

Microsoft Azure Fundamentals Certification Course (AZ-900)

<https://www.youtube.com/watch?v=NKEFWyqJ5XA&t=4609s>

1. What is cloud computing

What is Cloud Computing?

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cloud com·put·ing

noun

the practice of using a network of remote servers hosted on the Internet to store, manage, and process data, rather than a local server or a personal computer.



On-Premise

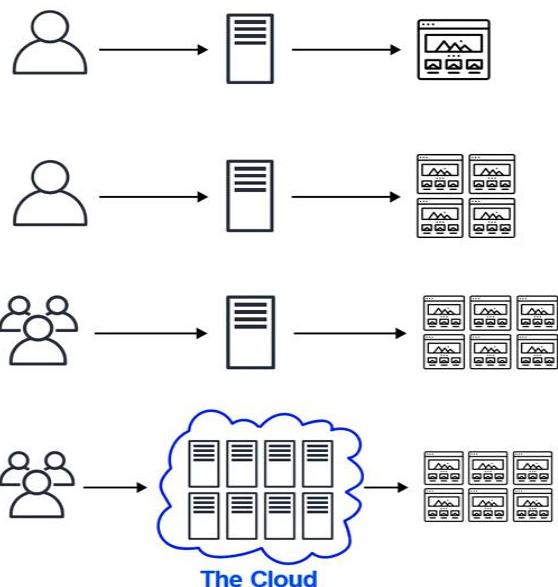
- You own the servers
- You hire the IT people
- You pay or rent the real-estate
- You take all the risk

Cloud Providers

- Someone else owns the servers
- Someone else hires the IT people
- Someone else pays or rents the real-estate
- You are responsible for your configuring cloud services and code, someone else takes care of the rest.

What is Cloud Computing?

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Dedicated Server

One physical machine dedicated to single a business.

Runs a single web-app/site.

Very Expensive, High Maintenance, High Security*

Virtual Private Server

One physical machine dedicated to a single business.

The physical machine is virtualized **into sub-machines**

Runs multiple web-apps/sites

Shared Hosting

One physical machine, shared by **hundred of businesses**

Relies on most tenants under-utilizing their resources.

Very Cheap, Very Limited.

Cloud Hosting

Multiple physical machines that act as one system.

The system is abstracted into multiple **cloud services**

Flexible, Scalable, Secure, Cost-Effective, High Configurability



2. Common Cloud Services

Common Cloud Services

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A cloud provider **can have hundreds of cloud services** that are grouped various types of services.
The four most common types of cloud services for Infrastructure as a Service (IaaS) would be:



Compute

Imagine having a virtual computer that can run application, programs and code.



Networking

Imagine having a virtual network being able to define internet connections or network isolations



Storage

Imagine having a virtual hard-drive that can store files



Databases

Imagine a virtual database for storing reporting data or a database for general purpose web-application

The term “Cloud Computing” can be used to refer to all categories, even though it has “compute” in the name.

3. Benefits of Cloud Computing

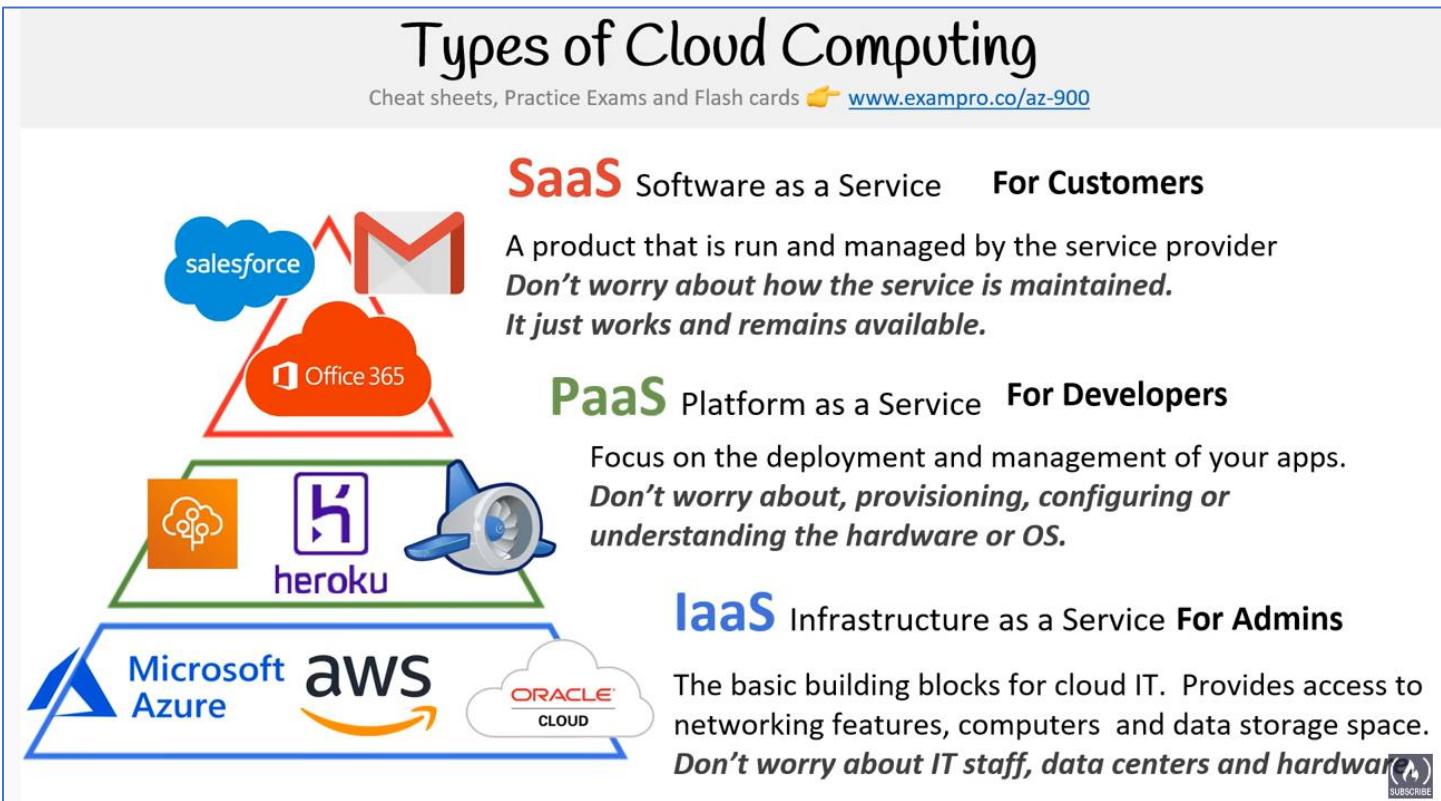
Cloud Benefits of Cloud Computing

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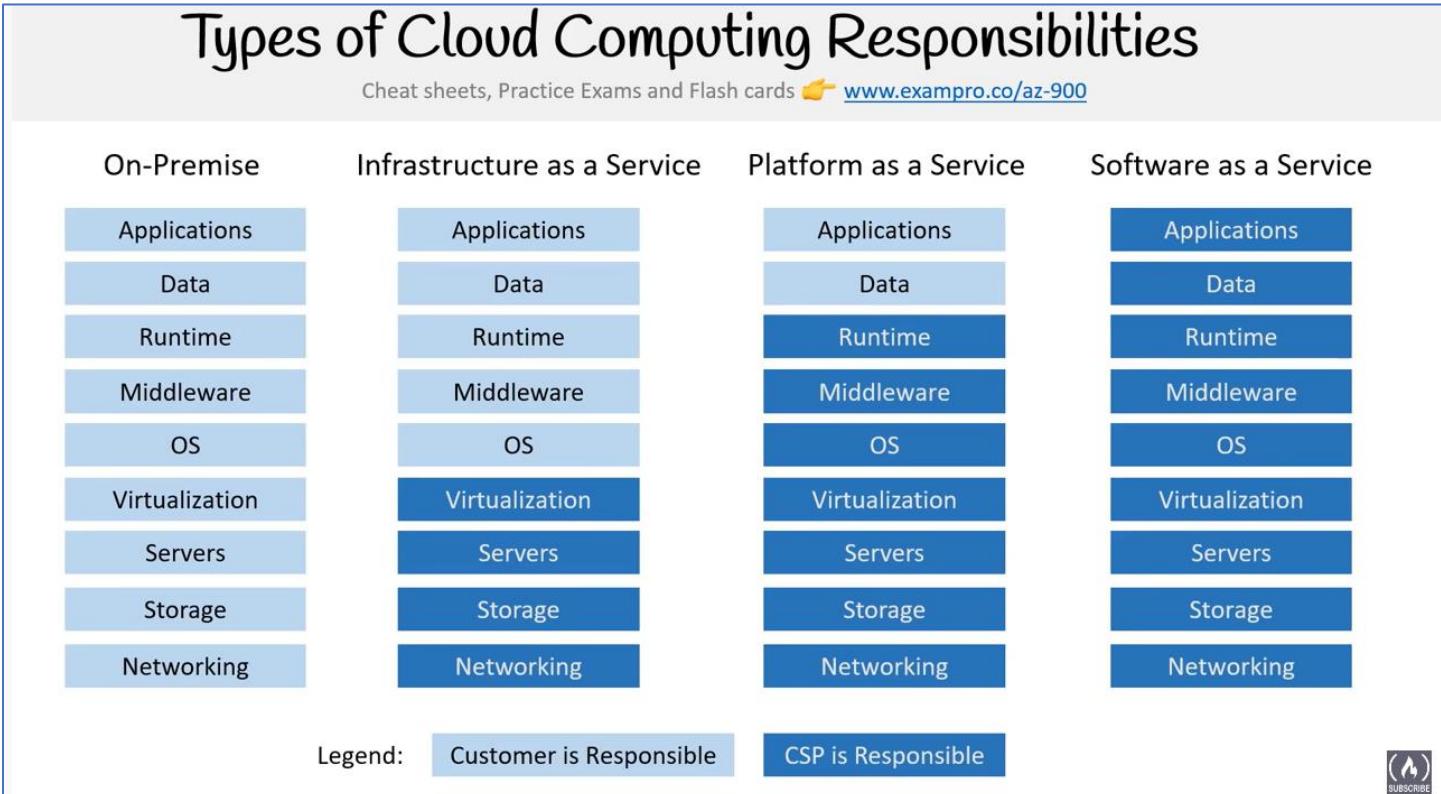
Cost-effective	You pay for what you consume, no up-front cost . Pay-as-you-go (PAYG) thousands of customers sharing the cost of the resources
Global	Launch workloads anywhere in the world , Just choose a region
Secure	Cloud provider takes care of physical security. Cloud services can be secure by default or you have the ability to configure access down to granular level.
Reliable	data backup, disaster recovery, and data replication, and fault tolerance
Scalable	Increase or decrease resources and services based on demand
Elastic	Automate scaling during spikes and drop in demand
Current	The underlying hardware and managed software is patched, upgraded and replaced by the cloud provider without interruption to you.



4. Types of Cloud Computing



5. Types of Cloud Computing Responsibility



6. Azure Development Models

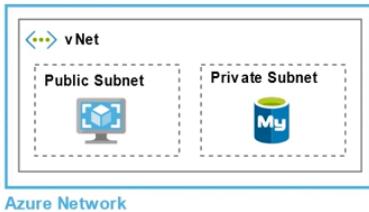
Azure's Deployment Models

Cheat sheets, Practice Exams and Flash cards  www.exampro.co/az-900

Public Cloud

Everything built on the Cloud Provider

Also known as: Cloud-Native

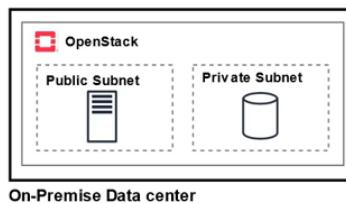


Private Cloud

Everything built on company's datacenters

Also known as **On-Premise**

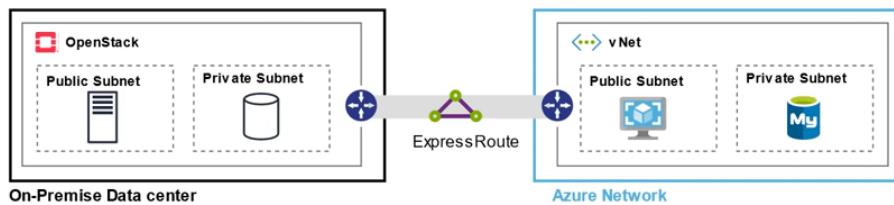
The cloud could be **OpenStack**



Hybrid

Using both **On-Premise** and

A **Cloud Service Provider**



Azure's Deployment Models

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	Cost	Security	Level of Configuration	Technical Knowledge
Public Cloud	👍 Most cost-effective	👍 Security Controls by Default 👎 Might not meet security requirements	👎 Limited based on what the Cloud Service Provider exposes to you.	👍 You don't need in-depth knowledge of underlying infrastructure
Private Cloud	👎 Most expensive	👎 no guarantee its secure 👍 can meet any security compliance requirement if you put in the work.	👍 You can configure the infrastructure however you like.	👎 You need to know in-depth how to configure all levels of your infrastructure
Hybrid	👍👎 Could be more cost-effective based on what you offload to the cloud.	👎 you now have to secure your connection to the cloud 👍 can meet all security requirements	👍 You get the best of both worlds.	👎 You need to know in-depth how to configure all levels of your infrastructure and know the CSPs services.



