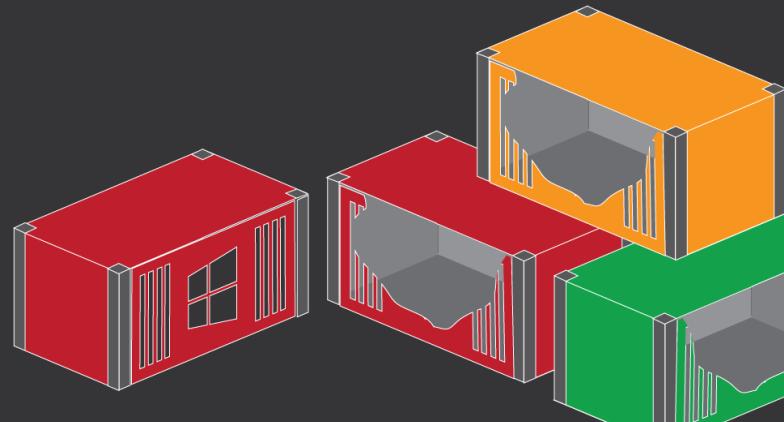
AZURE SERVICE LEVEL  
AGREEMENTS (SLAS)



SERVICE LIFECYCLE IN  
AZURE

# Azure Account

An Azure account is an identity in either Azure AD, or a directory that is trusted by Azure AD, such as a work or school organization.

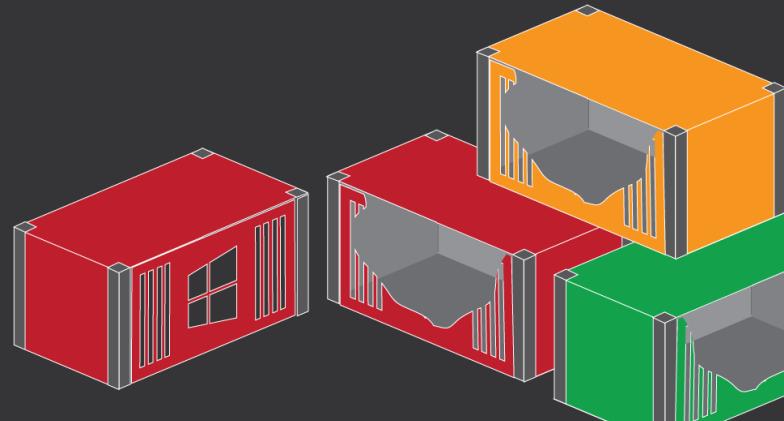


# Azure Subscriptions

An Azure subscription is a logical container used to provision resources in Microsoft Azure. It holds the details of all your resources such as virtual machines, databases, and so on.

Every Azure subscription is associated with Azure AD.

Users and services that access the resources of the subscription first need to authenticate with Azure AD.

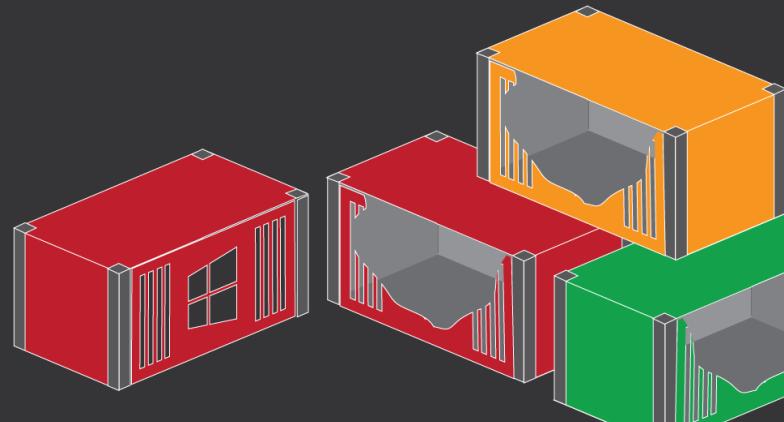


# Azure Subscriptions

## Subscription Types

Azure offers free and paid subscription options to suit different needs and requirements. The most commonly used subscriptions are as follows:

