



AZ-900 EXAM CRAM

THE COMPLETE COURSE

2024
EDITION

COVERS EVERY EXAM TOPIC

- ✓ Exam Prep Strategy
- ✓ Downable PDF for review
- ✓ 100+ question practice quiz

with **Pete Zerger** vCISO, CISSP, MVP





AZ-900 EXAM CRAM

THE COMPLETE COURSE

COVERS EVERY EXAM TOPIC

- ✓ Exam Prep Strategy
- ✓ Downable PDF for review
- ✓ 100+ question practice quiz

with **Pete Zerger** vCISO, CISSP, MVP



500K+ VIEWS
in original release

HOW CURRENT IS THIS EXAM CRAM?

Should be current through 2023 and 2024

...but check the video description for any addendums / add-ons to cover minor changes

EXAM DOMAINS FOR AZ-900

01

Describe Cloud Concepts

02

Describe Azure Architecture and Services

03

Describe Azure Management and Governance

BONUS

to assess your readiness

FREE PRACTICE QUESTIONS

for the AZ-900 exam



just getting
started

You are here!



2 years
experience



2-5 years
+ Associate



Experience?



~60 minutes in length

Roughly 40-60 questions
multiple choice

Lightly technical, focusing on
feature and concept description



FOCUS ON THE
VERBS

EXAM DOMAINS FOR AZ-900

01

Describe Cloud Concepts

02

Describe Azure Architecture and Services

03

Describe Azure Management and Governance

*Focuses on basic knowledge of concepts
and Azure services - NOT hands on!*

There is no
AWARD
for the longest
STUDY TIME!





AZ-900 EXAM CRAM

THE COMPLETE COURSE

EXAM PREP

Recommended Exam
Preparation Strategy

INSIDE CLOUD
AND SECURITY

EXAM PREP STRATEGY

Research shows **everyone benefits** from a **variety of sources!**



TARGETED
READING

Link in video
description



PRACTICE
EXAMS



LIVE QUIZ
(or flashcards)

Use my PDF



POWERPOINT
REVIEW (PDF)



VIDEO
CONTENT

Mix, match, and repeat based on your preferences

EXAM PREP STRATEGY

Research shows **everyone benefits** from a **variety of sources!**



TARGETED
READING?



PRACTICE
EXAMS



LIVE QUIZ
(or flashcards)



POWERPOINT
REVIEW (PDF)



VIDEO
CONTENT

Use MS Learn for topics you are struggling with...

EXAM PREP STRATEGY

Research shows **everyone benefits** from a **variety of sources!**



TARGETED
READING?



PRACTICE
EXAMS



LIVE QUIZ
(or flashcards)



POWERPOINT
REVIEW (PDF)



VIDEO
CONTENT

...but not to read line-by-line!

UNDERSTANDING CONCEPTS

Studies show understanding **BEFORE** you memorize greatly improves retention



EXAM DOMAINS FOR AZ-900

- 01** Describe Cloud Concepts
- 02** Describe Azure Architecture and Services
- 03** Describe Azure Management and Governance

EXAM DOMAINS FOR AZ-900

01

Describe Cloud Concepts

- 1.1** Describe cloud computing
- 1.2** Describe the benefits of using cloud services
- 1.3** Describe cloud service types

DOMAIN 1: DESCRIBE CLOUD COMPUTING



- ❖ Describe cloud computing
- ❖ ...the **shared responsibility model**
- ❖ ...cloud models, including **public, private, and hybrid**
- ❖ Identify **appropriate use cases** for each cloud model
- ❖ Describe the consumption-based model (**Budget and pricing**)
- ❖ Compare **cloud pricing models**
- ❖ Describe serverless **Easiest to compare/contrast with PaaS**

1.1 Describe cloud computing

DOMAIN 1: DEFINE CLOUD COMPUTING

NIST SP 800-145

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

The NIST definition of cloud computing

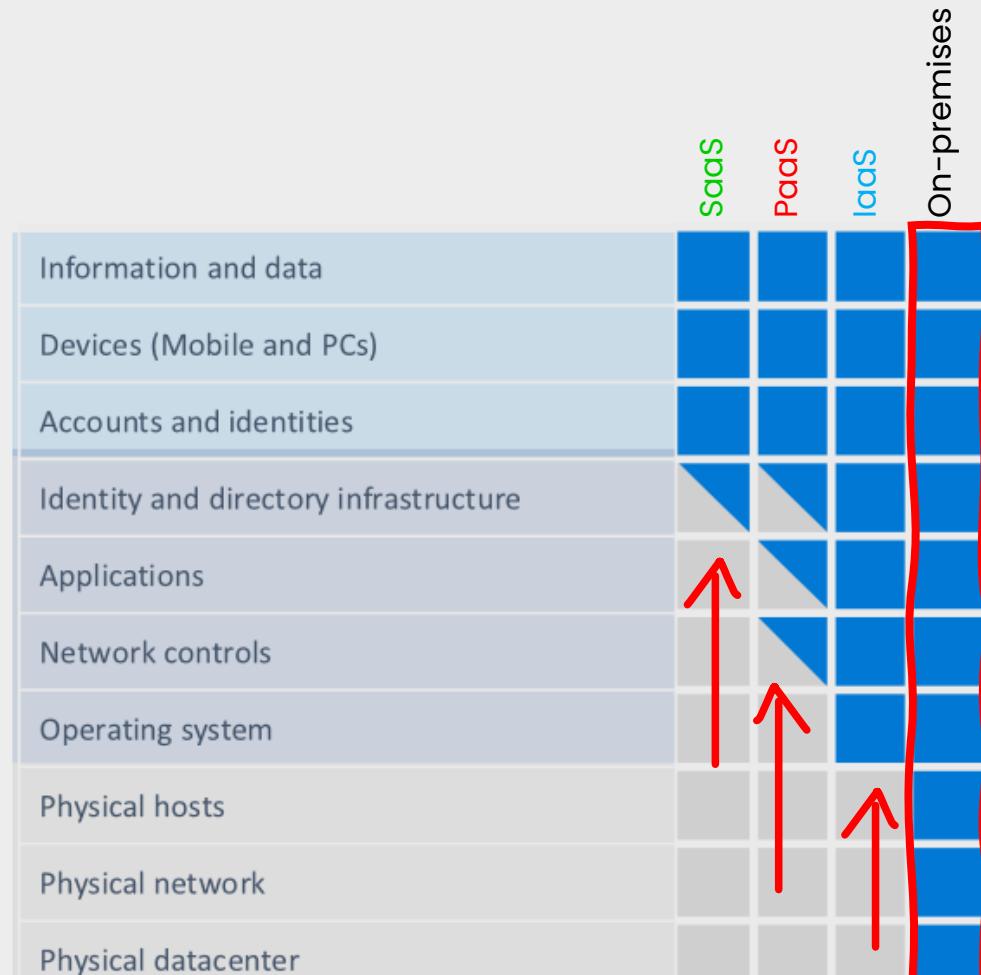
DOMAIN 1: DEFINE CLOUD COMPUTING

Cloud computing is the delivery of computing services over the internet

Expands the traditional IT offerings to include services like
Internet of Things (IoT)
Machine Learning (ML)
Artificial Intelligence (AI)

Enables organizations to quickly expand their compute footprint without the need to build a datacenter

SHARED RESPONSIBILITY MODEL



RESPONSIBILITY ALWAYS RETAINED BY CUSTOMER

RESPONSIBILITY VARIES BY SERVICE TYPE

RESPONSIBILITY TRANSFERS TO CLOUD PROVIDER



CSP

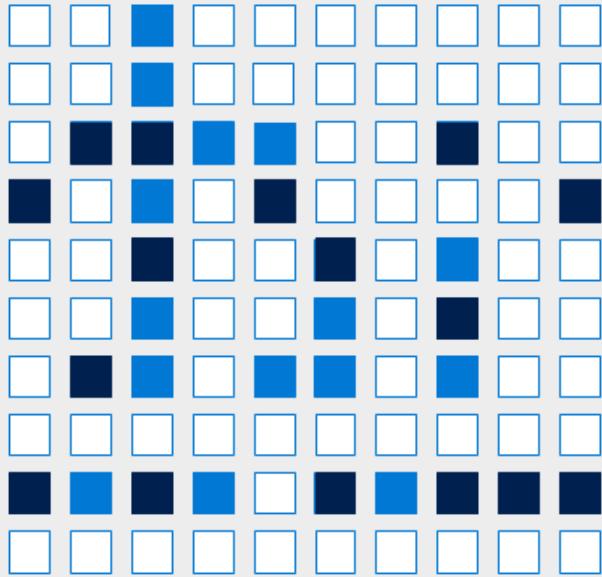


CUSTOMER

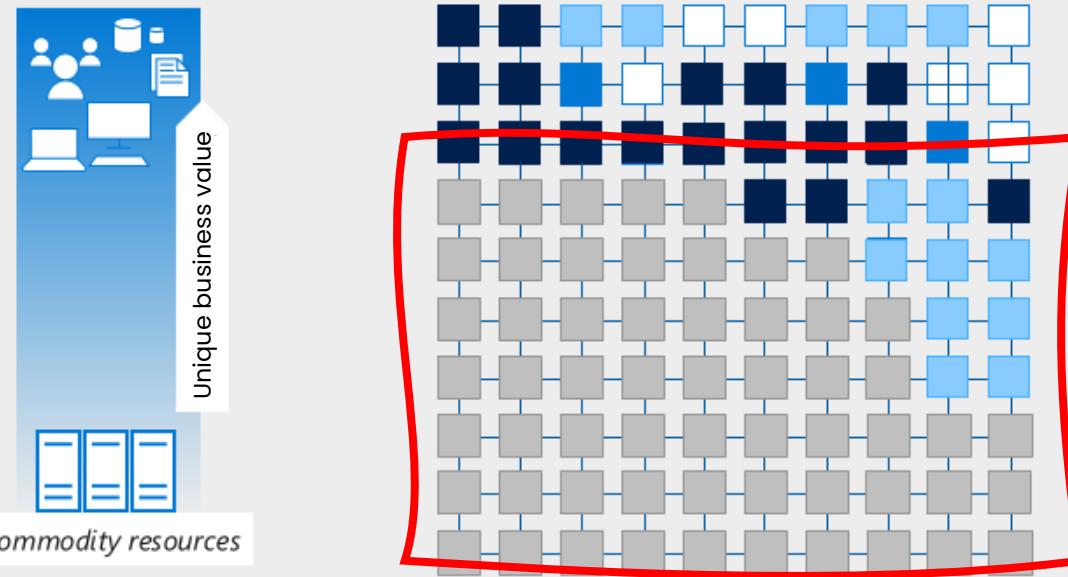
Image courtesy of Microsoft

BETTER SECURITY IN THE CLOUD?

ON-PREMISES



CLOUD-ENABLED



Security is a challenging and under-resourced function

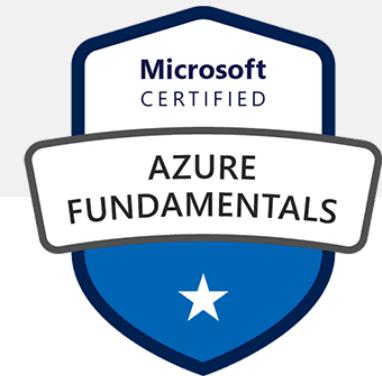
- █ Satisfied responsibility
- █ Unmet responsibility
- █ Partially met responsibility
- █ Cloud provider responsibility

Cloud Technology enables security to:

- █ Shift commodity responsibilities to provider and re-allocate your resources
- █ Leverage cloud-based security capabilities for more effectiveness
- █ Use cloud intelligence to improve detection/response time

DOMAIN 1: DESCRIBE CLOUD CONCEPTS

Describe cloud models, including public, private, and hybrid and appropriate use cases



Benefits of Cloud Computing

Cloud is **cost-effective**, **global**, **secure**, **scalable**, **elastic**, and **always current**

Allows orgs to transfer risk, operational responsibility, and to focus on innovation

DOMAIN 1: DESCRIBE CLOUD CONCEPTS

Describe cloud models, including public, private, and hybrid and appropriate use cases



Describe
Public Cloud

Everything runs on your
cloud provider's hardware.