Deployment Models

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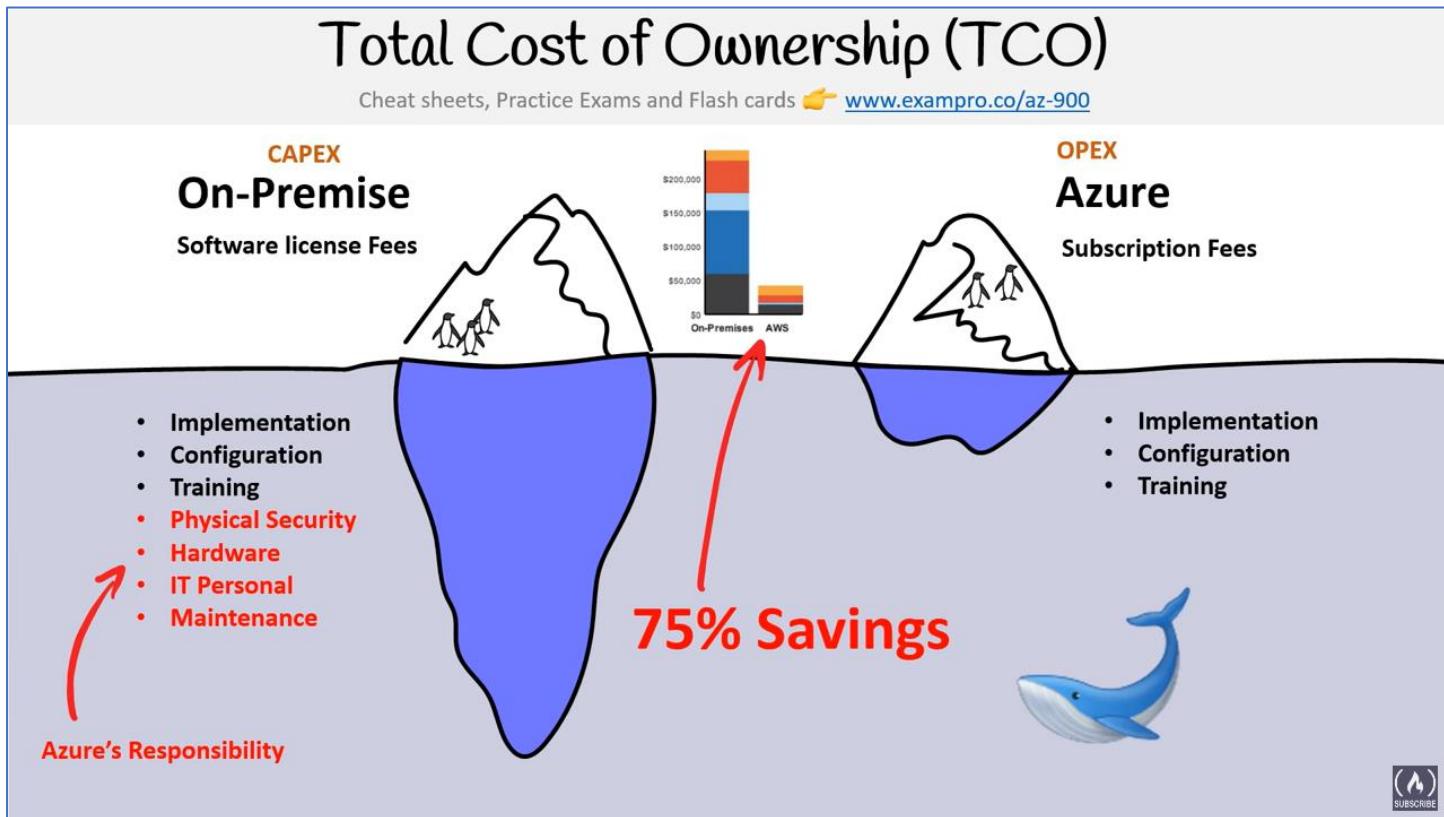
Cross-Cloud

Using **Multiple Cloud Providers**

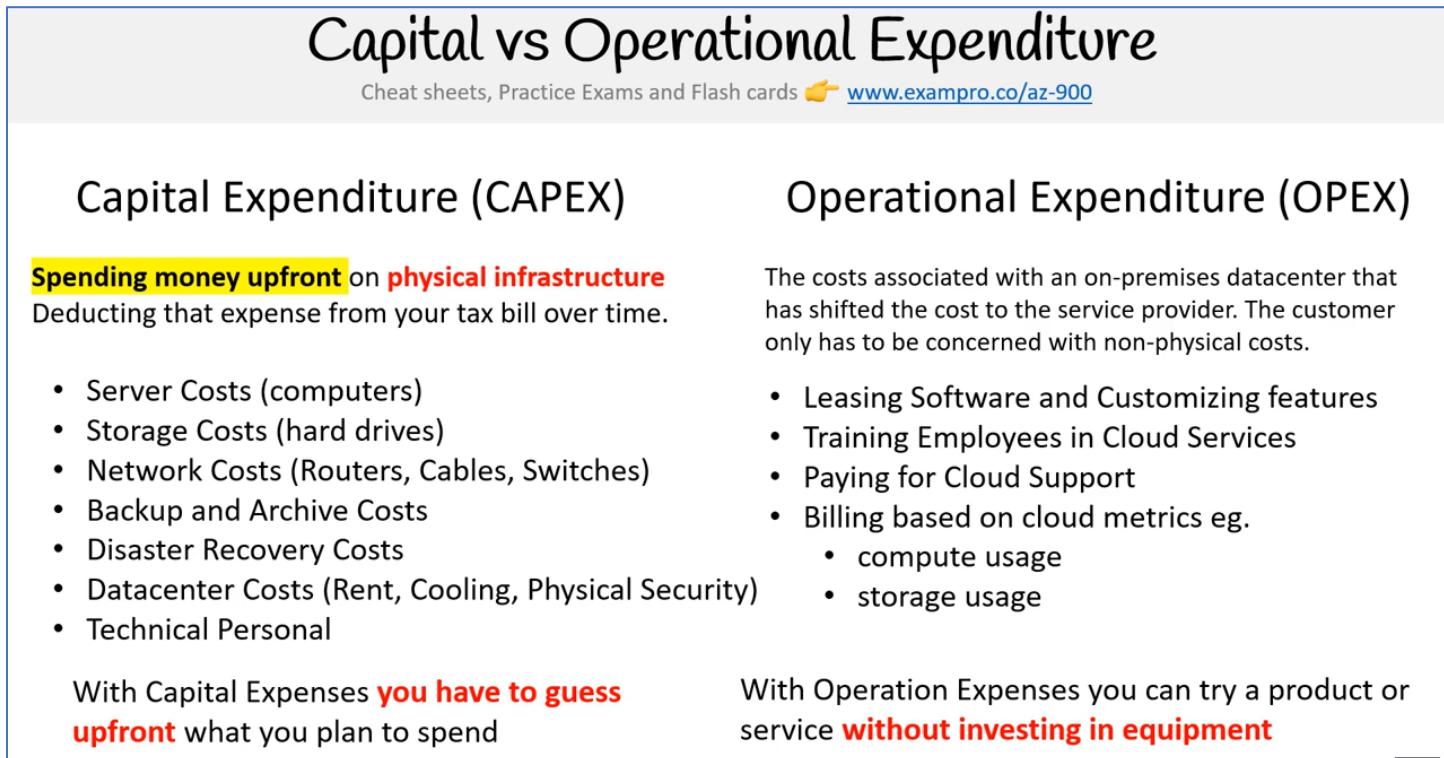
Aka multi-cloud, hybrid-cloud



7. TCO (Total Cost of Ownership)



8. CAPEX vs OPEX



9. Cloud Architecture Terminologies

Cloud Architecture Terminologies

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Availability - Your ability to ensure a service remains available
Highly Available (HA)

Scalability – Your ability to grow rapidly or unimpeded

Elasticity – Your ability to shrink and grow to meet the demand

Fault Tolerance – Your ability to prevent a failure

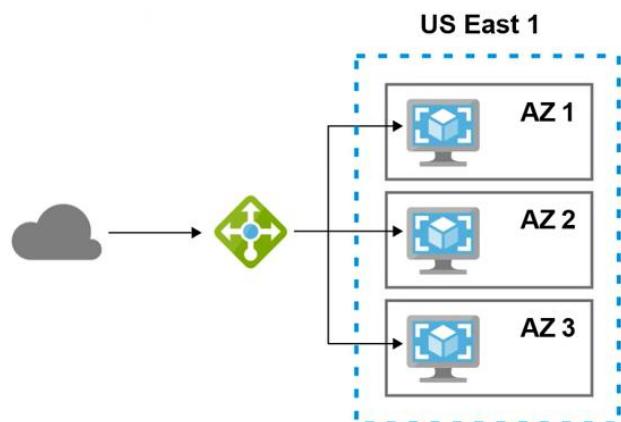
Disaster Recovery - Your ability to recover from a failure

Highly Durable (DR)

High Availability

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Your ability for your service to **remain available** by ensuring there is
***no single point of failure** and/or ensure a certain level of performance



Azure Load Balancer

A load balancer allows you to evenly distribute traffic to multiple servers in one or datacenter. If a datacenter or server becomes unavailable (unhealthy) the load balancer will route the traffic to only available datacenters with servers.

Running your workload across multiple **Availability Zones** ensures that if 1 or 2 **AZs** become unavailable your service / applications remains available.



High Scalability

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Your ability to **increase your capacity** based on the increasing demand of traffic, memory and computing power



Vertical Scaling
Scaling **Up**



Horizontal Scaling
Scaling **Out**

Upgrade to a bigger server

High Elasticity

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Your ability to **automatically** increase or decrease your capacity based on the current demand of traffic, memory and computing power



Horizontal Scaling

Scaling **Out** — Add more servers of the same size

Scaling **In** — Removing more servers of the same size

Vertical Scaling is generally hard for traditional architecture so you'll usually only see horizontal scaling described with Elasticity.



High Durability

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Your ability to **recover** from a disaster and to prevent **the loss** of data
Solutions that recover from a disaster is known as **Disaster Recovery (DR)**

- Do you have a backup?
- How fast can you restore that backup?
- Does your backup still work?
- How do you ensure current live data is not corrupt?

10. The Evolution of Computing

A. Dedicated Server

The Evolution of Computing

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*Dedicated VMs Containers Functions

The diagram shows a large red rectangular area labeled "Wasted Space" inside a dashed red border. Below this is a blue horizontal bar labeled "Host Operation System". On top of the Host OS bar are three smaller orange boxes labeled "App", "App", and "App". The entire stack is labeled "physical server" at the bottom.

- A physical server **wholly utilized by a single customer**.
- You have to guess your capacity, you'll overpay for an underutilized server
- Upgrading beyond your capacity will be slow and expensive
- You are limited by your Operating System
- Multiple apps can result in conflicts in resource sharing
- You have a ***guarantee of security, privacy and full utility of underlying resources**

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B. Virtual Machine

The Evolution of Computing

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*Dedicated VMs Containers Functions

The diagram shows three separate virtual machines (VMs) each containing a red "Wasted Space" area, an orange "App" box, and a blue "Guest OS" box. The VMs are labeled "VM", "VM", and "VM" below them. They are all running on a grey "Hypervisor" layer, which sits above a blue "Host Operation System" bar. The entire stack is labeled "physical server" at the bottom.

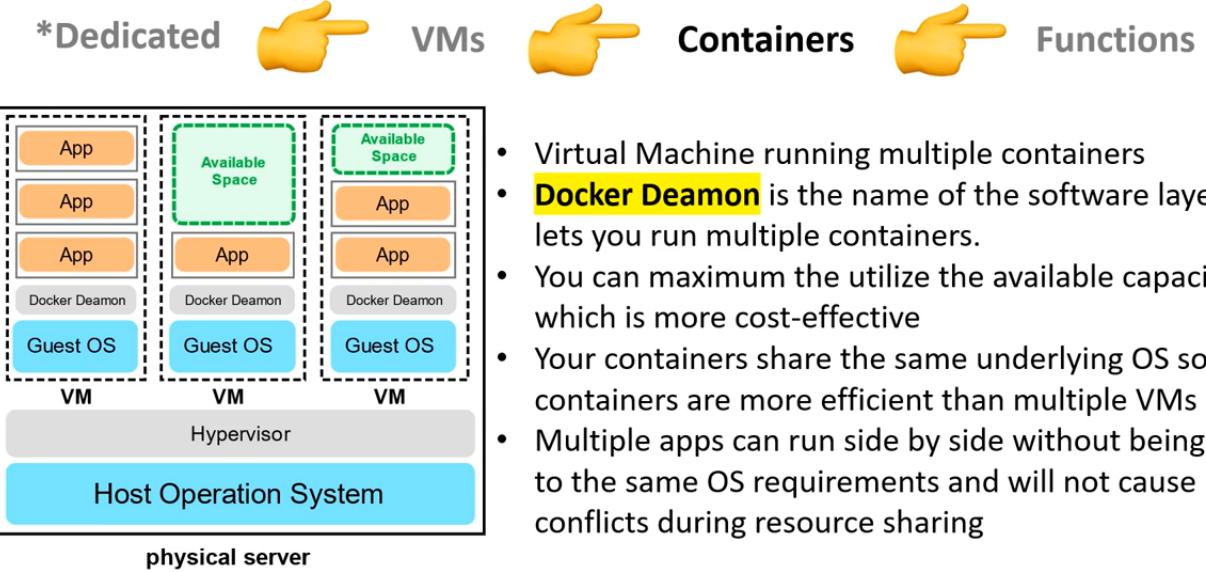
- You can run **multiple Virtual Machines on one machine**.
- **Hypervisor** is the software layer that lets you the VMs
- A physical server shared by multiple customers
- You are pay for a fraction of the server
- You'll overpay for an underutilized Virtual Machine
- You are limited by your Guest Operating System
- Multiple apps on a single Virtual Machine can result in conflicts in resource sharing