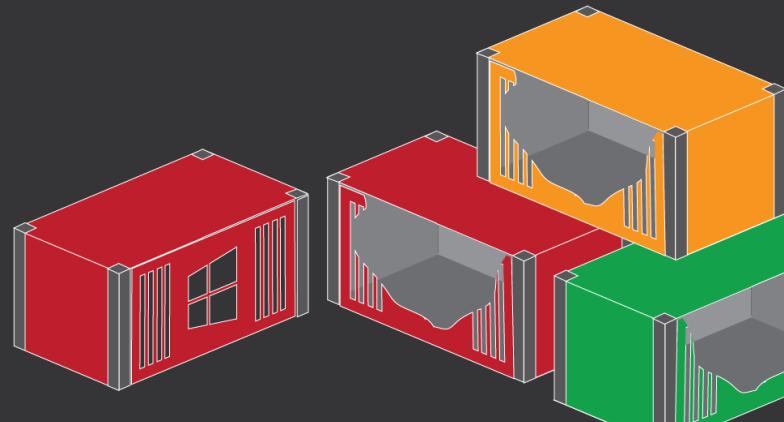
- ★ Free
- ★ Pay-As-You-Go
- ★ Enterprise Agreement
- ★ Student



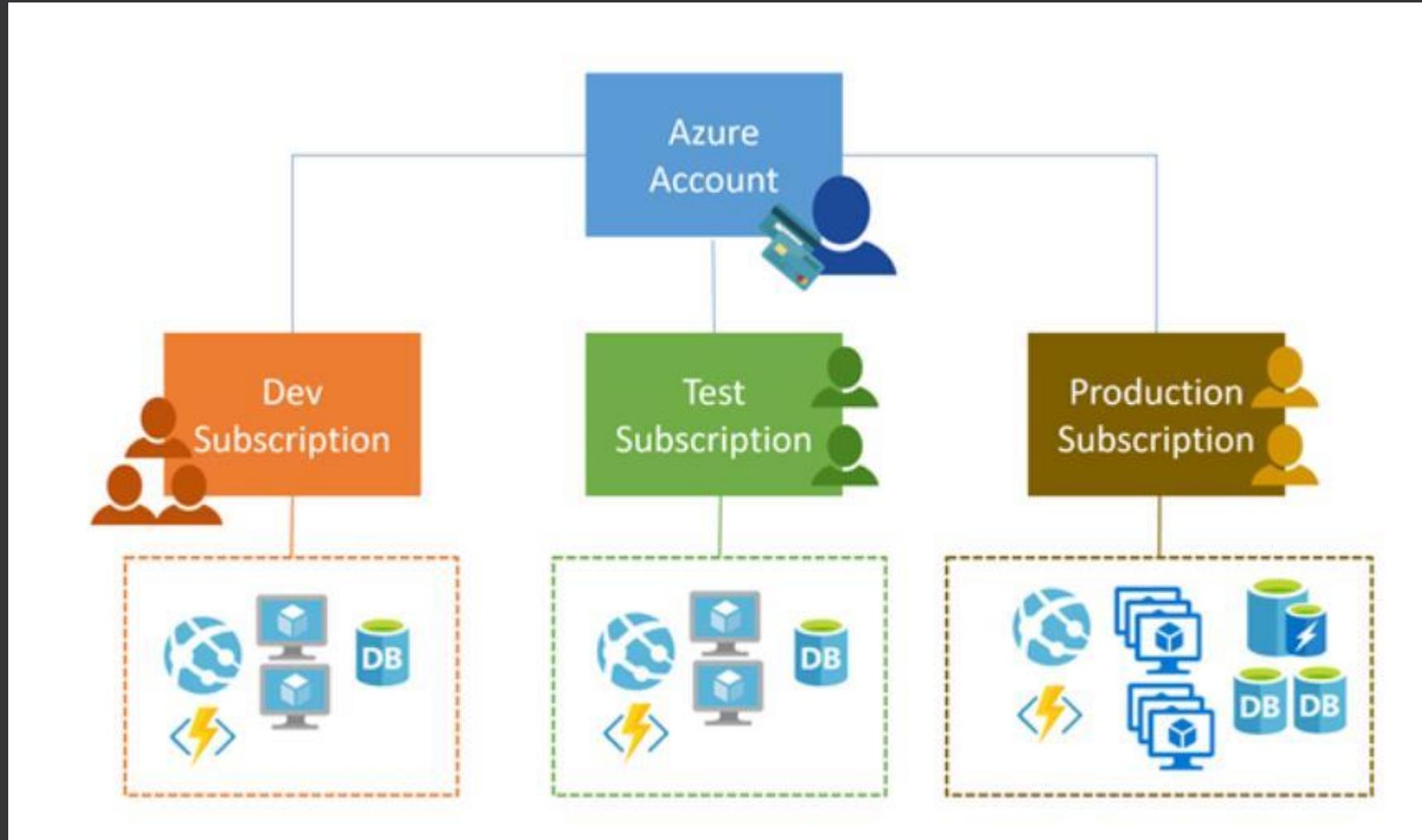
# Azure Subscriptions

Why you might want multiple subscriptions?

