

## EPISODE - 1

### Cloud Computing services

Service delivery model over the internet (cloud). This includes but is not limited to

- compute power - meaning servers such as windows, linux, hosting environments, etc.
- storage - like files and/or databases
- networking - in azure but also outside when connecting to your company network
- analytics services - for visualization and telemetry data

### Key concepts

Cloud characteristics:

- scalability is the ability to scale, so allocate and deallocate resources at any time
- elasticity is the ability to scale dynamically/ automatic scaling
- agility is the ability to react fast (scale quickly)
- fault tolerance is the ability to maintain system uptime while physical and service component failures happen/ability to remain up and running during component and service failures
- disaster recovery is the process and design principle which allows a system to recovers from natural or human induced disasters
- high availability is the agreed level of operational uptime for the system. It is a simple calculation of system uptime versus whole lifetime of the system.

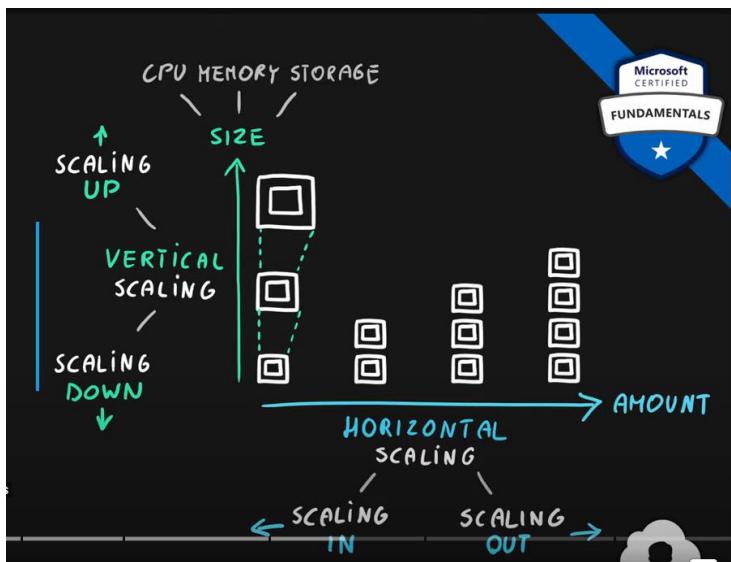
Or

Ability to keep services running for extended periods of time with very little downtime

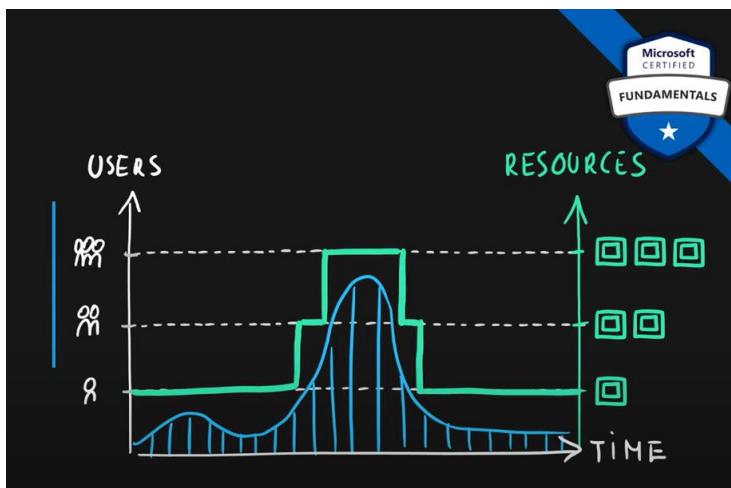
Availability – Measure of systems uptime for users/services

availability =  $\frac{\text{uptime}}{\text{uptime} + \text{downtime}}$

### Scalability



Elasticity



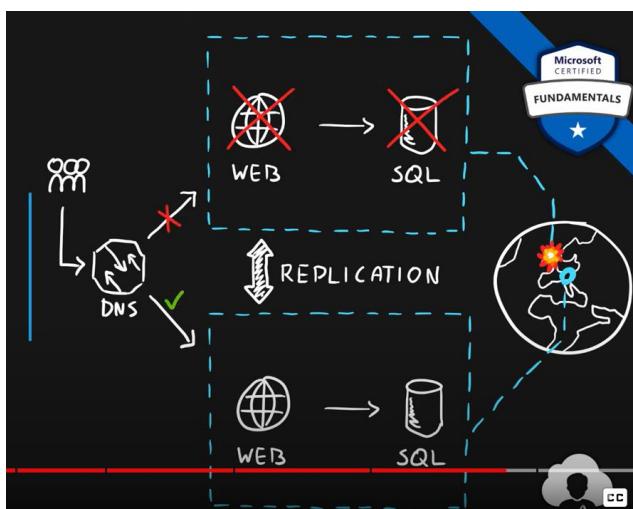
Agility



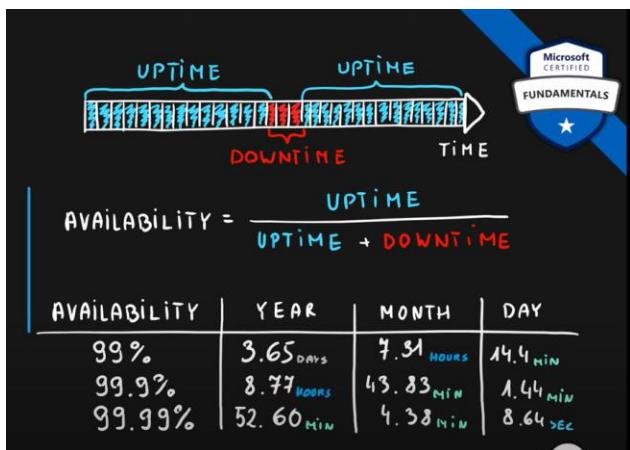
Fault tolerance



## Disaster recovery



## High availability



## EPISODE - 2

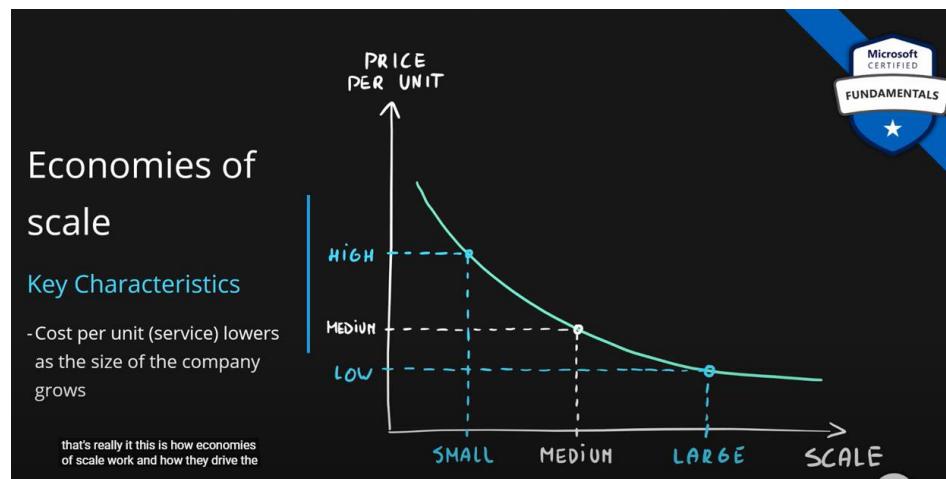
### Economies of Scale

The principle of economies of scale states that as the companies grow they become more effective at managing shared operations. Be that HR and hiring, taxes, accounting, internal operations, marketing, big purchases via contracts meaning better discounts, etc. etc.

Because of those, companies can save/earn more which in return allows for reduction in cost of their services to their customers. This is so called 'price per unit'.

It's not possible to go to 0 because in the end some underlying infrastructure needs to run to provide the services. But the larger the scale the more benefits can be passed to customers.

In fact, in the current scale, Microsoft can already offer multiple services for free due to how small a fraction of the cost it is for them.



Cost per unit/service lowers as the size of the company grows.

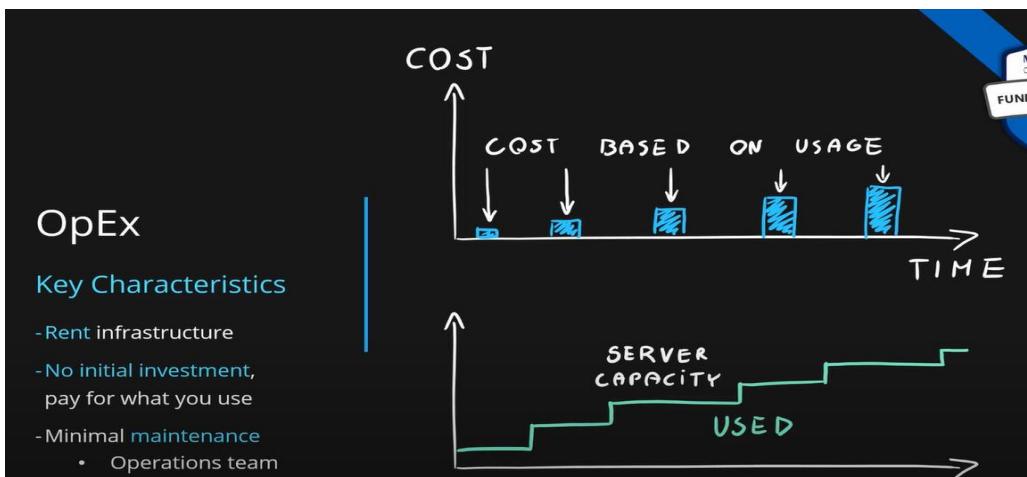
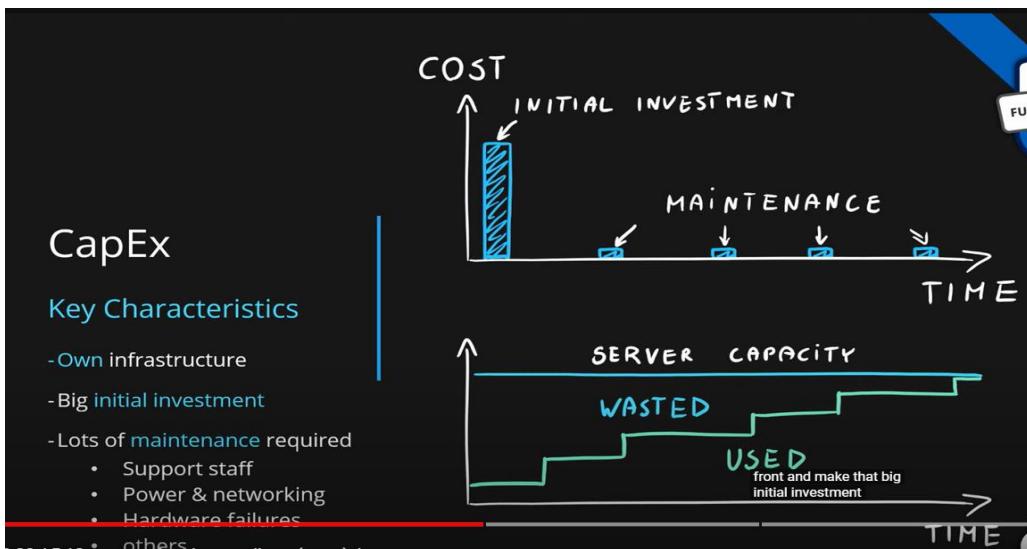
## EPISODE - 3

### CapEx vs OpEx- Differences between Capital Expenditure and Operational Expenditure

#### CapEx vs. OpEx

##### Differences

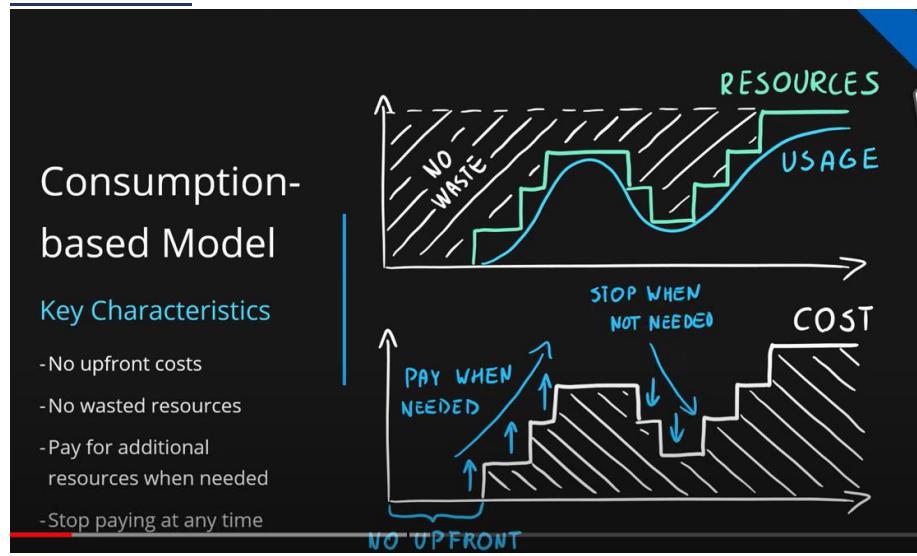
	CapEx	OpEx
Up front cost	Significant	None
Ongoing cost	Low	Based on usage
Tax Deduction	Over time	Same year
Early Termination	No	Anytime
Maintenance	Significant	Low
Value over time	Lowers	No change



Capex – Physical data centers

Opex – Cloud

## EPISODE – 4



What is a consumption-based model?

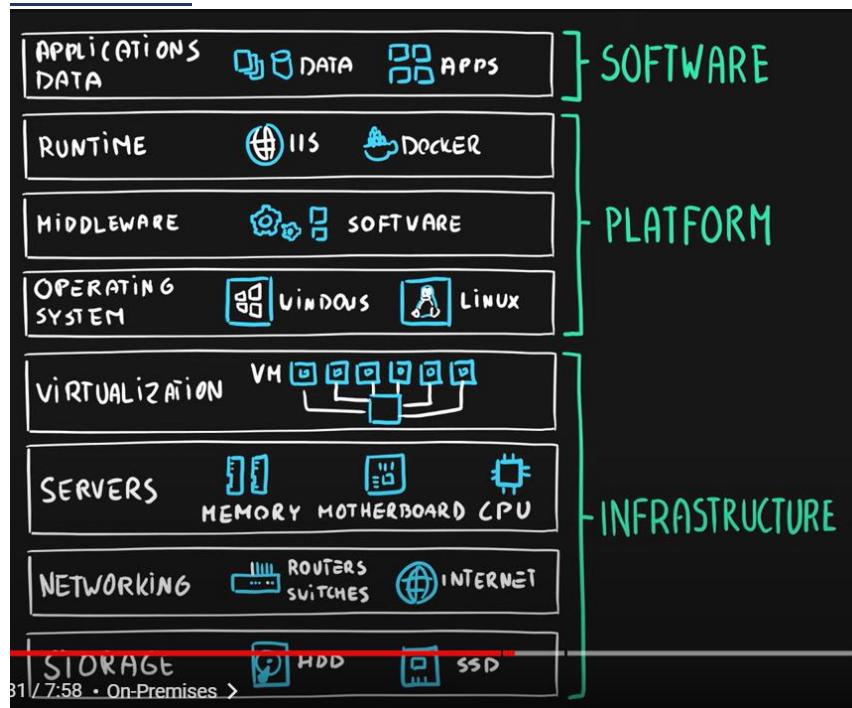
The consumption-based model is a **pricing model** used in the cloud so that customers are only charged **based on their resource usage**.

This model is characterized by

- **No associated upfront cost**
- **No wasted resources** as such *no charges are incurred for unused resources\**. Unused in this case is different per service. For instance, blob storage that stores any data is considered to be used, as it consumes the storage space. Virtual Machines that are running consume CPU, memory and other resources even if there isn't any traffic. Hence they are considered to be used and will incur charges.
- **Pay for what you need**
- **Stop paying when you don't**

**Consumption** is the virtual metric used to calculate how much each resource (service) in Azure was used. Each service has many smaller metrics that track its consumption to offer best possible pricing model. Those metrics are tracked on very granular level.

## EPISODE – 5



### On-Premises

#### Key Characteristics

##### Ownership

- Cloud provider manages **nothing**
- You manage **everything**
  - Infrastructure – networking, hardware & virtualization
  - Platform – operating system, middleware, runtime
  - Software – data & applications

### Infrastructure as a Service (IaaS)

#### Key Characteristics

##### Ownership

- Cloud provider manages **infrastructure**
  - Infrastructure – networking, hardware & virtualization
- You manage **platform & software**
  - Platform – operating system, middleware, runtime
  - Software – data & applications

##### Use cases

- Migration of workloads
- Test & development
- Storage, backups and recovery



## Platform as a Service (PaaS)

### Key Characteristics

#### Ownership

- Cloud provider manages **infrastructure & platform**
  - Infrastructure – networking, hardware & virtualization
  - Platform – operating system, middleware, runtime
- You manage **software**
  - Software – data & applications



#### Use cases

- Development framework
- Analytics & business intelligence

## Software as a Service (SaaS)

### Key Characteristics

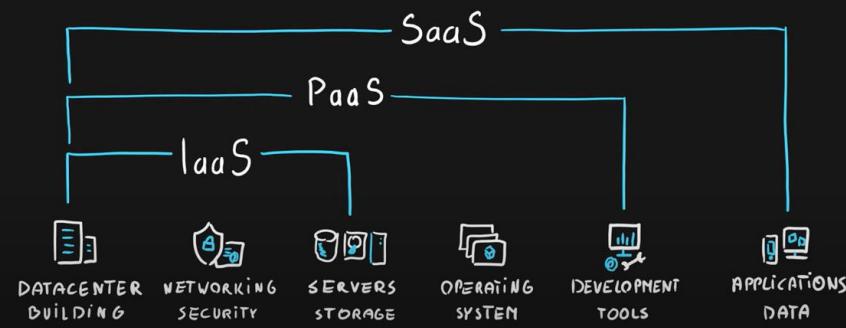
#### Ownership

- Cloud provider manages **infrastructure, platform & software**
  - Infrastructure – networking, hardware & virtualization
  - Platform – operating system, middleware, runtime
  - Software – data & applications
- You manage **nothing**



## IaaS vs. PaaS vs. SaaS

### Summary



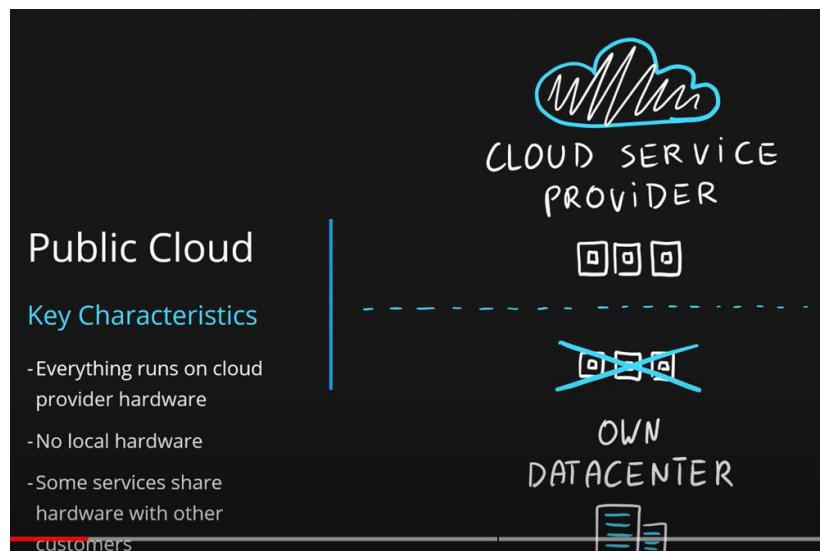
**As a service** means which party will manage the particular layer and all the layers below.

- **Software** layer consists of the application (application code and set) & the application data

- **Platform** layer means all the supporting software and the operating system required to host the application
- **Infrastructure** layer consists hardware the infrastructure and virtualization required to host the platform

Layer	On-Premises	IaaS	PaaS	SaaS
Application	You	You	You	Cloud provider
Data	You	You	You	Cloud provider
Runtime	You	You	Cloud provider	Cloud provider
Middleware	You	You	Cloud provider	Cloud provider
Operating System	You	You	Cloud provider	Cloud provider
Virtualization	You	Cloud provider	Cloud provider	Cloud provider
Servers	You	Cloud provider	Cloud provider	Cloud provider
Networking	You	Cloud provider	Cloud provider	Cloud provider
Storage	You	Cloud provider	Cloud provider	Cloud provider

## EPISODE - 6



## Public Cloud

### Advantages and Disadvantages

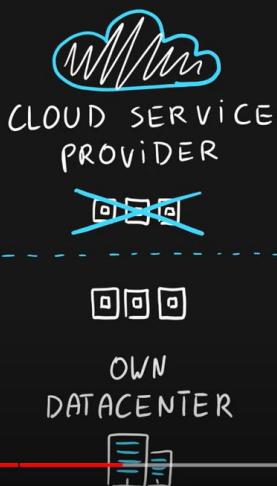
#### Advantages

- No CapEx
- High availability & Agility
- Pay as you go pricing
- No hardware maintenance
- No deep technical skills required

#### Disadvantages

- Security & Compliance
- Ownership
- Specific scenarios with unique business req.

FUN



## Private Cloud

### Key Characteristics

- Everything runs on your own datacenter
- Self-service should be provided
- You maintain the hardware

50 / 516 - Private Cloud

## Private Cloud

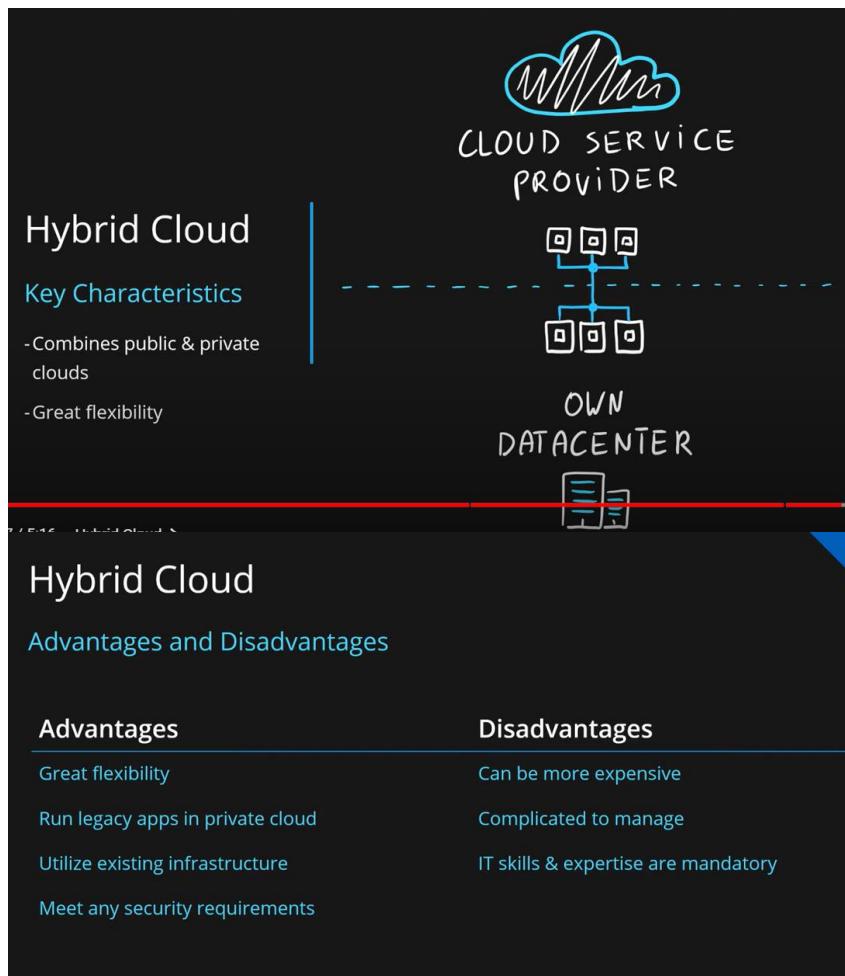
### Advantages and Disadvantages

#### Advantages

- Can support any scenario
- Control over security
- Can meet any security & compliance requirements

#### Disadvantages

- Initial CapEx
- Limited Agility
- IT skills & expertise are mandatory



## Cloud Deployment Model

**Cloud Deployment Model** is simple a separation which describes where are the company resources deployed. Whenever this is in public cloud provider environment or private datacenter.