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C. Container

The Evolution of Computing

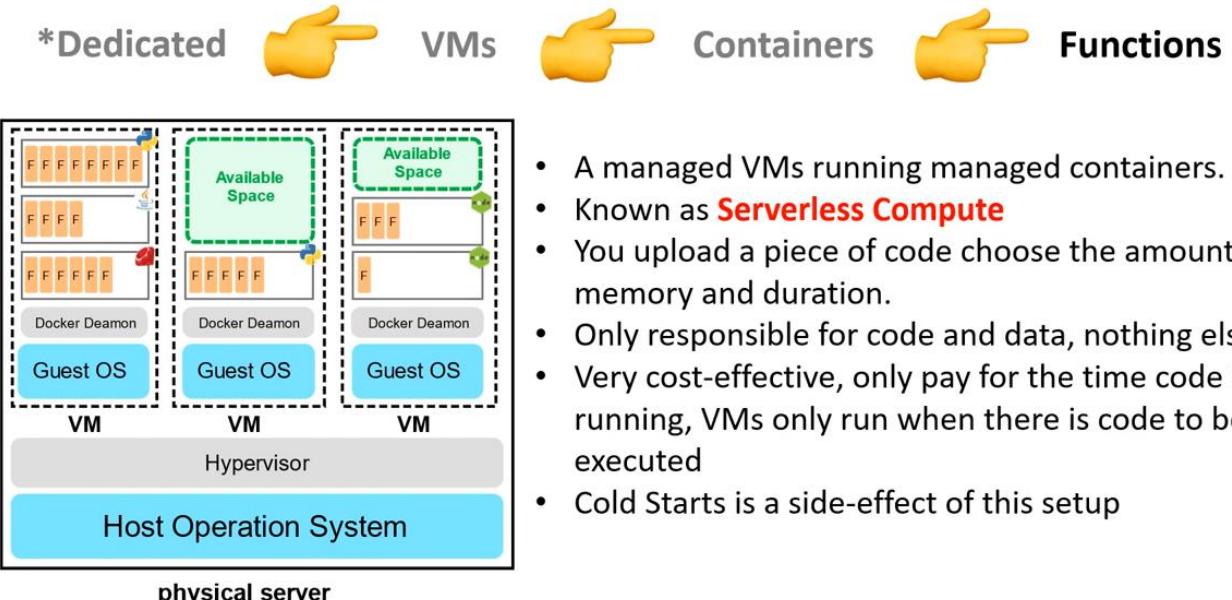
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D. Cloud

The Evolution of Computing

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11. Global Infrastructure

A. Regions and Geographies

Global Infrastructure – Regions and Geographies

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A **region** is a grouping of multiple datacenters (Availability Zones)

Azure has **58 Regions** available across **140 Countries**

A **Geography** is discreet market of two or more regions that preserves **data residency and compliance boundaries**.

Azure Geographies

- United States
- Azure Government (US)
- Canada
- Brazil
- Mexico

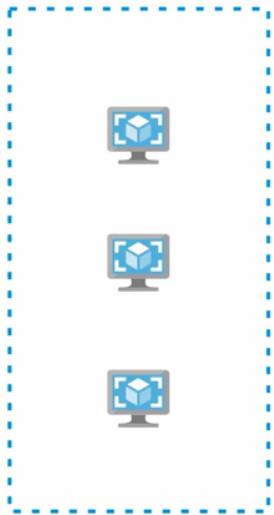


Imagine you are in Canada and **you want a guarantee that data will remain within Canada.**
You would want to use Canada Azure Geographies

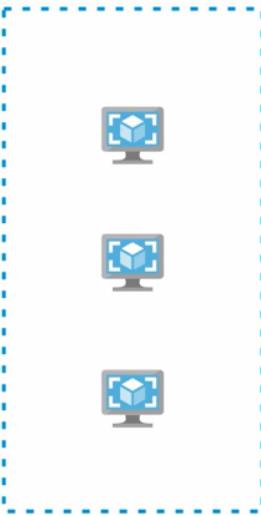
Global Infrastructure – Regions and Geographies

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US East 1

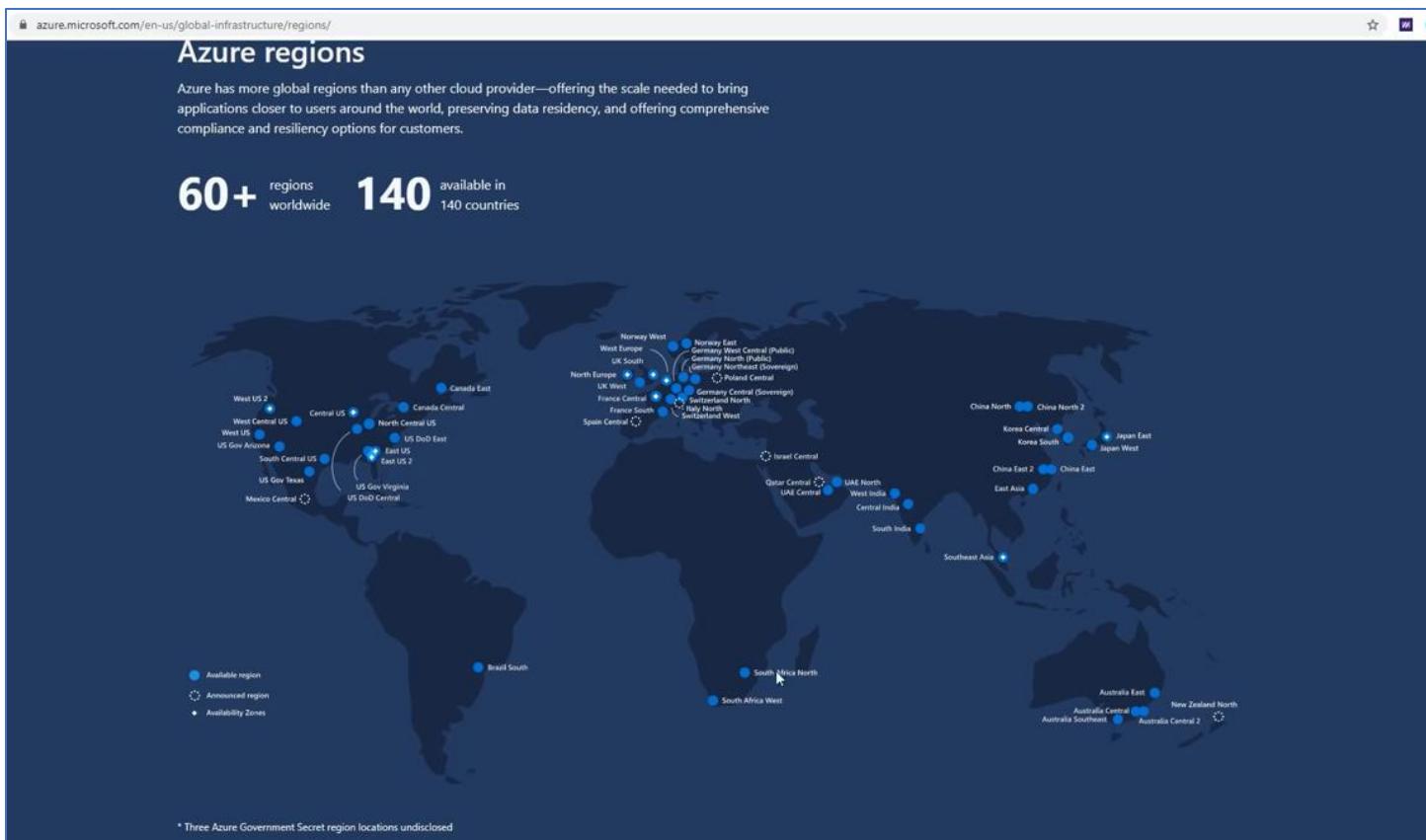


(Europe) Norway East



You choose the region when you launch a new cloud resource

Recommended ⓘ
(US) East US
(US) East US 2
(US) South Central US
(US) West US 2
(Asia Pacific) Australia East
(Asia Pacific) Southeast Asia
(Europe) North Europe
(Europe) UK South
(US) East US



B. Paired Regions

Global Infrastructure – Paired Regions

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Each region is paired with another region **300 miles** away.

Only one region is updated at a time to ensure no outages

Some Azure Services rely on Paired Regions for **Disaster Recovery**

Eg. **Azure Geo-redundant Storage (GRS)** replicates data to a secondary region automatically, ensuring that data is durable even in the event that the primary region isn't recoverable.

Canada	Canada Central	Canada East
North America	East US	West US
Germany	Germany Central	Germany Northeast

C. Region Types and Service Availability

Global Infrastructure – Region Types and Service Availability

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Not all Azure cloud services are available in every Region.

Recommended region

A region that provides the broadest range of service capabilities and is **designed to support Availability Zones** now, or in the future.

Alternate (other) region

A region that extends Azure's footprint within a data residency boundary where a recommended region also exists. **Not designed to support AZs**. These Regions are labeled as **Other** in the Azure Portal

General availability (GA) is when a service is considered ready to be used publicly by everyone.

Azure Cloud services are grouped into **three** categories.

Their category determines when cloud services become available:

1. **Foundational.** When GA, immediately or in 12 months in Recommended and Alternate Regions
2. **Mainstream** When GA immediately or in 12 months in Recommended Regions
May become available in Alternate Regions based on customer demand
3. **Specialized.** Available in Recommended or Alternate Region based on customer demand.



D. Special Regions

Global Infrastructure – Special Regions

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Azure has specialized regions to meet **compliance or legal reasons**



- US DoD Central
- US Gov Virginia
- US Gov Iowa

*Three Azure Government secret locations undisclosed



- China East
- China North

* Available through a unique partnership between Microsoft and 21Vianet. Microsoft does not directly maintain the datacenters.



E. Availability Zones

Global Infrastructure – AZs

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An **Availability Zone (AZ)** is physical location made up of one or more datacenter.

A datacenter is a secured building that contains hundreds of thousands of computers.

A region will ***generally** contain **3 Availability Zones**

Datacenters within a region will be isolate from each other (so different buildings). But they will be close enough to provide low-latency.

Its common practice to run workloads in at least 3 AZs to ensure services remain available in case one or two datacenters fail. (High Availability)

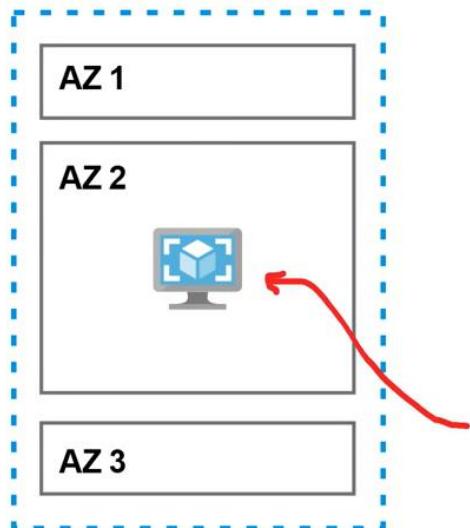


(A)

Global Infrastructure – AZs

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US East 1



If you region has multiple AZs you choose a number. Choosing 2 means AZ-2 not that you have chosen a quantity Of 2 AZs.

(US) East US

Availability zone

2

1

2

3

F.  Availability Zones Supported Regions

Global Infrastructure – AZ Supported Regions

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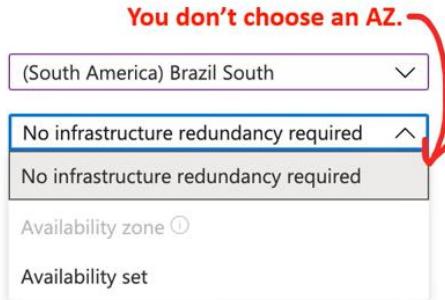
Not Every Region has support for Availability Zones

These regions are known as **Alternate** or **Other**

Recommended Regions are suppose to have at least 3 AZs.

The following Regions
have a minimum of 3 AZs

- Central US
- East US 2
- West US 2
- West Europe
- France Central
- North Europe
- Southeast Asia



G.  Availability Sets Fault and Update Domains

Global Infrastructure – Fault and Update Domains

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An Availability Zone (AZ) in an Azure region is
a combination of a **fault domain** and an **update domain**.

Fault Domain

A logical grouping of hardware to avoid a single point of failure within an AZ.
group of virtual machines that share a common power source and network switch.

Update Domain

Azure may need to apply updates to the underlying hardware and software.
Update domains ensure your resources do not go offline.

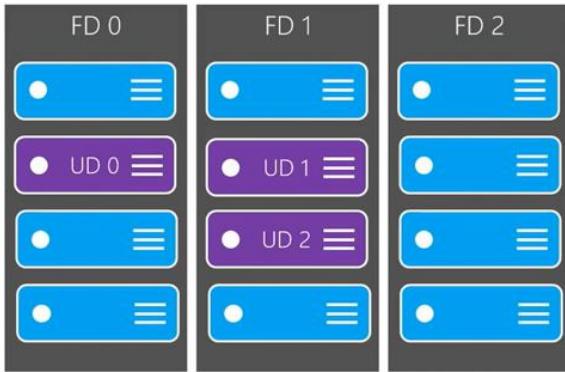
Availability Set

A logical grouping that you can use in Azure to ensure that the VMs you place in the Availability Set are different fault/update domains to avoid downtime.

Global Infrastructure – Fault and Update Domains

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Each Virtual Machine in an Availability Set is assigned a Fault Domain and Update Domain.