- Access management
- Separate bill for each subscription



# Azure Subscriptions



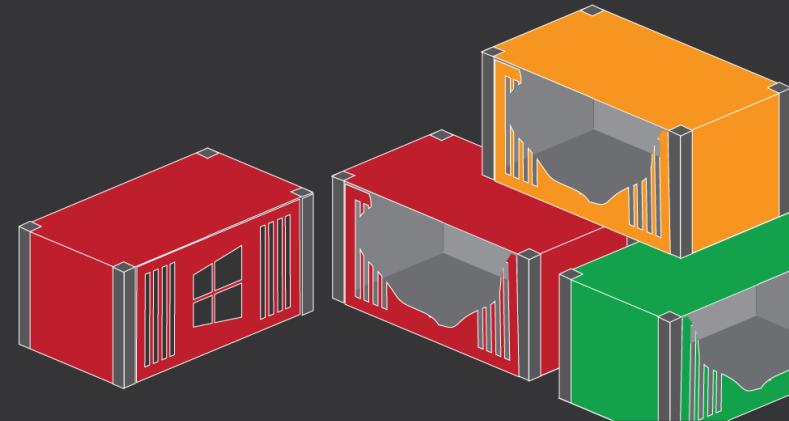
# Management Groups



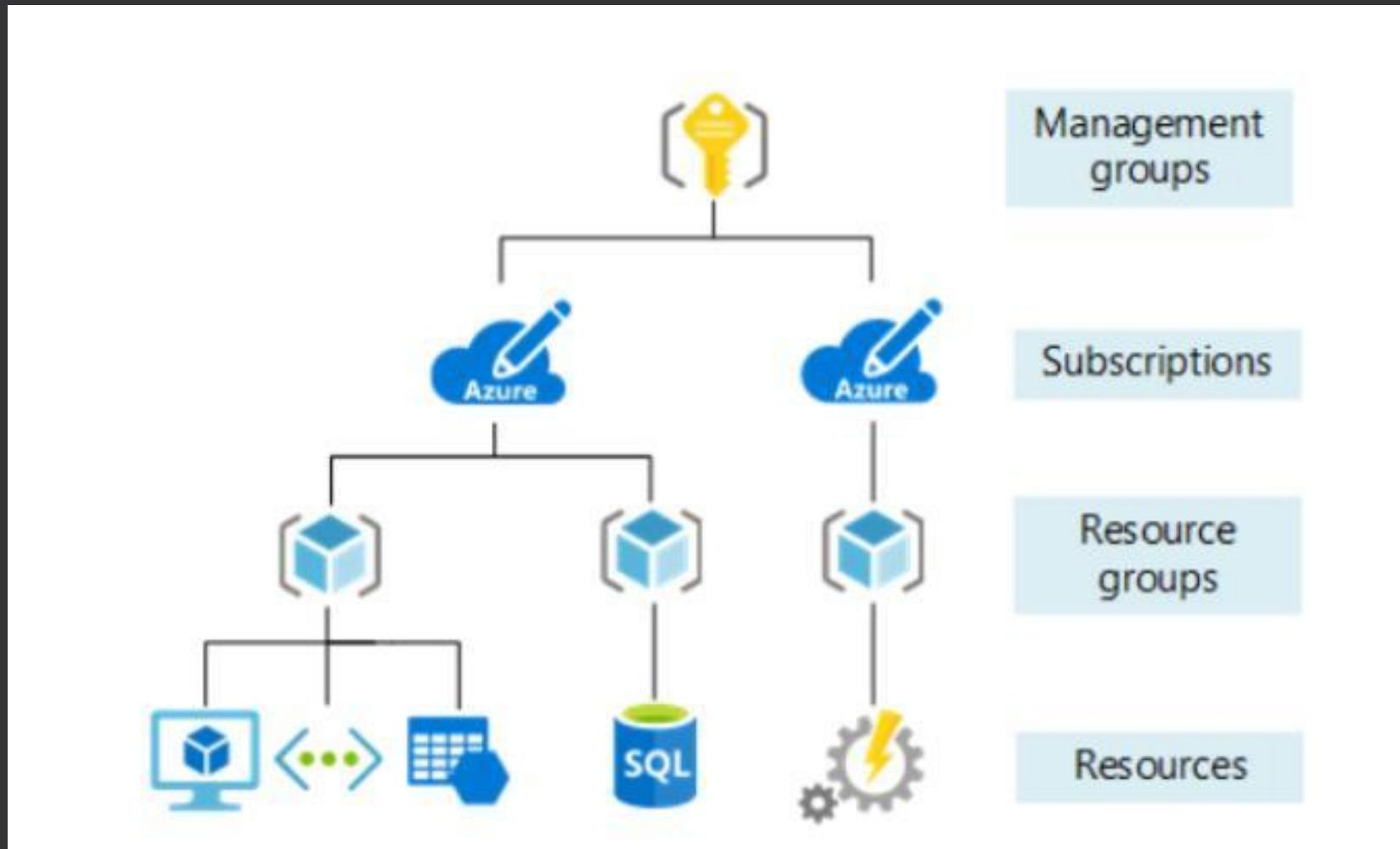
# Management Groups

Azure Management Groups are containers for managing access, policies, and compliance across multiple Azure subscriptions.

Management groups allow you to order your Azure resources hierarchically into collections, which provides a further level of classification that is above the level of subscriptions.



# Object Hierarchy



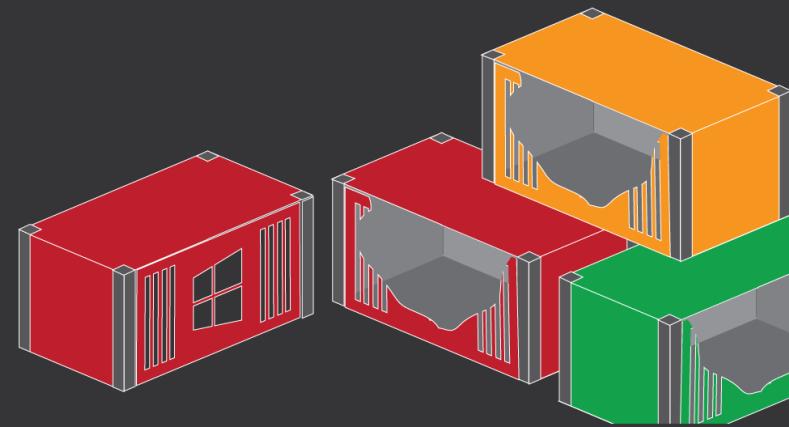
# <https://azure.microsoft.com/en-in/support/plans/>

		Purchase support	Purchase support	Purchase support	Contact Premier
Scope	Available to all Microsoft Azure accounts	Microsoft Azure: Trial and non-production environments	Microsoft Azure: Production workload environments	Microsoft Azure: Business-critical dependence	All Microsoft Products, including Azure: Substantial dependence across multiple products
Customer Service, Self-Help and Communities	24x7 access to billing and subscription support, online self-help, documentation, whitepapers and support forums	24x7 access to billing and subscription support, online self-help, documentation, whitepapers and support forums	24x7 access to billing and subscription support, online self-help, documentation, whitepapers and support forums	24x7 access to billing and subscription support, online self-help, documentation, whitepapers and support forums	24x7 access to billing and subscription support, online self-help, documentation, whitepapers and support forums
Best Practices	Access to full set of Azure Advisor recommendations	Access to full set of Azure Advisor recommendations	Access to full set of Azure Advisor recommendations	Access to full set of Azure Advisor recommendations	Access to full set of Azure Advisor recommendations
Health Status and Notifications	Access to personalised Service Health Dashboard and Health API	Access to personalised Service Health Dashboard and Health API	Access to personalised Service Health Dashboard and Health API	Access to personalised Service Health Dashboard and Health API	Access to personalised Service Health Dashboard and Health API
Technical Support	Business hours access <sup>1</sup> to Support Engineers via email	24x7 access to Support Engineers via email and phone	24x7 access to Support Engineers via email and phone	24x7 access to Support Engineers via email and phone	24x7 access to Support Engineers via email and phone
Who Can Open Cases	Unlimited contacts / unlimited cases	Unlimited contacts / unlimited cases	Unlimited contacts / unlimited cases	Unlimited contacts / unlimited cases	Unlimited contacts / unlimited cases
Third-Party Software Support	Interoperability and configuration				