DOMAIN 1: DESCRIBE CLOUD CONCEPTS

Describe cloud models, including public, private, and hybrid and appropriate use cases



Describe
Public Cloud

Advantages include
scalability, agility, PAYG, no maintenance, and low skills

Use to skip building your own datacenter

DOMAIN 1: DESCRIBE CLOUD CONCEPTS

Describe cloud models, including public, private, and hybrid and appropriate use cases



Describe
Private Cloud

A cloud environment **in your own datacenter**

DOMAIN 1: DESCRIBE CLOUD CONCEPTS

Describe cloud models, including public, private, and hybrid and appropriate use cases



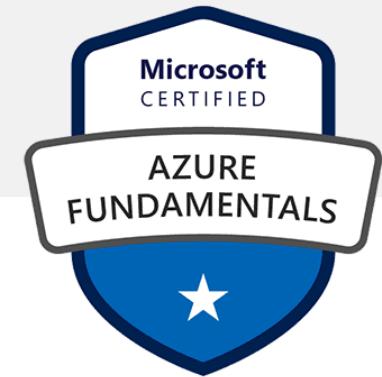
Describe
Private Cloud

Advantages include **legacy support**, **control**, and **compliance**

Use when you need more control

DOMAIN 1: DESCRIBE CLOUD CONCEPTS

Describe cloud models, including public, private, and hybrid and appropriate use cases



Describe
Hybrid Cloud

Combines public and private clouds, allowing you to run your apps in the right location

DOMAIN 1: DESCRIBE CLOUD CONCEPTS

Describe cloud models, including public, private, and hybrid and appropriate use cases



Describe
Hybrid Cloud

Advantages include **flexibility** in legacy, compliance, and scalability scenarios

DOMAIN 1: DESCRIBE CLOUD CONCEPTS



1.1 Describe cloud computing

Economies of Scale

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

DOMAIN 1: DESCRIBE CLOUD CONCEPTS



1.1 Describe cloud computing

**Capital
Expenditure**

Capital Expenditure (CapEx) is the spending of money on **physical infrastructure up front**

Associated with legacy on-premises datacenter scenarios

DOMAIN 1: DESCRIBE CLOUD CONCEPTS



1.1 Describe cloud computing

Operational
Expenditure

Operational Expenditure (OpEx) is spending money on services or products now and being **billed as you go**

Associated with public cloud consumption (pay-as-you-go)

DOMAIN 1: DESCRIBE CLOUD CONCEPTS



1.1 Describe cloud computing

Operational
Expenditure

The **cloud increases OpEx** spending
and **reduces CapEx** spending

DOMAIN 1: DESCRIBE CLOUD CONCEPTS



1.1 Describe cloud computing

Consumption-based model

Pay for what you use, typically per unit of time or capacity (per-minute, per-GB, per-execution)

DOMAIN 1: DESCRIBE CLOUD CONCEPTS



1.1 Describe cloud computing

Fixed price model

You provision resources and pay for those instances **whether you use them or not**

Ensures predictable costs for your cloud services

DOMAIN 1: DESCRIBE CLOUD CONCEPTS

Serverless Architecture

a cloud computing execution model where the cloud provider dynamically manages the allocation and provisioning of servers.

hosted as a pay-as-you-go model based on use.

Resources are stateless, servers ephemeral and often capable of being triggered.

Example: Function-as-service

**HOW
is SERVERLESS
DIFFERENT
from PaaS in terms of
RESPONSIBILITY?**



PaaS

Serverless

More control over deployment environment

Application **has to be configured** to auto-scale

Application takes **a while to spin up**

Devs have to write code

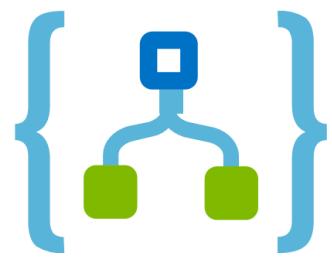
No server management

Less control over deployment environment

Application scales **automatically**

Application code only **executes when invoked**

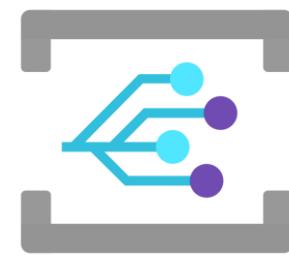
WORD ASSOCIATION: **SERVERLESS**



Logic App

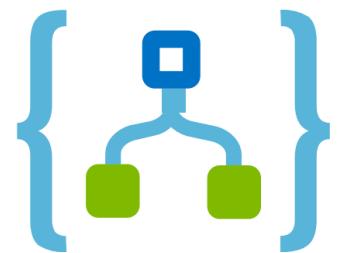


Functions



Event Grid

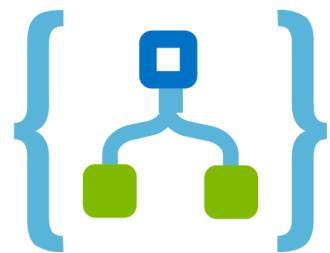
SERVERLESS COMPUTING SOLUTIONS



Logic App

A cloud service that helps you **schedule**, **automate**, and **orchestrate** tasks, business processes, and **workflows**

SERVERLESS COMPUTING SOLUTIONS



Logic App

A cloud service that helps you **schedule**, **automate**, and **orchestrate** tasks, business processes, and **workflows**

You can choose from a gallery of hundreds of **pre-built connectors** for MSFT & 3rd party services

Logic App is the foundation for Power Automate (MS Flow)



AZ-900 EXAM CRAM

THE COMPLETE COURSE

DEMO

Azure Logic App Data
Connectors

INSIDE CLOUD
AND SECURITY

SERVERLESS COMPUTING SOLUTIONS



Functions

An event driven, **compute-on-demand** experience that extends the existing Azure application platform...

SERVERLESS COMPUTING SOLUTIONS

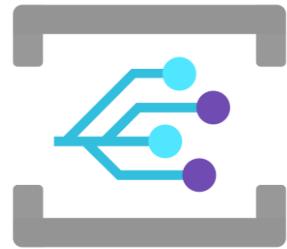


Functions

...with capabilities to implement code triggered by events occurring in Azure as well as on-premises systems.

This enables billing per execution rather than by time

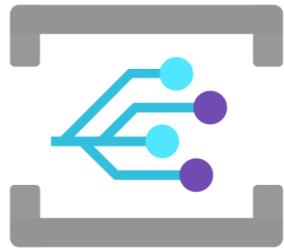
SERVERLESS COMPUTING SOLUTIONS



Event Grid

Enables you to easily **manage events** across many different Azure services and applications

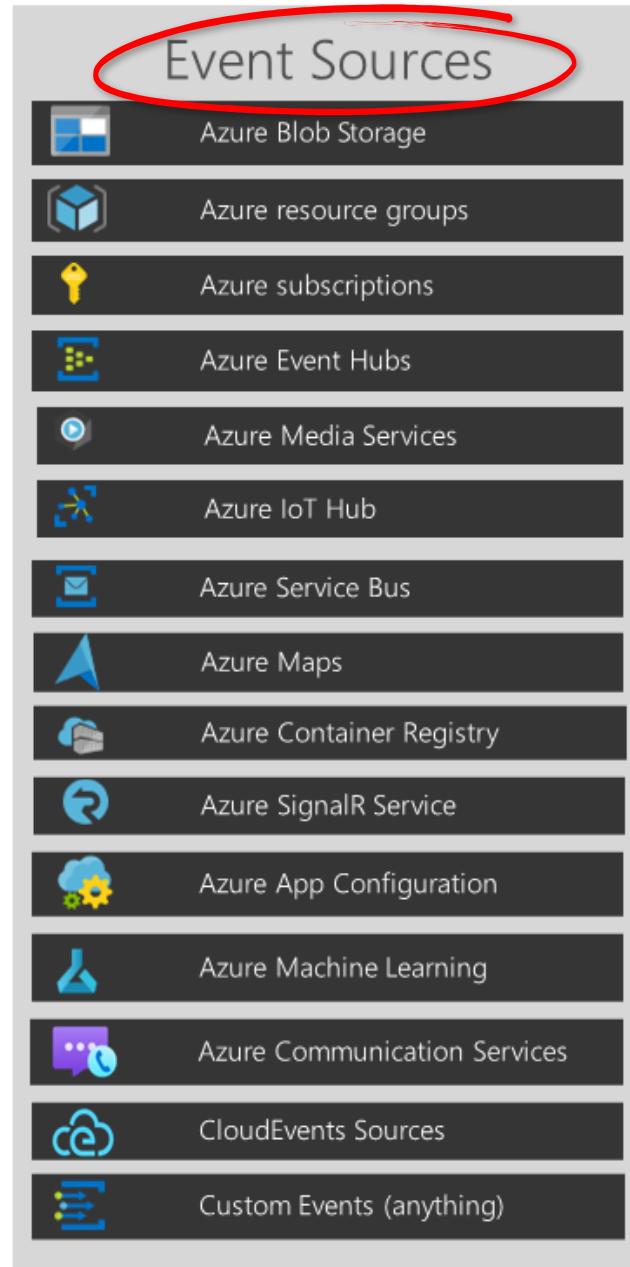
SERVERLESS COMPUTING SOLUTIONS



Event Grid

Enables you to easily manage events across many different Azure services and applications

Once a subscription is created, Event Grid will **push** events to the configured destination



Pub/Sub
model

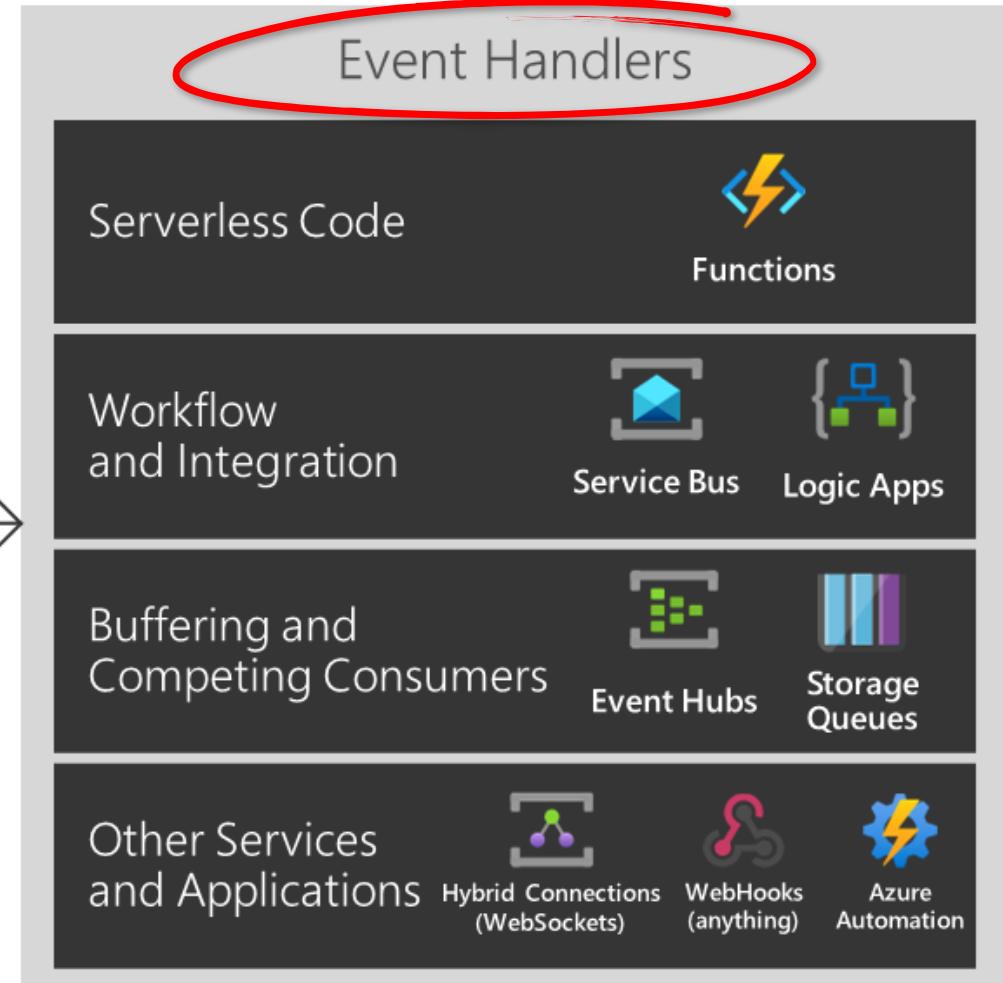
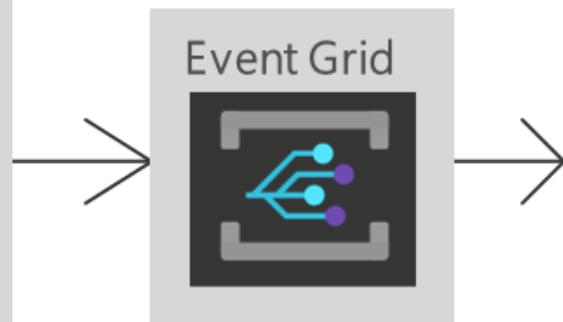
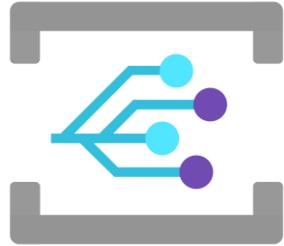


image credit: Microsoft

app or service "reacting" to an event

SERVERLESS COMPUTING SOLUTIONS



Event Grid

Makes it easy for any developer to utilize the “push” model instead of the inefficient “pull” across their Serverless architecture.