**Creating a Availability Set.
Choosing the amount of domains**

Group two or more VMs in an availability set to ensure that at least one is available during planned or unplanned maintenance events. [Learn more](#)

Name *

Fault domains ⓘ 2

Update domains ⓘ 5

Use managed disks ⓘ No (Classic) Yes (Aligned)

Create a virtual machine - Microsoft Azure +

portal.azure.com/#create/Microsoft.VirtualMachine

Microsoft Azure Upgrade Search resources, services, and docs (G+) Home > Virtual machines >

Create a virtual machine

Basics Disks Networking Management Advanced Tags Review + create

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

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

Subscription * ⓘ

Resource group * ⓘ Create new

Instance details

Virtual machine name * ⓘ

Region * ⓘ

Availability options ⓘ

Image * ⓘ Browse all public and private images

Azure Spot instance ⓘ Yes No

Size * ⓘ Select size

Administrator account

Authentication type ⓘ SSH public key Password

Username * ⓘ

SSH public key * ⓘ

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

PART-II- Technology Overview

1. Cloud computing

Computing Services

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Azure Virtual Machines

Windows or Linux virtual machines (VMs). The most common type of compute.
You choose your OS, Memory, CPU, Storage. You share hardware with other customers



Azure Container Instances

Docker as a Service Run containerized apps on Azure without provisioning servers or VMs



Azure Kubernetes Service (AKS)

Kubernetes as a Service. Easy to deploy, manage and scale containerized applications.
Uses the open source Kubernetes (K8) software.



Azure Service Fabric

Tier-1 Enterprise Containers as a Service

Distributed systems platform. Runs in Azure or on-premises.
Easy to package, deploy, and manage scalable and reliable **microservices**.



Azure Functions

Event-driven, serverless compute (functions) run code without provisioning or managing servers.
You pay only for the compute time you consume.



Azure Batch

Plans, schedules and executes your batch computer workloads across running 100+ jobs in parallel.
Use Spot VMs to save money (previously used Low-priority VMs to save on compute)



2. Storage Services

Storage Services

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Azure Blob Storage

Object Serverless Storage. Store very large files and large amounts of unstructured files.
Pay for what you store, unlimited storage, no-resizing volumes, filesystem protocols.



Azure Disk Storage

A virtual volume. Choose SSD or HDD, encryption by default, attach volume to VMs



Azure File Storage

A shared volume that you can access and manage like a file server. eg SMB



*Azure Queue Storage

Messaging Queue A data store for queuing and reliably delivering messages between applications



*Azure Table Storage

Wide-Column NoSQL Database A NoSQL store that hosts unstructured data independent of any schema



Azure Data Box / Azure Databox Heavy

A rugged briefcase computer and storage designed to move terabytes or petabytes of data



Azure Archive Storage

Long term cold storage for when you need to hold onto files for years on the cheapest storage options



Azure Data Lake Storage

A centralized repository that allows you to store all your structured and unstructured data at any scale.



3. Database Services

Database Services

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Azure Cosmos DB

A fully managed **NoSQL databases**. Designed for scale with guarantee of 99.999% availability



Azure SQL Database

Fully managed MS SQL database with auto-scale, integral intelligence, and robust security



Azure Database for MySQL / PostgreSQL / MariaDB

Fully managed and scalable **MySQL / PostgreSQL / MariaDB database** with high availability and security



SQL Server on VMs

Host enterprise SQL Server apps in the cloud. Lift-and-shift MS SQL servers from on-premise to Azure Cloud.



Azure Synapse Analytics (Azure SQL Data Warehouse)

Fully managed **data warehouse** with integral security at every level of scale at no extra cost



Azure Database Migration Service

Migrates your databases to the cloud with no application code changes



Azure Cache for Redis

Caches frequently used and static data to reduce data and application latency



*Azure Table Storage

Wide-Column NoSQL Database A NoSQL store that hosts unstructured data independent of any schema



4. Application Integration Services

Application Integration Services

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Azure Notifications Hub

Pub/Sub Send push notifications to any platform from any back end



Azure API Apps

API Gateway Quickly build and consume APIs in the cloud. Route APIs to Azure Services



Azure Service Bus

Service Bus Reliable cloud messaging as a service (MaaS) and simple hybrid integration



Azure Stream Analytics

Serverless **real-time analytics**, from the cloud to the edge



Azure Logic Apps

Schedule, automate and orchestrate tasks, businesses processes and workflows.

Integration with Enterprise SaaS and Enterprise applications.



Azure API Management

Hybrid, multi-cloud management platform for APIs across all environments.

Put in-front of existing APIs to add additional functionality.



*Azure Queue Storage

Messaging Queue A data store for queuing and reliably delivering messages between applications



5. Development and Mobile Tools

Developer and Mobile Tools

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Azure SignalR Service

Real-Time Messaging Easily add real-time web functionality to applications

Think of it like the Pusher for Azure



Azure App Service

Easy to use service for deploying and scaling web-applications with .Net, Node.js Java, Python and PHP

Developer focus on building their web-apps, and not worry about the underlying infrastructure

Think of it like Heroku for Azure



Visual Studio (Microsoft-owned)

Code Editor The integrated development environment (IDE) designed for creating powerful, scalable applications for Azure



Xamarin (Microsoft-owned)

Mobile-App Framework Create powerful and scalable native mobile apps with .NET and Azure



6. Azure DevOps Services

Azure DevOps Services

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Azure DevOps

Plan smarter, collaborate , and ship faster with a set of modern dev services.



Azure Boards

Kanban Deliver value to your users faster using proven agile tools to plan, track, and discuss work across your teams.



Azure Pipelines

Build, test, and deploy with **CI/CD** that works with any language, platform, and cloud. Connect to GitHub or any other Git provider and deploy continuously.



Azure Repos

Get unlimited, cloud-hosted private **Git repos** and collaborate to build better code with pull requests and advanced file management.



Azure Test Plans

Test and ship with confidence using **manual and exploratory testing tools**.



Azure Artifacts

Create, host, and share packages with your team, and add artifacts to CI/CD pipelines with a single click.



Azure DevTest Labs

Fast, easy, and lean dev-test environments



7. 📊 ARM (Azure Resource Manager)

Azure Resource Manager

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What is Infrastructure as code (IaC)?
The process of managing and provisioning computer data centers through machine-readable definition files, rather than physical hardware configuration or interactive configuration tools.

 **Azure Resource Manager (ARM)** allows you to programmatically create Azure resources via JSON template.

 **Launch VM** 

```
{ "$schema": "https://schema.management.azure.com/schemas/2019-04-01/deploymentTemplate.json#", "resources": [ { "type": "Microsoft.Compute/virtualMachines", "name": "MyServer", "properties": { "hardwareProfile": { "vmSize": "Standard_A4" } } } ] }
```

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8. 📊 Azure QuickStart Templates

Azure QuickStart Templates

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Azure QuickStart is a library of a **pre-made ARM templates** provided by the community and partners to help you quickly launch new projects for a variety of stack scenarios:

Deploy a Django app

This template uses the Azure Linux CustomScript extension to deploy an application. This example creates an Ubuntu VM, does a silent install of Python, Django...

 by Madhan Arumugam Ramakrishnan,
Last updated: 5/2/2019

Deploy an Ubuntu VM with Docker Engine

This template allows you to deploy an Ubuntu VM with Docker (using the Docker Extension). You can later SSH into the VM and run Docker containers.

 by Corey Sanders,
Last updated: 12/11/2019

CI/CD & Containerized App Deploy Docker Enterprise & Jenkins

This quick start launches a stack that allows you to Build, Run & Ship Containerized Applications using Docker Enterprise Edition and CloudBees Jenkins. This integrated sta...

 by Mazhar Hussain Warsi,
Last updated: 12/6/2019

Web App on Linux with PostgreSQL

This template provides a easy way to deploy Web App on Linux with Azure database for PostgreSQL.

 by Sunitha Muthukrishna,
Last updated: 5/5/2020

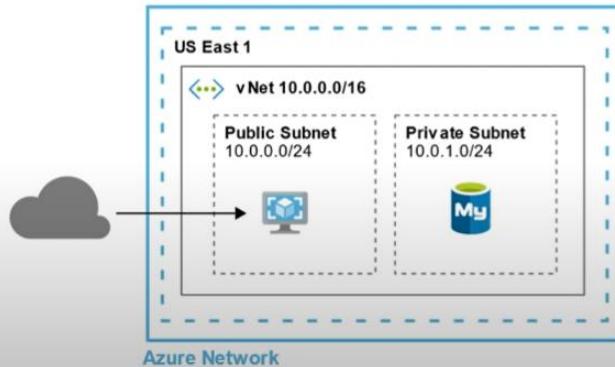
9. Azure Virtual Network (vNet) and Subnets

Azure Virtual Network (vNet) and Subnets

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Virtual Network (vNet) is a logically isolated section of the Azure Network where you launch your Azure resources. You choose a **range of IPs using CIDR Range**

CIDR Range of **10.0.0.0/16 = 65,536** IP Addresses



Subnets a logical partition of an IP network into multiple smaller network segments. **You are breaking up your IP range for VNet** into smaller networks.

Subnets **need to have a smaller CIDR range than to the vNet** represent their portion.
eg Subnet CIDR Range 10.0.0.0/24 = 256 IP Addresses

A Public Subnet is one that can reach the internet

A Private Subnet is one that cannot reach the internet



10. Cloud-Native Networking Services

Cloud-Native Networking Services

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Azure DNS

Provides ultra-fast DNS responses and ultra-high domain availability



Azure Virtual Network (vNET)

A logical isolated section of the Azure network for customers to launch Azure resources within.



Azure Load Balancer

OSI Level 4 (Transport) Load Balancer



Azure Application Gateway

OSI Level 7 (HTTP) Load Balancer, can apply a Web Application Firewall



Network Security Groups

A virtual firewall at the subnet level



11. Enterprise/Hybrid Networking Services

Enterprise/Hybrid Networking Services

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Azure Front Door

Scalable and secure entry point for fast delivery of your global applications



Azure Express Route

A connection between your on-premise to Azure cloud from 50 Mbps to 10 Gbps



Virtual WAN

a networking service that brings many networking, security, and routing functionalities together to provide a single operational interface



Azure Connection

A VPN connection securely connects two Azure local network via (IPsec).



Virtual Network Gateway

A site-to-site VPN connection between an Azure virtual network and your local network



12. Azure Traffic Manager

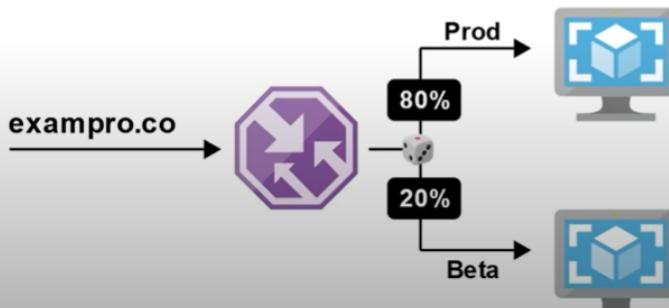
Azure Traffic Manager

Cheat sheets, Practice Exams and Flash cards www.exampro.co/az-900



Azure Traffic Manager operates at the **DNS layer** to quickly and efficiently direct incoming DNS requests based on the **routing method of your choice**.

- Route traffic to servers the geographically near by to reduce latency
- Fail-over to redundant systems in-case primary systems become unhealthy.
- Route to random VM to simulate A/B testing



A screenshot of the Azure portal showing the configuration for a Traffic Manager profile named `exampro`. The "Routing method" dropdown is set to "Weighted". Other options shown include "Performance", "Priority", "Geographic", "MultiValue", and "Subnet". A red arrow points from the text "Routing method of your choice" in the main text above to the "Weighted" option in the dropdown.

13. Azure DNS

Azure DNS

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Azure DNS allows you to host your domains names on Azure.
You can create DNS Zones and **manage your DNS records**.

Azure DNS **does not allow you to purchase domains**.
Only the ability to manage DNS records.

A screenshot of the Azure portal showing a list of DNS record sets for the zone `exampro.co`. The table includes columns for Name, Type, TTL, and Value.

Name	Type	TTL	Value
@	NS	172800	ns1-08.azure-dns.com. ns2-08.azure-dns.net. ns3-08.azure-dns.org. ns4-08.azure-dns.info.
@	SOA	3600	Email: azuredns-host... Host: ns1-08.azure-d... Refresh: 3600 Retry: 300 Expire: 2419200 Minimum TTL: 300 Serial number: 1

A screenshot of the Azure portal showing the "Add record set" dialog for the zone `exampro.co`. The "Name" field is set to `beta`, "Type" is `A`, and "Alias record set" is set to `Yes`. The "Alias type" is set to `Azure resource`. The "Choose a subscription" dropdown is set to `Free Trial`, and the "Azure resource" dropdown is set to `exampro`. A red arrow points from the text "manage your DNS records" in the main text above to the "Add record set" dialog.

14. Azure Load Balancer

Azure Load Balancer

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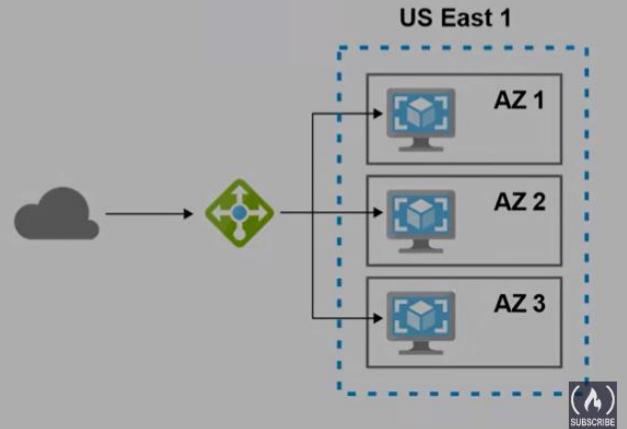


Azure Load Balancer is used for evenly distributing incoming network traffic across a group of backend resources or servers.