Below table presents high level deployment model separation

Layer	Cloud Provider	Own Datacenter
<b>Public</b>	<input checked="" type="checkbox"/>	✗
<b>Hybrid</b>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<b>Private</b>	✗	<input checked="" type="checkbox"/>

## EPISODE – 7

### Data Center

**Key Characteristics**

- Physical facility
- Hosting for group of networked servers
- Own power, cooling & networking infrastructure

The diagram illustrates a central "DATA CENTER" containing various server racks. To the left, icons represent different services: SQL (database), WEB (internet), and VM (virtual machine). To the right, icons represent infrastructure: POWER (battery), COOLING (fan), and NETWORKING (router). The "SERVERS" section is shown in the center, connected to the other components.

### Region

**Key Characteristics**

- Geographical area on the planet
- One but usually more datacenters connected with low-latency network (<2 milliseconds)
- Location for your services
- Some services are available only in certain regions
- Some services are global services, as such are not assigned/deployed in specific region
- Globally available with 50+ regions
- Special government regions (US DoD Central, US Gov Virginia, etc.)
- Special partnered regions (China East, China North)

A Microsoft Certified Fundamentals logo is visible in the top right corner of the slide.

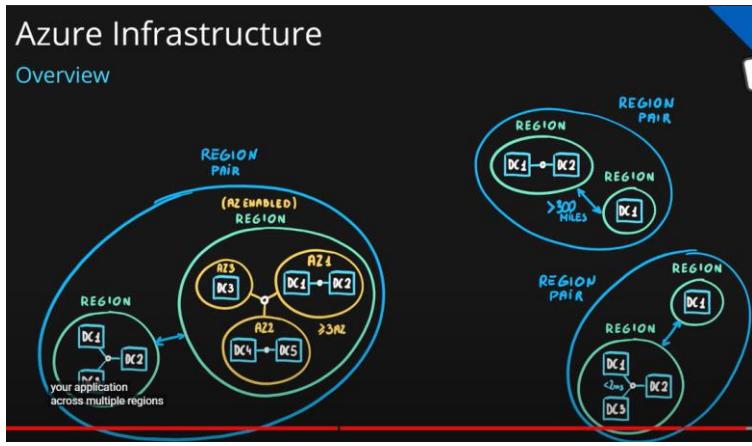
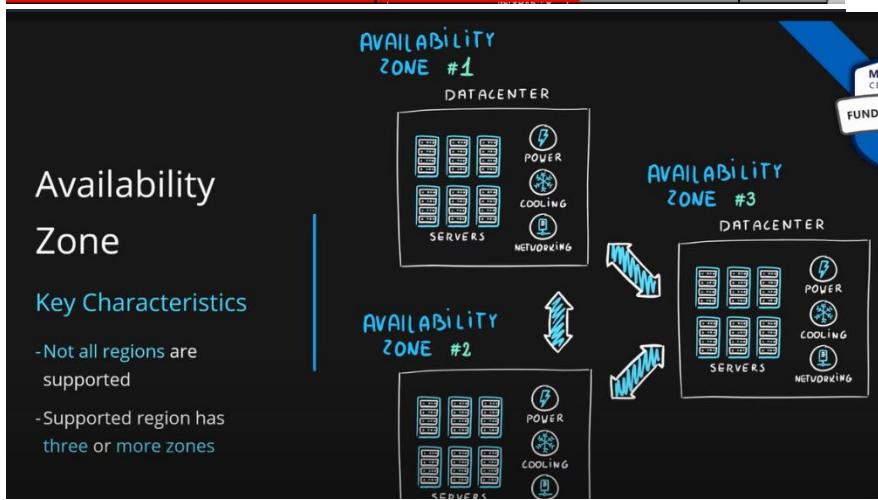
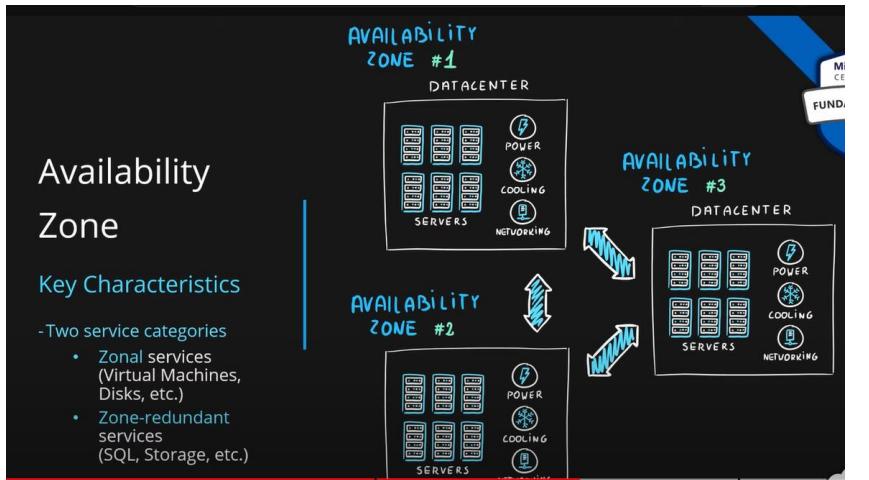
### Availability Zone

**Key Characteristics**

- Regional feature
- Grouping of physically separate facilities
- Designed to protect from data center failures

If zone goes down others

The diagram shows three separate "DATA CENTER" boxes labeled "AVAILABILITY ZONE #1", "AVAILABILITY ZONE #2", and "AVAILABILITY ZONE #3". Each box contains server racks and infrastructure icons. A red "X" is placed over the first zone, and a small fire icon is inside its box. Green checkmarks are placed over the second and third zones. Blue arrows point from the second zone to the first, and from the third zone to the first, indicating cross-zone connectivity.



## Region Pairs

### Key Characteristics

- Each region is paired with another region making it a region pair
- Region pairs are static and cannot be chosen
- Each pair resides within the same geography\*
  - Exception is Brazil South
- Physical isolation with at least 300 miles distance (when possible)
- Some services have platform-provided replication
- Planned updates across the pairs
- Data residency maintained for disaster recovery

## Region Pairs

### Key Characteristics

Region Pair A	Region Pair B
East US	West US
UK West	UK South
North Europe (Ireland)	West Europe (Netherlands)
East Asia (Hong Kong)	Southeast Asia (Singapore)

## Geographies

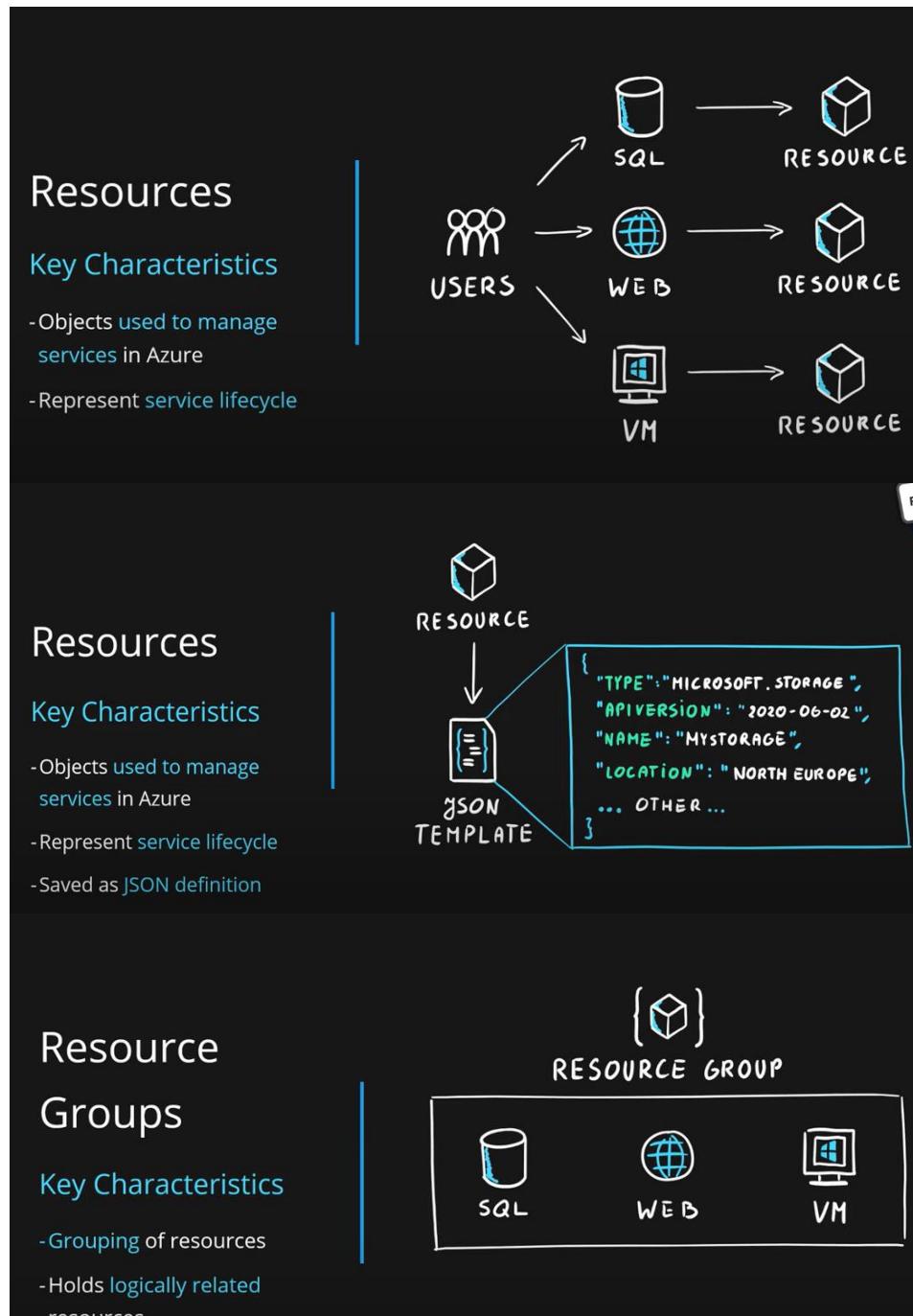
### Key Characteristics

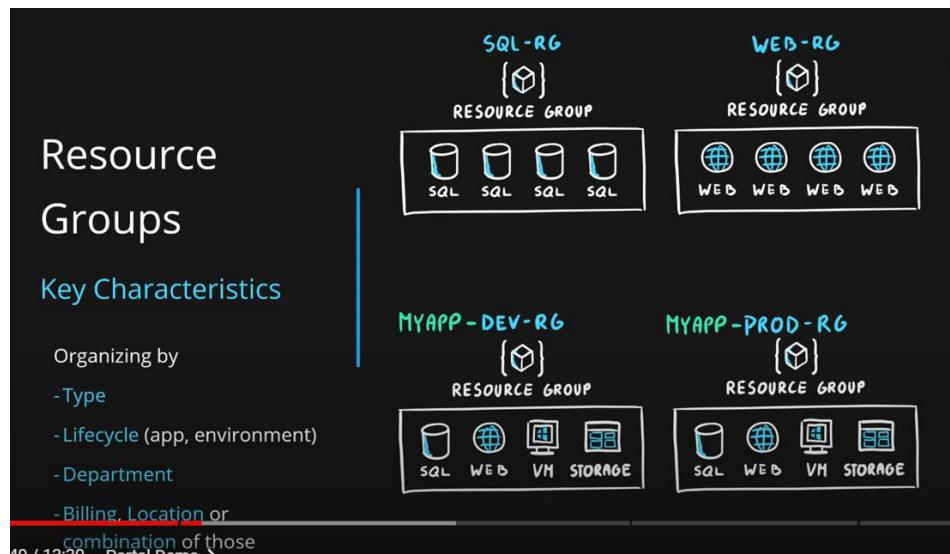
- Discrete market
- Typically contains two or more regions
- Ensures data residency, sovereignty, resiliency, and compliance requirements are met
- Fault tolerant to protect from region wide failures
- Broken up into areas
  - Americas,
  - Europe,
  - Asia Pacific,
  - Middle East and Africa
- Each region belongs only to one Geography

- Data center – Group of networked servers
- Region – 1 or more data centers
- Availability zone – 1 or more DC's. Regional feature. Group of physically separate facilities
- Supported availability zone region – 3 or more availability zones
- Regions pairs – In same Geography
- 1 region - belongs to 1 geography. – mapped to 1 another region only

- Geography – 2 or more regions.

## EPISODE – 8





- Resource groups are free, can create as many as possible, no charges.

#### Azure cli:

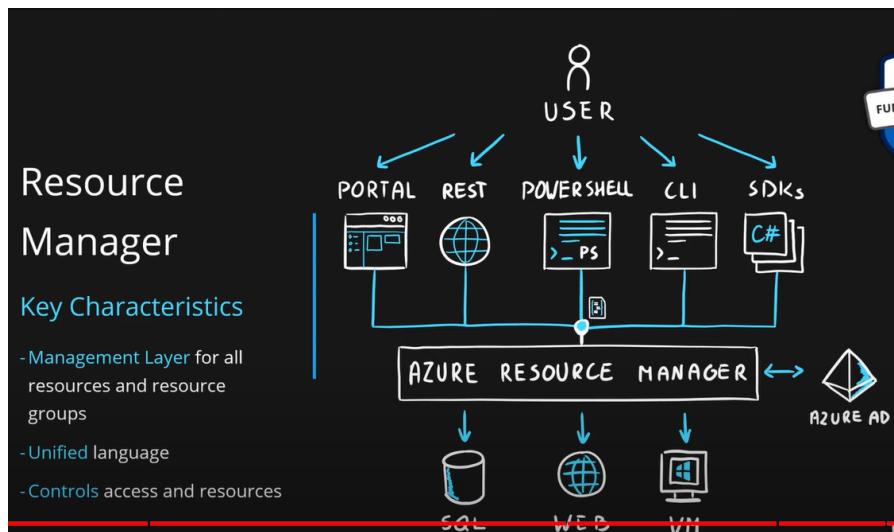
- az login
- az group create --name az-900-2 --location "north Europe"
- az storage account create --name xx --resource-group az-900-2 --location "north Europe"

[resources.azure.com](https://resources.azure.com) → Finds json info of all resources created

## Resource Groups

### Additional information

- Each resource must be in one, and only one resource group
- Resource groups have their own location assigned
- Resources in the resource groups can reside in a different locations
- Resources can be moved between the resource groups
- Resource groups can't be nested
- Organize based on your organization needs but consider
  - Billing
  - Security and access management
  - Application Lifecycle

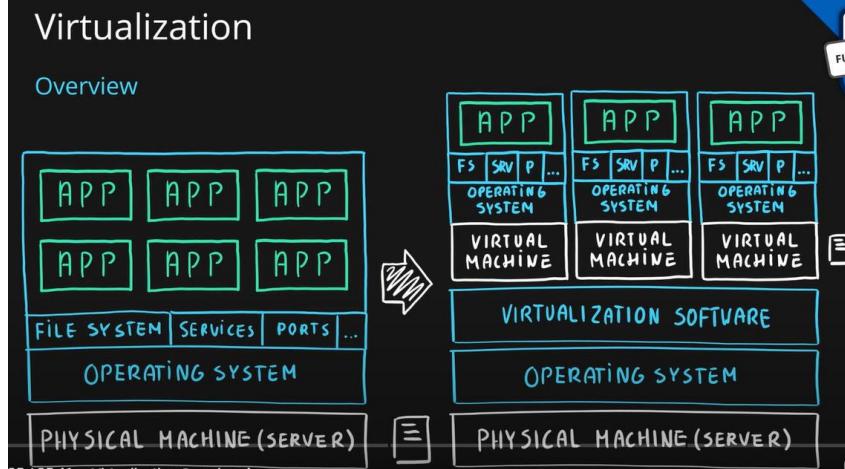


## EPISODE - 9

### Azure Compute Services

#### Summary

- **Virtual Machines (IaaS)**  
Custom software, custom requirements, very specialized, high degree of control
- **VM Scale Sets (IaaS)**  
Auto-scaled workloads for VMs
- **Container Instances (PaaS)**  
Simple container hosting, easy to start
- **Kubernetes Service (PaaS)**  
Highly scalable and customizable container hosting platform
- **App Services (PaaS)**  
Web applications, a lot of enterprise web hosting features, easy to start
- **Functions (PaaS) (Function as a Service) (Serverless)**  
micro/nano-services, excellent consumption-based pricing , easy to start

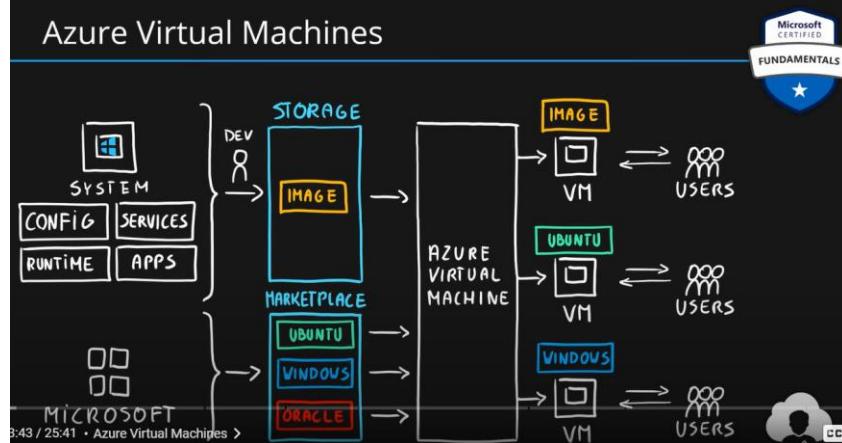


# Virtualization

## Key Characteristics

- Emulation of physical machines
- Different virtual hardware configuration per machine/app
- Different operating systems per machine/app
- Total separation of environments
  - file systems,
  - services,
  - ports,
  - middleware,
  - configuration

## Azure Virtual Machines

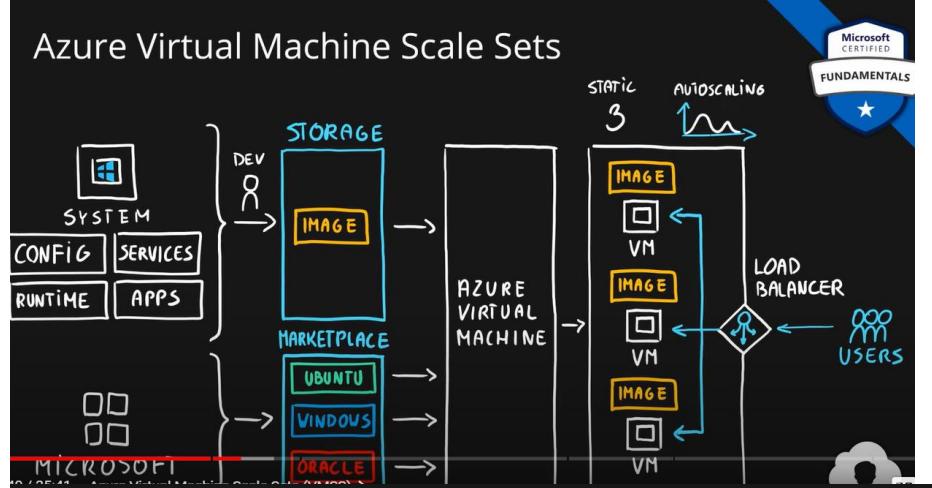


# Virtual Machines

## Key Characteristics

- Infrastructure as a Service (IaaS)
- Total control over the operating system and the software
- Supports marketplace and custom images
- Best suited for
  - Custom software requiring custom system configuration
  - Lift-and-shift scenarios
- Can run any application/scenario
  - web apps & web services,
  - databases,
  - desktop applications,
  - jumpboxes,

## Azure Virtual Machine Scale Sets

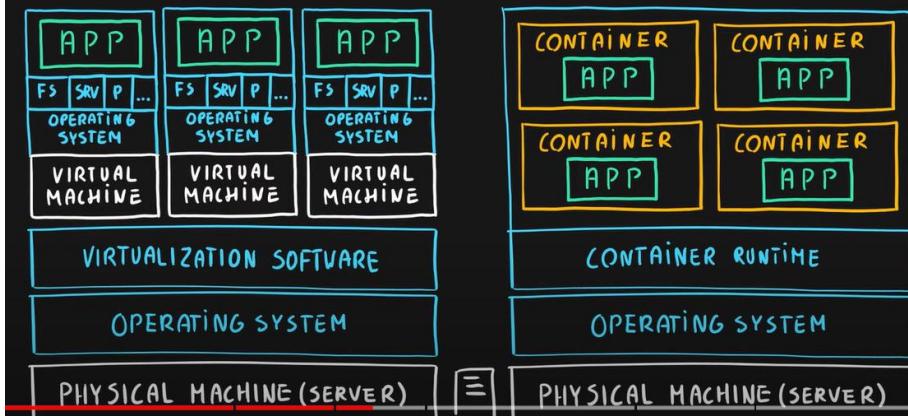


## Virtual Machine Scale Sets

### Key Characteristics

- Infrastructure as a Service (IaaS)
- Set of identical virtual machines
- Built-in auto scaling features
- Designed for manual and auto-scaled workloads like web services, batch processing, etc.