Like Azure Functions, it is ‘pay per use’

DOMAIN 1: DESCRIBE CLOUD COMPUTING



- ❖ Describe the benefits of **high availability** and scalability in the cloud
- ❖ Describe the benefits of **reliability and predictability** in the cloud
- ❖ Describe the benefits of **security and governance** in the cloud
- ❖ Describe the benefits of manageability in the cloud

1.2 Describe the benefits of using cloud services



KNOW THESE CLOUD
CONCEPTS

DESCRIBE CLOUD CONCEPTS



1.2 Describe the benefits of using cloud services

Availability

Encompasses availability of the infrastructure, applications, and services

DESCRIBE CLOUD CONCEPTS



1.2 Describe the benefits of using cloud services

Availability

Encompasses availability of the infrastructure, applications, and services
Generally expressed as a number of 9's, such as five nines or 99.999% availability



Availability and **uptime** are often used interchangeably.
Uptime simply measures the amount of time a system is running

DESCRIBE CLOUD CONCEPTS

1.2 Describe the benefits of using cloud services



Scalability

The ability of a system to handle **growth** of users or work

Refers to the ability of a system or service to handle more traffic (to scale)

DESCRIBE CLOUD CONCEPTS



1.2 Describe the benefits of using cloud services

Elasticity

The ability of a system to **automatically grow and shrink** based on app demand

Focuses on the ability of a system or service to scale quickly to spikes in demand

KEY CLOUD COMPUTING CHARACTERISTICS

Characteristics common in cloud platforms and services

Rapid **elasticity** and **scalability**

Allows the customer to grow or shrink the IT footprint as necessary to meet needs without excess capacity.

These two are related, but unique. What's the difference?

Elasticity. The ability of a system to **automatically grow and shrink** based on **app demand**.

Capabilities can be **rapidly provisioned and de-provisioned** (scale-out, scale-in)

Additional instances quickly auto-deployed

Scalability. The ability of a system to handle growth of users or work.

Ability to **grow as demand increases**. *Controlled by SKU or tier selection*

DESCRIBE CLOUD CONCEPTS



1.2 Describe the benefits of using cloud services

Agility

Focuses on the speed and ease of allocating and deallocating resources.

DESCRIBE CLOUD CONCEPTS



1.2 Describe the benefits of using cloud services

Agility

Focuses on the speed and ease of **allocating** and **deallocating** resources.

This allows for vast amounts of computing resources to be provisioned in minutes.

Example: Provisioning a scale set of 10 VMs



HIGH AVAILABILITY & **DISASTER RECOVERY**

DESCRIBE CLOUD CONCEPTS

1.2 Describe the benefits of using cloud services

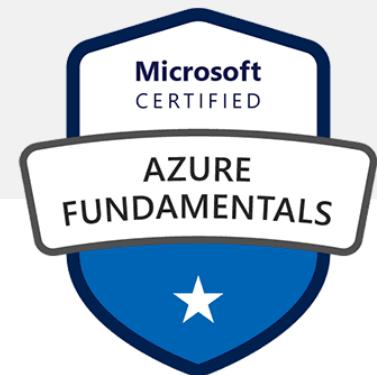


Fault Tolerance

The ability of a system to **handle faults** in a service like **power, network, or hardware failures**

DESCRIBE CLOUD CONCEPTS

1.2 Describe the benefits of using cloud services



Fault Tolerance

Generally, refers to **component-level failures**

DESCRIBE CLOUD CONCEPTS

1.2 Describe the benefits of using cloud services



High Availability

The ability to **keep services up and running** for long periods of time.

DESCRIBE CLOUD CONCEPTS

1.2 Describe the benefits of using cloud services

High Availability

Generally, refers to **service-level failures**



DESCRIBE CLOUD CONCEPTS

1.2 Describe the benefits of using cloud services



Disaster Recovery

The **ability to recover** from an event which has taken down a cloud service.

DESCRIBE CLOUD CONCEPTS

1.2 Describe the benefits of using cloud services



Disaster Recovery

Generally, focuses on recovery in the event of a **service or site failure**.

DESCRIBE CLOUD CONCEPTS

1.2 Describe the benefits of using cloud services



Reliability

The ability of a system to recover from failures and continue to function.

DESCRIBE CLOUD CONCEPTS



1.2 Describe the benefits of using cloud services

Reliability

Reliability consists of two principles:
resiliency and **availability**.

DESCRIBE CLOUD CONCEPTS



1.2 Describe the benefits of using cloud services

Reliability

Reliability consists of two principles:
resiliency and **availability**.

Resiliency aims to return an application to a fully functioning state after a failure occurs.

DESCRIBE CLOUD CONCEPTS



1.2 Describe the benefits of using cloud services

Reliability

Reliability consists of two principles: **resiliency** and **availability**.

Resiliency aims to return an application to a fully functioning state after a failure occurs.

The goal of **availability** is to provide consistent access to your application.

DESCRIBE CLOUD CONCEPTS



1.2 Describe the benefits of using cloud services

Predictability

Azure enables solutions with predictable cost and performance.

The level of service and performance and the associated cost are known in advance!

DESCRIBE CLOUD CONCEPTS



1.2 Describe the benefits of using cloud services

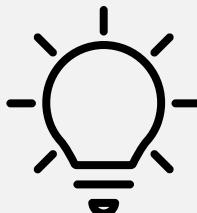
Security

Protection of customer **data**
(access control, encryption)

Protection of cloud **applications**

Protection of cloud **infrastructure**

All models have built-in DDoS protection from Azure DDoS



IaaS gives the customer more **control** versus PaaS and SaaS,
but also places more security responsibility on the customer.

DESCRIBE AZURE NETWORK SECURITY



Azure DDoS

Standard tier provides enhanced DDoS mitigation features to defend against DDoS attacks.

DESCRIBE AZURE NETWORK SECURITY



Azure DDoS

Standard tier provides enhanced DDoS mitigation features to defend against DDoS attacks.

Also includes logging, alerting, and telemetry not included in the free Basic tier present by default.

DESCRIBE CLOUD CONCEPTS



1.2 Describe the benefits of using cloud services

Governance

A set of rules and policies that guide an organization's cloud operations

DESCRIBE CLOUD CONCEPTS



1.2 Describe the benefits of using cloud services

Governance

A set of rules and policies that guide an organization's cloud operations

To ensure data security, manage risk, control costs, and improve efficiency

The guidance and guardrails that ensure we're as secure, consistent, and efficient as possible

DESCRIBE CLOUD CONCEPTS



1.2 Describe the benefits of using cloud services

Governance

Cloud features are designed to support governance and compliance

DESCRIBE CLOUD CONCEPTS



1.2 Describe the benefits of using cloud services

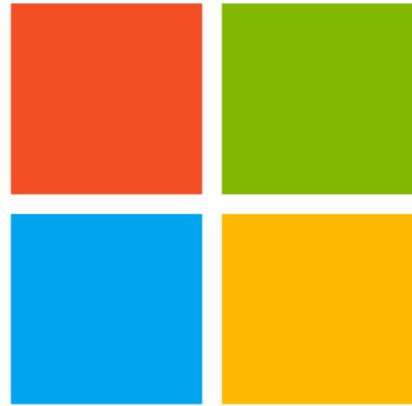
Governance

Cloud features are designed to support governance and compliance

Deployment templates help ensure deployed resources meet corporate standards and regulatory requirements.



Depending on the model, software updates may be applied by the cloud provider, which helps with governance and security.



Cloud Adoption Framework

Guidance designed to help you create and implement the business and technology strategies to succeed in Azure

Includes governance framework based on "Five disciplines of cloud governance"

DESCRIBE CLOUD CONCEPTS



1.2 Describe the benefits of using cloud services

Security

Protection of customer **data**
(access control, encryption)

Protection of cloud **applications**

Protection of cloud **infrastructure**

The "**WHAT**" and "**WHO**" of security



The **Shared Responsibility Model** explains who is responsible for security in each model and scenario.

DESCRIBE CLOUD CONCEPTS



Manageability

There are two aspects of manageability for the cloud:

WHAT and HOW

DESCRIBE CLOUD CONCEPTS



Manageability OF THE CLOUD

Answers **WHAT**

Automatically scale resource deployment based on need.

Deploy resources based on a preconfigured template.

Monitor the health of resources and automatically replace failing resources.

Receive automatic alerts based on configured metrics.

DESCRIBE CLOUD CONCEPTS



Manageability

IN THE CLOUD

Speaks to HOW

Speaks to how you're able to manage your cloud environment and resources:

- Through a web portal
- Using a command line interface
- Using APIs
- Using PowerShell

DOMAIN 1: DESCRIBE CLOUD COMPUTING



- ❖ Describe **infrastructure as a service (IaaS)**
- ❖ Describe **platform as a service (PaaS)**
- ❖ Describe **software as a service (SaaS)**
- ❖ Identify **appropriate use cases** for each cloud service (IaaS, PaaS, and SaaS)

A walkthrough of the "Shared responsibility Model"