Azure Load Balancer operates on **OSI Layer 4 (Transport)**

You can create a:

- **Public Load Balancer** incoming traffic from the internet **to public-facing servers** (Public IPs)
- **Internal (Private) Load Balancer** incoming internal network traffic to **private-facing servers** (Private IPs)



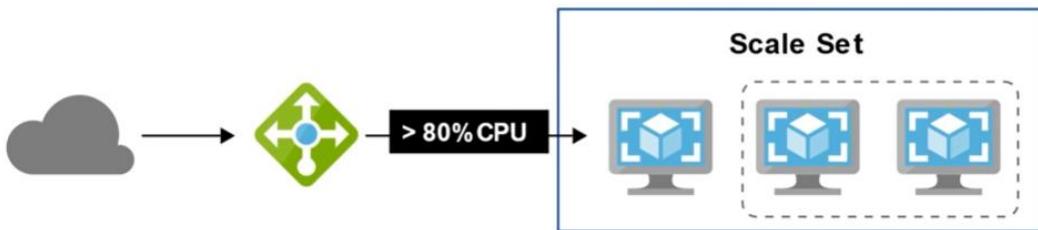
15. Scale Sets

Scale Sets

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Allows you group together identical Virtual Machines (VMs) and **automatically increase or decrease the amount of servers** based on:

- change in CPU, memory, disk, and network performance
- On a predefined schedule



16. Big Data and Analytics Services

Big Data and Analytics Services

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What is BigData?

A term used to describe **massive volumes of structured/unstructured data** that is so large it is difficult to **move and process** using traditional database and software techniques..



Azure Synapse Analytics (formally known as SQL Data Warehouse)

Enterprise **data warehousing and Big Data analytics**.

Intended to **run SQL queries** against large databases for things such as reporting.



HDInsight

Run **open-source analytics software** such as Hadoop, Kafka and Spark



Azure Databricks

An Apache Spark-based analytics platform optimized for the Microsoft Azure cloud services platform.

Third-Party Databricks cloud services supported within Azure.



Data Lake Analytics

An on-demand analytics job service that simplifies big data.

A **data lake** is a storage repository that holds a vast amount of raw **data** in its native format until it is needed.



17. IoT Services

IoT Services

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What is Internet of Things (IoTs)?

A network of Internet connected objects (usually hardware) able to collect and exchange data.



- Smart Bulbs
- Smart Fridges
- Smart Light Switches
- Narrowband vs Wideband hardware
- Security Cameras
- Voice Command Speakers
- Temperature, Pressure or Humidity Sensors
- Drones
- Phones
- Buttons



IoT Services

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IoT Central

Connects your IoT devices to the cloud



IoT Hub

Enable highly secure and reliable communication between your IoT application and the devices it manages



IoT Edge

A fully managed service built on Azure IoT Hub. It allows data processing and analysis nearest the **IoT** devices. Edge computing is when you offload compute from the cloud to local computing hardware such as IoT devices, phones or home computers



Windows 10 IOT Core Services

A cloud services subscription that provides the essential **services** needed to commercialize a device on **Windows 10 IoT Core**. Long-term OS support and services to manage device updates and assess device health



18. AI/ML Services

AI/ML Services

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What is Artificial Intelligence (AI)?

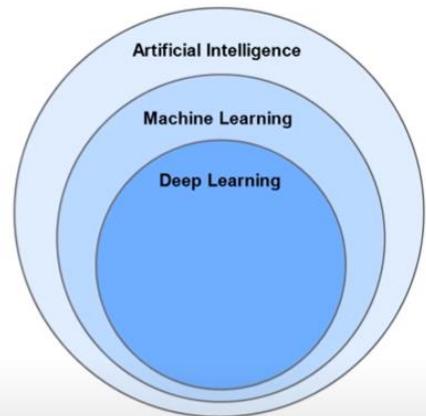
Machines that perform jobs that mimic human behavior

What is Machine Learning (ML)?

Machines that get better at a task without explicit programming

What is Deep Learning (DL)?

Machines that have an artificial neural network inspired by the human brain to solve complex problems.



Azure Machine Learning Service

A service for that simplifies running AI/ML related workloads allowing you to build flexible Pipelines to automate workflow. Use Python an R, Run DL workloads such as Tensorflow

Azure Machine Learning Studio (classic)

An older service that manages AI/ML workloads. Does not have a pipeline and other limitations. Workloads are not easily transferable to from classic to the new service.



AI/ML Services

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Personalizer Deliver rich, personalised experiences for every user.



Translator Add real-time, multi-language text translation to your apps, website and tools.



Anomaly detector Detect anomalies in data to quickly identify and troubleshoot issues.



Azure Bot Service Intelligent, serverless bot service that scales on demand



Form Recogniser Automate the extraction of text, key/value pairs and tables from your documents.



Computer Vision Easily customise computer vision models for your unique use case.



Language Understanding Build natural language understanding into apps, bots and IoT devices.



AI/ML Services

Cheat sheets, Practice Exams and Flash cards  www.exampro.co/az-900



QnA Maker Create a conversational question-and-answer bot from your existing content.



Text Analytics Extract information such as sentiment, key phrases, named entities and language from your text.



Content moderator Moderate text and images to provide a safer, more positive user experience.



Face Detect and identify people and emotions in images.



Ink Recogniser Recognise digital ink content, such as handwriting, shapes and document layout.



19. Serverless Services:

Serverless Services

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What is Serverless?

When the underlying servers, infrastructure and OS is taken care of by the Cloud Service Provider (CSP) It will generally be highly available, scalable and cost-effective.

Event-Driven Scale

A serverless function can be triggered or trigger other events allowing you to compose complex applications and its just scales.

Abstraction of Servers

Servers are abstracted away. Your code is described as functions. These functions can be running on different compute instances.

Micro-Billing

Serverless compute could run for a fraction of a second.

Billing into micro-seconds will save you money.

Serverless Services

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Azure Functions

Run small amounts of code known as serverless functions in your favorite language: C#, Java, JavaScript, Python and PowerShell



Blob Storage

Serverless Object Storage. Just upload files, don't think about the underlying file-systems, resizing



Logic Apps

Allows you to build serverless workflows composed of Azure Functions
Building a state machines for serverless compute.



Event Grid

Uses Pub/Sub messaging system to allow you react to events and trigger other Azure cloud services such as Azure Functions.



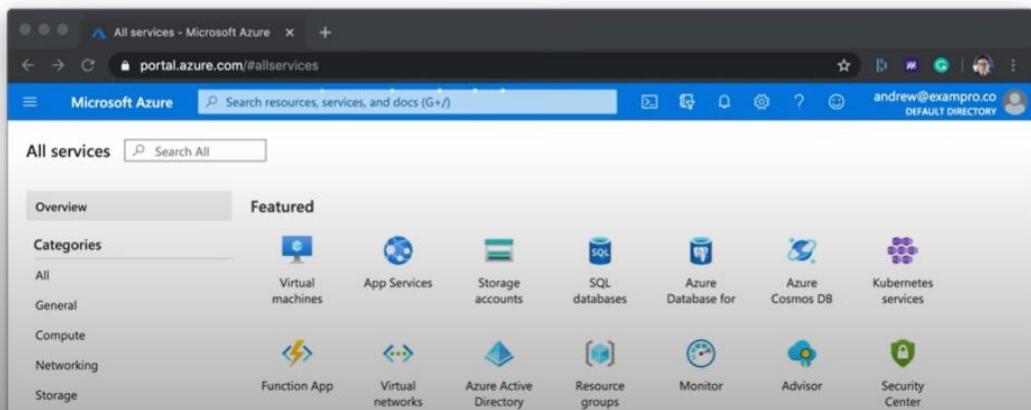
PART-III- Management Tools

1. Azure Portal

Azure Portal

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The Azure portal is **a web-based, unified console** that provides an alternative to command-line tools. You can manage your Azure subscription with the Azure portal. Build, manage, and monitor everything from simple web apps to complex cloud deployments.



Azure Preview Portal

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You can utilize new features that are in

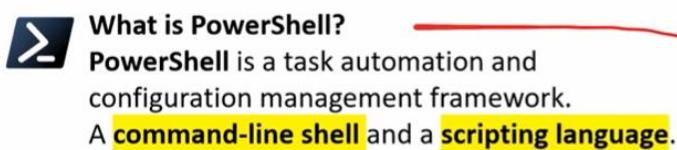
- **Preview**
- **Beta**
- **Other pre-release**

- If you want to **test preview features** should use **preview.portal.azure.com**
- if you **stable-release and production-ready** features you should use **portal.azure.com**

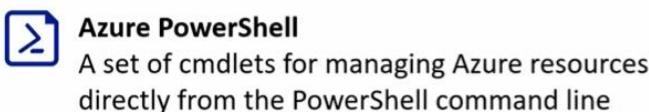
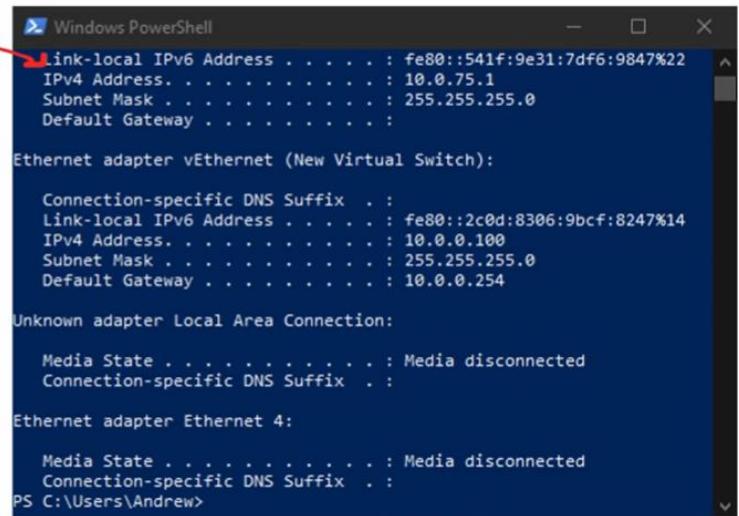
2. Azure Power Shell

Azure PowerShell

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Unlike most shells, which accept and return text, PowerShell is built on top of the .NET Common Language Runtime (CLR), and accepts and returns .NET objects.



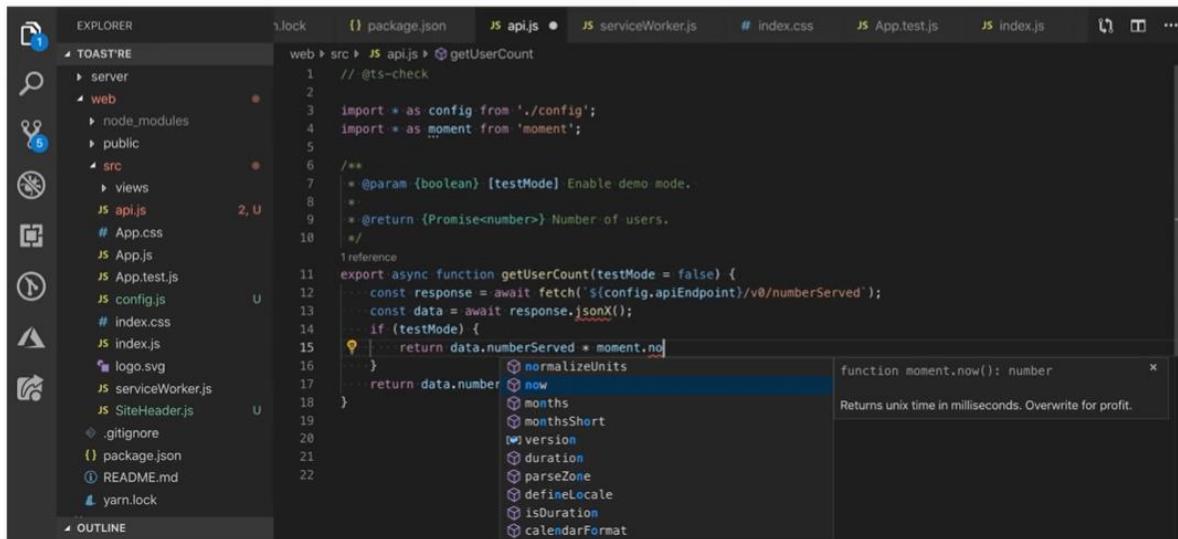
3. Visual Studio Code

Visual Studio Code

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Visual Studio Code is a free source-code editor made by Microsoft for Windows, Linux and macOS.



4. Azure Cloud Shell

Azure Cloud Shell is an interactive, authenticated, **browser-accessible shell** for managing Azure resources.

It provides the flexibility of choosing the shell experience that best suits the way you work, either **Bash or PowerShell**.

The screenshot shows the Azure Cloud Shell interface with a terminal window displaying PowerShell commands and output. Red arrows point from the text to the terminal window and the Azure portal navigation bar.

5. Azure CLI

What is a CLI?

A Command Line Interface (CLI) **processes commands to a computer program in the form of lines of text**. Operating systems implement a command-line interface in a shell or terminal

The Azure CLI can be installed on Windows, Mac and Linux. Once installed you can type **az** followed by other commands to create, update, delete, view and manage Azure resources.

```
#!/bin/bash

# Create a resource group.
az group create --name myResourceGroup --location westeurope

# Create a new virtual machine, this creates SSH keys if not present.
az vm create --resource-group myResourceGroup --name myVM --image UbuntuLTS --generate-ssh-keys
```

()

LAB:

-  [\(01:54:03\) Create a Resource Group](#)
-  [\(01:55:55\) Create a vNet](#)
-  [\(01:58:26\) Launching a Server](#)
-  [\(02:04:16\) Creating a Azure Function](#)
-  [\(02:08:44\) Storing files in Blob Storage](#)
-  [\(02:12:08\) Exploring Azure Cloud Shell](#)

Cloud PART – IV Security

1. 🛡️ Azure Trust Center

Azure Trust Center

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A public-facing website portal providing easy access to **privacy** and **security** and **regulatory compliance** information.

"If we can't protect people, then we don't deserve their trust."