## Containers vs VMs

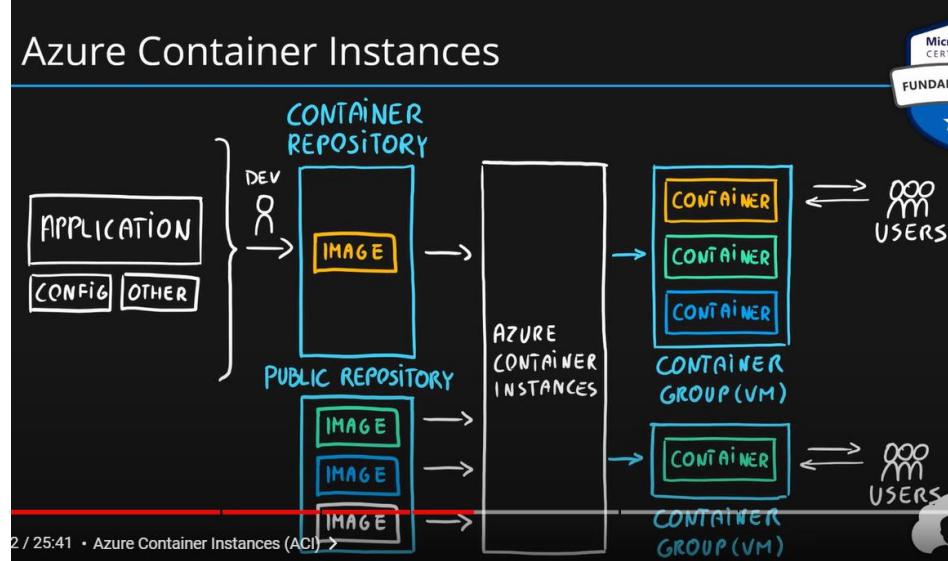


# Containers

## Key Characteristics

- Use host's operating system
- Emulate operating system (VMs emulate hardware)
- Lightweight (no O/S)
  - Development Effort
  - Maintenance
  - Compute & storage requirements
- Respond quicker to demand changes
- Designed for almost any scenario

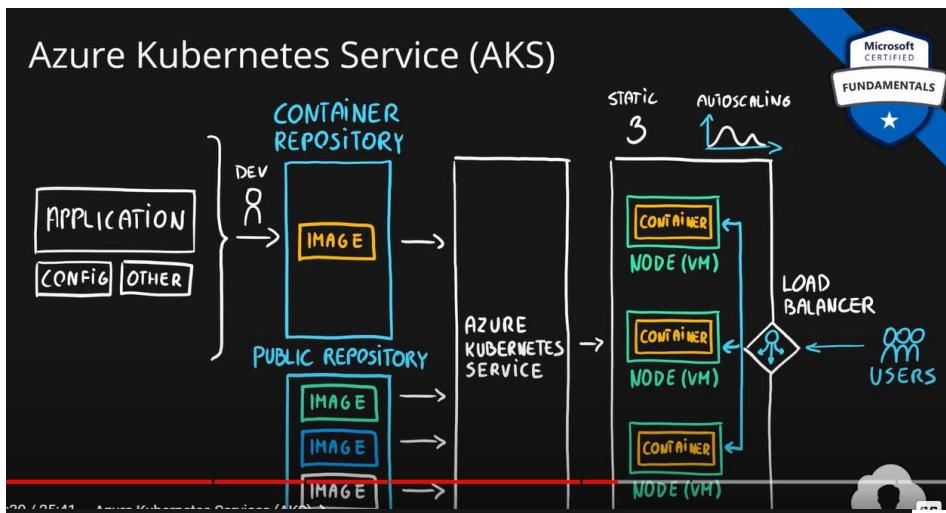
## Azure Container Instances



## Azure Container Instances

### Key Characteristics

- Simplest and fastest way to run a container in Azure
- Platform as a Service
- Serverless Containers
- Designed for
  - Small and simple web apps/services
  - Background jobs
  - Scheduled scripts

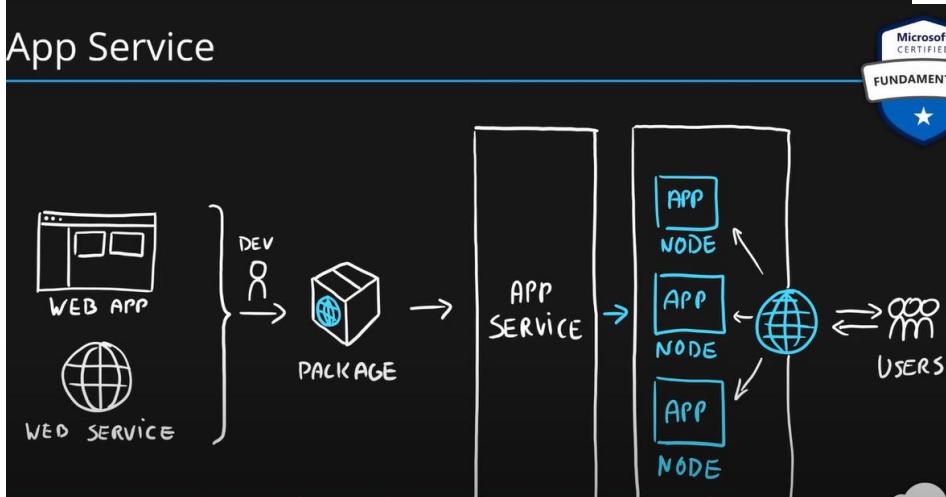


## Azure Kubernetes Service (AKS)

### Key Characteristics

- Open-source container orchestration platform
- Platform as a Service
- Highly scalable and customizable
- Designed for high scale container deployments (anything really!)

## App Service

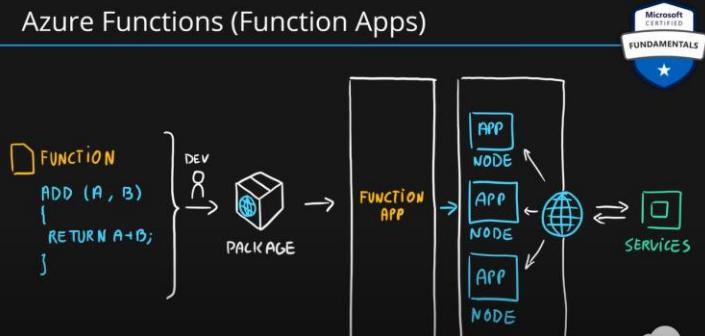


## App Service

### Key Characteristics

- Designed as enterprise grade web application service
- Platform as a Service
- Supports multiple programming languages and containers

### Azure Functions (Function Apps)



## Azure Functions (Function Apps)

### Key Characteristics

- Platform as a Service
- Serverless
- Two hosting/pricing models
  - Consumption-based plan
  - Dedicated plan
- Designed for micro/nano-services

## Azure Compute Services

### Summary

Service	Configuration Control / Maintenance	Autoscaling	Min Nodes	Max Nodes	Scalability
Virtual Machines	☆☆☆☆☆	No	1	1	☆
VM Scale Sets	☆☆☆☆☆	Yes	1	1000/600	☆☆☆☆☆
Container Instances	☆☆☆	No	0	20	☆☆
Kubernetes Service	☆☆☆☆	Yes	3	100	☆☆☆☆
App Service	☆☆	Yes	1	20/100	☆☆☆
Functions	☆	Yes	0	200	☆☆☆☆

## EPISODE – 10

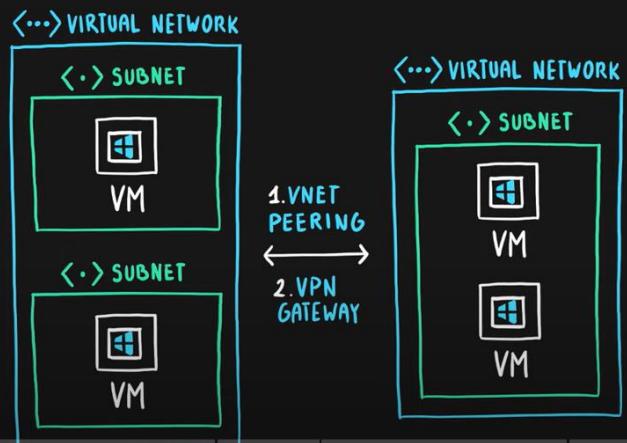
### Azure Networking Services

#### Service Category

Category of services with capability to

- Connect cloud and [on-premise](#) resources
- Protect & monitor services
- Help with [application delivery](#)

### Virtual Network



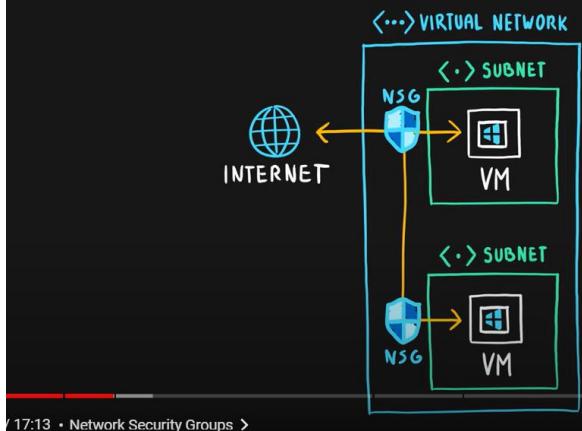
### Azure Virtual Network



#### Key Characteristics

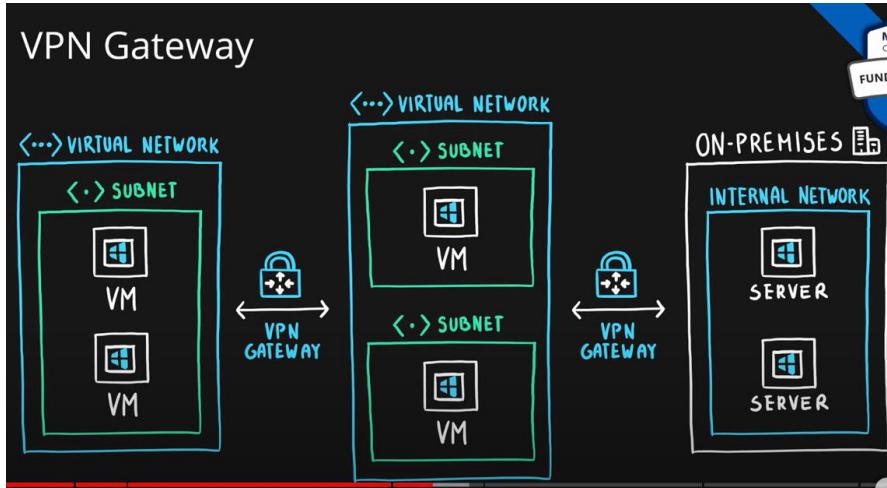
- Emulation of physical networking infrastructure
- Designed for [isolation](#), [segmentation](#), [communication](#), [filtering](#), [routing](#) between resources (internet and on-premises)
- Scoped to a single region
- [VNet Peering](#) or [VPN Gateway](#) allow cross VNet communication
- Segmented into one or more [subnets](#)
- [Subnets](#) are discrete sections used for
  - effective [address allocation](#) and
  - [network filtering](#) via [Network Security Groups \(NSG\)](#) or [Application Security Groups \(ASG\)](#)

## Network Security Groups



17:13 • Network Security Groups >

## VPN Gateway

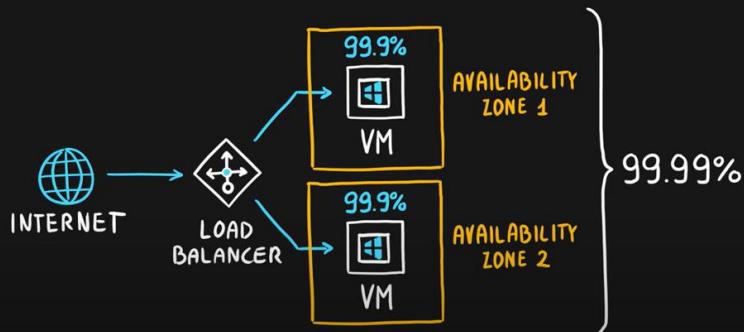


## Azure VPN Gateway

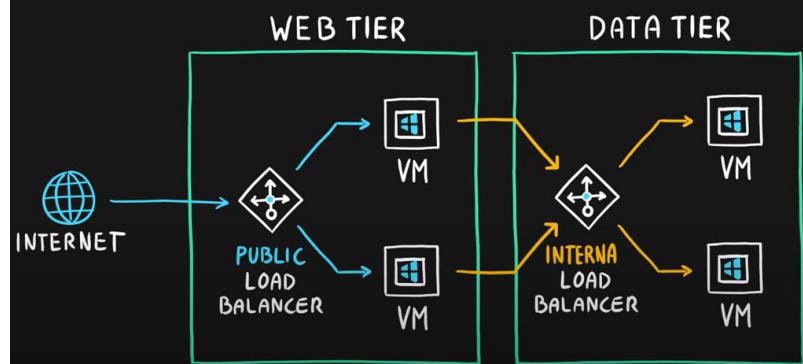
### Key Characteristics

- On-premises to azure traffic over the public internet
- Cross-regional communication of azure virtual networks
  - VNet peering vs VPN gateway should be chosen based on the organization needs

## Azure Load Balancer



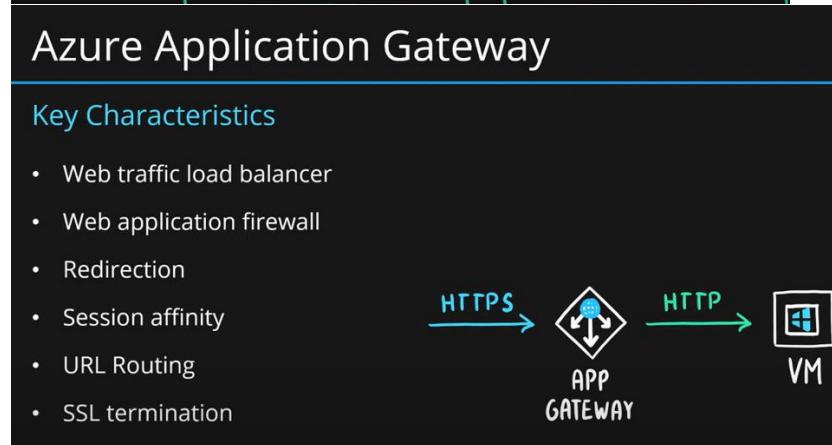
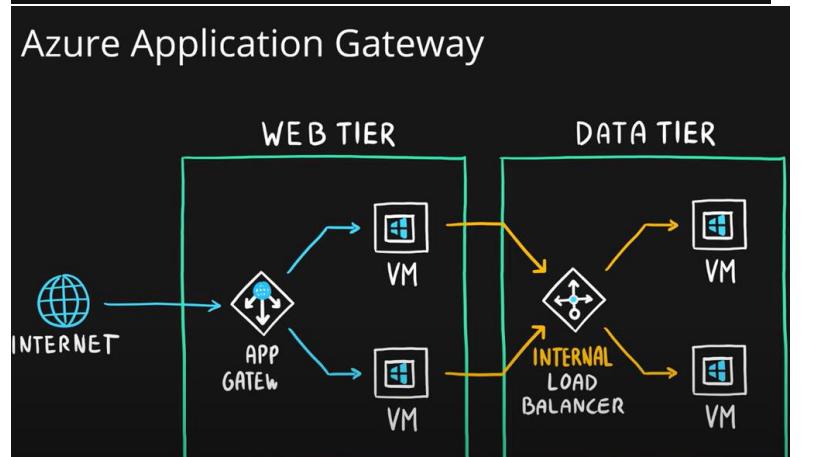
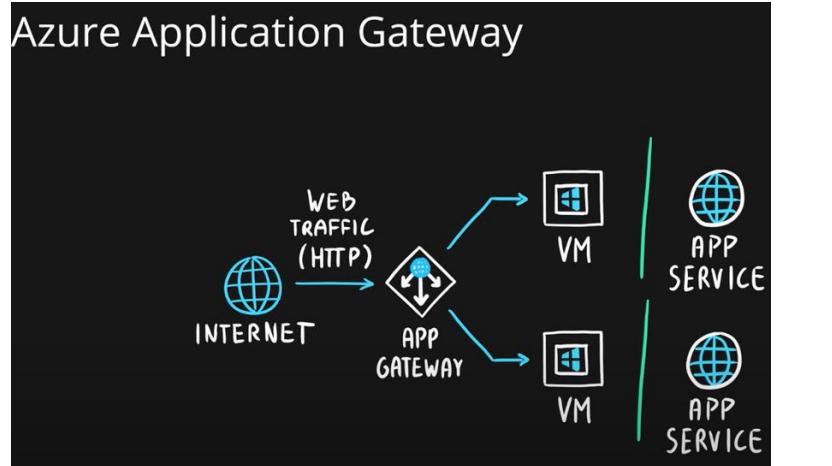
## Azure Load Balancer

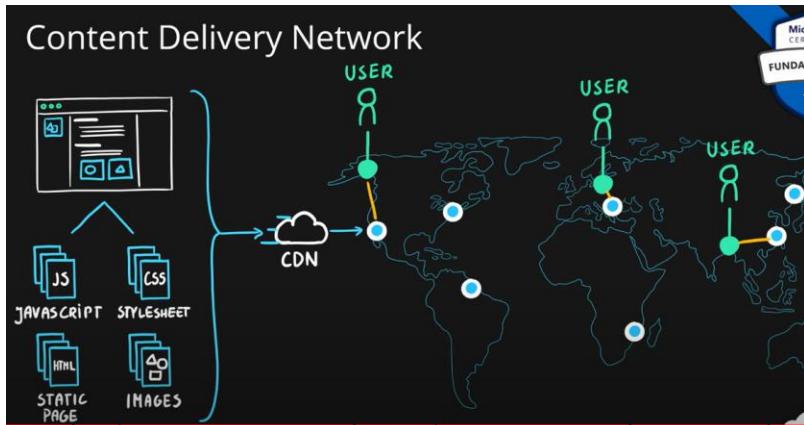


## Azure Load Balancer

### Key Characteristics

- Even traffic distribution
- Supports both **inbound** and **outbound** scenarios
- High-availability and **scalability** scenarios
- Both **TCP** (transmission control protocol) and **UDP** (user datagram protocol) applications
- External and **internal** traffic





## Content Delivery Network

### Key Characteristics

- Deliver web content to users
- Minimize latency
- POP (points of presence) locations

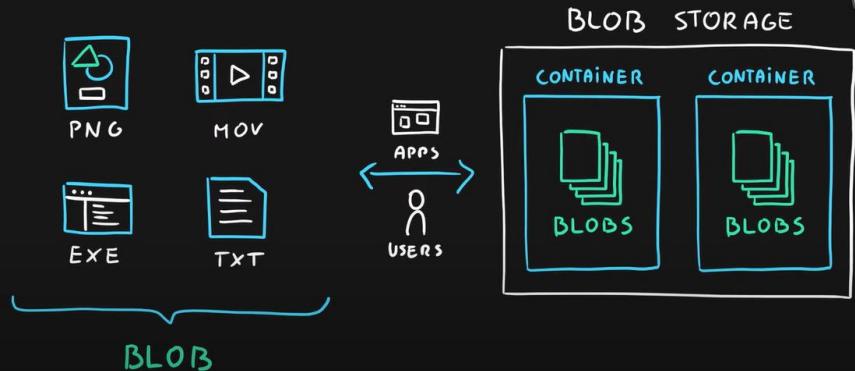
## Azure Networking Services

### Summary

- Azure [Virtual Network](#) – Emulation/representation of physical networking in the cloud, grouping, filtering and segmentation of network related resources
- Azure [VPN Gateway](#) – Connecting On-Premises with the Virtual Network and Virtual Networks with each other (remember about VNet Peering)
- Azure [Load Balancer](#) – Even traffic distribution for non-HTTP (non-web) traffic
- Azure [Application Gateway](#) – Even traffic distribution for HTTP (web) traffic
- Azure [Content Delivery Network](#) (CDN) – Global content caching & distribution to offload web applications and reduce latency

## EPISODE – 11

### Azure Blob Storage

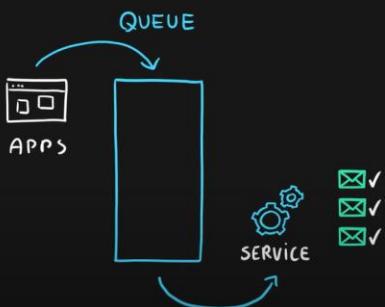


### Azure Blob Storage

#### Key Characteristics

- Designed for storage of **files** of any kind  
(**BLOB** – Binary Large OBject – file)
- Three **storage tiers**
  - **Hot** – frequently accessed data
  - **Cool** – infrequently accessed data (lower availability, high durability)
  - **Archive** – rarely (if-ever) accessed data

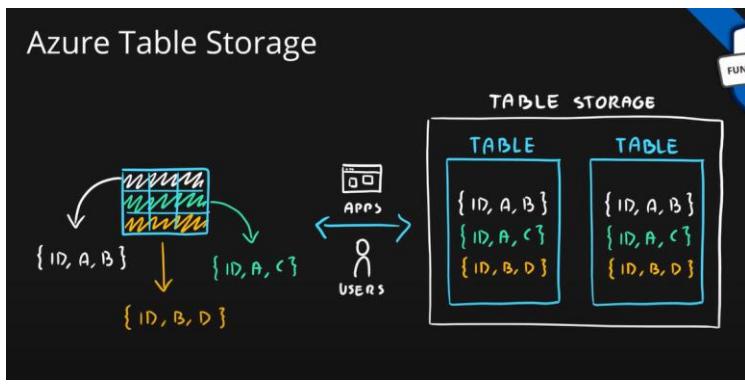
### Azure Queue Storage



### Azure Queue Storage

#### Key Characteristics

- Storage for small pieces of data (**messages**)
- Designed for **scalable asynchronous processing**

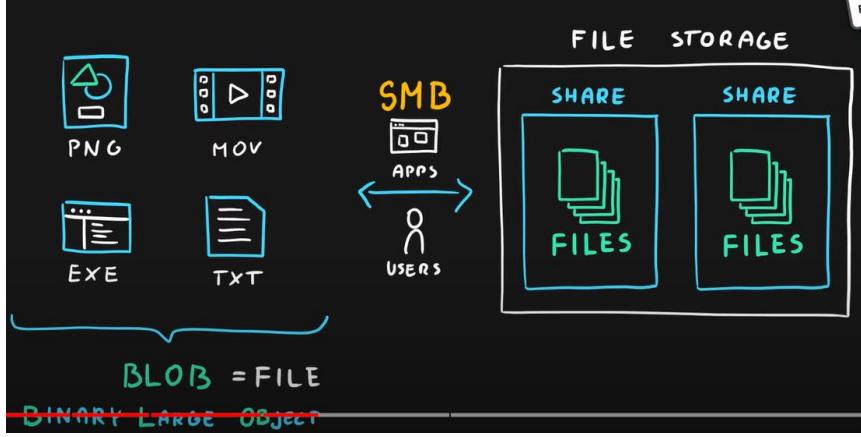


## Azure Table Storage

### Key Characteristics

- Storage for **semi-structured data** (NoSQL)
  - No need for foreign joins, foreign keys, relationships or strict schema
  - Designed for fast access
- Many programming interfaces and SDKs

## Azure File Storage



## Azure File Storage

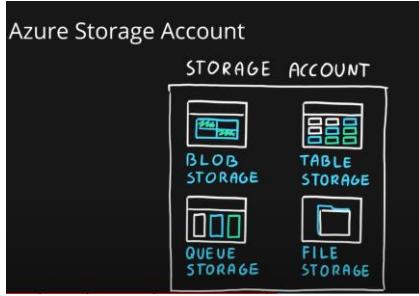
### Key Characteristics

- Storage for **files** accessed via **shared drive protocols**
- Designed to **extend on-premise file shares** or implement **lift-and-shift scenarios**