1.3 Describe cloud service types



COMPARE CLOUD
MODELS & SERVICES

COMPARE CLOUD
MODELS & SERVICES

PRIVATE

HYBRID

PUBLIC

IAAS

PAAS

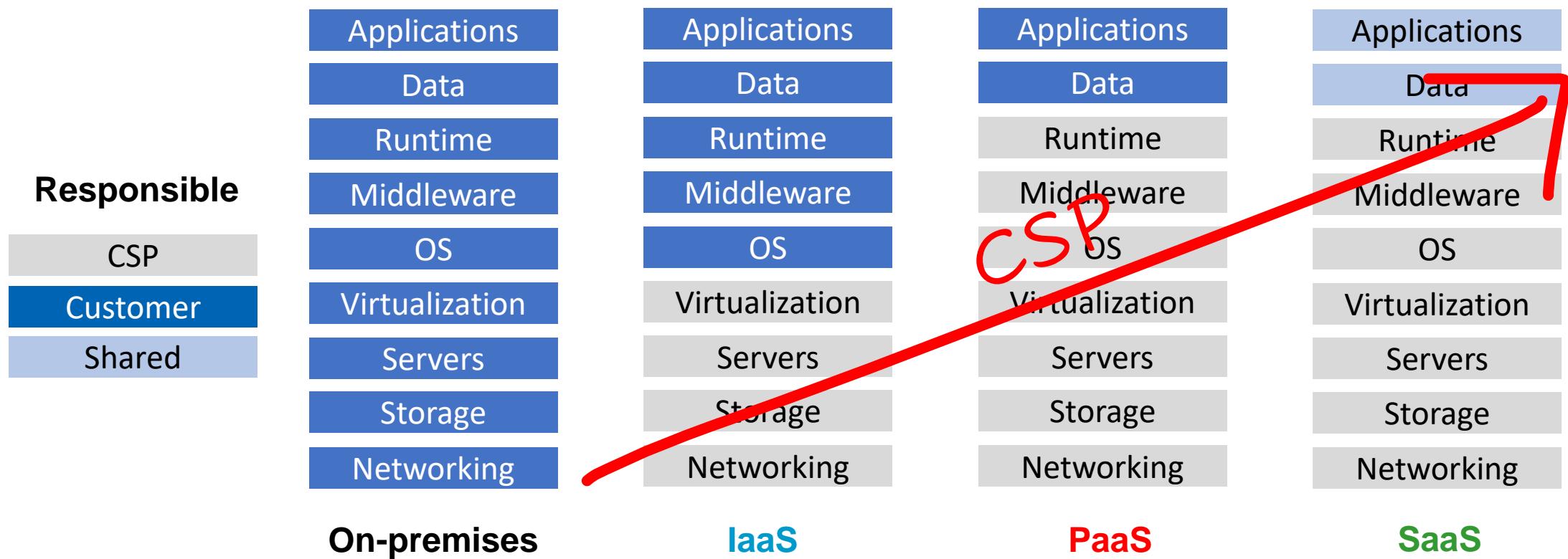
SAAS

COMPARE CLOUD
MODELS & SERVICES

SHARED RESPONSIBILITY MODEL

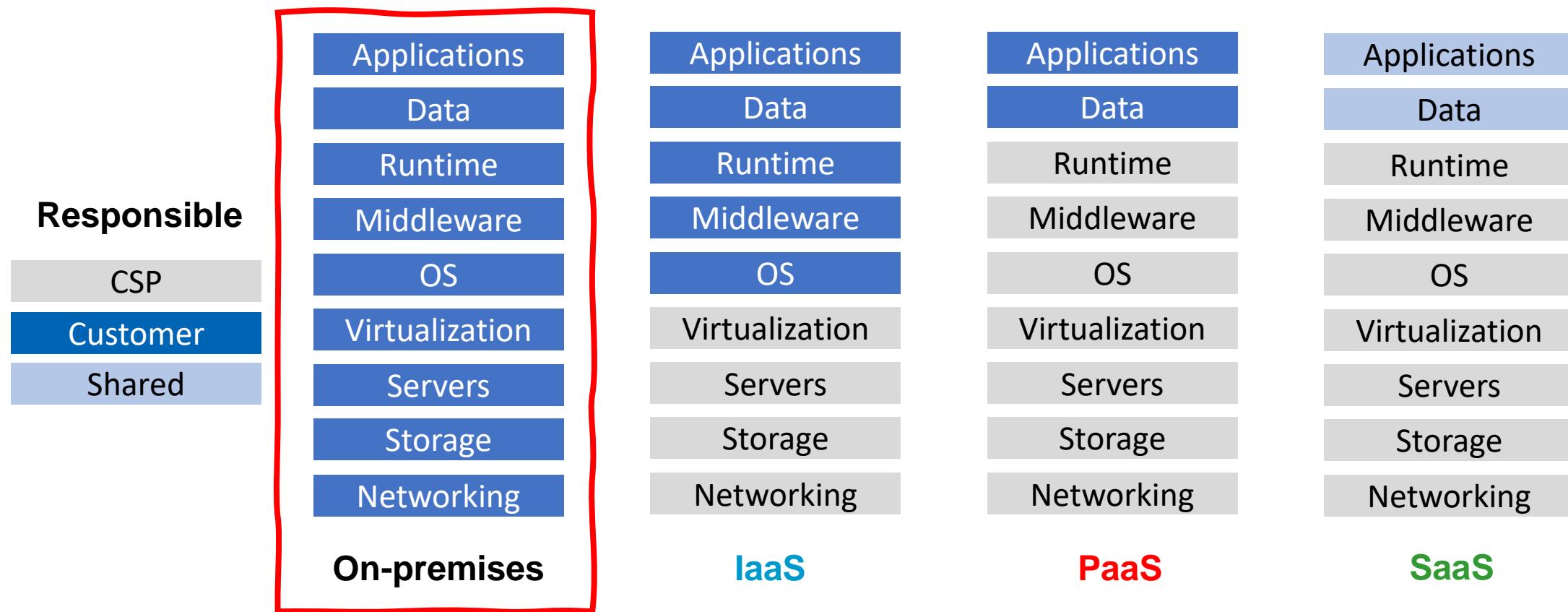
SHARED RESPONSIBILITY MODEL

100% YOURS



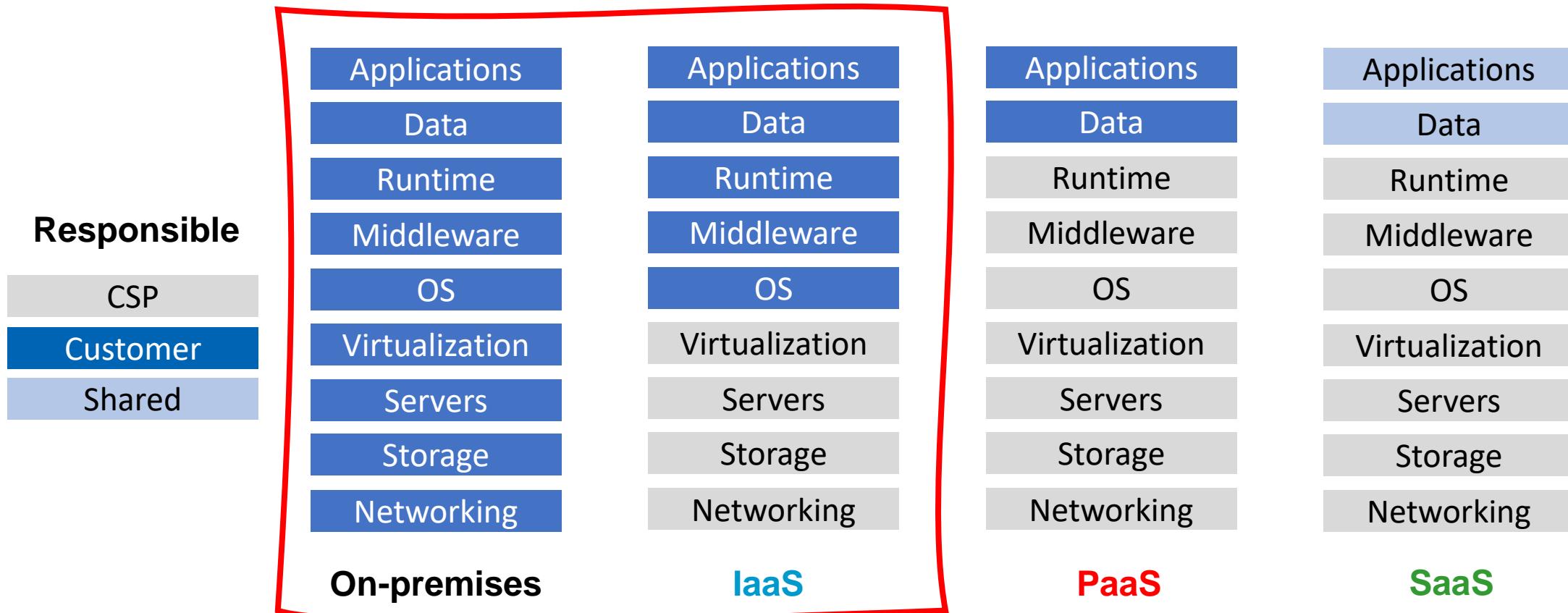
SHARED RESPONSIBILITY MODEL

Private cloud lives here

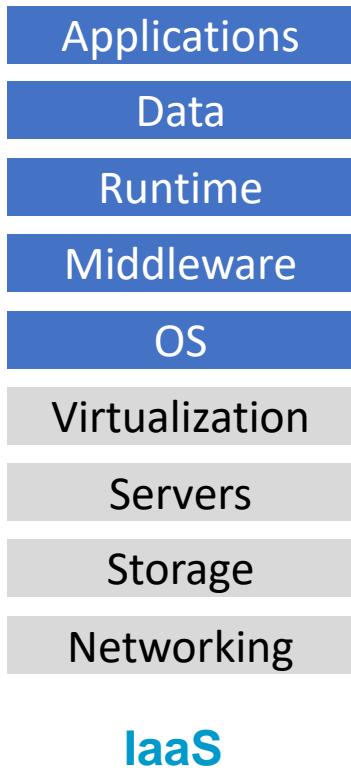
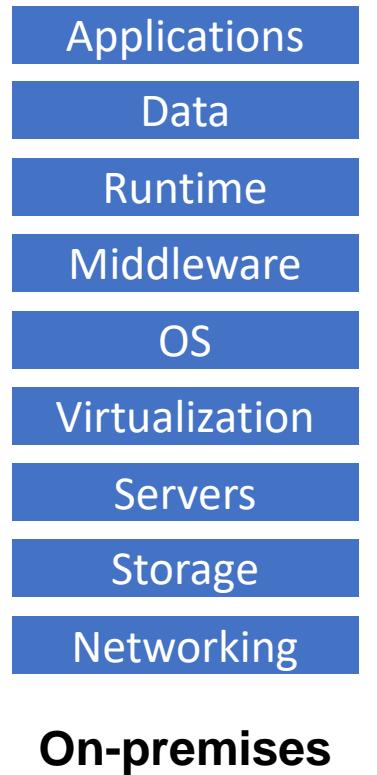


SHARED RESPONSIBILITY MODEL

Hybrid cloud includes IaaS (at minimum), connected by site-to-site VPN



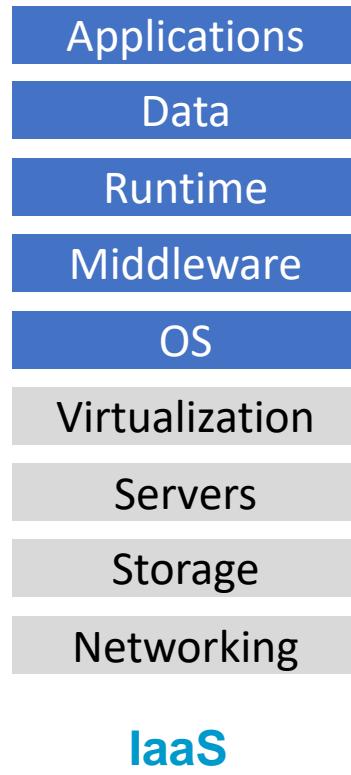
CLOUD MODELS & SERVICES - IAAS



CSP provides building blocks, like networking, storage and compute

CSP manages staff, HW, and datacenter

CLOUD MODELS & SERVICES - IAAS



Azure Virtual
Machines



Amazon EC2



GCP Compute
Engine

IAAS USE CASES

When to use virtual machines?

During testing and development. VMs provide a quick and easy way to create different OS and application configurations.

Test and dev teams can **easily deploy and then delete the VMs** when they no longer need them.

When running applications in the cloud. Can provide technical and financial benefits, as when an application might need to handle fluctuations in demand. Shutting down VMs when you don't need them or quickly starting them up to meet a sudden increase in demand means you **pay only for resources you use.**

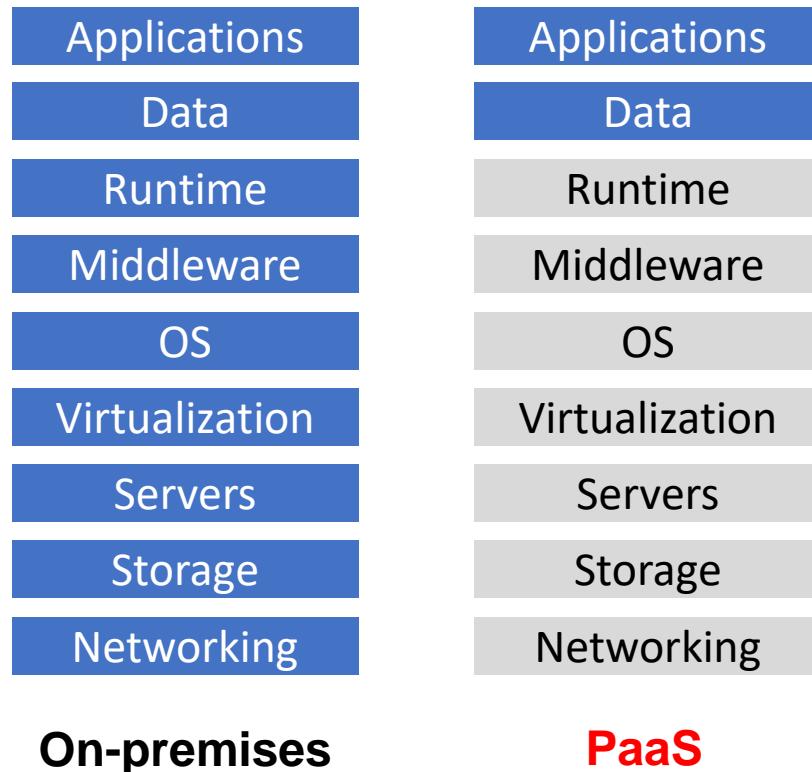
When extending your datacenter to the cloud. Can extend the capabilities of its own on-premises network by creating a virtual network in Azure and adding VMs to that virtual network.

Makes it easier/less expensive to deploy than on-premises.

During disaster recovery. Enables significant cost savings by using an IaaS-based approach to disaster recovery.

Enables push button, automated VM spin up and shutdown in a disaster.

CLOUD MODELS & SERVICES - PaaS



Customer is responsible for deployment and management of apps

CSP manages provisioning, configuration, hardware, and OS

CLOUD MODELS & SERVICES - PaaS



Azure SQL
Database



API
Management



Azure App
Service

PAAS USE CASES

When to use PaaS services?

Development framework

PaaS provides a framework that developers can build upon to develop or customize cloud-based applications.

PaaS lets developers create applications using built-in software components

Cloud features such as scalability, high-availability, and multi-tenant capability are included, reducing the amount of coding that developers must do.