- Brad Smith, President and Chief Legal Officer

Security, Privacy, and Compliance are core tenets of how we empower organizations to serve their customers.

[Watch video](#)

Principles for maintaining data integrity in the cloud

Microsoft Trust Center Overview

Get cloud compliance with the broadest set of offerings

Take advantage of more than 90 compliance certifications, including over 50 specific to global regions and countries, such as the US, the European Union, Germany, Japan, the United Kingdom, India, and China. And, get more than 35 compliance offerings specific to the needs of key industries, including health, government, finance, education, manufacturing, and media. Your emerging compliance needs are covered, too: Microsoft engages globally with governments, regulators, standards bodies, and non-governmental organizations.

Explore [Azure compliance offerings](#) in the Microsoft Trust Center.

Global	US Government	Region / Country Specific	Industry Specific		
CIS Benchmark	CIS	BIR_2012 (Netherlands)	IT-Grundschutz (Germany)	23_NYCRB_500 (US)	GLBA (US)
CSA STAR Attestation	CNSI	CS (Germany)	LOED (Spain)	AFM/DNB (Netherlands)	GxP
CSA STAR Certification	DFARS	CS_Mark_Gold (Japan)	MeitY (India)	AMF/ACPR (France)	HIPAA (US)
CSA STAR Self-Assessment	DoD_L2.4.5	Cyber_Essentials_Plus (US)	MTCS_Level_3 (Singapore)	APRA (Australia)	HITRUST (US)
ISO 20000	DoE_10	DJCP (China)	My_Number_Act (Japan)	CDSSA	KNF (Poland)
ISO 22301	EAR	EN_301_549 (EU)	New Zealand CC Framework	CETIC_131 (US)	MARS-E (US)
ISO 27001	FDA CFR Title 21	ENISA IAF (EU)	BASE (UK)	DPP (UK)	MAS/ABS (Singapore)
ISO 27017	FedRAMP	ENS (Spain)	PIPEDA (Canada)	EBA (EU)	MPAA (US)
ISO 27701	EIPS_140-2	EU Model Clauses	EDPA (Argentina)	FACT (UK)	NBB/FSMA (Belgium)
ISO 27018	IRS_1075	EU-US Privacy Shield	TISAX (Germany)	FCIA/PRA (UK)	NEN_7510 (Netherlands)
ISO 9001	ITAR	GB_10030 (China)	TRIICS (China)	FERPA (US)	NERC
SOC 1-2-3	NIST CSF	G-Cloud OFFICIAL (UK)	FFIEC (US)	OSFI (Canada)	
WCAG 2.0	NIST 800-171	GDPR	FINMA (Switzerland)	PCL DSS	
		Section 508 VPATs	HDS (France)	FINRA (US)	RBI/IRDAI (India)

2. ☐ Compliance Programs

Azure Security – Compliance Programs

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Enterprise Companies WILL NOT BUY your software solutions unless its  **secure**.

How are you going **to meet their security compliance requirements?**

We'll only do business with you if you are...

- **NIST 800-53**
- **PIPEDA Compliant**
- **HIPPA Compliant**
- **FIPS-140-2 Compliant**



Azure Security – Compliance Programs

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Criminal Justice Information Services (CJIS)

Any US state or local agency that wants to access the FBI's CJIS database is required to adhere to the CJIS Security Policy.



Cloud Security Alliance (CSA) STAR Certification

Independent third-party assessment of a cloud provider's security posture



General Data Protection Regulation (GDPR)

A European privacy law. Imposes new rules on companies, government agencies, non-profits, and other organizations that offer goods and services to people in the European Union (EU), or that collect and analyze data tied to EU residents.



EU Model Clauses

Contractual guarantees around transfers of personal data outside of the EU



Azure Security – Compliance Programs

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Health Insurance Portability and Accountability Act (HIPAA).
US federal law that regulates patient Protected Health Information



International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC) 27018.
Code of practice, covering the processing of personal information by cloud service providers.



Multi-Tier Cloud Security (MTCS) Singapore.

Operational Singapore security management Standard. A common standard that cloud service providers (CSPs) can apply to address customer concerns about the security and confidentiality of data in the cloud, and the impact on businesses of using cloud services.



Service Organization Controls (SOC) 1, 2, and 3.

independent third-party examination reports that demonstrate how the company achieves key compliance controls and objectives



Azure Security – Compliance Programs

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National Institute of Standards and Technology (NIST) Cybersecurity Framework (CSF)

Voluntary Framework that consists of standards, guidelines, and best practices to manage cybersecurity-related risks.



UK Government G-Cloud.

Cloud computing certification for services used by government entities in the United Kingdom



Federal Information Processing Standard (FIPS) 140-2

US and Canadian government standard that specifies the security requirements for cryptographic modules that protect sensitive information.



3. 🖥 Azure Active Directory

Azure Active Directory

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

External Resources	Internal Resources
<ul style="list-style-type: none">• Microsoft Office 365• Azure Portal• SaaS applications	Applications within your internal networking Access to workstations on-premise

Use Azure AD to implement **Single-Sign On (SSO)**

Azure Active Directory comes in four editions

1. **Free** MFA, SSO, Basic Security and Usage Reports, User Management
2. **Office 365 Apps** Company Branding, SLA, Two-Sync between On-Premise and Cloud
3. **Premium 1** Hybrid Architecture, Advanced Group Access, Conditional Access
4. **Premium 2** Identity Protection, Identity Governance

(🔍) [SUBSCRIBE](#)

4. 🖥 MFA

Multi-Factor Authentication

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What is Multi-Factor Authentication (MFA)?

A security control where after you fill in your username/email and password **you have to use a second device** such as a phone to confirm that its you logging in.

MFA **protects** against people who have stolen your password.

MFA is an option in most cloud providers and even social media websites such as Facebook.

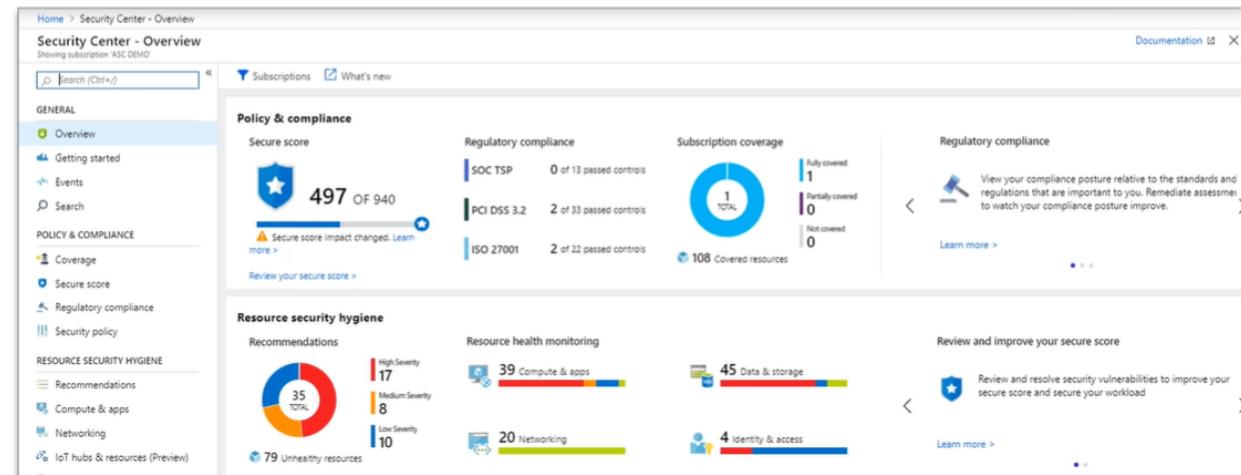
The diagram illustrates the MFA process. On the left, there is a user interface with fields for 'andrew@exampro.co' and '*****'. Below these is an orange 'LOGIN' button. To the right of the login fields is a blue bar containing the text 'One Factor'. Further down is a larger blue bar containing the text 'Two-Factor / Multi-Factor'. An arrow points from the user interface to a smartphone icon. The smartphone icon displays a verification code '439 691' and a green checkmark inside a green circle, indicating successful authentication.

(🔍) [SUBSCRIBE](#)

5. Azure Security Center

Azure Security Center

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

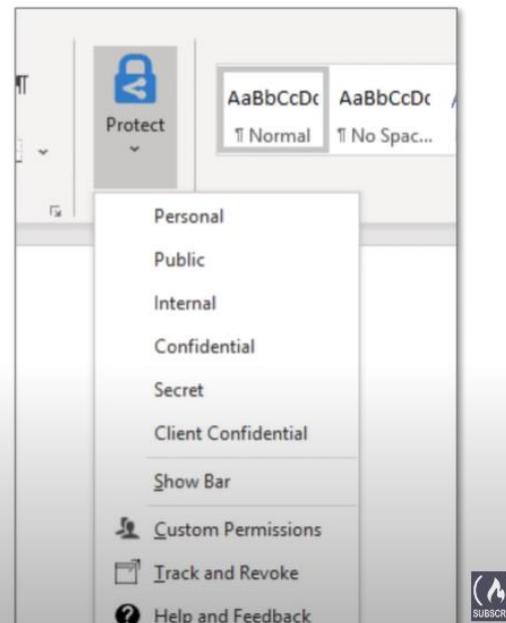
The dashboard includes:

- Policy & compliance:** Secure score (497 of 940), Regulatory compliance (SOC TSP, PCI DSS 3.2, ISO 27001), Subscription coverage (108 covered resources).
- Resource security hygiene:** Recommendations (35 total, 17 High Severity, 8 Medium Severity, 10 Low Severity), Resource health monitoring (Compute & apps: 39, Networking: 20, Data & storage: 45, Identity & access: 4).
- Review and improve your secure score:** Learn more >

6. Azure Information Protection

Azure Information Protection (AIP)

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Protects sensitive information such as emails and documents with encryption, restricted access and rights, and integrated security in Office apps

6. 🗃 Key Vault

Key Vault

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Azure Key Vault helps you **safeguard cryptographic keys and other secrets** used by cloud apps and services.

Secrets Management

store and tightly control access to **tokens, passwords, certificates, API keys, and other secrets**

Key Management

create and control the **encryption keys** used to encrypt your data

Certificate Management

easily provision, manage, and deploy public and private **SSL certificates** for use with Azure and internal connected resources.

Hardware Security Module

secrets and keys can be protected either by software or **FIPS 140-2 Level 2** validated HSMs



Key Vault

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An HSM is a **Hardware Security Module**.
Its a piece of hardware designed to store encryption keys.



Federal Information Processing Standard (FIPS) 140-2
US and Canadian government standard that specifies the security requirements for cryptographic modules that protect sensitive information.

HSM's that are **multi-tenant** are **FIPS 140-2 Compliant**
(multiple customers virtually isolated on an HSM)

HSM's that are **single-tenant** are **FIPS 140-3 Compliant**
(single customer on a dedicated HSM)



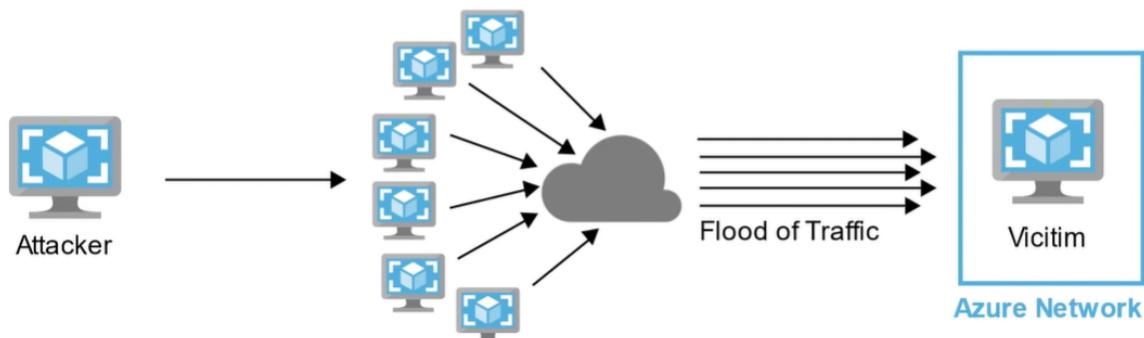
7. 🛡️ Azure DDoS Protection

Azure DDoS Protection

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What is a DDoS (Distributed Denial of Service) Attack?

A malicious attempt to disrupt normal traffic by flooding a website with large amounts of fake traffic.