# Azure Support Options

Every Azure subscription includes free access to the following essential support services:

- Billing and subscription support
- Azure products and services documentation
- Online self-help documentation
- Whitepapers
- Community support forums



# Available Support Channels Outside of Support Plan Channels

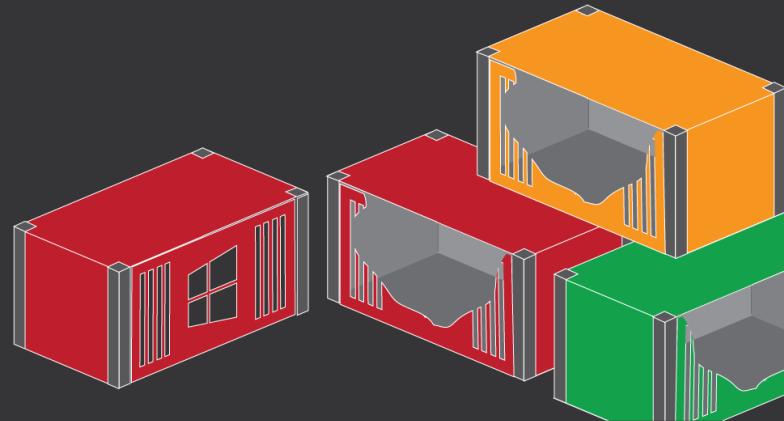
- **MSDN Forums** ( <https://social.msdn.microsoft.com/Forums/en-US/home?category=windowsazureplatform> )
- **Azure Feedback Forums** ( <https://feedback.azure.com/forums/34192--general-feedback> )
- **Stackoverflow** ( <https://stackoverflow.com/questions/tagged/azure/> )

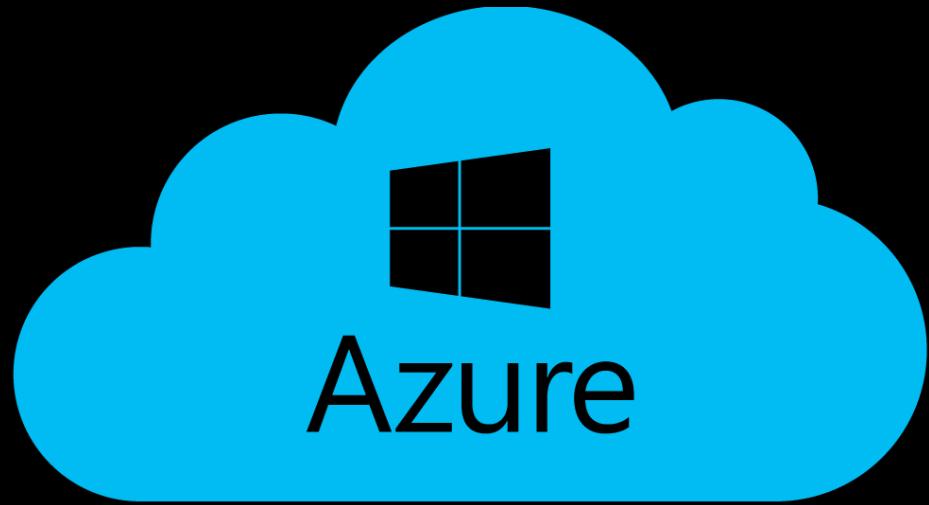
- **Twitter** ( Tweet @AzureSupport to get answers and support )

# Knowledge Center

The Azure Knowledge Center is a searchable database that contains answers to common support questions, from a community of Azure experts, developers, customers, and users.