# Azure Storage Account

## Key Characteristics

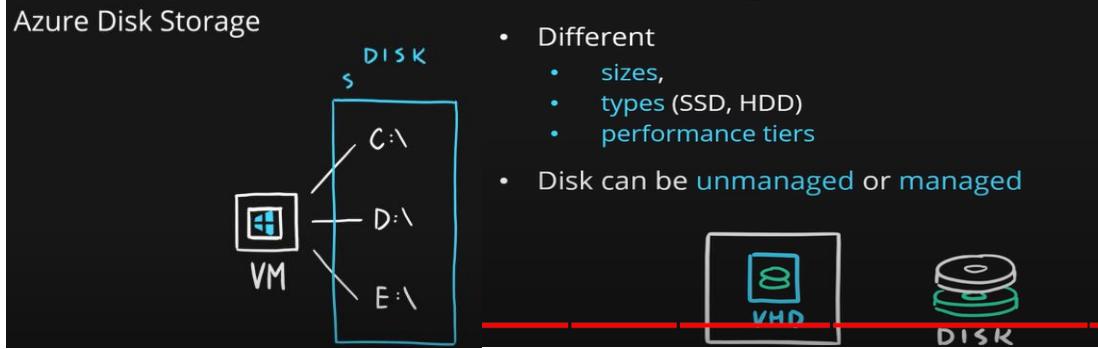
- Group of services which include
  - blob storage,
  - queue storage,
  - table storage, and
  - file storage
- Used to store
  - files,
  - messages, and
  - semi-structured data
- Highly scalable (up to petabytes of data)
- Highly durable (99.99999999% - 11 nines, up to 16 nines)
- Cheapest per GB storage



# Azure Disk Storage

## Key Characteristics

- Disk emulation in the cloud
- Persistent storage for Virtual Machines
- Different
  - sizes,
  - types (SSD, HDD)
  - performance tiers
- Disk can be unmanaged or managed



# Azure Storage Services

## Summary

- Azure **Storage Account** – Highly scalable and highly durable storage service consisting group of smaller services (blob, file, queue and table storage services)
- Azure **Blob Storage** – General purpose (blob) file storage, fits any scenario
- Azure **File Storage** – File share service in the cloud, lift-and-shift scenarios
- Azure **Queue Storage** – Service for storing small messages for asynchronous processing
- Azure **Table Storage** – Scalable NoSQL storage service for semi-structured data
- Azure **Disk Storage** – Disk emulation service in the cloud



## EPISODE – 12

# Azure Database Services

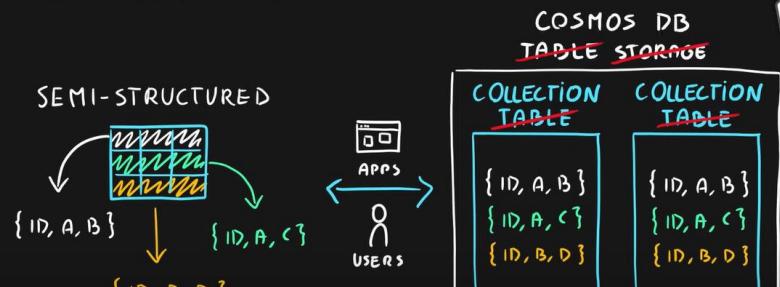
FUN

## Summary

- Azure [Cosmos DB](#) – Globally distributed NoSQL database, low latency, multi-master, perfect for serverless
- Azure [SQL Database](#) – Reliable relational database based on SQL Server
- Azure [Database for MySQL](#) – Azure SQL version for MySQL database engine
- Azure [Database for PostgreSQL](#) – Azure SQL version for PostgreSQL database engine
- Azure [SQL Managed Instance](#) – Fully fledged SQL Server managed by cloud provider
- Azure [SQL on VM](#) – Fully fledged SQL Server on IaaS
- Azure [SQL DW \(Synapse\)](#) – Massively Parallel Processing (MPP) version of SQL Server

## Azure Cosmos DB

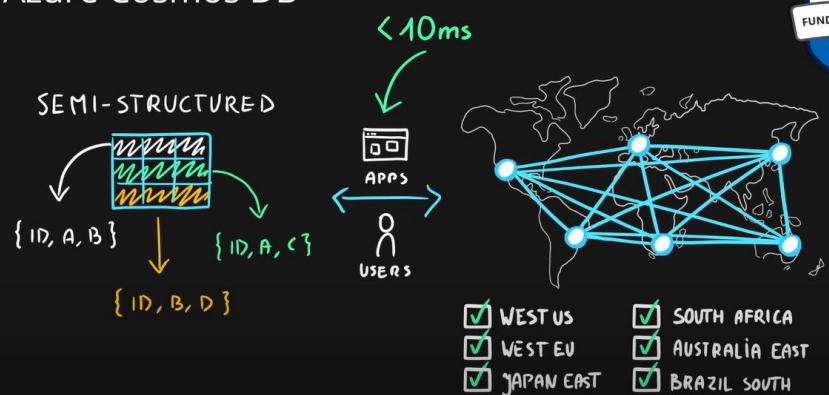
FUN



## Azure Cosmos DB

MIC  
CER

FUNDA

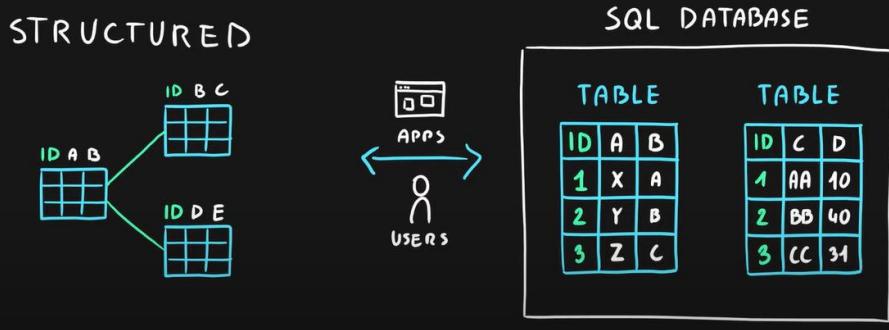


# Azure Cosmos DB

## Key Characteristics

- Globally distributed NoSQL (semi-structured data) Database service
- Schema-less
- Multiple APIs (SQL, MongoDB, Cassandra, Gremlin, Table Storage)
- Designed for
  - Highly responsive (real time) applications with super low latency responses <10ms
  - Multi-regional applications

## Azure SQL Database



## Azure SQL Database

### Key Characteristics

- Relational database service in the cloud (PaaS) (DBaaS - Database as a Service)
- Structured data service defined using schema and relationships
- Rich Query Capabilities (SQL)
- High-performance, reliable, fully managed and secure database for building applications

## Azure SQL

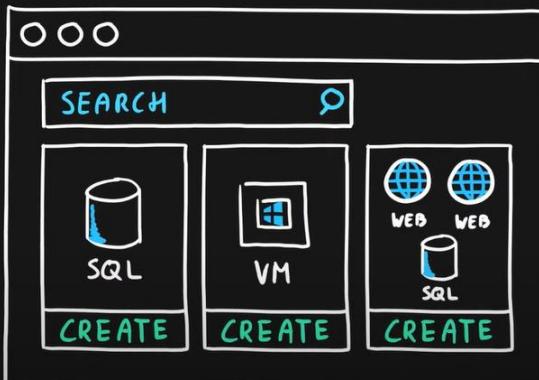


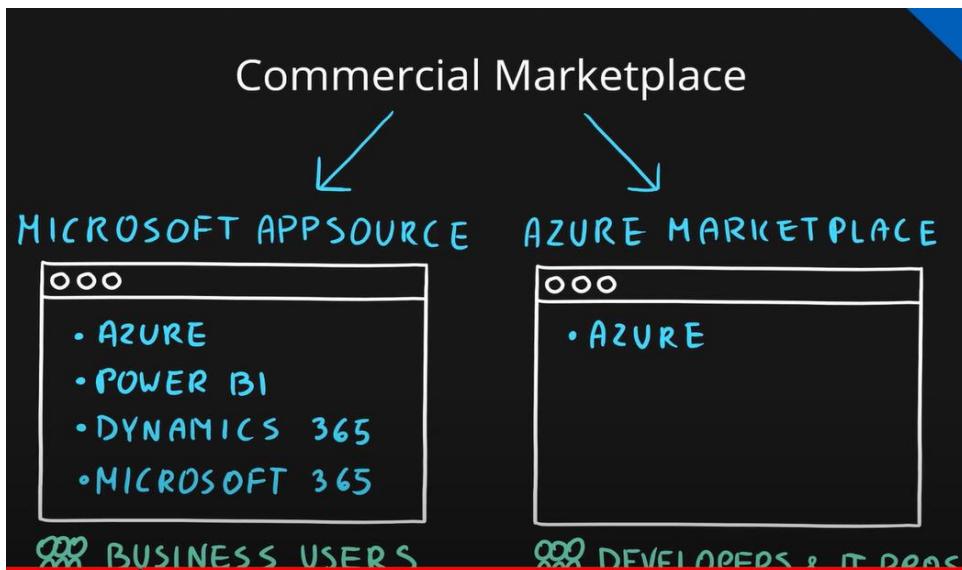
## EPISODE - 13

Azure Marketplace

Key Characteristics

- "Azure Shop"
- First and third-party products
- IaaS, PaaS and SaaS

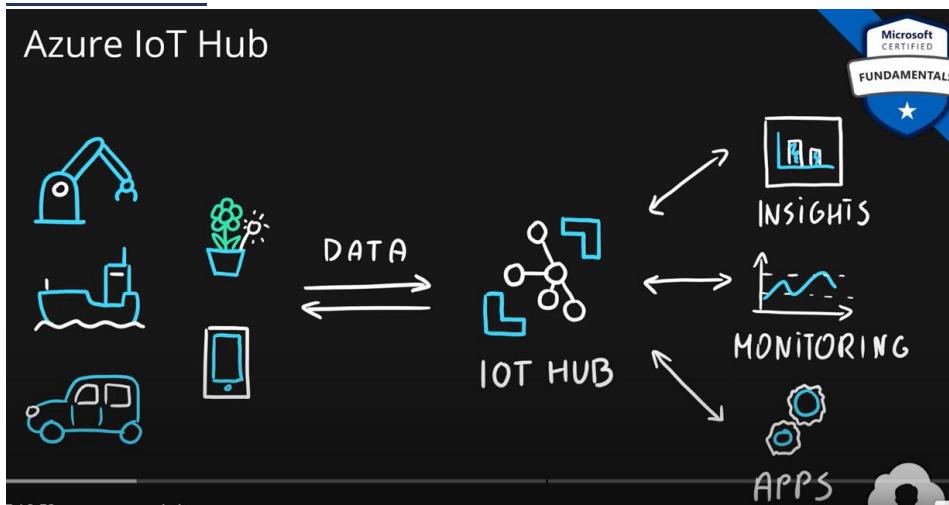




- Think of it like an "Azure Shop" where you purchase services and solutions for the Azure platform
- Each product is a template which contains one or multiple services
- Products are delivered by first and third-party vendors
- Solutions can leverage all service categories like IaaS, PaaS and SaaS

## EPISODE – 14

### Azure IoT Hub



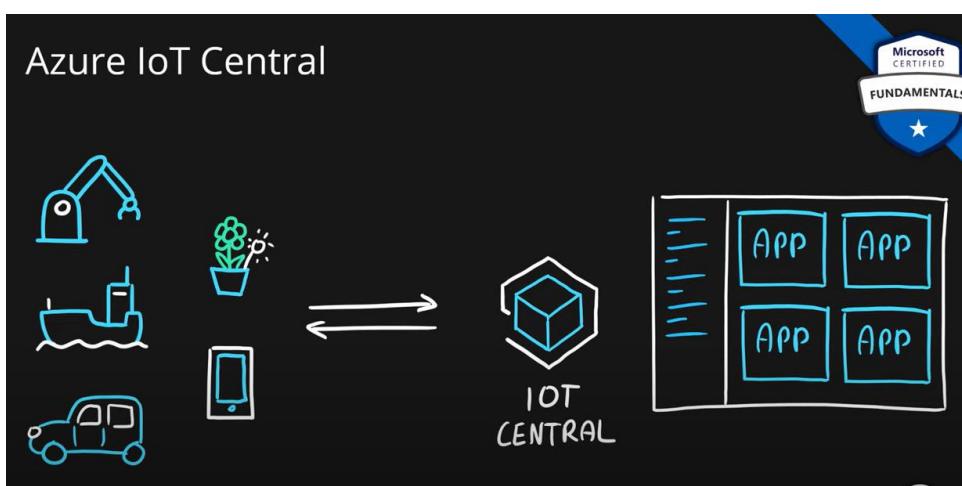
### Azure IoT Hub

#### Key Characteristics

- Managed service for **bi-directional communication**
- Platform as a Service (PaaS)
- Highly **secure, scalable and reliable**
- Integrates with a lot of Azure Services
- Programmable **SDKs** for popular languages (C, C#, Java, Python, Node.js)
- Multiple **protocols** (HTTPS, AMQP, MQTT)

Azure iot central – Better than above as we needn't start from scratch, templates are available

### Azure IoT Central



## Azure IoT Central

### Key Characteristics

- IoT App Platform - Software as a Service (SaaS)
- Industry specific app templates
- No deep technical knowledge required
- Service for connecting, management and monitoring IoT devices
- Highly secure, scalable and reliable
- Built on top of the IoT Hub service and 30+ other services

## Azure Sphere

### Key Characteristics

- Secure end-to-end IoT Solutions
  - Azure Sphere certified chips (microcontroller units - MCUs)
  - Azure Sphere OS based on Linux
  - Azure Security Service trusted device-to-cloud communication

## Azure IoT Services

### Summary

- IoT Hub – managed service for bi-directional communication with IoT devices, PaaS
- IoT Central – IoT application platform, dozen of functionalities, SaaS
- Azure Sphere – end-to-end approach for building secure IoT solutions

## EPISODE – 15

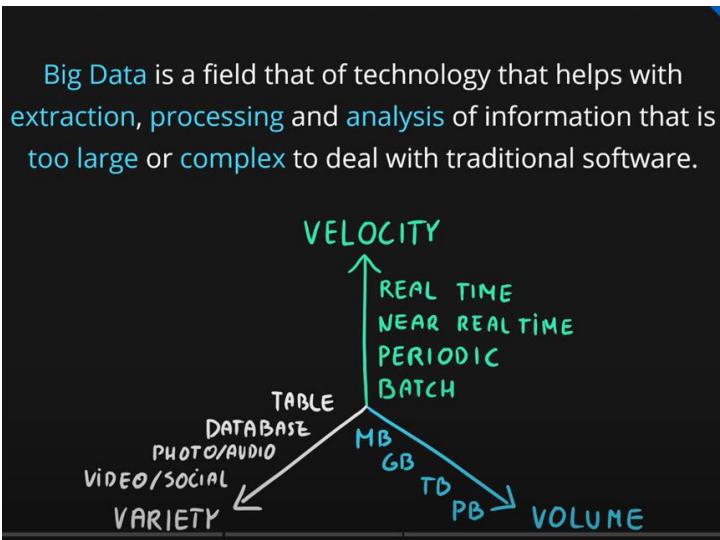
### What is Big Data?

**Big Data** is a field of technology that helps with the extraction, processing and analysis of information that is **too large or complex** to be dealt with by traditional software.

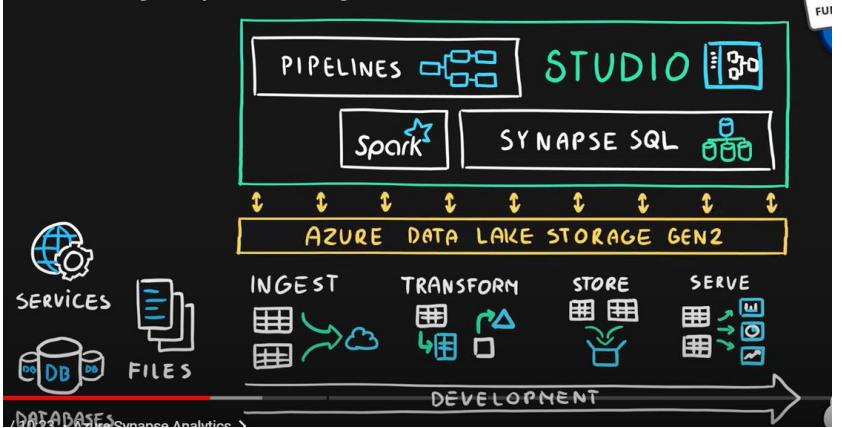
The three V's rule

Big data typically has one of the following characteristics

- **Velocity** - how fast the data is coming in or how fast we are processing it
  - Batch
  - Periodic
  - Near Real Time
  - Real Time
- **Volume** - how much data we are processing
  - Megabytes
  - Gigabyte
  - Terabytes
  - Petabytes
- **Variety** - how structured/complex the data is
  - Tables
  - Databases
  - Photo, Audios
  - Video, Social Media



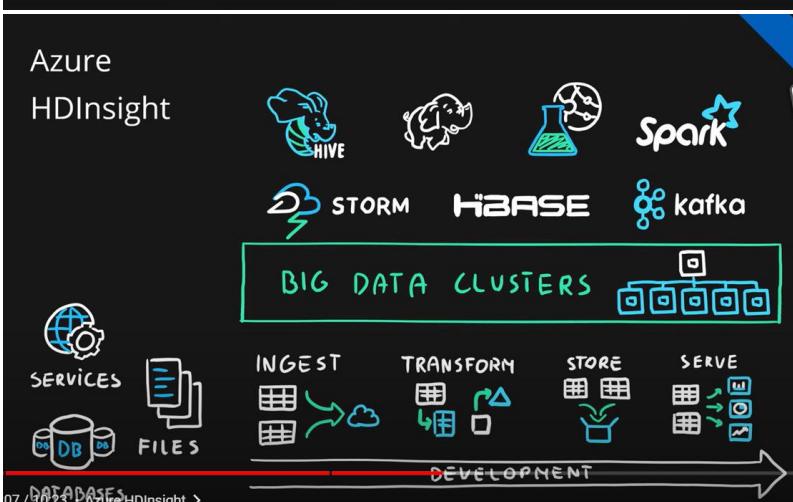
## Azure Synapse Analytics



## Azure Synapse Analytics

### Key Characteristics

- Big data analytics platform (PaaS)
- Multiple components
  - Spark
  - Synapse SQL
    - SQL pools (dedicated – pay for provisioned performance)
    - SQL on-demand (ad-hoc – pay for TB processed)
  - Synapse Pipelines (Data Factory – ETL)
  - Studio (unified experience)

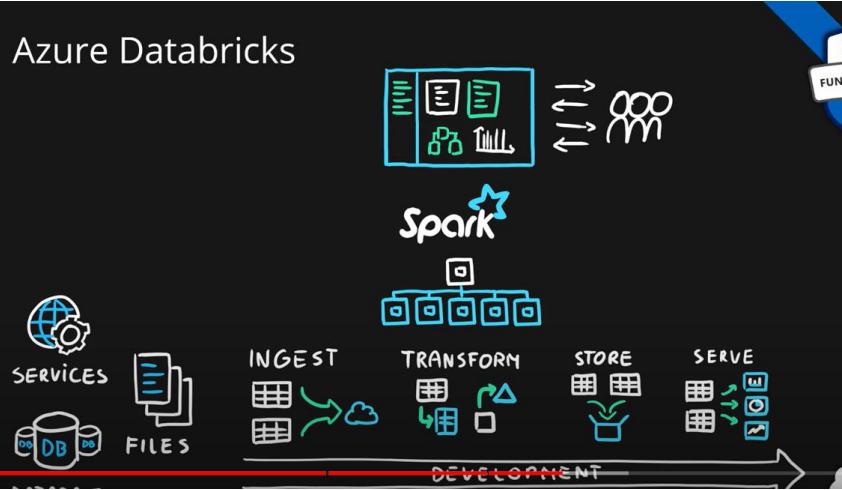


## Azure HDInsight

### Key Characteristics

- Flexible multi-purpose big data platform (PaaS)
- Multiple technologies supported (Hadoop, Spark, Kafka, HBase, Hive, Storm, Machine Learning)

## Azure Databricks



## Azure Databricks

### Key Characteristics

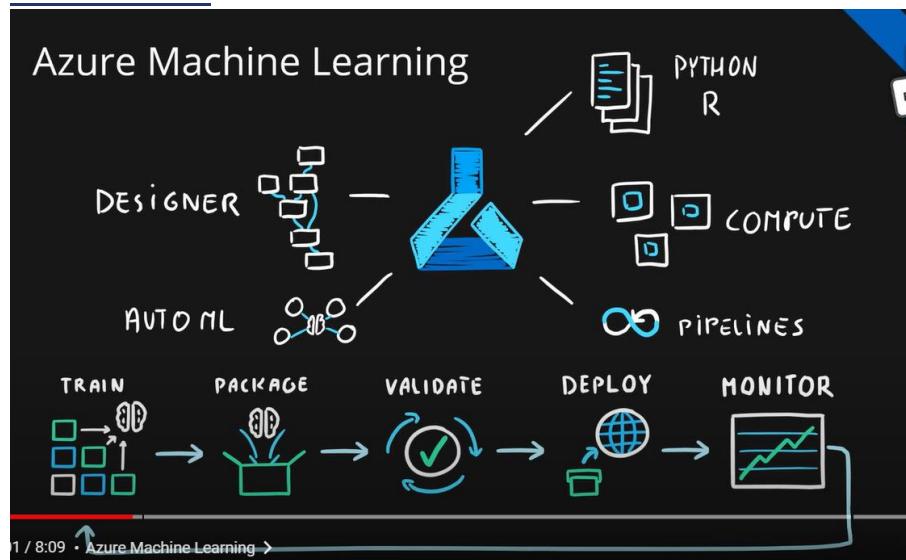
- Big data collaboration platform (PaaS)
- Unified workspace for notebook, cluster, data, access management and collaboration
- Based on Spark
- Integrates very well with common Azure data services

## Azure Big Data & Analytics Services

### Summary

- Azure Synapse Analytics – Modern workspace for end-to-end enterprise data warehousing & analytics with a lot of integrated tools like Data Factory, Spark, SQL, etc.
- Azure HDInsight – Fully-managed open source analytics service with a lot of supported frameworks & tools like Hadoop, Spark, Kafka, Hive, etc.
- Azure Databricks – Apache Spark based analytics platform for data transformation and collaborative analytics

## EPISODE – 16



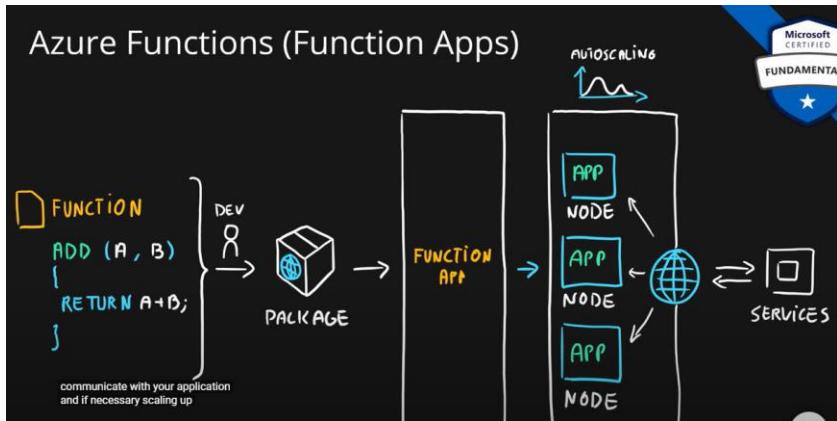
**Azure Machine Learning**

### Key Characteristics

- Cloud-based platform for **creating, managing and publishing machine learning models**
- Platform as a Service (PaaS)
- Machine Learning Workspace – top level resource
- Machine Learning Studio – web portal for end-to-end development
- Features
  - Notebooks – using Python and R
  - Automated ML – run multiple algorithms/parameters combinations, choose the best model
  - Designer – graphical interface for no-code development
  - Data & Compute – management of storage and compute resources
  - Pipelines – orchestrate model training, deployment and management tasks

## EPISODE – 17

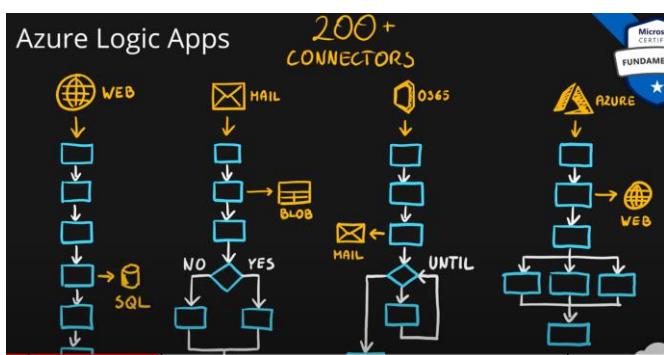
Serverless computing is cloud-hosted execution environment that allows customers to **run their applications** in the cloud while **completely abstracting underlying infrastructure**.