Azure DDoS Protection

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Azure offers **two tiers** of DDoS Protection

DDoS Protection Basic

- Free
- Already turned on protect Azure's global network

DDoS Protection Standard

- Starting at \$2,994/month
- Metrics, Alerts, Reporting
- DDoS Expert Support
- Application and Cost Protection SLAs

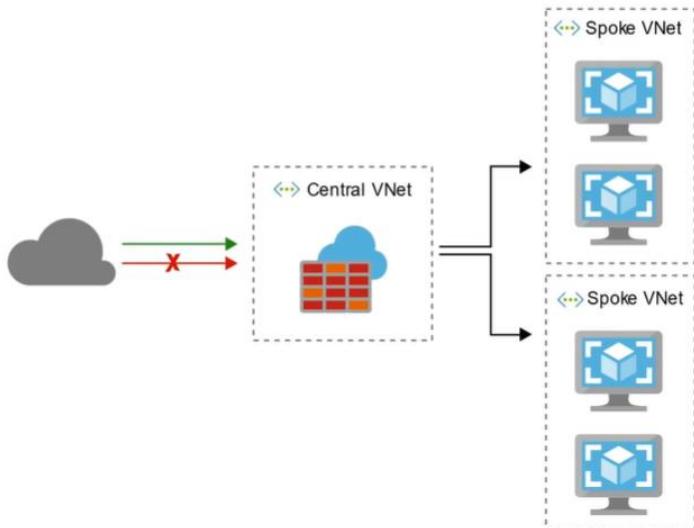
8. Azure Firewall

Azure Firewall

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



Azure Firewall

Cheat sheets, Practice Exams and Flash cards  www.exampro.co/az-900



Azure Firewall Features

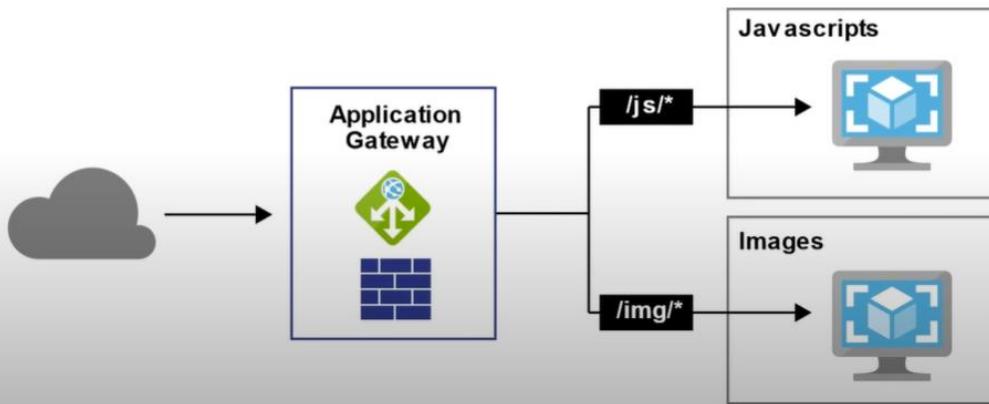
- Centrally create, enforce, and log application and network connectivity policies **across subscriptions** and virtual networks.
- Uses a **static public IP address** for your virtual network resources allowing outside firewalls to identify traffic originating from your virtual network
- High availability is built in, **no additional load balancers are required**
- Can configure during deployment to **span multiple AZs for increased availability**.
- There's **no additional cost** for a firewall deployed in an Availability Zone (AZ)
- There are **additional costs for inbound and outbound data transfers** associated with AZs

9. Application Gateway

Azure Application Gateway

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Application Gateway is a **web-traffic load balancer** (Layer 7 HTTP) that re-route traffic based on a set of rules. A Web Application Firewall (WAF) can be attached for additional protection on OSI Layer 7.



10. Advanced Threat Protection ATP

Azure Advanced Threat Protection (ATP)

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What is IDS/IPS?

Intrusion Detection System and Intrusion Protection System

A device or software application that monitors a network or systems for malicious activity or policy violations.



Azure Advanced Threat Protection (ATP) is a cloud-based security solution that **leverages your on-premises Active Directory signals to identify, detect, and investigate advanced threats, compromised identities, and malicious insider actions directed at your organization.**

11. Microsoft Security Development Lifecycle SDL

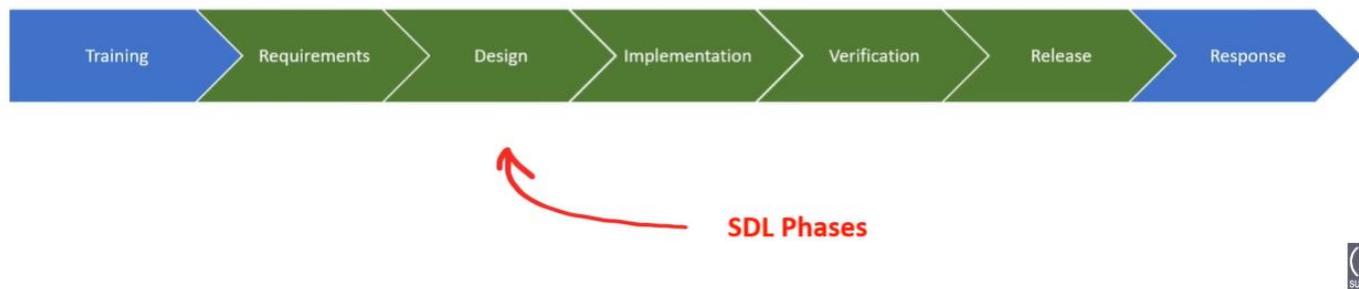
Microsoft Security Development Lifecycle (SDL)

Cheat sheets, Practice Exams and Flash cards  www.exampro.co/az-900

Microsoft Security Development Lifecycle (SDL) is an industry-leading software security assurance process.

A Microsoft-wide initiative and a mandatory policy since 2004, the SDL has played a critical role in embedding security and privacy in Microsoft software and culture.

Building security into each **SDL phase** of the development lifecycle helps you catch issues early, and it helps you reduce your development costs.



12. Azure Policies

Azure Security – Policies

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Azure Policy is a service you can use to create, assign, and manage policies. A policy allows you to enforce or control the properties of a resource

Azure Policy evaluates resources in Azure by comparing the properties of those resources to business rules. These business rules, described in **JSON** format, are known as **Policy Definitions**.

13. Role Based Access Control RBAC

Azure Role-Based Access Control (RBAC)

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Azure role-based access control (Azure RBAC) helps you manage **who has access to Azure resources**, what they can do with those resources, and what areas they have access to.

Role Assignments the way you control access to resources

A Role Assignment is consist of these three elements

1. security principal
2. role definition
3. scope

Azure Role-Based Access Control (RBAC)

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A Security Principal represents the identities requesting access to an Azure resource such as:

User An individual who has a profile in Azure Active Directory

Group A set of users created in Azure Active Directory.

Service Principal A security identity used by applications or services to access specific Azure resources.

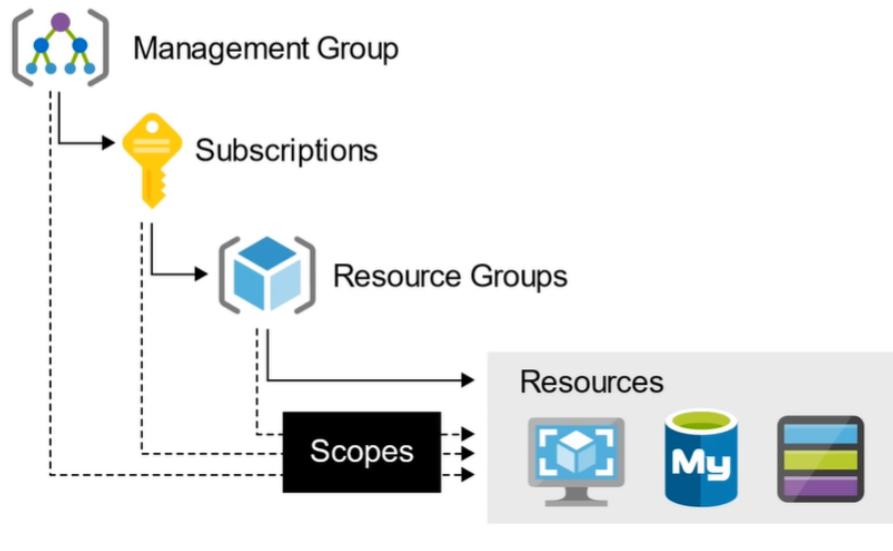
Managed identity An identity in Azure Active Directory that is automatically managed by Azure.



Azure Role-Based Access Control (RBAC)

Cheat sheets, Practice Exams and Flash cards [👉 www.exampro.co/az-900](http://www.exampro.co/az-900)

Scope is the **set of resources** that access for the Role Assignment applies to.
Scope Access Controls at the Management, Subscription or Resource Group level.



Azure Role-Based Access Control (RBAC)

Cheat sheets, Practice Exams and Flash cards [👉 www.exampro.co/az-900](http://www.exampro.co/az-900)

A Role Definition is a collection of permissions.
A role definition lists the operations that can be performed, such as **read, write, and delete**.
Roles can be high-level, like owner, or specific, like virtual machine reader.

Azure has **built-in roles** and you can define **custom roles**

	Read	Grant	Create, Update, Delete
Owner	Green		Green
Contributor	Green	Red	Green
Reader	Green	Red	Red
User Access Administrator	Red	Green	Red

These are the four fundamental built-in roles



14. Lock resources

Lock resources

Cheat sheets, Practice Exams and Flash cards  www.exampro.co/az-900

As an admin, you may need to **lock a subscription, resource group, or resource** to **prevent other users from accidentally deleting or modifying critical resources.**

In the **Azure Portal** you can set the following lock levels.

CanNotDelete (Delete)

authorized users can still read and modify a resource, but they can't delete the resource.

ReadOnly (Read-only)

authorized users can read a resource, but they can't delete or update the resource



15. Management Groups

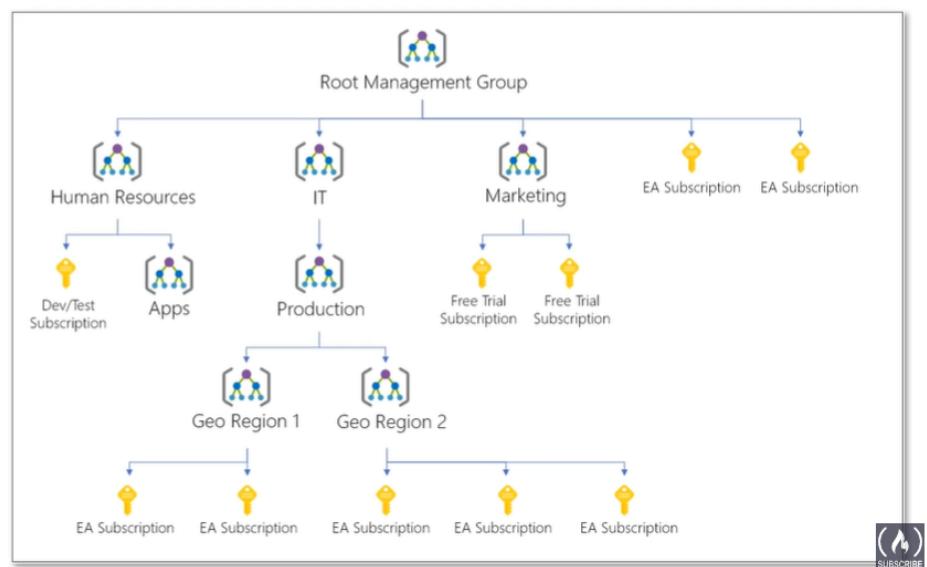
Azure Management Groups

Cheat sheets, Practice Exams and Flash cards  www.exampro.co/az-900

Managing multiple subscriptions (accounts) into a hierachal structure.

Each directory is given a single top-level management group called the "Root" management group.

All subscriptions within a management group automatically inherit the conditions applied to the management group.



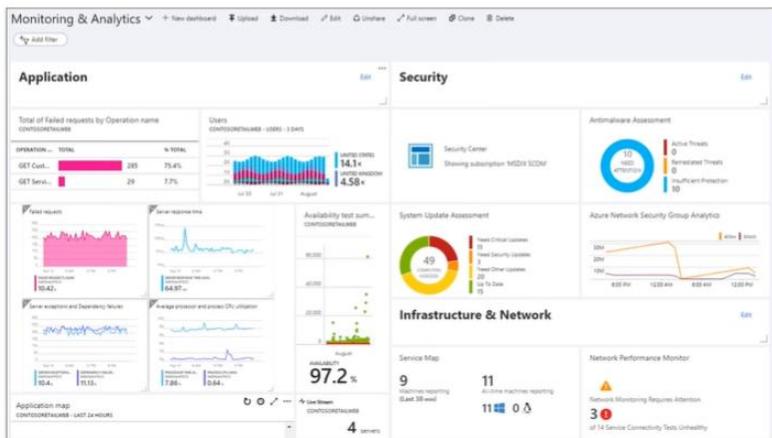
16. 📈 Azure Monitor

Azure Monitor

Cheat sheets, Practice Exams and Flash cards  www.exampro.co/az-900



Azure Monitor comprehensive solution **for collecting, analyzing, and acting on telemetry** from your cloud and on-premises environments



- Create Visual Dashboards
- Smart Alerts
- Automated Actions
- Log Monitoring



17. 📈 Service Health

Azure Service Health

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Information about **current and upcoming issues** such as:

- service impacting events
- planned maintenance
- and other changes that may affect your availability.

1. **Azure Status** informs you of service outages in Azure
2. **Azure service health** a personalized view of the health of the Azure services and regions you're using.
3. **Azure resource health** information about the health of your individual cloud resources eg. VM



18. Azure Advisor

Azure Advisor

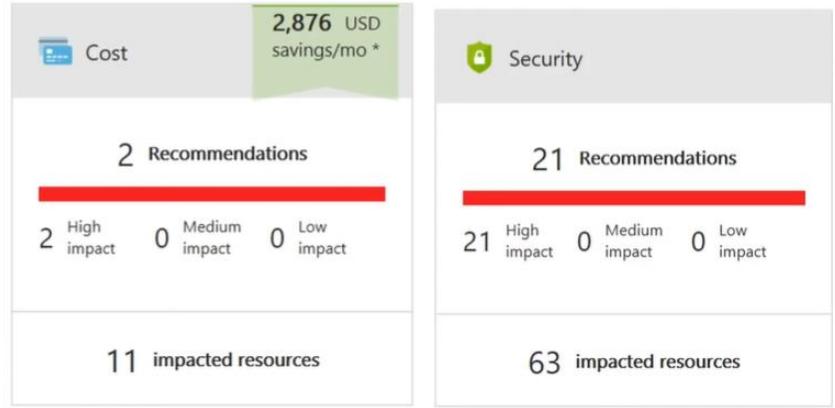
Cheat sheets, Practice Exams and Flash cards  www.exampro.co/az-900



Azure Advisor is a personalized cloud consultant that helps you follow best practices to optimize your Azure deployments.