BOTTOM LINE: Reduces developer effort and increases solution quality

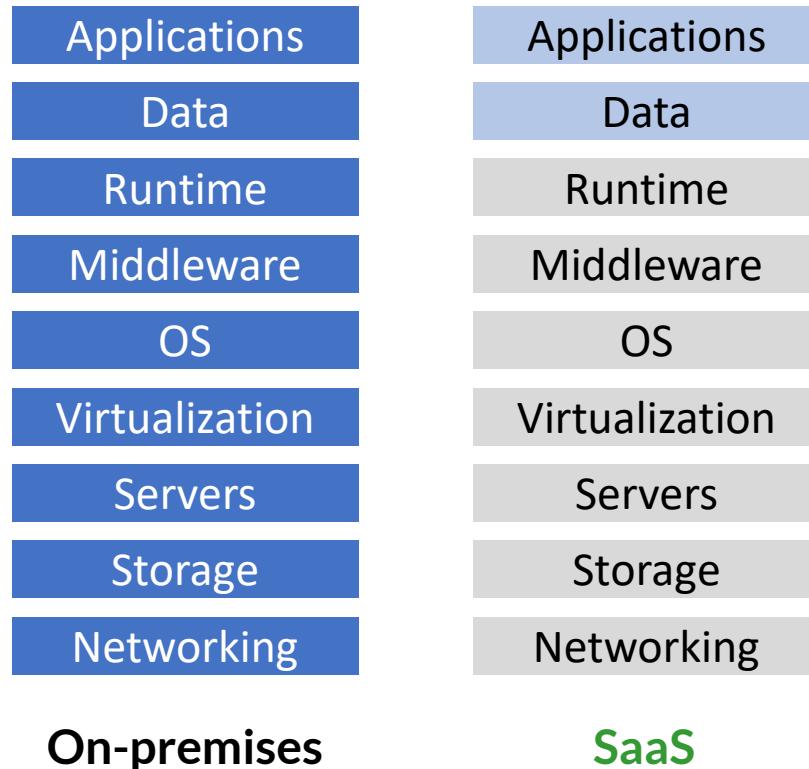
Analytics or business intelligence

Tools provided as a service with PaaS allow organizations to analyze and mine their data, finding insights and patterns and predicting outcomes

Improves forecasting, product design decisions, investment returns, and other business decisions.

BOTTOM LINE: Simplifies data analysis and improves business outcomes

CLOUD MODELS & SERVICES - SaaS

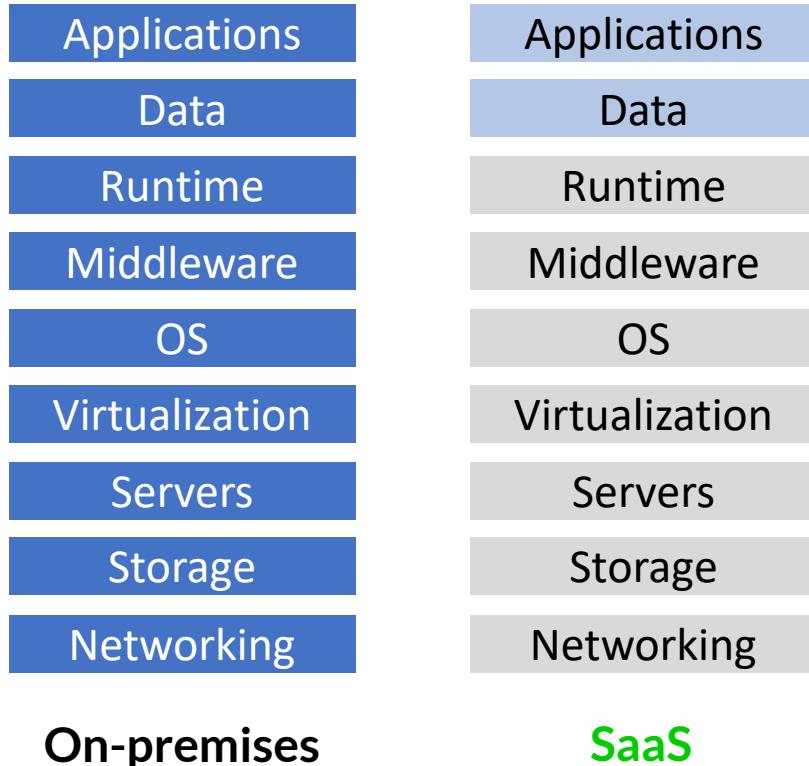


Customer has some responsibility in access management and data recovery

Customer just configures features.

CSP is responsible for management, operation, and service availability.

CLOUD MODELS & SERVICES - SaaS



service
now



SAAS USE CASES

When to use SaaS services?

Common SaaS use cases include:

Email and messaging

Business productivity applications

Finance and expense tracking

BOTTOM LINE: These are important utility functions not core to the company's purpose.



SaaS enables companies to securely and reliably outsource a variety of functions so they can focus on revenue generation.

EXAM DOMAINS FOR AZ-900

- 01** Describe Cloud Concepts
- 02** Describe Azure Architecture and Services
- 03** Describe Azure Management and Governance

EXAM DOMAINS FOR AZ-900

02

Describe Azure Architecture and Services

- 2.1** Describe the core architectural components of Azure
- 2.2** Describe Azure compute and networking services
- 2.3** Describe Azure storage services
- 2.4** Describe Azure identity, access, and security

DOMAIN 2: AZURE ARCHITECTURE & SERVICES

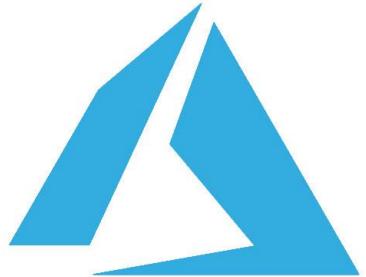


Describe Azure regions, region pairs, and sovereign regions

- ❖ ...Availability Zones
- ❖ ...Datacenters
- ❖ ...Resources and Resource Groups
- ❖ ...Subscriptions
- ❖ ...Management Groups
- ❖ ...Resource hierarchy

2.1 Describe the core architectural components

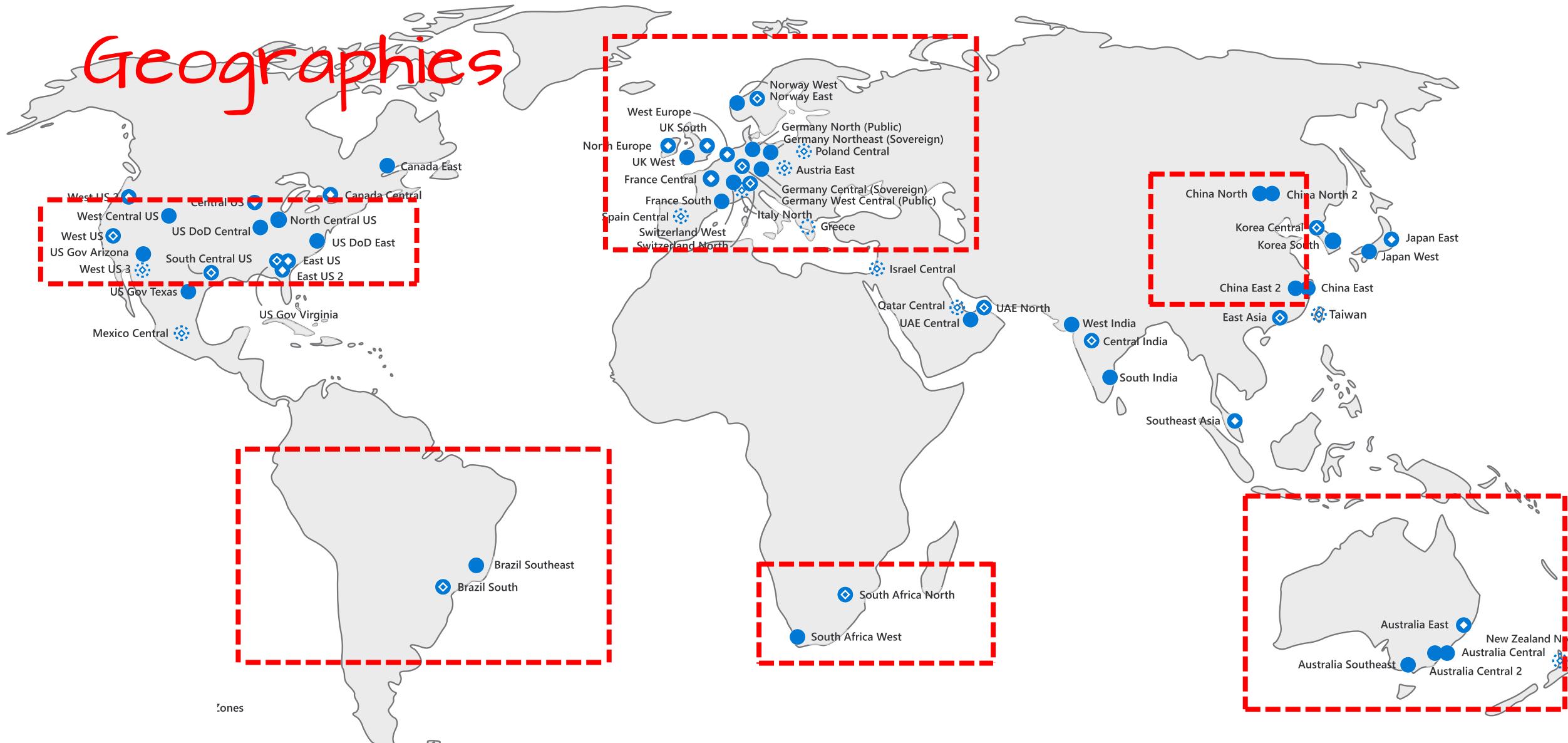
DESCRIBE CORE ARCHITECTURE COMPONENTS



Azure
Geography

A **discrete market**, typically containing two or more regions, that preserves data residency and compliance boundaries

DESCRIBE CORE ARCHITECTURE COMPONENTS



DESCRIBE CORE ARCHITECTURE COMPONENTS



A **set of datacenters** deployed within a latency-defined perimeter and connected through a dedicated regional low-latency network.

DESCRIBE CORE ARCHITECTURE COMPONENTS

REGIONS



DESCRIBE CORE ARCHITECTURE COMPONENTS

Azure Sovereign Regions

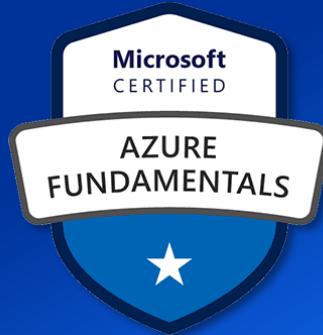
operated by special trustees

Special regions that you might need to for compliance or legal purposes:

Government (Fed govt, DoD), China



physical and logical isolation



AZ-900 EXAM CRAM

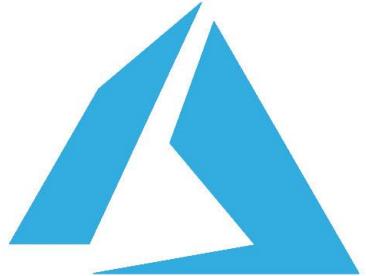
THE COMPLETE COURSE

DEMO

A look at available
Azure geographies

INSIDE CLOUD
AND SECURITY

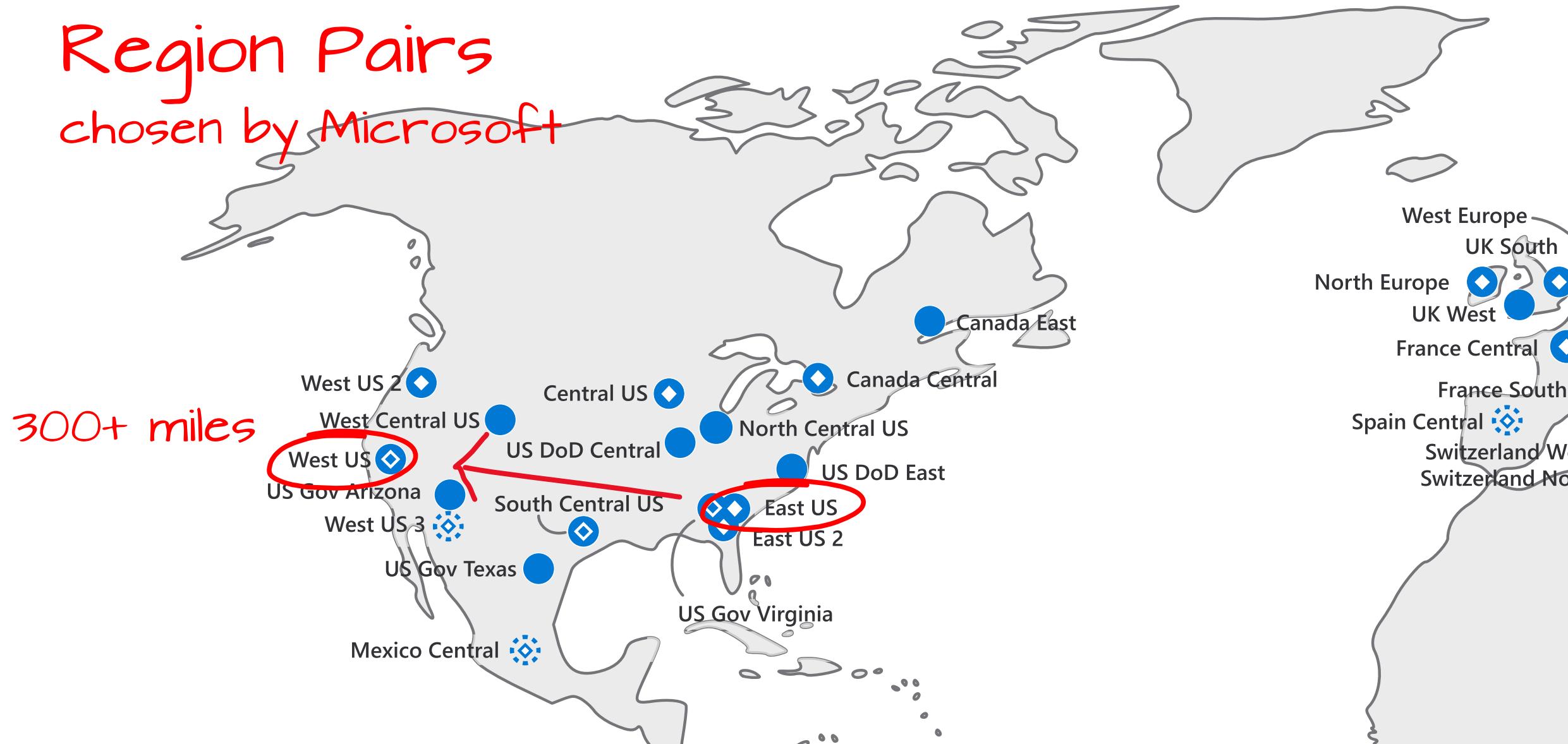
DESCRIBE CORE ARCHITECTURE COMPONENTS



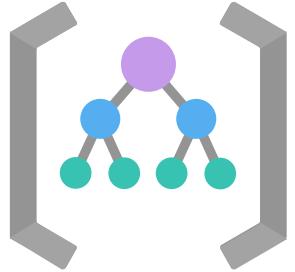
Region Pairs

A relationship between **2 Azure Regions** within the same geographic region for disaster recovery purposes.

DESCRIBE CORE ARCHITECTURE COMPONENTS



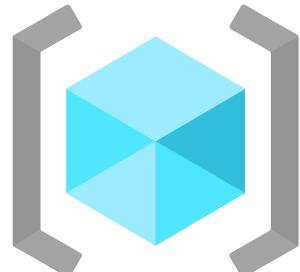
DESCRIBE CORE ARCHITECTURE COMPONENTS



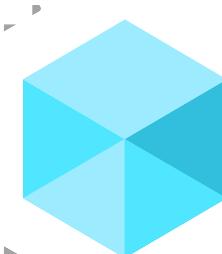
Management
Groups



Subscriptions

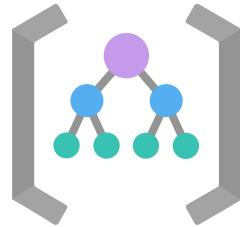


Resource
Groups



Resources

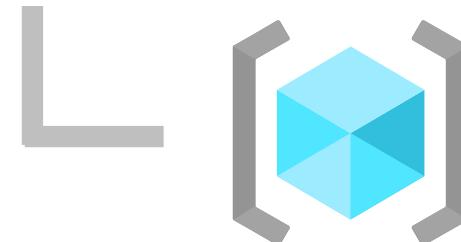
DESCRIBE CORE ARCHITECTURE COMPONENTS



Management
Groups



Subscriptions

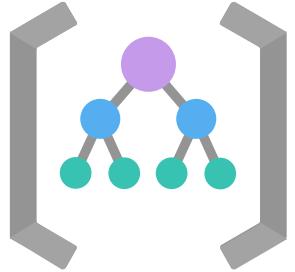


Resource
Groups



Resources

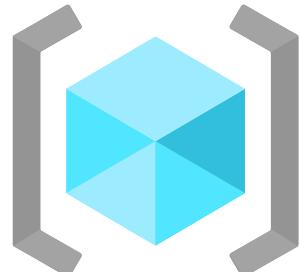
DESCRIBE CORE ARCHITECTURE COMPONENTS



Management
Groups



Subscriptions

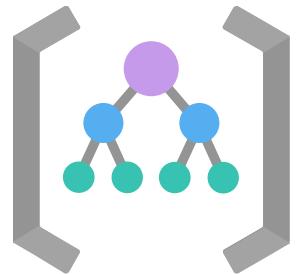


Resource
Groups



Resources

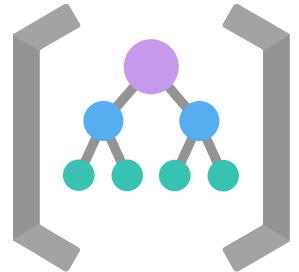
DESCRIBE CORE ARCHITECTURE COMPONENTS



Management
Groups

Management groups provide a level of scope above subscriptions

DESCRIBE CORE ARCHITECTURE COMPONENTS



Management
Groups

Management groups provide a level of scope above subscriptions

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

A boundary for management and application of policy

DESCRIBE CORE ARCHITECTURE COMPONENTS



Subscriptions

Subscription is a logical container used to provision resources in Azure.

DESCRIBE CORE ARCHITECTURE COMPONENTS



Subscriptions

Why would I create **multiple subscriptions**?

DESCRIBE CORE ARCHITECTURE COMPONENTS



Subscriptions

- ✓ when **subscription limits** are reached

DESCRIBE CORE ARCHITECTURE COMPONENTS



Subscriptions

- ✓ when **subscription limits** are reached
- ✓ to use different **payment methods**

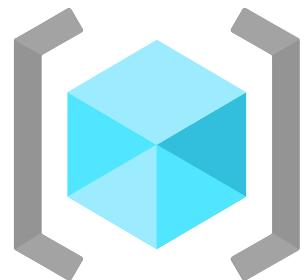
DESCRIBE CORE ARCHITECTURE COMPONENTS



Subscriptions

- ✓ when **subscription limits** are reached
- ✓ to use different **payment methods**
- ✓ to **isolate resources** between departments, projects, etc

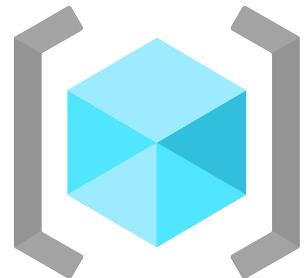
DESCRIBE CORE ARCHITECTURE COMPONENTS



Resource
Groups

A container that holds **related resources** for an Azure solution.

DESCRIBE CORE ARCHITECTURE COMPONENTS



Resource
Groups

A container that holds **related resources** for an Azure solution.

Used to group resources that share a common **resource lifecycle**.

DESCRIBE CORE ARCHITECTURE COMPONENTS



An **entity managed by Azure**, like a virtual machine, virtual network, or storage account.



AZ-900 EXAM CRAM

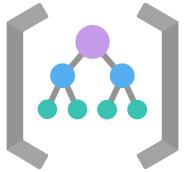
THE COMPLETE COURSE

DEMO

A look at a resource group (for an Azure VM)

INSIDE CLOUD
AND SECURITY

DESCRIBE CORE ARCHITECTURE COMPONENTS



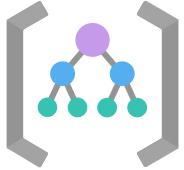
Management Group

Can be used to **aggregate policy and initiative assignments** via Azure Policy

Can contain **multiple subscriptions**

All new subscriptions will be placed under the **root management group** by default

DESCRIBE CORE ARCHITECTURE COMPONENTS



Management Group

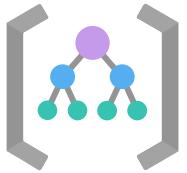


Subscriptions

Are a unit of **management, billing, and scale** within Azure.

Serve as a management boundary for assigning Azure **policies, governance, and isolation**.