<https://azure.microsoft.com/en-in/resources/knowledge-center/>





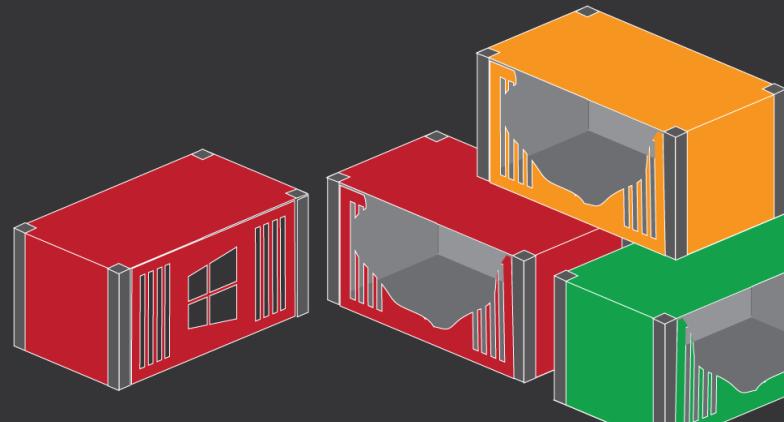
# Service Level Agreements (SLAs)

There are three key characteristics of SLAs for Azure products and services:

- Performance targets

- Uptime and connectivity guarantees

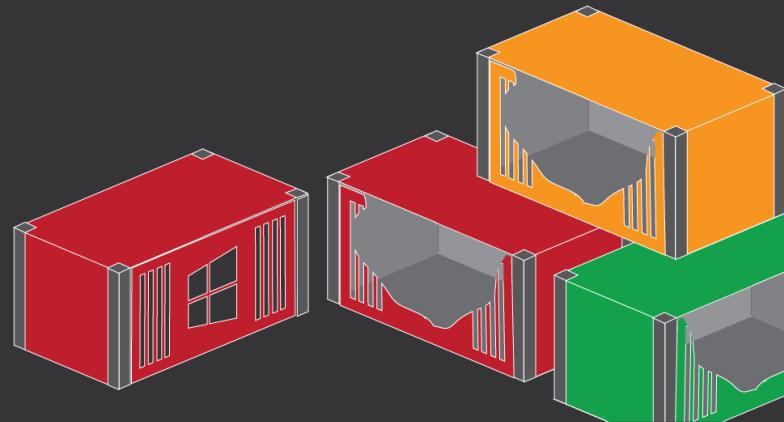
- Service credits



# Service Level Agreements (SLAs)

Microsoft maintains its commitment to providing customers with high-quality products and services by adhering to comprehensive operational policies, standards, and practices.

Formal documents called Service-Level Agreements (SLAs) capture the specific terms that define the performance standards that apply to Azure.