The Advisor dashboard displays personalized recommendations for all your subscriptions for the following 5 categories:

1. High Availability
2. Security
3. Performance
4. Cost
5. Operational Excellence



PART – V Billing and Pricing

1. Service Level Agreements

Pricing and Support – SLAs

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Service Level Agreement (SLA) describes Azure's commitments for **uptime** and **connectivity**

SLA's are individualized per Azure service

Uptime and connectivity is described as **Performance Targets**

A Performance Target is represented as a **percentage %**.

- 99% (two nines)
- 99.9% (three nines)
- 99.999% (five nines)
- 99.9999999% (nine nines)

Azure does not provide SLAs for Free Tier or the shared tiers.



2. Service Credits

Pricing and Support – Service Credits

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Service Credits

customers may **have a discount applied to their Azure bill**, as compensation for an **under-performing Azure product or service** based on the SLA.



Azure Virtual Machine Service Credit Calculation

Monthly Uptime %	Service Credit %
< 99.9	10
< 99	25
< 95	100

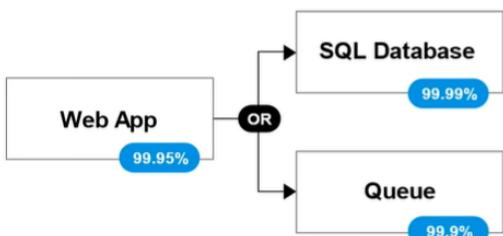
3. Composite SLAs

Pricing and Support – Composite SLA

Cheat sheets, Practice Exams and Flash cards  www.exampro.co/az-900

Different services have different SLAs.

A **Composite SLA** is when you **combine** SLAs across different service offerings.



The real SLA for a Web-App + SQL Database would be:
 $99.95\% \times 99.99\% = 99.94\%$.

Fallback systems will improve overall SLA.

Imagine SQL Database was down but you had a queue
Saving transactions attempts from Web App to Queue to write to DB.
Web app *and* (database *or* queue) = $99.95\% \times 99.99999\% = \sim 99.95\%$



4. TCO Calculator

Pricing and Support – TCO Calculator

Cheat sheets, Practice Exams and Flash cards  www.exampro.co/az-900

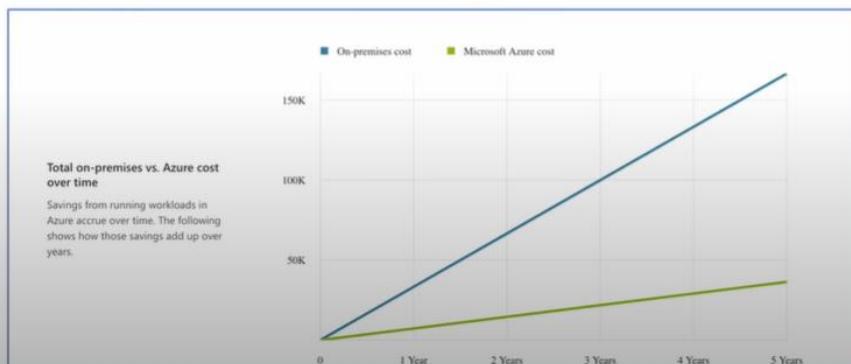
Estimate the cost savings you can realize by migrating your workloads to Azure

Generate out a detailed report and export as a PDF to send to decision makers.

azure.microsoft.com/pricing/calculator

Over 5 year(s) with Microsoft Azure, your estimated cost savings could be as

much as **\$130,191**

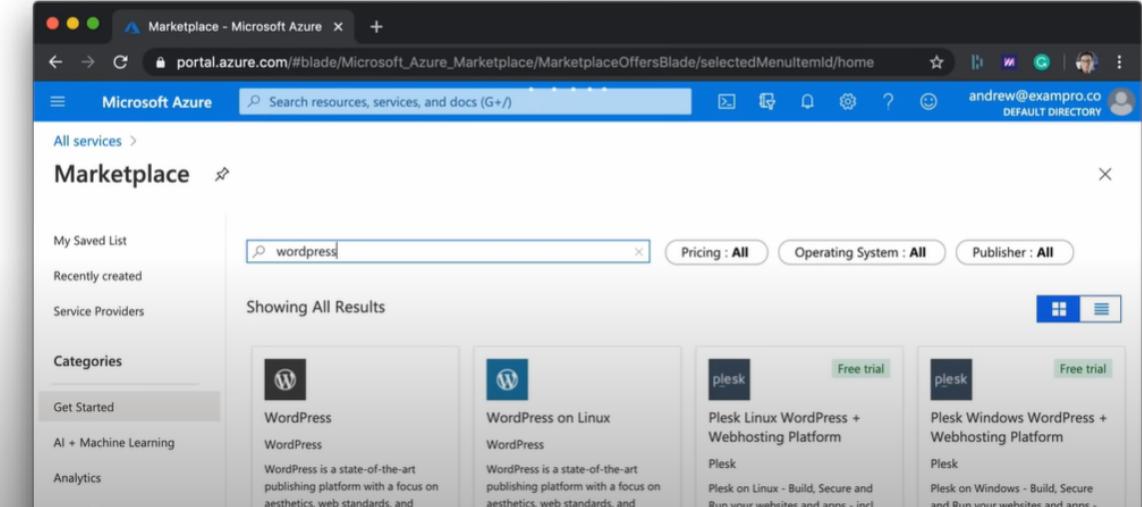


5. 🖥 Azure Marketplace

Azure Marketplace

Cheat sheets, Practice Exams and Flash cards  www.exampro.co/az-900

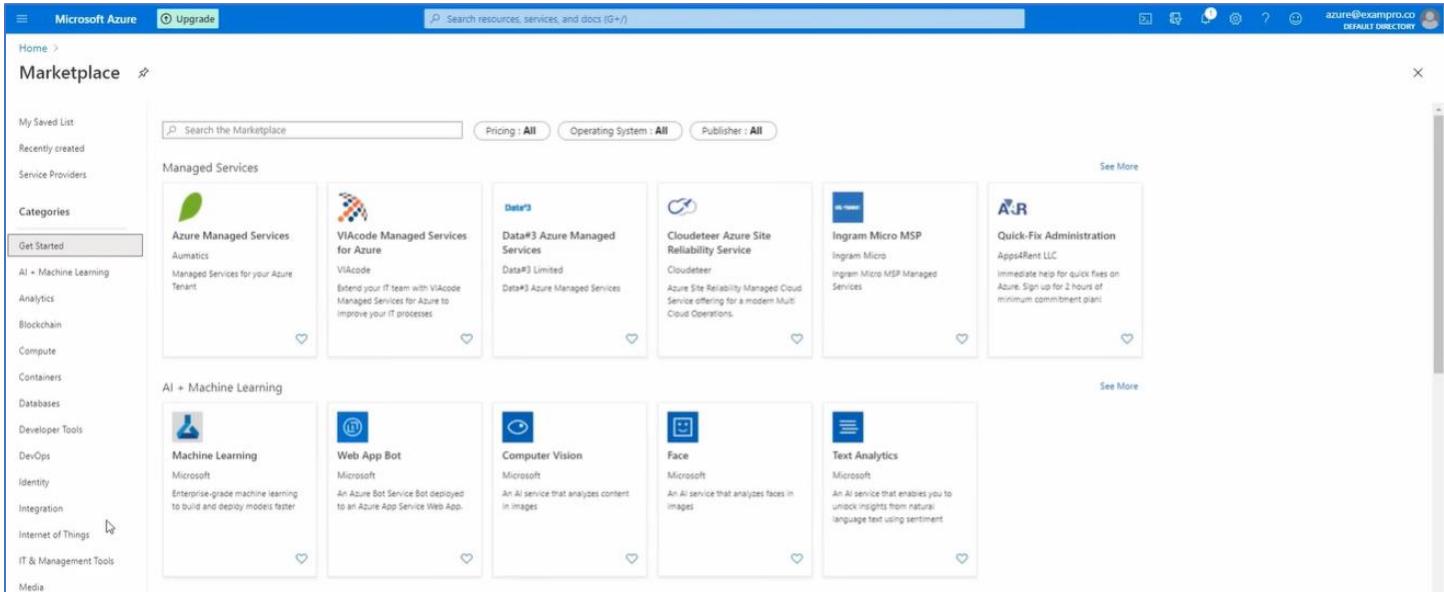
Azure Marketplace are **apps and services** made available by **third-party publishers** to quickly get started. The available apps and services can be Free, Free-Trial, Pay-As-You-Go, Bring-Your-Own-License (BYOL)



The screenshot shows the Microsoft Azure Marketplace search results for "wordpress". The search bar contains "wordpress". Below it are filters for Pricing: All, Operating System: All, and Publisher: All. The results show four items:

- WordPress (Free trial) - Plesk
- WordPress on Linux (Free trial) - Plesk
- Plesk Linux WordPress + Webhosting Platform (Free trial) - Plesk
- Plesk Windows WordPress + Webhosting Platform (Free trial) - Plesk

On the left sidebar, under Categories, "Get Started" is selected. Other categories listed include AI + Machine Learning, Analytics, and others.



The screenshot shows the Microsoft Azure Marketplace homepage. The left sidebar includes categories like Get Started, AI + Machine Learning, Analytics, Blockchain, Compute, Containers, Databases, Developer Tools, DevOps, Identity, Integration, Internet of Things, IT & Management Tools, and Media. The main area displays Managed Services and AI + Machine Learning offerings:

- Managed Services:**
 - Azure Managed Services (Aumatics)
 - VIAcode Managed Services (VIAcode)
 - Data#3 Azure Managed Services (Data#3 Limited)
 - Cloudteer Azure Site Reliability Service (Cloudteer)
 - Ingram Micro MSP (Ingram Micro)
 - Quick-Fix Administration (AppRant LLC)
- AI + Machine Learning:**
 - Machine Learning (Microsoft)
 - Web App Bot (Microsoft)
 - Computer Vision (Microsoft)
 - Face (Microsoft)
 - Text Analytics (Microsoft)

6. ☐ Azure Support

Azure Support Plans			
Cheat sheets, Practice Exams and Flash cards  www.exampro.co/az-900			
Basic	Developer	Standard	Professional Direct
Email Support only For Billing and Account	 Email Tech Support <i>Reply during Business Hours</i>	 24/7 Phone Support	
	Third Party Software Support		
	Minimal business impact (Sev C)	< 8 hours	(Sev C) < 4 hours
	Moderate (Sev B)	< 4 hours	(Sev B) < 2 hours
	Critical business impact (Sev C)		< 1 hour
Azure Advisor, Azure Health Status, Community Support, Azure Documentation			
\$0 USD / month	Architecture General Guidance	\$100 USD / month	 Architecture, Operational Support and Proactive Guidance by pool ProDirect delivery managers  Webinars led by Azure Engineers  SUBSCRIBE
\$29 USD / month			

7. ☐ Azure Licensing

Azure Licensing – Azure Hybrid Benefit			
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Many customers have invested in Windows Server licenses and would like to repurpose this investment on Azure.			
			
Azure Hybrid Use Benefit (HUB)			
Gives customers the right to use these licenses for virtual machines on Azure.			
<ul style="list-style-type: none">• Windows Servers• SQL Servers			
<ul style="list-style-type: none">• HUB can be turned on and off at anytime for existing VMs• HUB can be applied at deployment time for new VMs			
Bring your own license (BYOL)			
 SUBSCRIBE			

8. Azure Subscriptions

Azure Subscriptions

Cheat sheets, Practice Exams and Flash cards www.exampro.co/az-900

An Azure Subscription is the same as saying our Azure Account.

There are **4 tiers** of Azure Subscriptions:



Free Subscription

- Credit Card Required
- \$200 USD credits free for 30 days
- Certain Azure products free for 12 months



Pay-As-You-Go (PAYG) Subscription

- Credit Card Required
- Charged end at the end of the month based on consumed cloud resources



Enterprise Agreement

- An Enterprise and Azure agree on receive discounted price for licenses and cloud services



Student Subscription

- No Credit Card Required
- \$100 USD credits for 12 months
- Requires valid student email



9. Pricing Calculator

Azure Pricing Calculator

Cheat sheets, Practice Exams and Flash cards www.exampro.co/az-900

Configure and estimate the costs for Azure products. No Sign-in required.

Download an **Excel spreadsheet** and share with your boss.

azure.microsoft.com/pricing/calculator

Virtual Machines

REGION: West US	OPERATING SYSTEM: Windows	TYPE: (OS Only)	TIER: Standard
INSTANCE: D2 v3: 2 vCPU(s), 8 GB RAM, 50 GB Temporary storage, US\$0.209/hour	VIRTUAL MACHINES: 1	Hours: 730	

Savings Options

Save up to 72% on pay-as-you-go prices with 1-year or 3-year Reserved Virtual Machine Instances. Reserved Instances are great for applications with steady-state usage and applications that require reserved capacity. [Learn more about Reserved VM Instances pricing.](#)

Compute (D2 v3)	OS (Windows)	= US\$152.57
<input checked="" type="radio"/> Pay as you go	<input checked="" type="radio"/> License included	Average per month (US\$0.00 charged upfront)
<input type="radio"/> 1 year reserved (~62% discount)	<input type="radio"/> Azure Hybrid Benefit	
<input type="radio"/> 3 year reserved (~76% discount)		
US\$85.41 Average per month (US\$0.00 charged upfront)	US\$67.16 Average per month (US\$0.00 charged upfront)	
<input type="checkbox"/> Managed Disks		Upfront cost US\$0.00
<input type="checkbox"/> Storage transactions		Monthly cost US\$0.05

10. Azure Cost Management

Azure Cost Management

Cheat sheets, Practice Exams and Flash cards  www.exampro.co/az-900

Perform **cost-analysis**, visualize the spending of your Azure cloud resources
Create **budgets**, set a budget threshold be alerted when approaching or exceeded