DESCRIBE CORE ARCHITECTURE COMPONENTS



Management Group



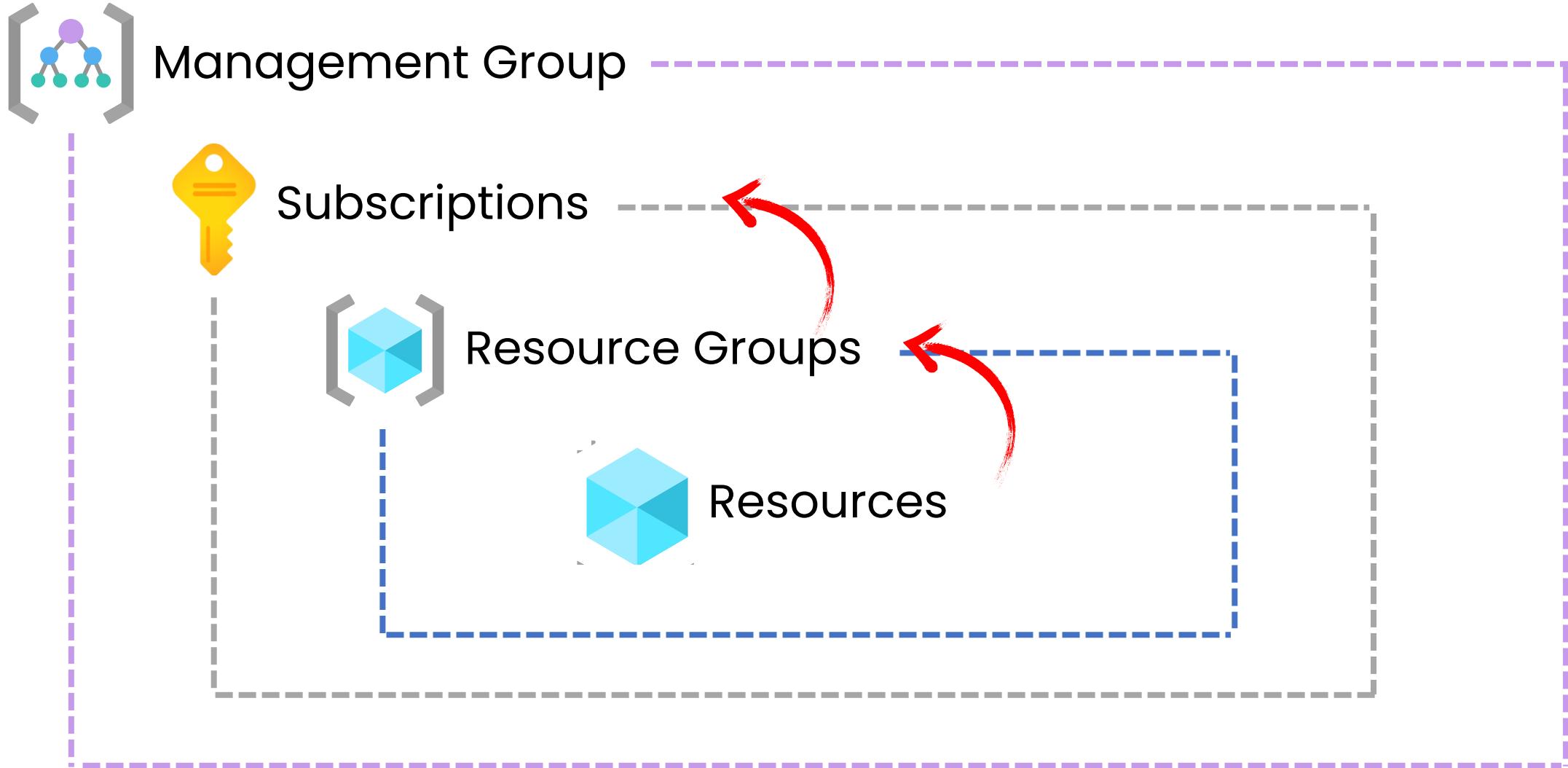
Subscriptions



Resource Groups

A container that holds for
resources with a common lifecycle

DESCRIBE CORE ARCHITECTURE COMPONENTS



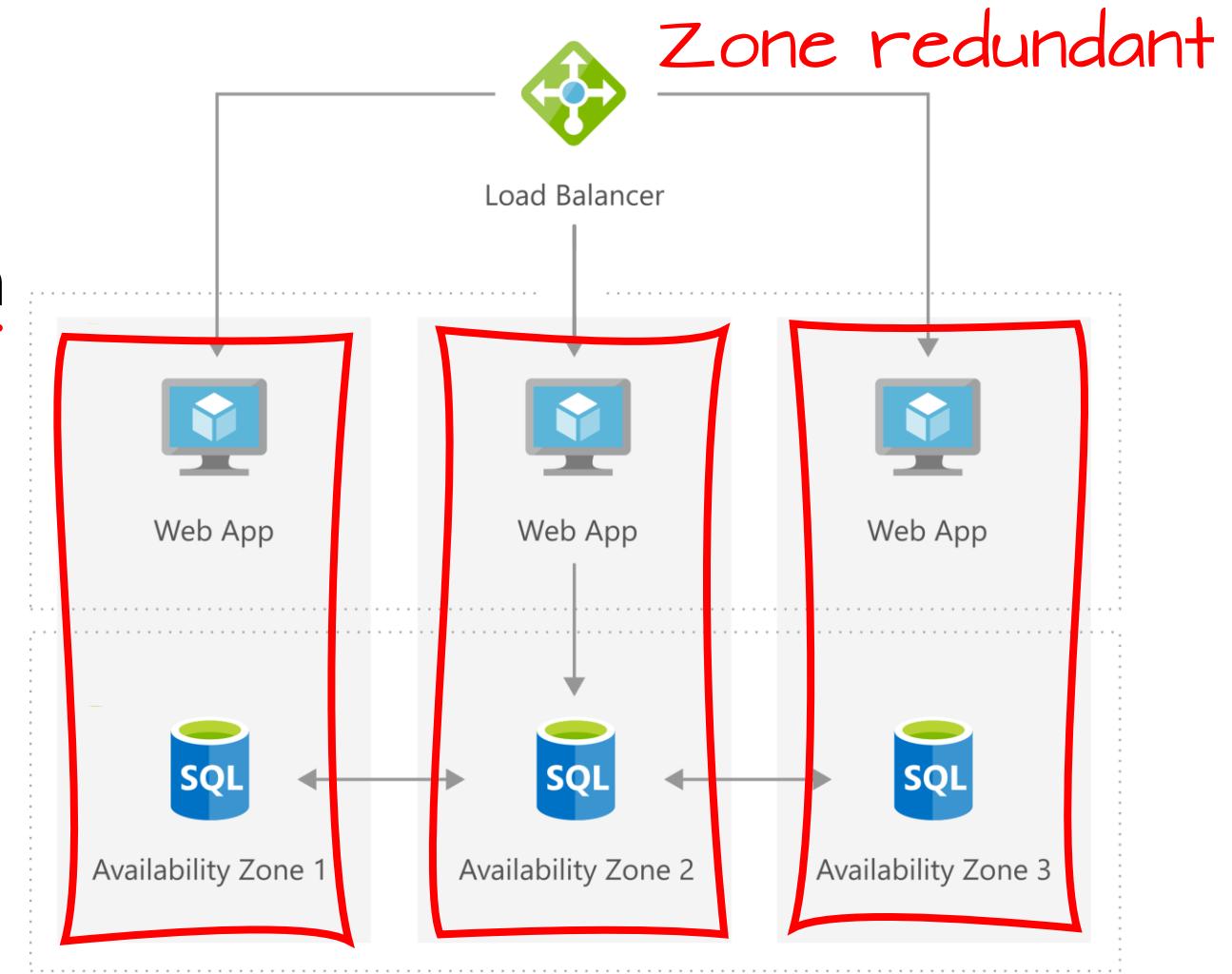
DESCRIBE CORE ARCHITECTURE COMPONENTS

Availability Zones

Unique physical locations within a region with independent power, network, and cooling

Comprised of one or more datacenters

Tolerant to datacenter failures via redundancy and isolation



DESCRIBE CORE ARCHITECTURE COMPONENTS



Azure
Datacenters

Physical buildings that contain thousands of servers and other hardware to provide cloud computing services.

Azure datacenters are located all over the world and are organized into regions.

Designed to be secure, reliable, and efficient, leveraging economies of scale, multi-tenant.

Consists of multiple physical buildings, redundant power, ISPs, etc.

DOMAIN 2: AZURE ARCHITECTURE & SERVICES



- ❖ Compare **compute types**, including containers, virtual machines, and functions
- ❖ Describe **virtual machine options**, including Azure virtual machines, Azure Virtual Machine Scale Sets, availability sets, and Azure Virtual Desktop
- ❖ Describe the resources required for **virtual machines**
- ❖ Describe **application hosting options**, including web apps, containers, and virtual machines

2.2 Describe Azure compute and networking services

DOMAIN 2: AZURE ARCHITECTURE & SERVICES



- ❖ Describe **virtual networking**, including the purpose of Azure **virtual networks**, Azure virtual **subnets**, **peering**, **Azure DNS**, Azure **VPN Gateway**, and **ExpressRoute**
- ❖ Define **public** and **private endpoints**

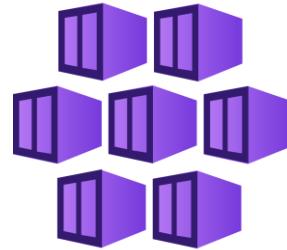
Hybrid cloud connectivity

2.2 Describe Azure compute and networking services

COMPARE COMPUTE TYPES - VM OPTIONS



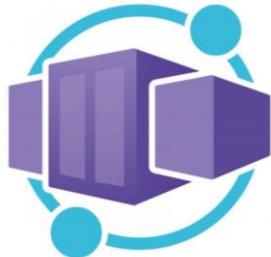
Azure VMs



Azure Kubernetes
Services (AKS)



Azure Container
Instance (ACI)

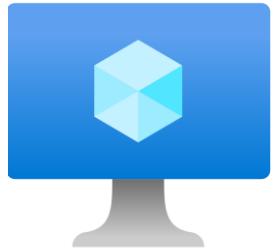


Azure Container
Apps



Azure Virtual
Desktop

COMPARE COMPUTE TYPES - VM OPTIONS



Azure VMs

Server virtualization (**compute**)
on-demand without need for
hardware purchase

COMPARE COMPUTE TYPES - VM OPTIONS

Virtual machine scale sets

Allow you to create and manage a group of identical, **load-balanced VMs**.

The number of VM instances can **automatically increase or decrease** in response to demand or based on a schedule.

Focus = scale (scalability, capacity)

Virtual machine availability sets

Help build a more resilient, highly available environment by **staggering VM updates** and ensuring **varied power and network connectivity**.

Focus = resiliency (availability)

COMPARE COMPUTE TYPES - VM OPTIONS

Virtual machine scale sets

Allows you to create and manage a group of identical, **load-balanced VMs**.

The number of VM instances can **automatically increase or decrease** in response to demand or based on a schedule.

Focus = scale (capacity)

Virtual machine availability sets

They do this through two mechanisms:
FAULT DOMAINS and **UPDATE DOMAINS**.

Focus = resiliency (availability)

VIRTUAL MACHINES AVAILABILITY SETS

Update Domains

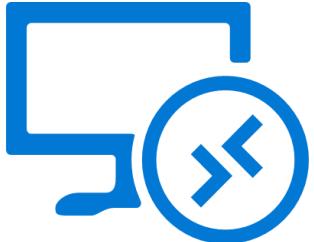
Allows you to apply updates while knowing that **only one update domain grouping** will be offline at a time.

Fault Domains

Groups your VMs by common power source and **network switch**.

By default, an availability set will split your VMs across **up to three fault domains**.

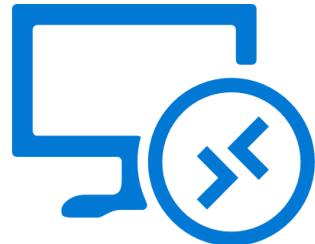
COMPARE COMPUTE TYPES - VM OPTIONS



Azure Virtual
Desktop

A **desktop and app virtualization service** that runs in Microsoft Azure

COMPARE COMPUTE TYPES - VM OPTIONS



Azure Virtual
Desktop

A **desktop and app virtualization service** that runs in Microsoft Azure

Enable IT Pros and MSPs to create **Windows 10 & 11 virtual desktops** in Azure

If a question mentions "Virtual Desktop Infrastructure (VDI),
Azure Virtual desktop is quite likely the answer!

COMPARE COMPUTE TYPES - VM OPTIONS



Azure Container
Instance (ACI)

Runs Docker containers on-demand in a managed, serverless Azure environment.

COMPARE COMPUTE TYPES - VM OPTIONS

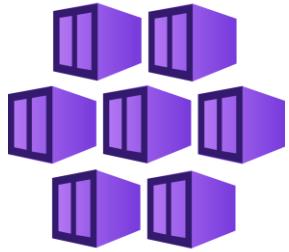


Azure Container
Instance (ACI)

Runs Docker containers on-demand in a managed, serverless Azure environment.

A solution for any scenario that can operate in isolated containers, without orchestration.

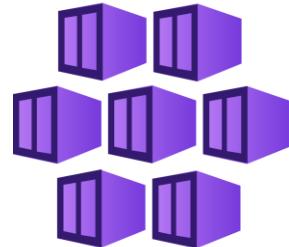
COMPARE COMPUTE TYPES - VM OPTIONS



Azure Kubernetes
Services (AKS)

A **hosted Kubernetes service**, where Azure handles critical tasks like health monitoring and maintenance for you.

COMPARE COMPUTE TYPES - VM OPTIONS



Azure Kubernetes
Services (AKS)

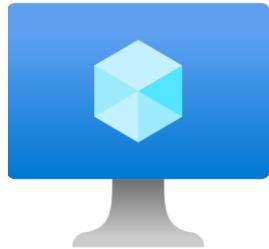
Production →

A **hosted Kubernetes service**, where Azure handles critical tasks like health monitoring and maintenance for you.

You pay only for the agent nodes within your clusters, not for the masters (free tier)

For a financially backed SLA, you pay a few cents per hour for cluster management.

VM RESOURCE REQUIREMENTS



VM Resource Requirements

Virtual Disk

Virtual Network (VNET)

Network Interface (Virtual NIC)

Network Security Group

Public IP Address



AZ-900 EXAM CRAM

THE COMPLETE COURSE

DEMO

Create a VM in the
Azure Portal

INSIDE CLOUD
AND SECURITY

APP HOSTING OPTIONS



App Service

An HTTP-based service for **hosting web applications**, REST APIs, and mobile back ends.

APP HOSTING OPTIONS



App Service

Types of app service styles include

Web apps

API apps

Web jobs

Mobile apps

APP HOSTING OPTIONS



App Service

Web apps

API apps

Web jobs

Mobile apps

Types of app service styles include

Using ASP.NET, ASP.NET Core, Java, Ruby, Node.js, PHP, or Python.

Run on Windows or Linux as host OS.

APP HOSTING OPTIONS



App Service

Web apps

API apps

Web jobs

Mobile apps

Types of app service styles include

Build REST-based web APIs
by using your choice of
language and framework.

Full Swagger support and
publish to Azure Marketplace.

APP HOSTING OPTIONS



App Service

Types of app service styles include

Web apps

API apps

Web jobs

Mobile apps

Run a **program** (.exe, Java, PHP, Python, or Node.js) or **script** (.cmd, .bat, PowerShell, or Bash) in the same context as a web app, API app, or mobile app.

APP HOSTING OPTIONS



App Service

Types of app service styles include

Web apps

API apps

Web jobs

Mobile apps

Can be scheduled or run by a trigger.

Often used to run background tasks as part of your application logic.

APP HOSTING OPTIONS



App Service

Types of app service styles include

Web apps

API apps

Web jobs

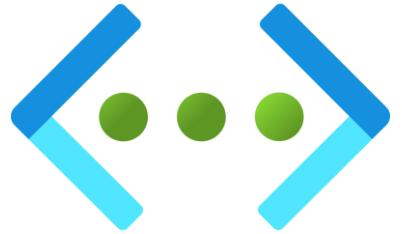
Mobile apps

Used to quickly build a back end for iOS and Android apps.

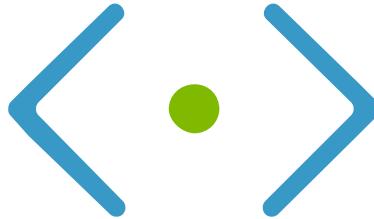
Enables auth with social identity providers, send push notifications, and execute backend logic.

DESCRIBE CORE SERVICES IN AZURE

- NETWORK



Virtual Network



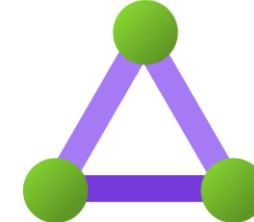
Virtual Subnet



VPN Gateway

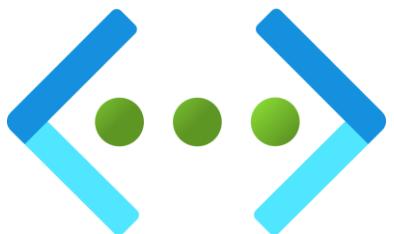


VNET Peering



ExpressRoute

DESCRIBE CORE SERVICES IN AZURE



Virtual Network

VNET

A **logical representation** of
your network in Azure.

A VNET contains one or more SUBNETS

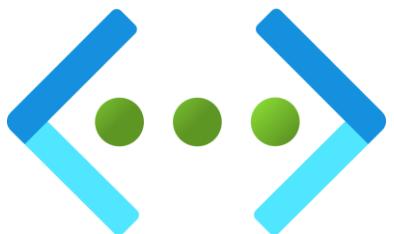
DESCRIBE CORE SERVICES IN AZURE



Virtual Network
vNET

A **logical representation** of your network in Azure.
VNets provide **logical isolation** in Azure dedicated to your subscription.