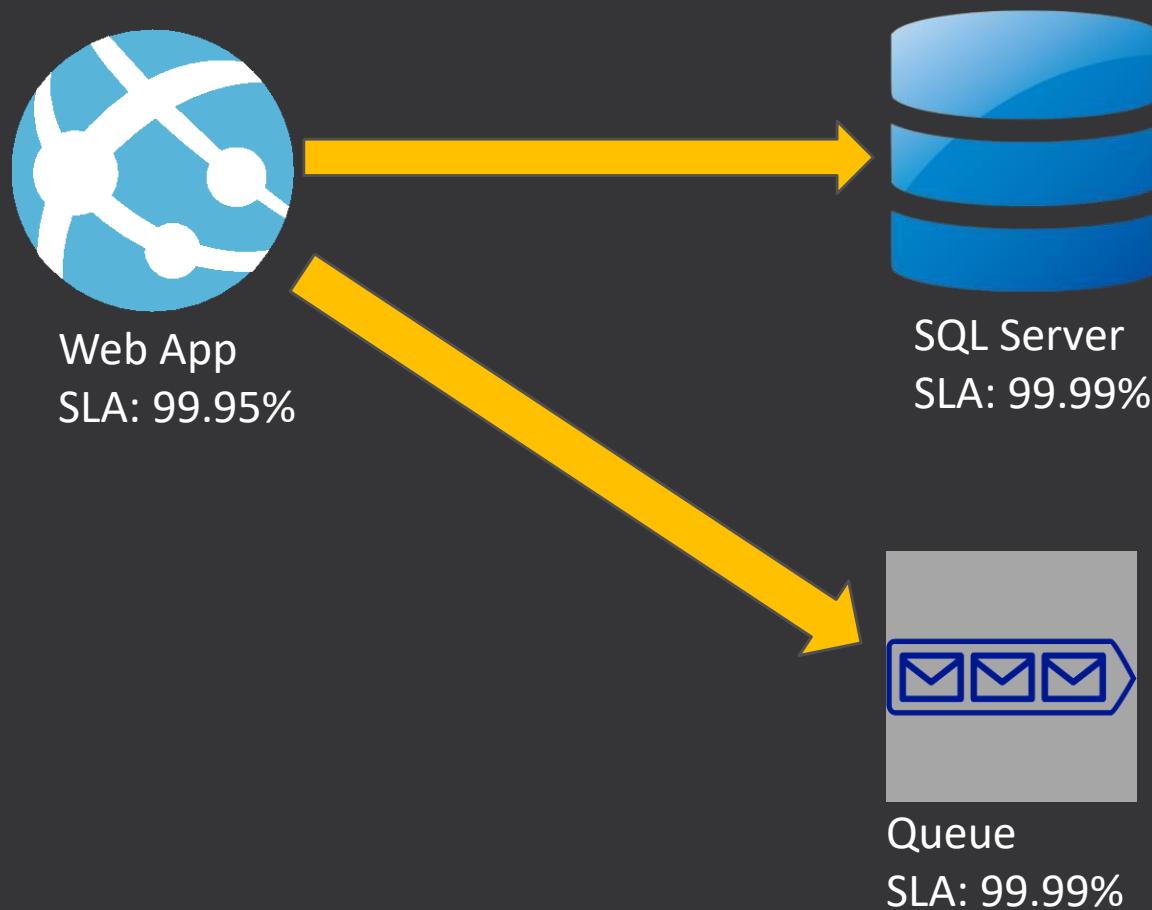
# Composite SLAs



## COMPOSITE SLA

$$\begin{aligned} &= 99.95 \text{ percent} \times 99.99 \text{ percent} \\ &= 99.94 \text{ percent} \end{aligned}$$

# Composite SLAs



## COMPOSITE SLA

$$= \frac{99.95\text{ percent}}{} \times \frac{99.99\text{ percent}}{}$$

$$= 99.94\text{ percent}$$

## New COMPOSITE SLA

#Calculating UPTIME for SQL & Queue combined

$$= 1.0 - (0.0001 \times 0.001)$$

$$= 99.99999\text{ percent}$$

## #Composite SLA

Either SQL or Queue AND WebApp

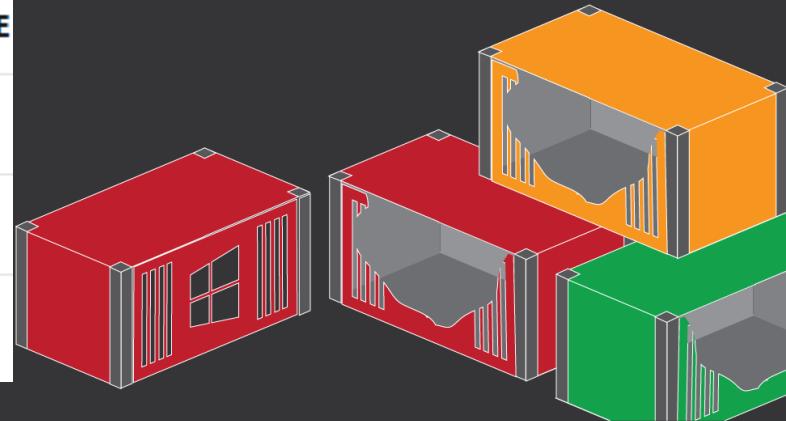
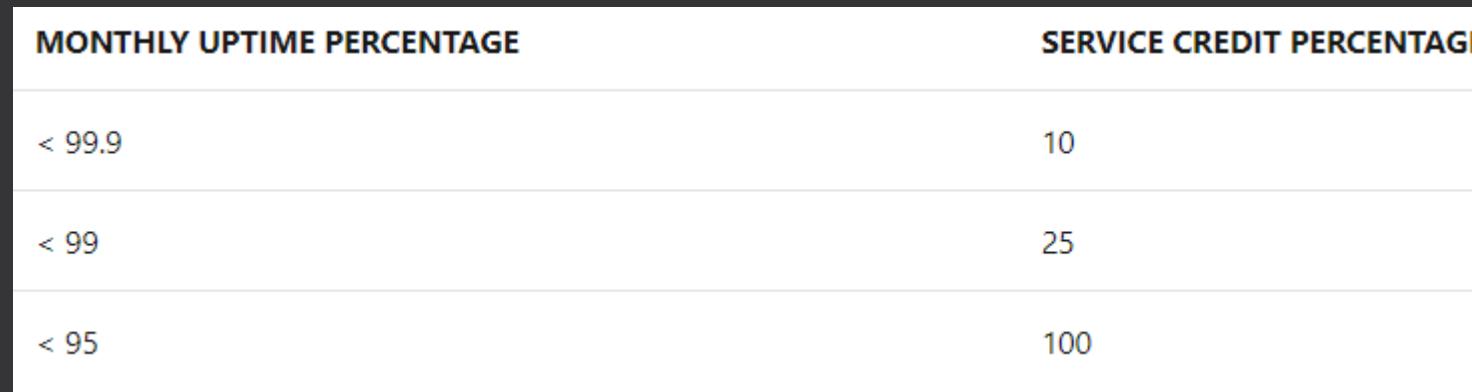
$$99.95\text{ percent} \times 99.99999\text{ percent}$$