## Azure Functions

### Key Characteristics

- Serverless coding platform (Functions as a Service, FaaS)
- Designed for **nano-service** architectures and **event-based** applications
- Scales up and down very **quickly**
- Highly scalable
- Supports popular languages and frameworks (.NET & .NET Core, Java, Node.js, Python, PowerShell, etc.)

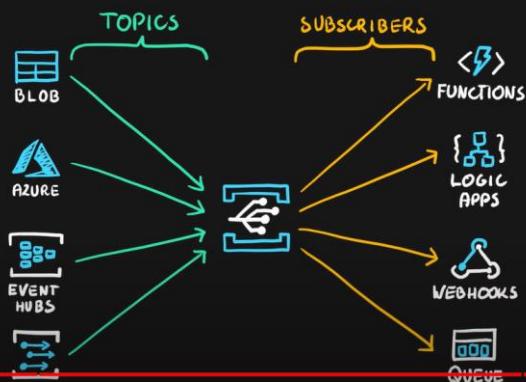


# Azure Logic Apps

## Key Characteristics

- Serverless enterprise integration service (PaaS)
- 200+ connectors for popular services
- Designed for **orchestration** of
  - business processes,
  - integration workflows for applications, data, systems and services
- No-code solution

## Azure Event Grid



## Azure Event Grid

### Key Characteristics

- Fully managed serverless event routing service
- Uses **publish-subscribe** model
- Designed for **event-based** and **near-real time** applications
- Supports dozen of **built-in events** from most common **Azure services**

## Azure Serverless Services

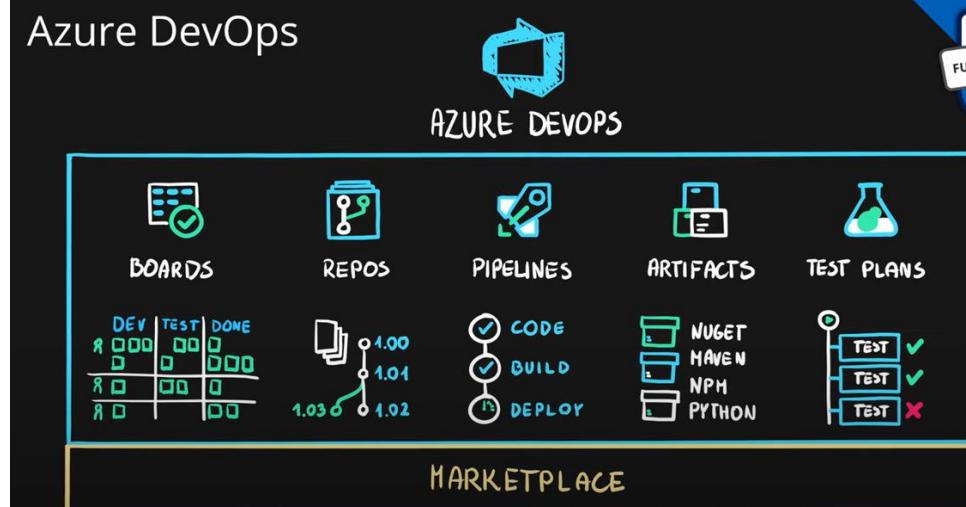
### Summary

- **Azure Functions** – application development platform for nano-services and event-based applications using popular languages/frameworks
- **Azure Logic Apps** – enterprise integration services for orchestration of business and application workflows
- **Azure Event Grid** – scalable event routing service for integration and near-real time applications

## EPISODE – 18

DevOps is a set of practices that combine both development (**Dev**) and operations (**Ops**).

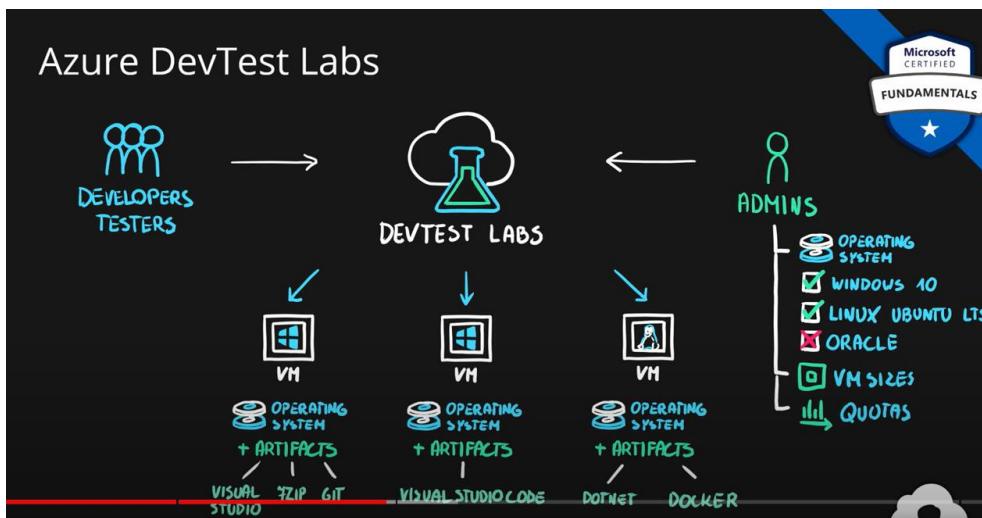
DevOps aims to shorten the development life cycle by providing continuous integration and delivery (CI/CD) capabilities while ensuring high quality of deliverables.



## Azure DevOps

### Key Characteristics

- Collection of services for building solutions using DevOps practices
- Services included
  - Boards – tracking work
  - Pipelines – building CI/CD workflows (build, test and deploy apps)
  - Repos – code collaboration and versioning with Git
  - Test Plans – manual and exploratory testing
  - Artifacts – manage project deliverables
- Extensible with Marketplace – over 1000 of available apps
- Evolved from TFS (Team Foundation Server), through VSTS (Visual Studio Team Services)



## Azure DevTest Labs

### Key Characteristics

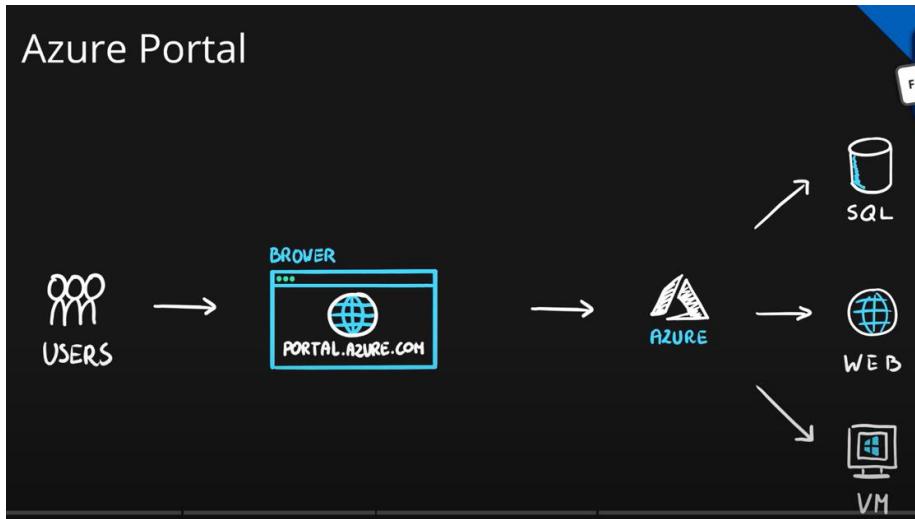
- Service **sandbox environment** for **developers/testers** (PaaS)
- Quick setup of **self-managed virtual machines**
- **Preconfigured templates** for VMs
- Plenty of additional **artifacts** (tools, apps, custom actions)
- Lab **policies** (quotas, sizes, auto-shutdowns)
- Share and automate labs via custom images
- Premade plugins/API/tools for **CI/CD pipeline automation**

## Azure DevOps Services

### Summary

- Azure DevOps – end to end platform for building CI/CD pipelines, code versioning, tracking work and managing project deliverables
- Azure DevTest Labs – cloud-based environments for developers and testers with self-serve environments, reusable templates, cost management and multiple integrations

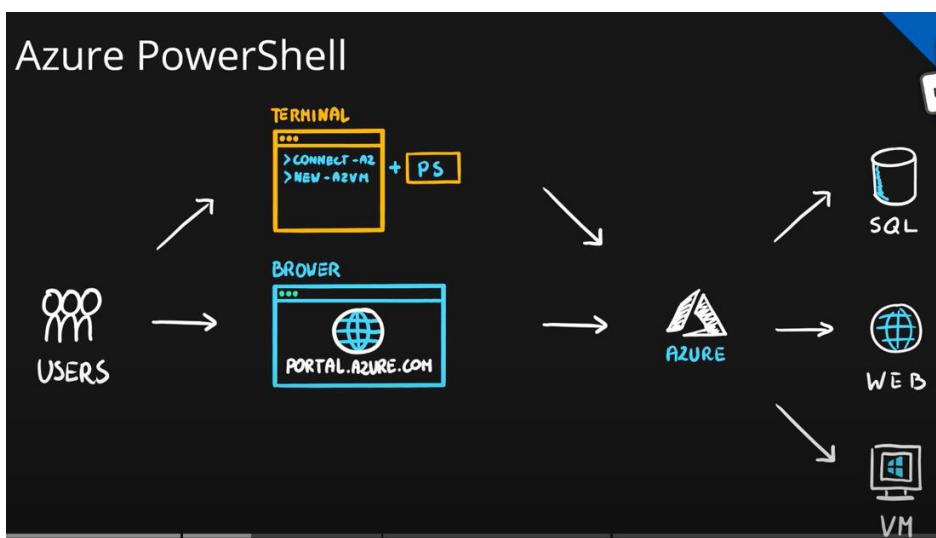
## EPISODE - 19



### Azure Portal

#### Key Characteristics

- Public web-based interface for management of Azure platform
- Designed for self-service
- Customizable
- Simple tasks

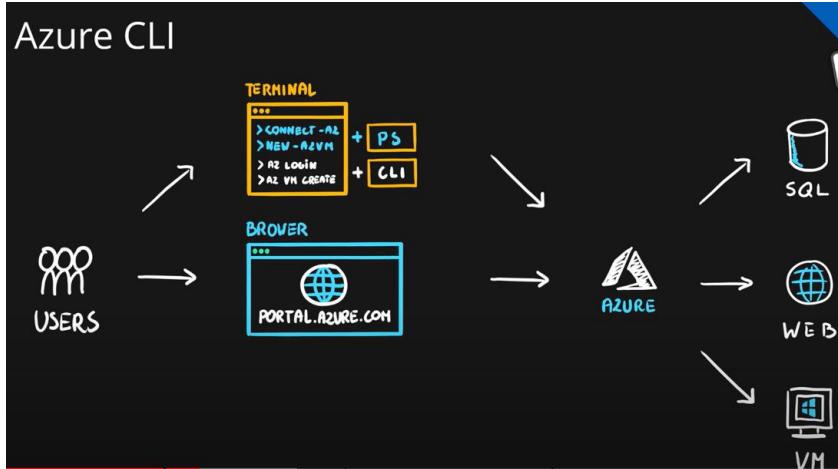


# Azure PowerShell

## Key Characteristics

- PowerShell and [module](#)
- Designed for [automation](#)
- Multi-platform with [PowerShell Core](#)
- Simple to use
  - `Connect-AzAccount` – log into Azure
  - `Get-AzResourceGroup` – list resource groups
  - `New-AzResourceGroup` – create new resource group
  - `New-AzVm` – create virtual machine

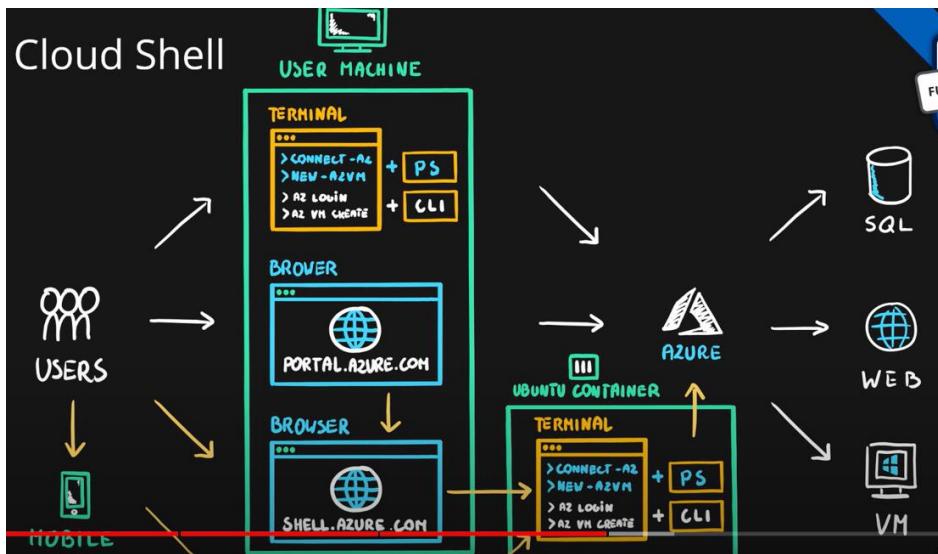
# Azure CLI



# Azure CLI

## Key Characteristics

- Command Line Interface for Azure
- Designed for [automation](#)
- Multi-platform (Python)
- Simple to use
  - `az login` – log into Azure
  - `az group list` – list resource groups
  - `az group create` – create new resource group
  - `az vm create` – create virtual machine
- Native OS terminal scripting



## Azure Cloud Shell

### Key Characteristics

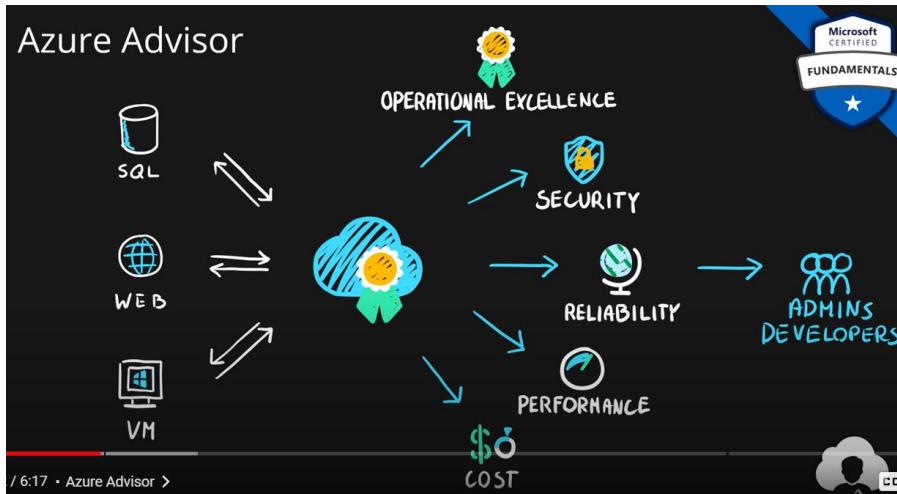
- Cloud-based **scripting environment**
- Completely **free**
- Supports both Azure **PowerShell** and Azure **CLI**
- Dozen of **additional tools**
- Multiple client interfaces
  - Azure Portal integration ([portal.azure.com](#))
  - Shell Portal ([shell.azure.com](#))
  - Visual Studio Code Extension
  - Windows Terminal
  - Azure Mobile App

## Azure Tools

### Summary

- Azure **Portal** – Web based portal for self-service management of Azure platform
- Azure **CLI** – automation module for terminal
- Azure **PowerShell** – automation module for PowerShell
- Azure **Cloud Shell** – free cloud-based scripting environment

## EPISODE - 20

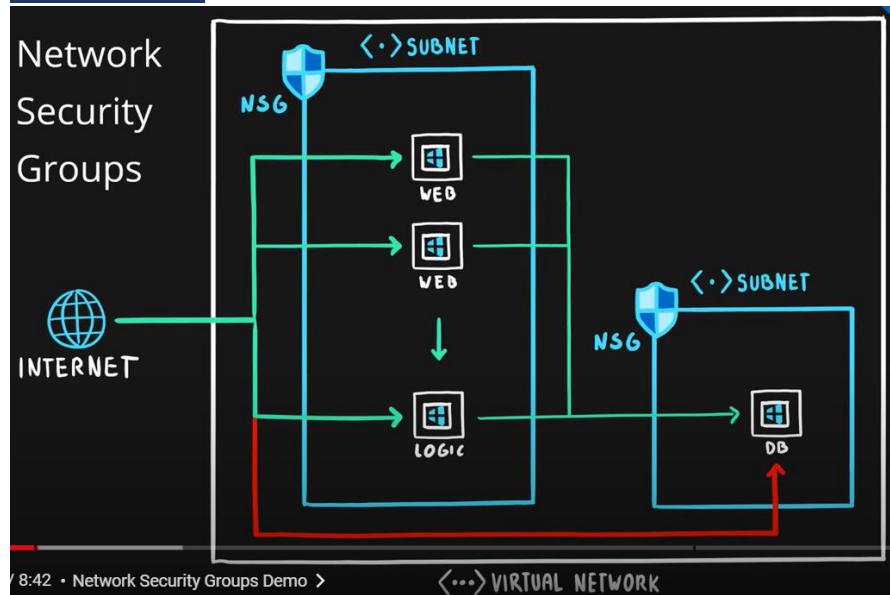


## Azure Advisor

### Key Characteristics

- Personalized consultant service
- Designed to provide **recommendations** and **best practices** for
  - **Cost** (SKU sizes, idle services, reserved instances, etc.)
  - **Security** (MFA settings, vulnerability settings, agent installations, etc.)
  - **Reliability** (redundancy settings, soft delete on blobs, etc.)
  - **Performance** (SKU sizes, SDK versions, IO throttling, etc.)
  - **Operational Excellence** (service health, subscription limits, etc.)
- **Actionable** recommendations
- Free!

## EPISODE - 21



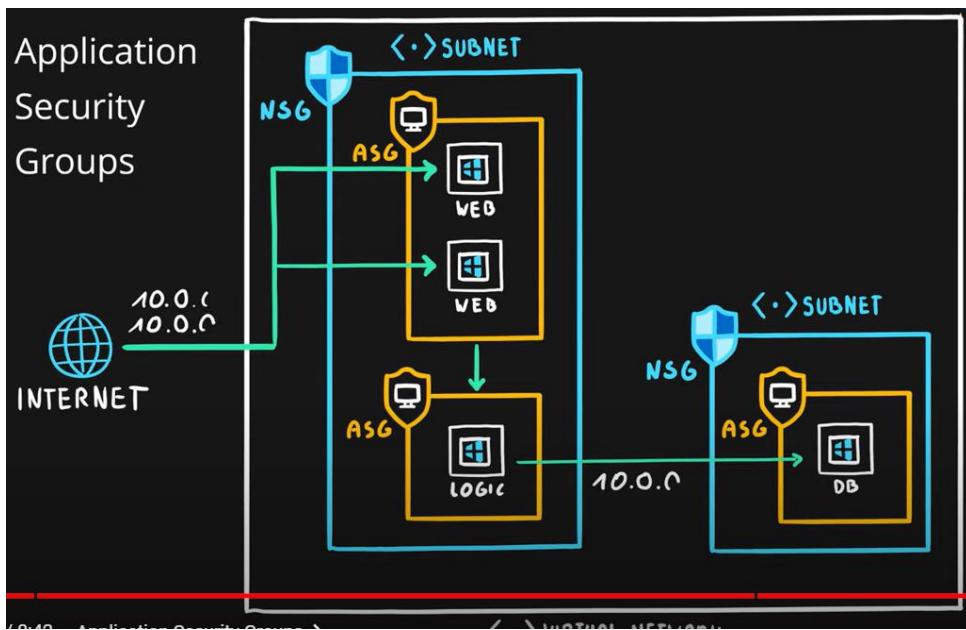
8:42 • Network Security Groups Demo >

<...> VIRTUAL NETWORK

## Network Security Groups

### Key Characteristics

- Designed to filter traffic to (inbound) and from (outbound) Azure resources located in Azure Virtual Network
- Filtering controlled by rules
- Ability to have multiple inbound and outbound rules
- Rules are created by specifying
  - Source/Destination (IP addresses, service tags, application security groups)
  - Protocol (TCP, UDP, any)
  - Port (or Port Ranges, ex. 3389 – RDP, 22 – SSH, 80 HTTP, 443 HTTPS)
  - Direction (inbound or outbound)
  - Priority (order of evaluation)



## Application Security Groups



### Key Characteristics

- Feature that allows **grouping** of virtual machines located in Azure virtual network
- Designed to **reduce** the maintenance effort (assign ASG instead of the explicit IP address)

## Azure Security Groups



### Summary

- Network Security Groups – Filtering of incoming and outgoing traffic for virtual network resources
- Application Security Groups – Logical grouping of virtual network resources for easier maintenance

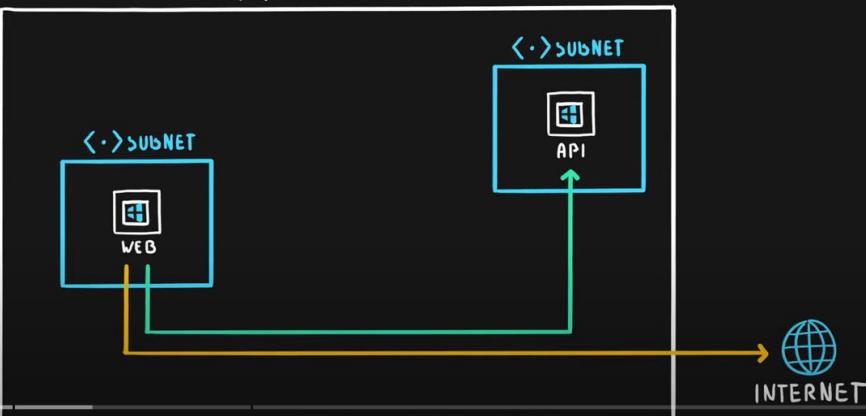
EPISODE – 22

## Routing

*Process of finding/selecting a path for a traffic in one or across multiple networks.*

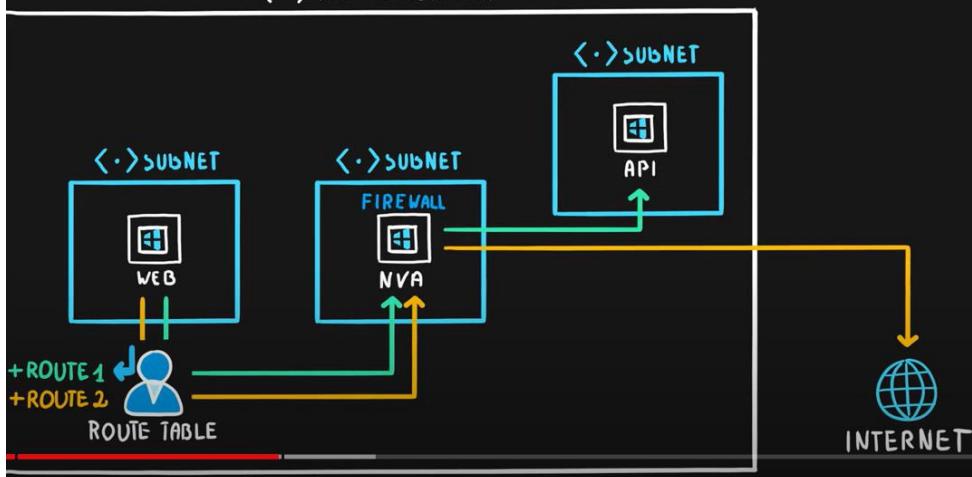
## User-defined Routes

<--> VIRTUAL NETWORK



## User-defined Routes

<--> VIRTUAL NETWORK



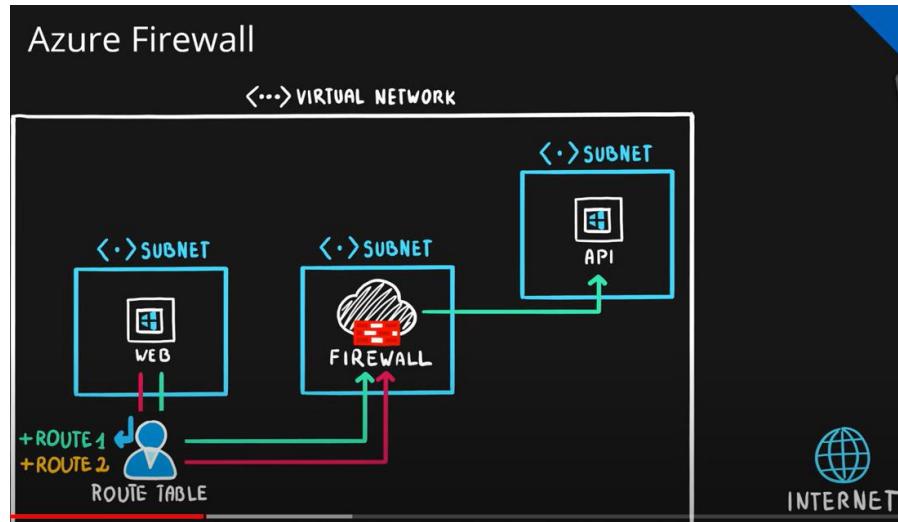
## User-defined Routes

### Key Characteristics

- Custom (user-defined, static) routes (UDRs)
- Designed to override Azure default routing or add new routes
- Managed via Azure Route Table resource
- Associated with a zero or more Virtual Network subnets

## EPISODE - 23

Firewall is a network security service that monitors and controls incoming and outgoing traffic.



### Azure Firewall

#### Key Characteristics

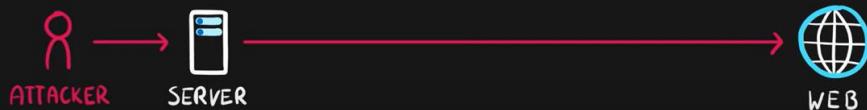
- Managed, cloud-based **firewall service** (PaaS, Firewall as a Service)
- Built-in **high availability**
- Highly **Scalable**
- **Inbound & outbound** traffic filtering rules
- Support for **FQDN** (Fully Qualified Domain Name), ex. microsoft.com
- Fully integrated with Azure monitor for logging and analytics

## EPISODE – 24

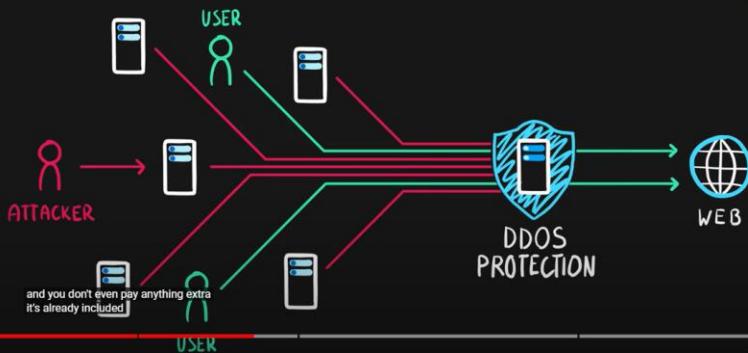
### What is DoS?

**DoS - Denial of Service**

*Cyber-attack with **intent** to cause temporary or indefinite **disruption of service***



### What is DDoS?



### DDoS Protection

#### Key Characteristics

- DDoS protection service in Azure
- Designed to
  - Detect malicious traffic and block it while allowing legitimate users to connect
  - Prevent additional costs for auto-scaling environments
- Two tiers
  - Basic – automatically enabled for Azure platform
  - Standard – additional mitigation & monitoring capabilities for Azure Virtual Network resources
- Standard tier uses machine learning to **analyze traffic patterns** for better accuracy

EPISODE - 25

## Identity

*The fact of being something or someone.*

A *user* with a username and password.

Also *applications* or other *servers* with secret keys or certificates.



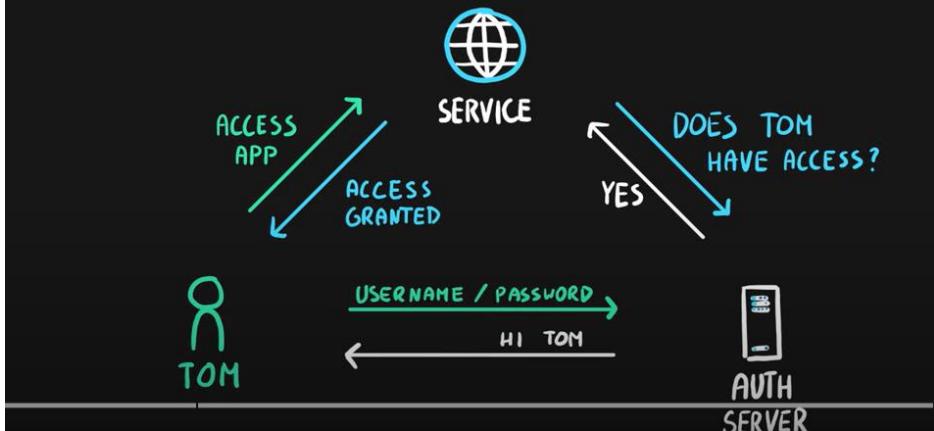
## Authentication

*The process of verification/assertion of identity*



## Authorization

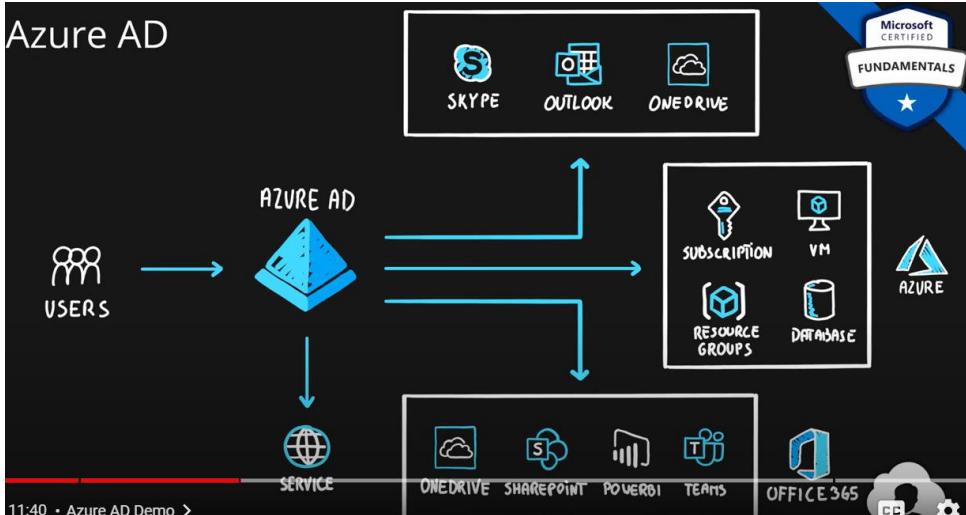
*The process of ensuring that only **authenticated identities** get access to the resources for which they have been granted access.*



## Access Management

*The process of **controlling, verifying, tracking and managing access** to authorized users and **applications**.*

### Azure AD



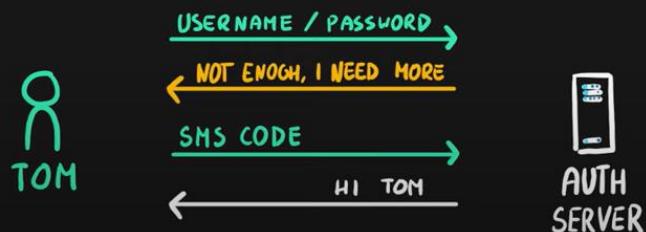
# Azure Active Directory

## Key Characteristics

- Identity and [Access Management service](#) in Azure
- [Identities](#) management – users, groups, applications
- [Access management](#) – subscriptions, resource groups, roles, role assignments, authentication & authorization settings, etc.
- Used by multiple Microsoft cloud platforms
  - Azure
  - Microsoft 365
  - Office 365
  - Live.com services (Skype, OneDrive, etc.)
- Syncs with [on-premises](#) Active Directory via sync services

## Multi-factor Authentication

*Process of presenting [two or more](#) pieces of evidence to prove one's identity*

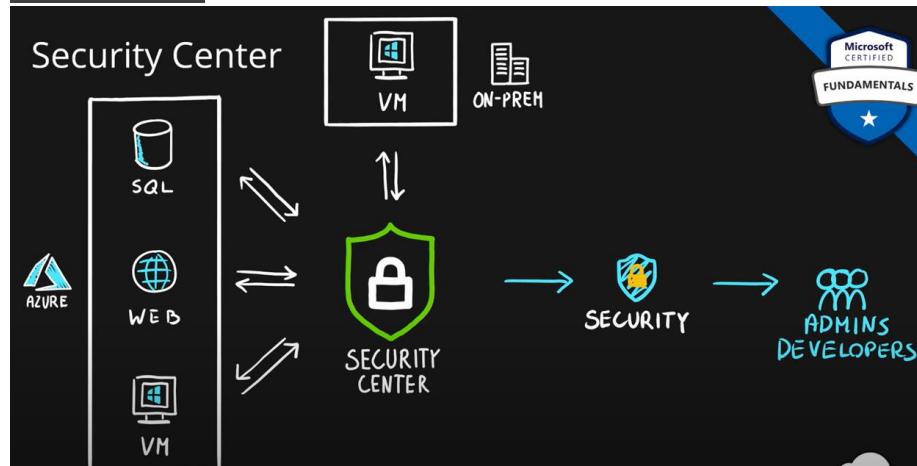


## Multi-factor Authentication

### Key Characteristics

- Process of authentication using more than one [factor \(evidence\)](#) to prove identity
- Factor types
  - [Knowledge Factor](#) – "Something you know", ex. password, pin
  - [Possession Factor](#) – "Something you have", ex. phone, token, card, key
  - [Physical Characteristic Factor](#) – "Something you are", ex. fingerprint, voice, face, eye iris
  - [Location Factor](#) – "Somewhere you are", ex. GPS location
- Supported by Azure AD by default (simple on-off switch)

## EPISODE - 26



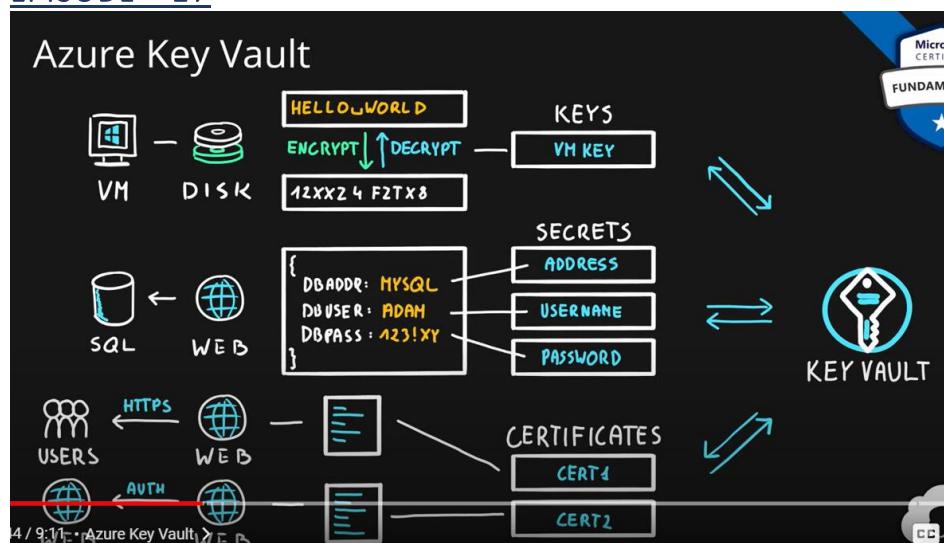
## Azure Security Center

### Key Characteristics

- Centralized/unified infrastructure and platform security management service
- Natively embedded in Azure services
- Integrated with Azure Advisor
- Two tiers
  - **Free (Azure Defender OFF)** – included in all Azure services, provides continuous assessments, security score, and actionable security recommendations
  - **Paid (Azure Defender ON)** – hybrid security, threat protection alerts, vulnerability scanning, just in time (JIT) VM access, etc.

## EPISODE – 27

### Azure Key Vault

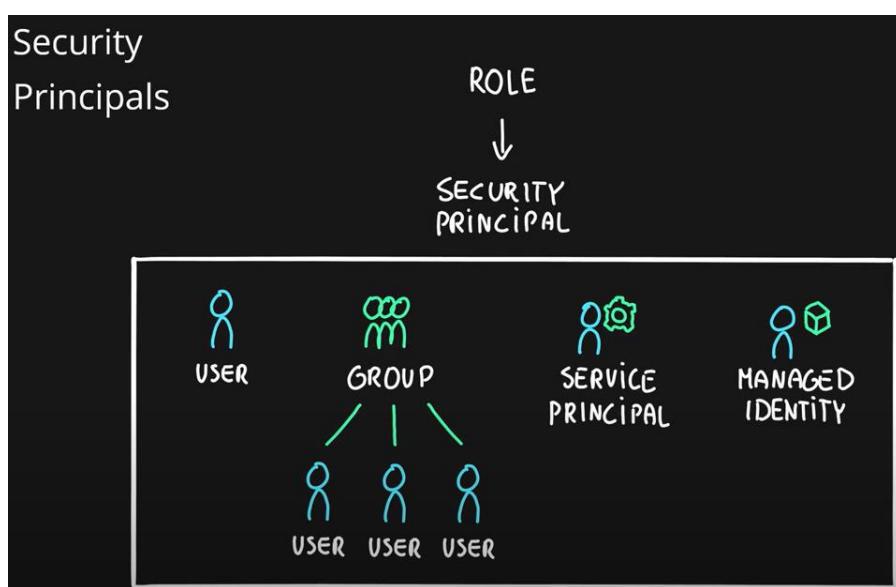
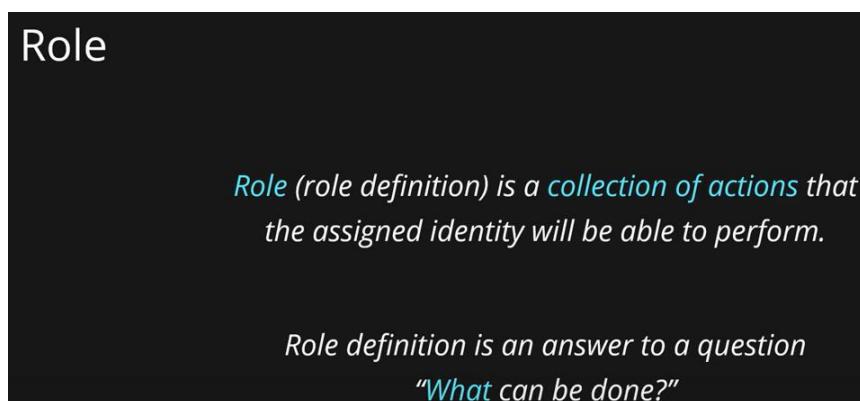
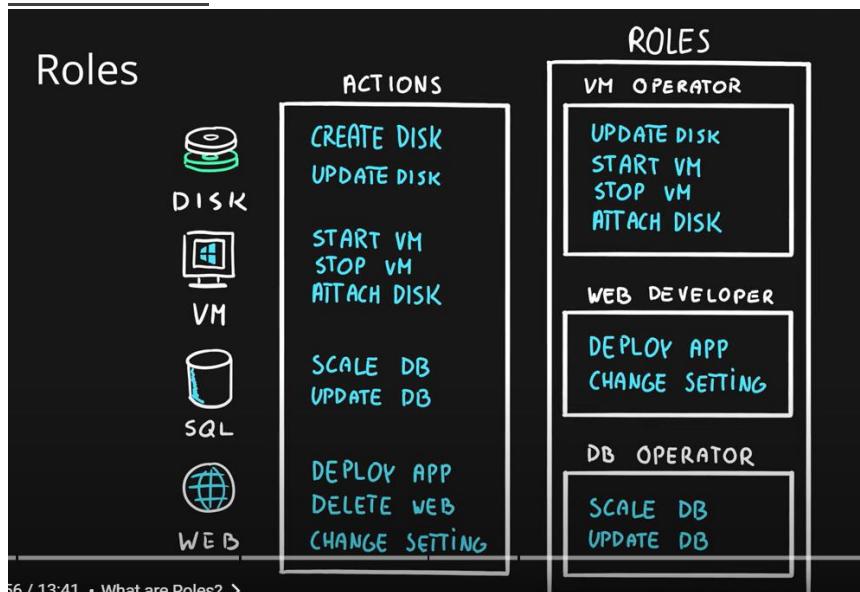


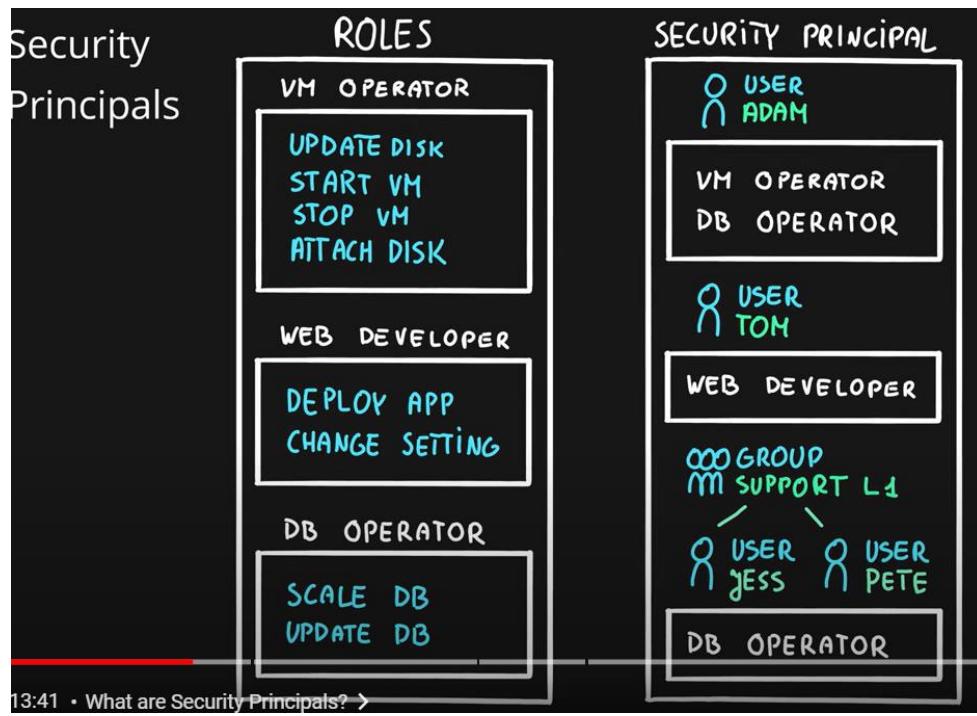
### Azure Key Vault

#### Key Characteristics

- Managed service for securing sensitive information (application/platform) (PaaS)
- Secure storage service for
  - Keys,
  - Secrets and
  - Certificates
- Highly integrated with other Azure services (VMs, Logic Apps, Data Factory, Web Apps, etc.)
- Centralization
- Access monitoring and logging

## EPISODE – 28





## Security Principal

*Security Principal is an Azure object (*identity*) that can be assigned to a role (ex. *users, groups or applications*).*

*Security Principal assignment is an answer to a question  
“Who can do it?”*

## Scopes

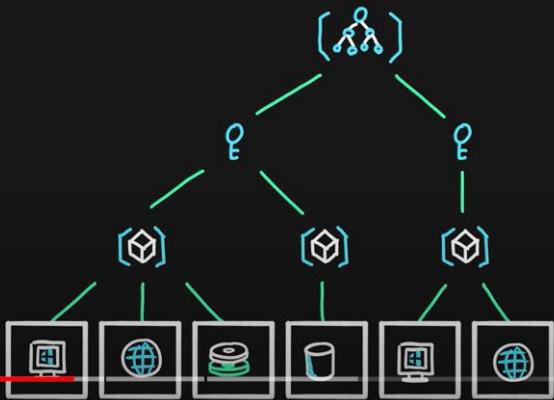
*Scope one or more Azure resources that the access applies to.*

*Scope assignment is an answer to a question  
“Where can it be done?”*

## Scopes

ROLE  
↓  
SCOPE

MANAGEMENT GROUP  
SUBSCRIPTION  
RESOURCE GROUP  
so if you want you can give me an access to your specific virtual machine  
RESOURCE



"What can be done?"