$$= \sim 99.95\text{ percent}$$

# Service Credits

SLAs also describe how Microsoft will respond if an Azure product or service fails to perform to its governing SLA's specification.

For example, customers may have a discount applied to their Azure bill as compensation for an under-performing Azure product or service.



# Public and Private Preview Features

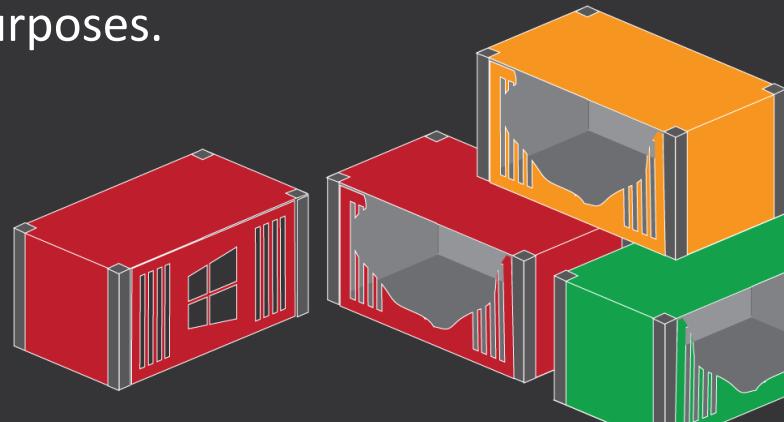
There are two categories of preview available:

## Private Preview

Feature is available to certain Azure customers for evaluation purposes.

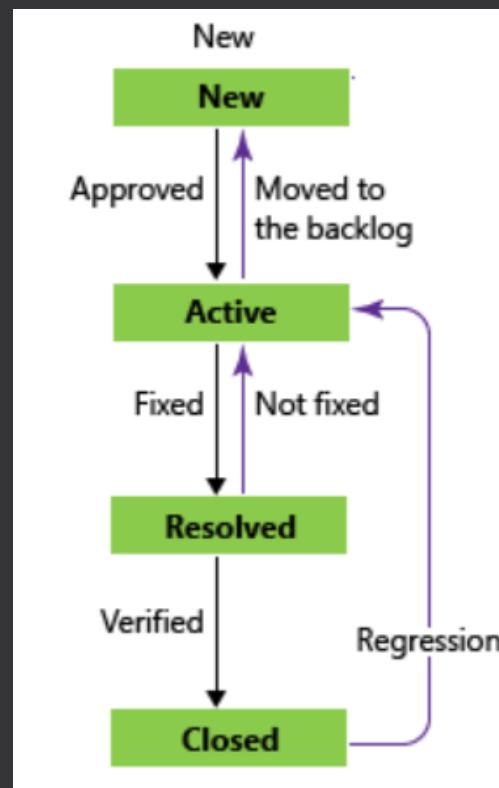
## Public Preview

Feature is available to all Azure customers for evaluation purposes.



# General Availability (GA)

Once a feature is evaluated and tested successfully, it may be released to customers as part of Azure's default product, service, or feature set, which means that feature is moved to **General Availability(GA)** stage.



Thank You