OWNER - EVERYTHING



"Who can do it?"

USER - ADAM



"Where can it be done?"

VM RESOURCE - DEV-VM

*Role assignment is a combination of the role definition, security principal and scope*

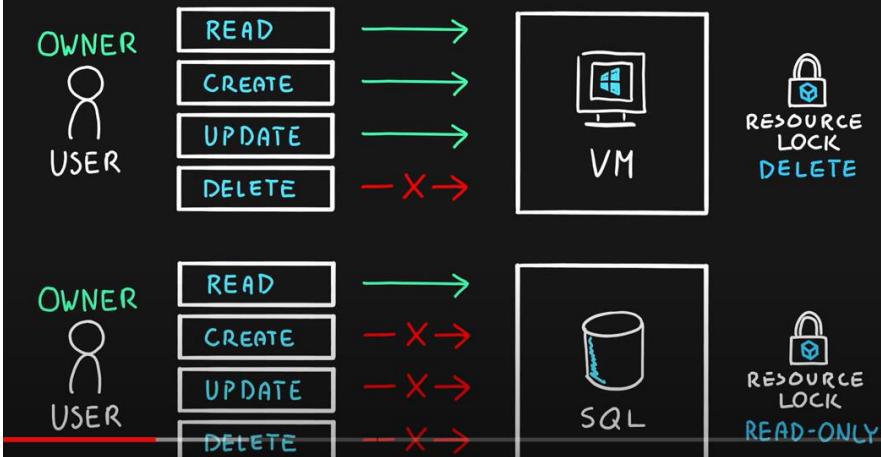
## Role-Based Access Control (RBAC)

### Key Characteristics

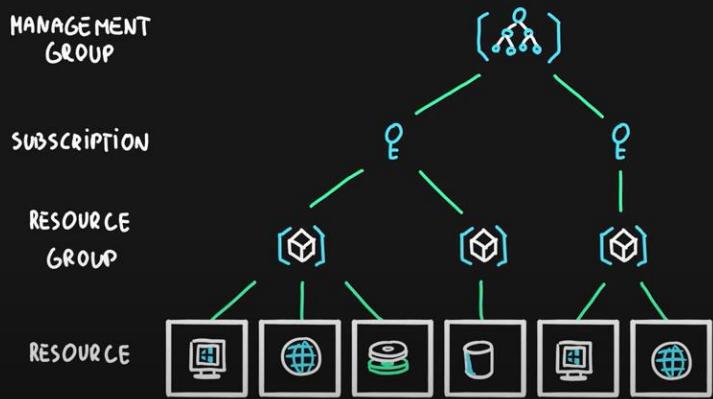
- Authorization system built on [Azure Resource Manager \(ARM\)](#)
- Designed for [fine-grained access management](#) of Azure Resources
- Role [assignment](#) is combination of
  - [Role definition](#) – list of permissions like create VM, delete SQL, assign permissions, etc.
  - [Security principal](#) – user, group, service principal and managed identity and
  - [Scope](#) – resource, resource groups, subscription, management group
- Scopes are [hierarchical](#)
  - Management Groups > Subscriptions > Resource Groups > Resources
- [Built-in](#) and [Custom](#) roles are supported

## EPISODE – 29

### Resource Locks



### Lock Scopes



### Resource Locks

#### Key Characteristics

- Designed to prevent accidental deletion and/or modification
- Used in conjunction with RBAC
- Two types of locks
  - **Read-only (ReadOnly)** – only read actions are allowed
  - **Delete (CanNotDelete)** – all actions except delete are allowed
- Scopes are **hierarchical** (inherited)
  - Subscriptions > Resource Groups > Resources
- **Management Groups** can't be locked
- Only **Owner** and **User Access Administrator** roles can manage locks (built-in roles)

## EPISODE – 30

### Resource Tags



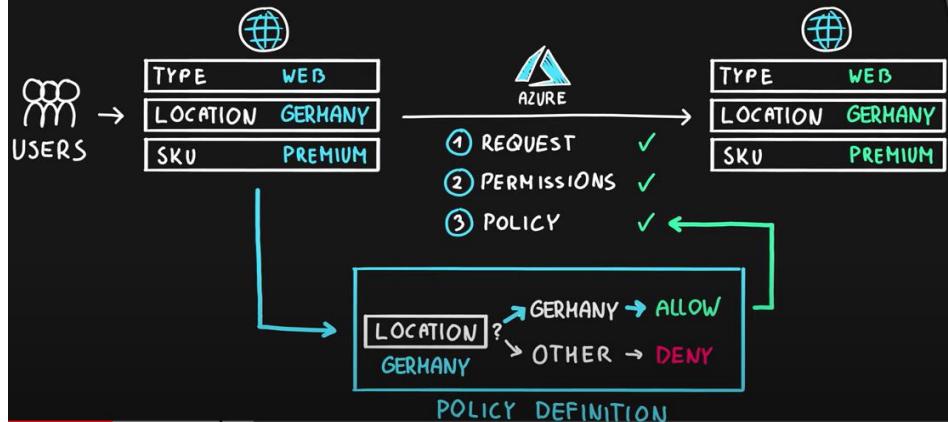
### Resource Tags

#### Key Characteristics

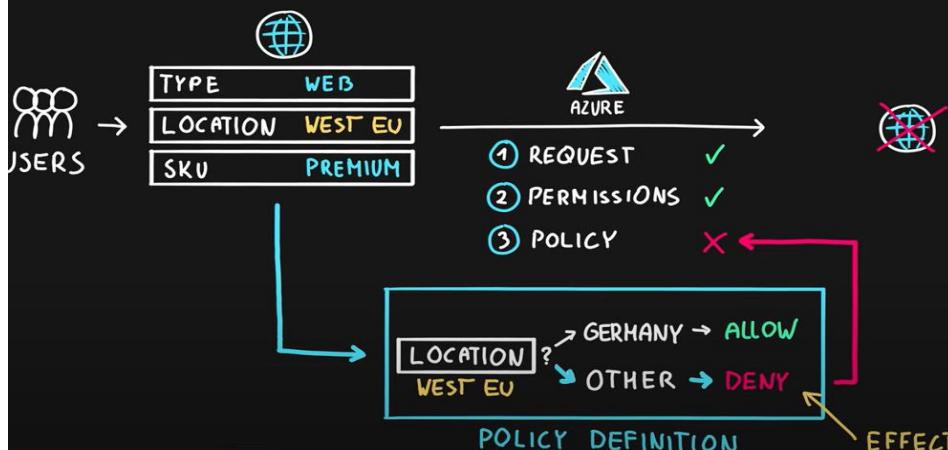
- Tags are simple **Name (key) - Value** pairs
- Designed to help with **organization** of Azure resources
- Used for **resource governance, security, operations management, cost management, automation, etc.**
- Typical tagging strategies
  - Functional – mark by **function** ( ex: *environment = production* )
  - Classification – mark by **policies used** ( ex: *classification = restricted* )
  - Finance/Accounting – mark for **billing purposes** ( ex: *department = finance* )
  - Partnership – mark by **association of users/groups** ( ex: *owner = adam* )
- Applicable for **resources, resource groups and subscriptions**
- NOT inherited by default**

## EPISODE – 31

### Azure Policy



### Azure Policy



### Azure Policy

#### Key Characteristics

- Designed to help with resource governance, security, compliance, cost management, etc.
- Policies focus on resource properties (RBAC focused on user actions)
- Policy definition – Defines what should happen
  - Define the condition (if/else) and the effect (deny, audit, append, modify, etc.)
  - Examples include allowed resource types, allowed locations, allowed SKUs, inherit resource tags
  - Built-in and custom policies are supported
- Policy initiative – a group of policy definitions
- Policy assignment – assignment of a policy definition/initiative to a scope
  - Scopes can be assigned to management groups, subscriptions, resource groups and resources
  - Policies allow for exclusions of scopes

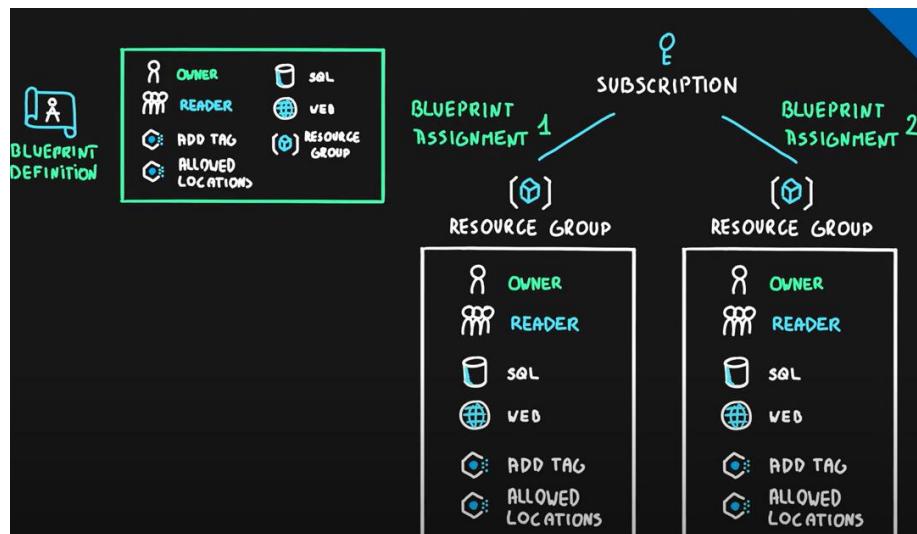
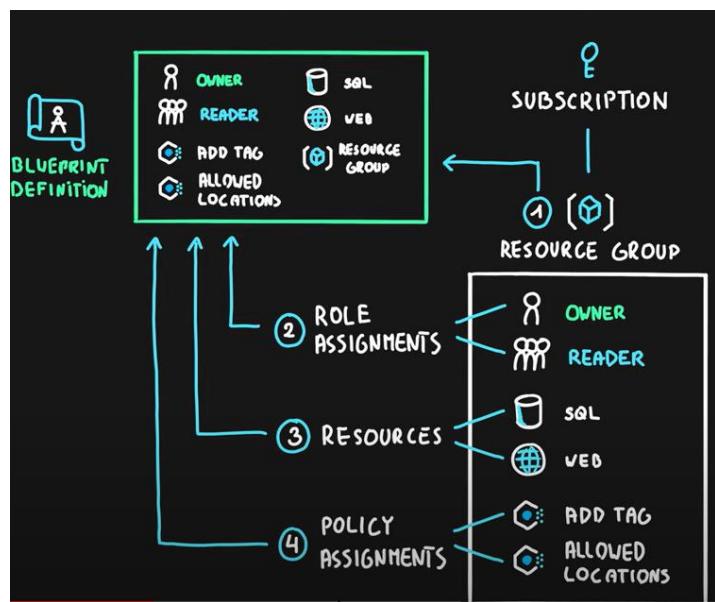
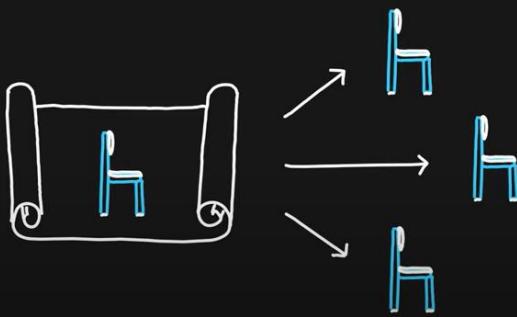
Micros  
CERTIF

FUNDAME



## EPISODE – 32

A *blueprint* is a *guide, pattern or design* for making something.



# Azure Blueprints

## Key Characteristics

- Package of various Azure components ([artifacts](#))
  - Resource Groups
  - ARM Templates
  - Policy Assignments
  - Role Assignments
- Centralized storage for organizationally [approved design patterns](#)
- Blueprint [definition](#) – describing what should happen (reusable package)
- Blueprint [assignment](#) – describing where it should happen (package deployment)

## EPISODE – 33

### *Cloud adoption*

**Cloud adoption** is a strategic move by an organization to leverage cloud in their business

### **Cloud Adoption Framework**

Cloud Adoption Framework for Azure is a set of

- **tools**,
- **best practices**,
- **guidelines** and
- **documentation**

prepared by Microsoft to help companies with their cloud adoption journey.

### **Strategy**

#### **1. Understand your motivation**

- Answer the question **WHY MOVE?**
- Common Motivation Triggers include
  - **Migration**
    - Cost Savings on infrastructure
    - Reduction in complexity
    - Operation optimization
    - Increased business agility
  - **Innovation**
    - Reaching a global scale
    - Customer experience improvements

- Transformation of products or services
- Market disruption

## **2. Business Outcome**

- Answer the question **WHAT TO MEASURE?**
- Defined, concise and observable outcome captured by a specific measure, for example
  - Increase in revenue
  - Increase in profit
  - Cost reduction
  - Global access to customers
  - Reaching new markets

## **3. Business Justification**

- Answer the question **WHAT'S MY RETURN ON INVESTMENT?**
- Develop a business case to validate the financial model that supports your motivations and outcomes
- Tools that support this process are
  - Azure TCO (Total Cost of Ownership) calculator - estimate current on-prem costs
  - Azure Pricing Calculator - estimate future Azure costs
  - Azure Cost Management - see current Azure costs

## **4. First Project**

- Choose first project to validate your strategy (Proof of concept - POC) based on
  - Business Criteria
    - Currently operating
    - Dedicated owner
    - Strong motivation to move
  - Technical Criteria
    - Minimum dependencies and assets

### *Plan*

1. Digital Estate (INVENTORY OF ASSETS)
  - Review current landscape and list all projects/solutions (digital assets)

- Choose one of the five (5) R's of rationalization
  - Rehost - move as is; typically into containers or IaaS (virtual machines)
  - Refactor - make small code changes and move to PaaS (ex. Azure SQL, Azure App Service, etc.)
  - Rearchitect - make complex code changes to introduce new features or fix incompatible apps
  - Rebuild - create a new application using cloud first design
  - Replace - review available SaaS solutions and replace legacy or unneeded applications
- 2. Initial Organization Alignment
  - Align people so they will support your adoption plan
  - Map people to capabilities
- 3. Skills Readiness Plan
  - Review current skills and address the gaps
- 4. Cloud Adoption Plan - combine everything from steps 1 to 3 into a single cloud adoption plan

### *Ready*

1. Azure Setup Guide - Review the Azure setup guide to become familiar with the tools and approaches you need to use to create a landing zone.
2. Azure Landing Zone - Choose an appropriate Azure Subscription type that best suits your needs and establish an initial Azure environment.
3. Extend Landing Zone - Expand the initial landing zone to fit your business needs.
4. Best Practices - Review everything and ensure best practices are followed.

### *Adopt*

#### **Migrate**

1. First Migration - migrate your first application to familiarize yourself with the cloud, guidelines and tools
2. Migration Scenarios - review and prepare migration scenarios/guidelines for your company
  - Virtual Machines - Linux, Windows, etc.
  - Apps - Java, .NET, NodeJS web apps, etc.
  - Data - SQL Server, PostgreSQL, File Servers, etc.
  - Other - VMware, Azure Stack, etc.

3. Best Practices - address common migration needs through the application of consistent best practices.
4. Process Improvements - important part of this process heavy activity is to identify bottlenecks and improve with every migration

## **Innovate**

1. Business Value Consensus (VALUE TO STRATEGY)
  1. Create hypothetical customer need
  2. Decide on solution that solves it
  3. Map this to your strategy
2. Innovation Guide (TOOLS) - choose available Azure tools that will help you build this application
3. Best Practices - verify that best practices are followed for all tools in the toolchain
4. Process Improvements - gather feedback from the users and the customers to improve architectural decisions and future products

## *Govern & Manage*

1. Define governance solutions - Choose solutions to maintain compliance, security and ensure total control of the environment.
  - o Those solutions should focus to
    - Address Business Needs
    - Provide Agility
    - Control Risks
2. Manage cloud environment (CLOUD OPERATIONS) - Hand over solutions and environment to cloud operations team for maintenance. Team should ensure that stability and costs are always in perfect balance to meet business commitments. Team should allow environment to grow, evolve and adapt to changing business needs.

## *Organize*

Ensure that everyone knows what to do and when to do it for every stage in this process. One of the ways to achieve this is via RACI (Responsible, Accountable, Consulted, and Informed) matrix.

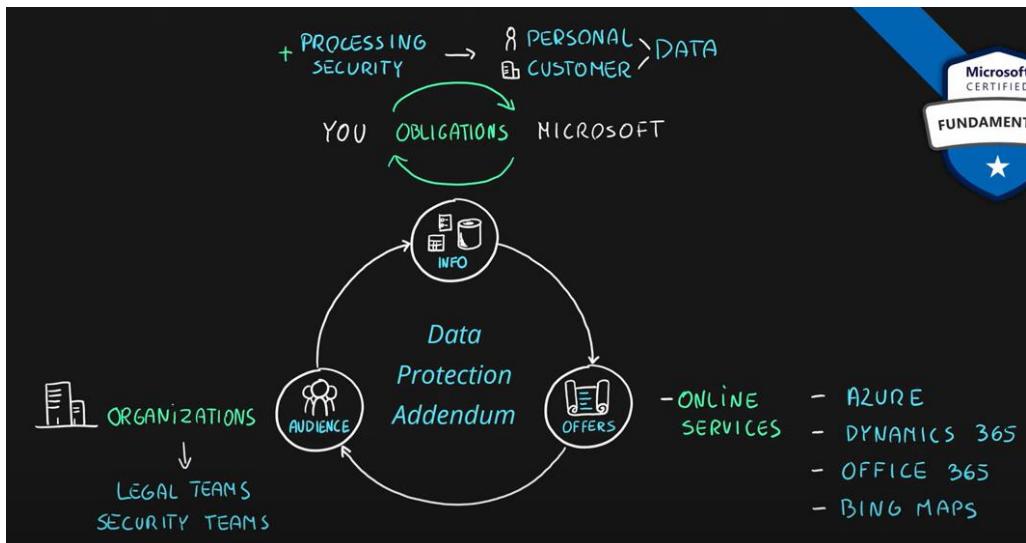
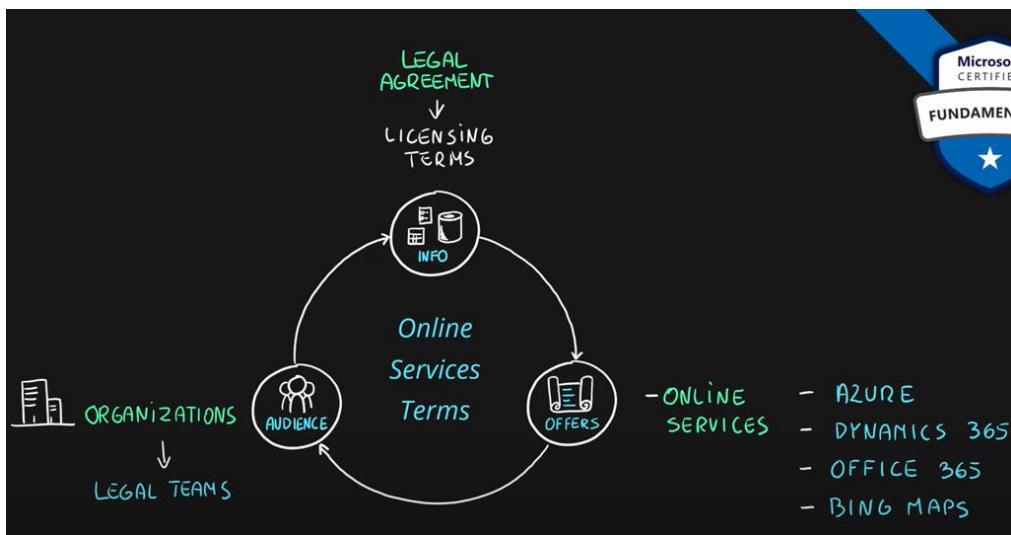
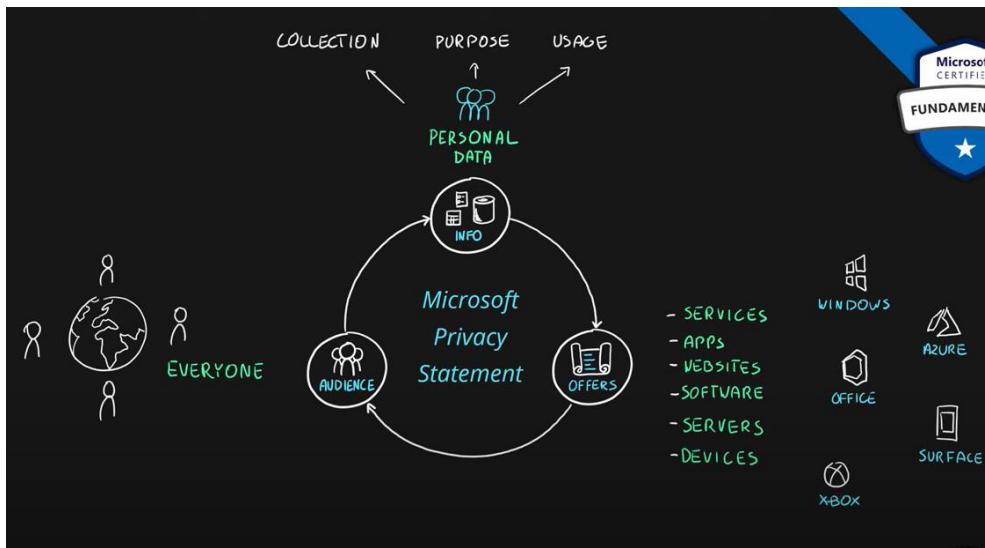
## EPISODE – 34

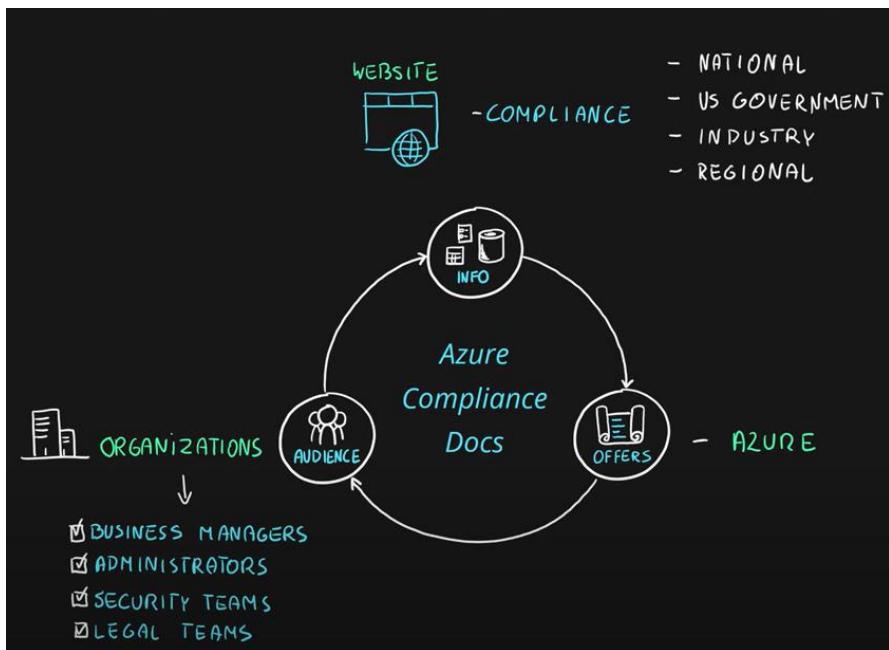
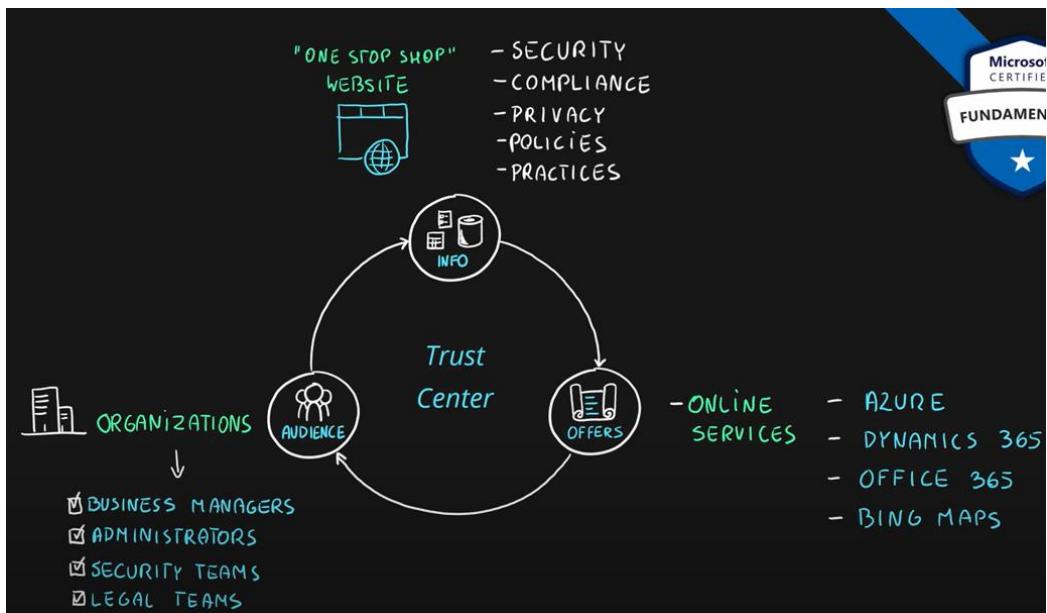
Document/Website	Info	Offers	Audience
<b>Microsoft Privacy Statement</b>	Collection, Purpose and Usage of Personal Data	All Microsoft offers including services, applications, websites, software, servers, devices	Everyone - end customers or companies
<b>Online Services Terms (OST)</b>	Licensing Terms (legal agreement) - usage rights about Azure services. What can be done and what is forbidden.	Microsoft Online Services like Azure, Microsoft 365 services, Bing Maps, etc.	Organizations - legal team
<b>Data Protection Addendum</b>	Appending to OST describing obligations by both parties (Microsoft and you) with regards to the processing of customer and personal data	Microsoft Online Services like Azure, Microsoft 365 services, Bing Maps, etc.	Organizations - legal team security teams
<b>Trust Center</b>	One stop shop web portal for everything related to security, compliance, privacy, policies, best practices, etc.	Microsoft Online Services like Azure, Microsoft 365 services, Bing Maps, etc.	Organizations - legal team security teams, business managers, administrators
<b>Azure Compliance Documentation</b>	Web portal focusing on compliance offerings in Azure, similar to the trust center but narrowed down	Azure	Organizations - legal team security teams, business managers, Azure administrators

### Azure Sovereign Regions

Azure Sovereign Regions provide Azure services in markets with very strict regulatory requirements

- Azure Government designed for the US government
  - Separate instance of Azure (lifecycle, services, portal, etc.)
  - Physically isolated from other Azure regions
  - Only authorized scanned personnel can get access
- Azure China designed for the Chinese market
  - Separate instance of Azure (lifecycle, services, portal, etc.)
  - Physically isolated from other Azure regions
  - Operated by a Chinese telecom company called 21Vianet







## Summary



### Key Characteristics

- Microsoft Privacy Statement – collection, purpose and usage of personal data for all MS offers
- Online Services Terms (OST) – license terms (use rights) for Microsoft online products and services
- Data Protection Addendum (DPA) – in-depth specification on processing and security of personal and customer data as well as obligations of the customer and Microsoft
- Trust Center – single place for organizations to review security, privacy and compliance of Microsoft online services
- Azure compliance documentation – compliance documentation for Azure services
- Azure Sovereign Regions provide Azure services in markets with very strict regulatory requirements
  - Azure Government designed for the US government
  - Azure China designed for the Chinese market

## EPISODE – 35

### Resource Types

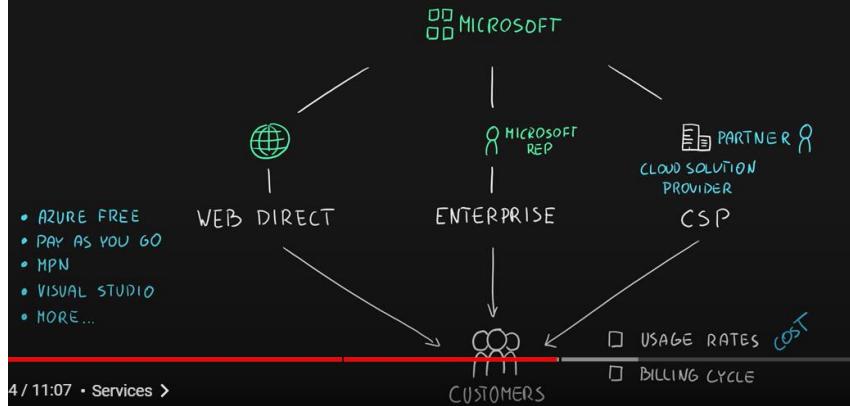


What kind of service do we use?



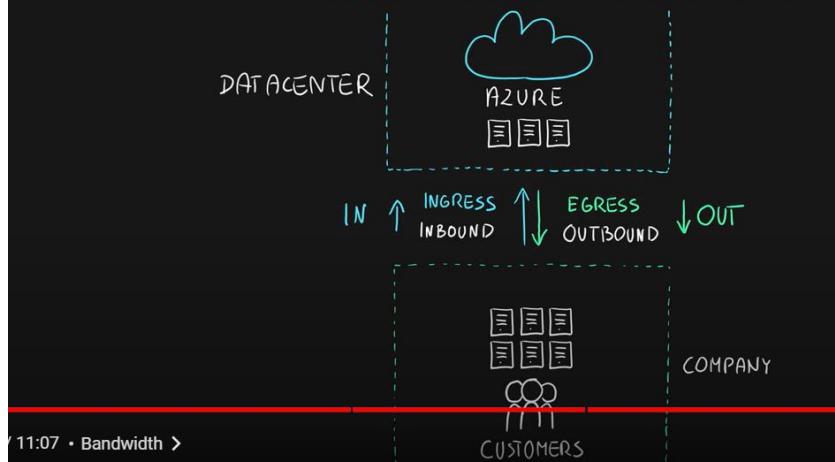
## Services

*What is our Azure offer type?*



## Bandwidth/Traffic

*How much data do we move in and out of Azure?*



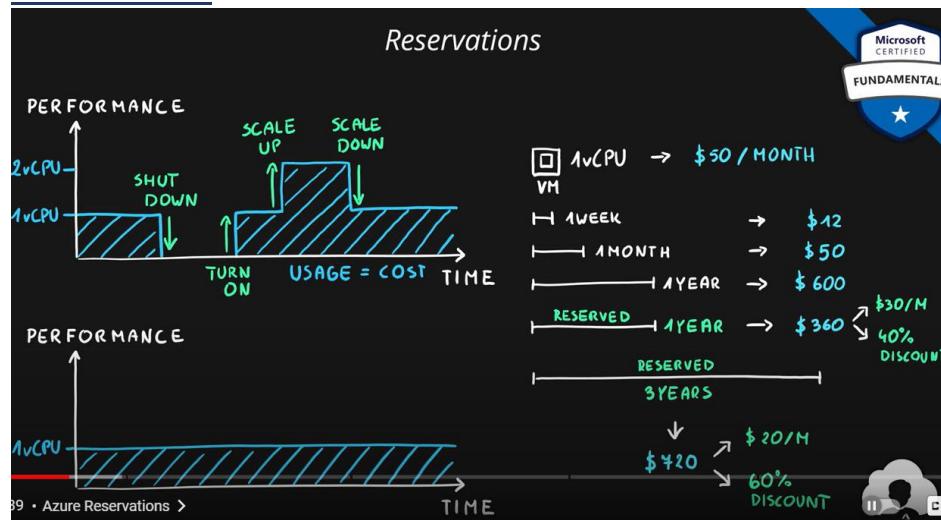
# Cost Affecting Factors



## Key Characteristics

- Base Cost
  - Resource Types – All Azure services (resources) have resource-specific pricing models. Typically consisting of one or more metrics.
  - Services – Azure specific offers (Enterprise, Web Direct, CSP, etc.) have different cost and billing components like prepaids, billing cycles, discounts, etc.
  - Location – running Azure services vary between Azure regions
  - Bandwidth – network traffic when uploading (inbound/ingress) data to Azure or downloading (outbound/egress) from Azure
- Savings
  - Reserved Instances
  - Hybrid Benefits

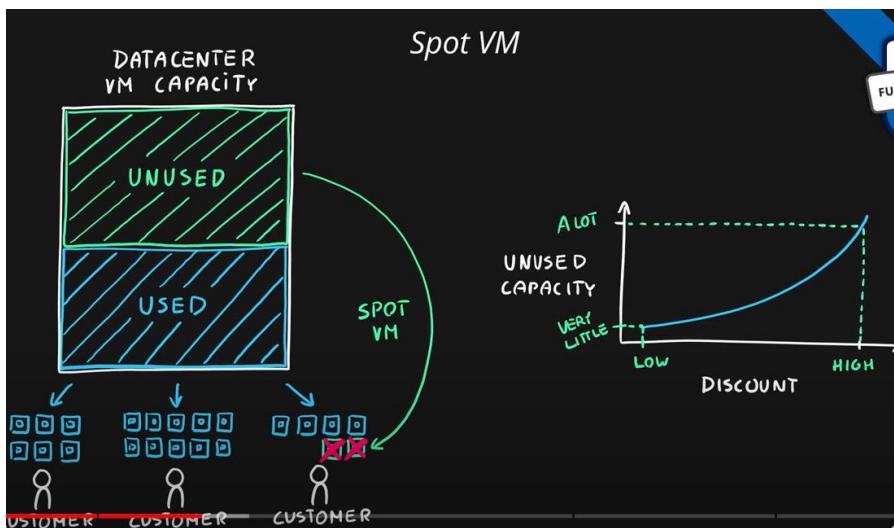
## EPISODE – 36



## Reservations

### Types

- Reserved instances – Azure Virtual Machines
- Reserved capacity – Azure Storage, SQL Database vCores, Databricks DBUs, Cosmos DB RUs
- Software plans – Red Hat, Red Hat OpenShift, SUSE Linux, etc.



### Spot VM

**Microsoft CERTIFIED FUNDAMENTALS**

#### Examples

- How it works
  - Significant discount for Azure VMs
  - Capacity can be taken away at any time
  - Customer can set maximum price after discount

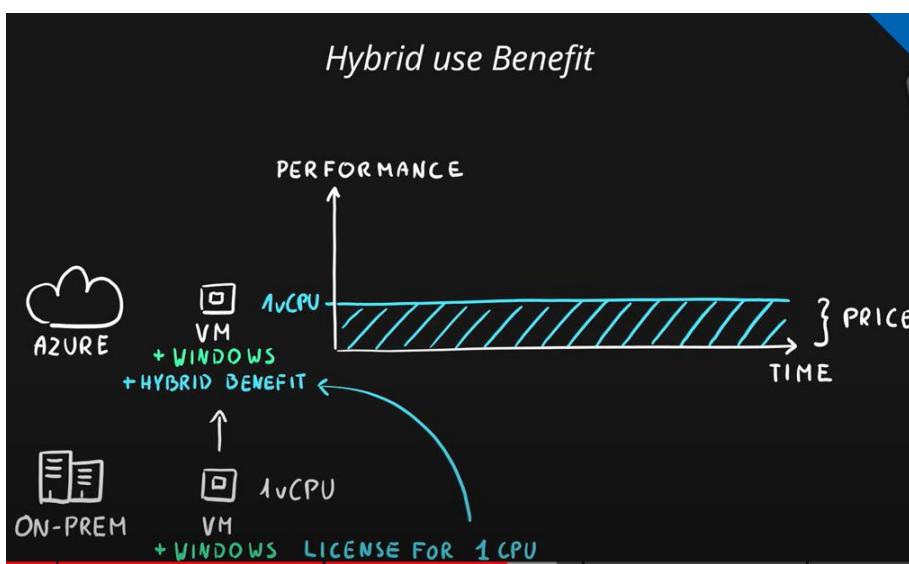
PRICE

MAX PRICE

Evict

KEEP IT

- Best for interruptible workloads (batch processing, dev/test environments, large compute workloads, non-critical tasks, etc.)



# Hybrid Benefit

## Summary

- Use existing licenses in the Azure
  - Windows Server
    - Azure VM
  - RedHat
    - Azure VM
  - SUSE Linux
    - Azure VM
  - SQL Server
    - Azure SQL Database
    - Azure SQL Managed Instance
    - Azure SQL Server on VM
    - Azure Data Factory SQL Server Integration Services

# Cost Reduction Methods

## Tools

- Azure Pricing Calculator – estimate cost of Azure services



- Total Cost of Ownership (TCO) Calculator – compare datacenter versus Azure workloads



# Cost Reduction Methods

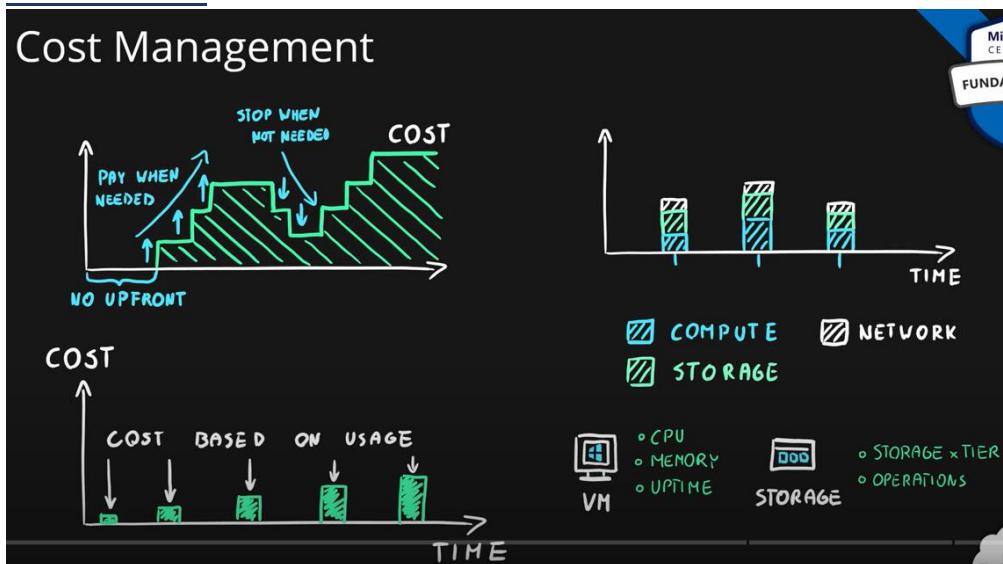


## Summary

- Cost Reduction
  - Reservations (reserved instances, reserved capacity) – purchase Azure services for 1 or 3 years in advance with a significant discounts
  - Spot pricing – purchase unused Virtual Machine capacity for significant discount
  - Hybrid use benefit – use existing licenses in the cloud
- Tools
  - Pricing calculator – estimate the cost of Azure services
  - Total Cost of Ownership (TCO) calculator – estimate and compare the cost of running workloads in datacenter versus Azure

## EPISODE – 37

### Cost Management



### Azure Cost Management

#### Summary

- Centralized service for reporting usage and billing of Azure environment
- Self-service cost exploration capabilities
- Budgets & alerts
- Cost recommendations
- Automated exports

### Cost Management

#### Minimizing costs

1. Azure Pricing Calculator to choose the low-cost region
  - Good latency
  - All required services are available
  - Data sovereignty/compliance requirements
2. Hybrid use benefit and Azure Reservations
3. Azure Cost Management monitoring, budgets, alerts and recommendations
4. Understand service lifecycle and automate environments
5. Use autoscaling features to your advantage
6. Azure Monitor to find and scale down underutilized resources
7. Use tags & policies for effective governance

## EPISODE – 38

*Service Level Agreement (SLA) is a formal agreement between a service provider and a customer.*

*SLA is a promise of a service's availability (uptime & connectivity).*

SLA	Monthly Downtime
99%	7h 18m 17s
99.5%	3h 39m 8s
99.9%	43m 49s
99.95%	21m 54s
99.99%	4m 22s
99.999%	26s

**SLA**

**Per Month Availability**

- Each Service has its own SLA
- Ranges from 99% to 99.999%
- Free services typically don't have an SLA
- Broken SLA means service credit / return (discount)

*Composite SLA is a combined SLA of all components in your application.*

$$\text{AVAILABILITY} = 99.95\%$$

$$\text{UNAVAILABILITY} = 100\% - \text{AVAILABILITY}$$

$$= 100\% - 99.95\%$$

$$= 0.05\%$$

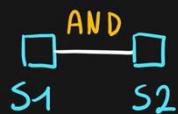
 → **99.95% WEB APP**

$$\text{UNAVAILABILITY}_{\text{MONTH}} = \frac{430 \times 60}{\underbrace{\text{HOURS}}_{43800} \underbrace{\text{MINUTES}}_{\text{MINUTES}}} \times 0.0005$$

$$= 21.9 \times 0.0005$$


---

posite SLA > **21 MINUTES 54 SECONDS**



$$\text{AVAILABILITY} = A_{S1} \times A_{S2}$$



**WEB APP AND 99.9% SQL**

$$\begin{aligned}\text{Availability} &= A_{\text{web app}} * A_{\text{sql}} \\ &= 99.95\% * 99.95\% \\ &= 0.9995 * 0.9995 \\ &= 0.99900025 \\ &\sim 99.9\%\end{aligned}$$

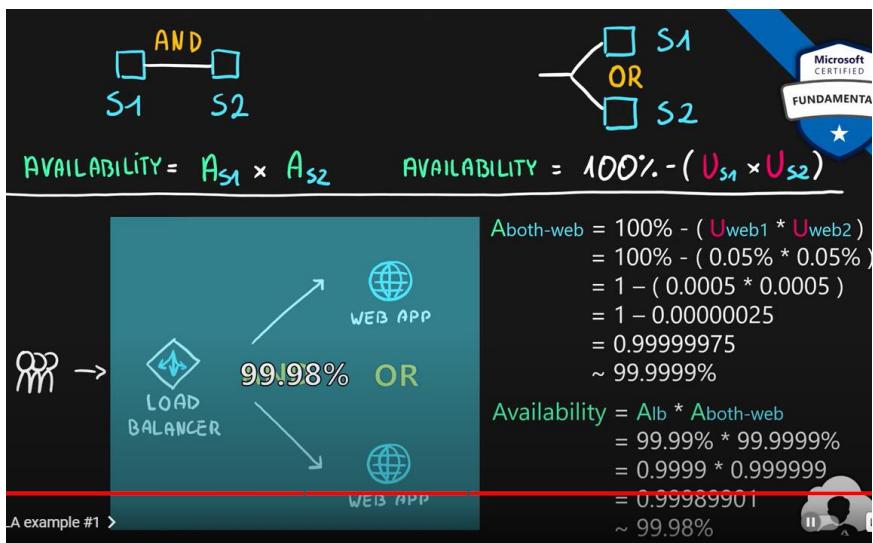
## SLA

Factors that impact SLA

Lower your SLA

Adding more services

Free/preview services



## SLA

Factors that impact SLA

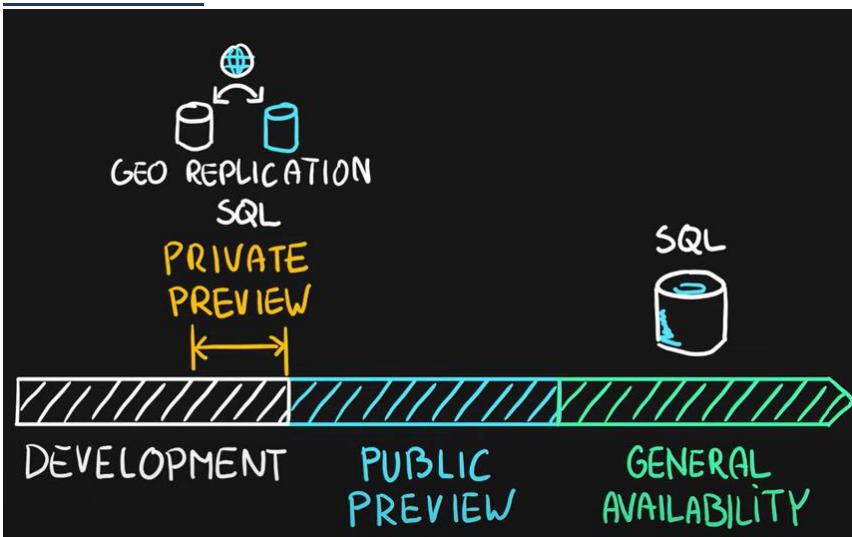
Lower your SLA	Raise your SLA
Adding more services	Adding Redundancy
Free/preview services	Service configuration (ex. Availability Zones)
Different services (ex. Cosmos DB vs Table Storage)	
Different service tiers (SKUs, ex. Standard vs. Premium vs. Business Critical)	

## SLA for Azure

### Key Characteristics

- Formal agreement between Microsoft & the customer
- Calculated as a percentage of service availability (uptime & connectivity) (a promise)
  - Breaking the SLA provides a discount from the final monthly bill (Service Credit)
- Higher tier services offer better SLAs
- Free services typically have no SLA (0% SLA)
- Preview services have no SLA
- Composite SLA is a combined SLA of all application components

## EPISODE – 39



## Public Preview

### Key Information

- No SLA
- Some services have no support coverage
- Limited region availability
- Limited functionality
- Pricing changes
- Direction changes
- Azure Portal Previews (<https://preview.portal.azure.com>)

## Service Lifecycle

### Summary

- Every service in Azure follows its own service lifecycle
- **Public preview** is a 'beta' stage of the service available to general public use
  - Features can also be in preview stages
  - Designed for testing, not production solutions
- **General availability** is a 'production' release of the service