DESCRIBE CORE SERVICES IN AZURE

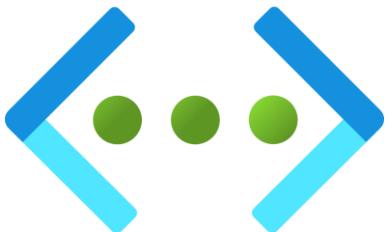


Virtual Network

vNET

- ✓ Create a dedicated private
cloud-only network

DESCRIBE CORE SERVICES IN AZURE

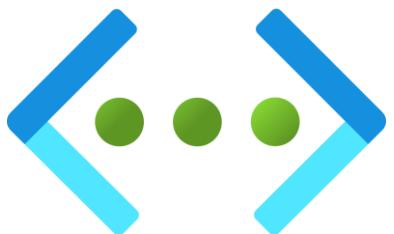


Virtual Network
VNET

- ✓ Create a dedicated private **cloud-only network**
- ✓ Securely extend your data center (**Site-to-Site VPN**)

DESCRIBE CORE SERVICES IN AZURE

VMs in different VNets cannot communicate by default!

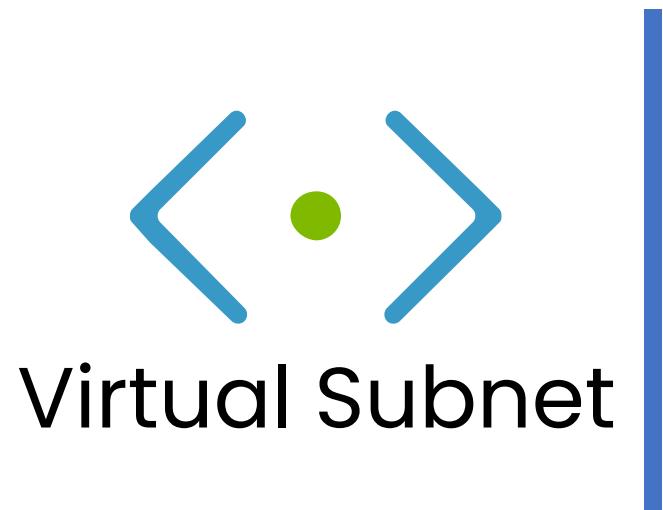


Virtual Network

VNET

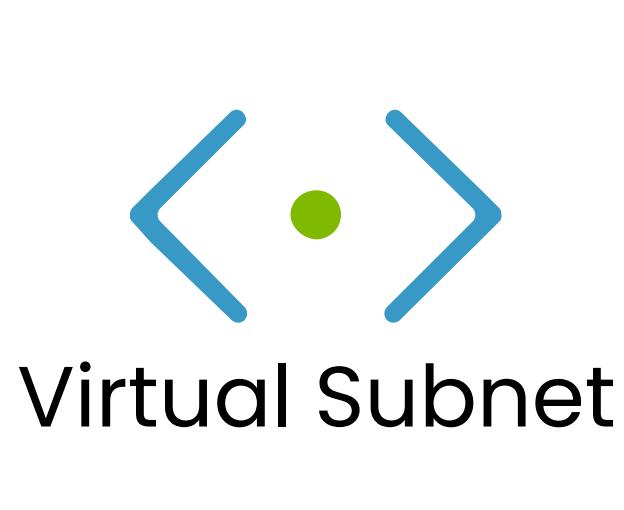
- ✓ Create a dedicated private **cloud-only network**
- ✓ Securely extend your data center (**Site-to-Site VPN**)
- ✓ Enable **hybrid cloud** scenarios

DESCRIBE CORE SERVICES IN AZURE



- ✓ **Segment address space** of VNET to create sub-networks

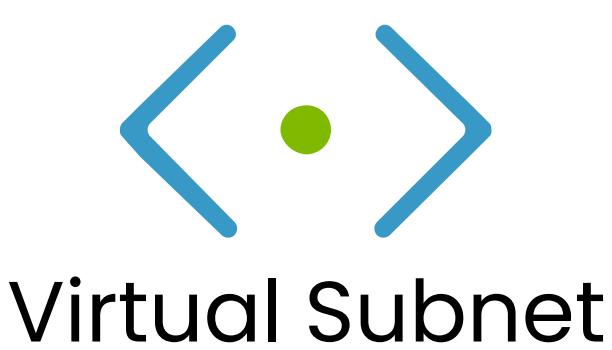
DESCRIBE CORE SERVICES IN AZURE



- ✓ **Segment address space** of VNET to create sub-networks
- ✓ Allows Azure **resource deployment** into a **specific subnet**

DESCRIBE CORE SERVICES IN AZURE

VMs in different subnets within a VNET can communicate by default!



- ✓ **Segment address space** of VNET to create sub-networks
- ✓ Allows Azure **resource deployment** into a **specific subnet**
- ✓ Can affect outbound access and routing traffic between resources

DESCRIBE CORE SERVICES IN AZURE

site-to-site VPN traffic traverses the Internet



VPN Gateway

A **virtual network gateway** that sends encrypted traffic between an **Azure VNET** and an **on-premises location** over **the Internet**

Core component of "hybrid cloud"

DESCRIBE CORE SERVICES IN AZURE



VNET Peering

Enables seamless connection of **two or more Virtual Networks** in Azure

DESCRIBE CORE SERVICES IN AZURE



VNET Peering

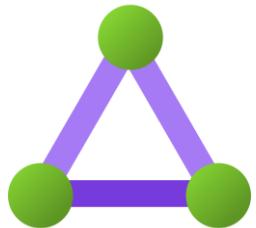
Enables seamless connection of **two or more Virtual Networks** in Azure

The **two networks function as one** in terms of connectivity

REMEMBER:

Resources different VNETS cannot communicate by default!

DESCRIBE CORE SERVICES IN AZURE



ExpressRoute

Extends your on-premises networks into Azure over a **private connection** with the help of a **connectivity provider**

traffic does NOT traverse the Internet

DESCRIBE CORE SERVICES IN AZURE



Azure DNS

a hosting service for DNS domains that provides name resolution by using Microsoft Azure infrastructure.

Can provide internal and external DNS

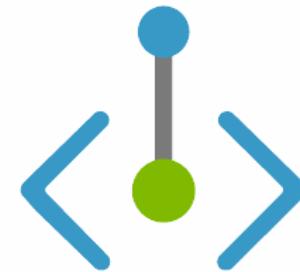
DEFINE PRIVATE AND PUBLIC ENDPOINTS



Service Endpoint

Provides a way to lock down access to **all instances** of a PaaS service to a VNET

Accessible from public Internet

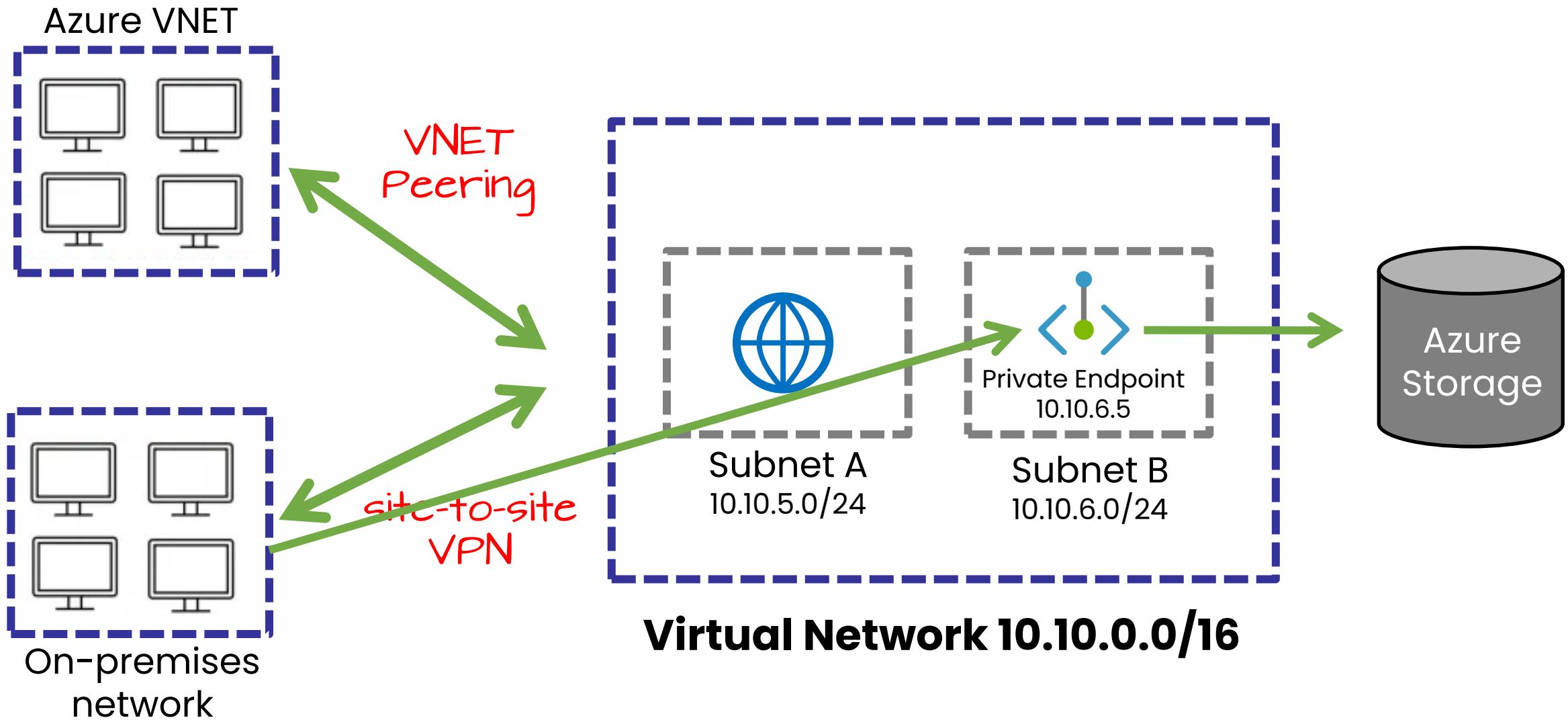


Private Endpoint

Grants access to **a specific instance** (resource) of a PaaS service in your VNET on a private IP address

Enables access from on premises without public endpoint

CONNECTIVITY EXAMPLE



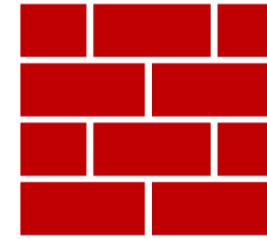
DESCRIBE AZURE NETWORK SECURITY



Defense
in-Depth



Network
Security Group



Azure
Firewall



Azure
DDoS

DESCRIBE AZURE NETWORK SECURITY



Defense
in-Depth

A layered (defense in depth) approach that does not rely on one method to completely protect your environment.

DESCRIBE AZURE NETWORK SECURITY



Network
Security Group

Contains **security rules** that allow or deny inbound network traffic to, or outbound network traffic from, several types of Azure resources.

DESCRIBE AZURE NETWORK SECURITY



Network
Security Group

Contains **security rules** that allow or deny inbound network traffic to, or outbound network traffic from, several types of Azure resources.

For each rule, you can specify **source** and **destination port** and **protocol**.

DESCRIBE AZURE NETWORK SECURITY

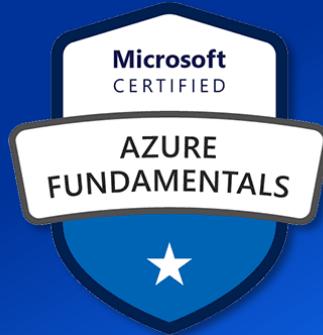


Network
Security Group

Contains **security rules** that **allow or deny** **inbound** network traffic to, or **outbound** network traffic from, several types of Azure resources.

For each rule, you can specify **source** and **destination port** and **protocol**.

Can be applied to a **subnet** or **network adapter**



AZ-900 EXAM CRAM

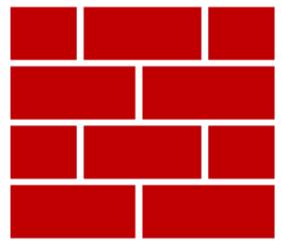
THE COMPLETE COURSE

DEMO

Tour of Network Security Groups (NSGs) in Azure

INSIDE CLOUD
AND SECURITY

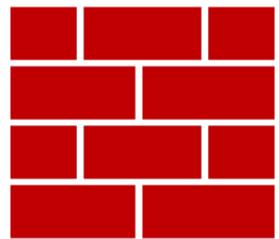
DESCRIBE AZURE NETWORK SECURITY



Azure
Firewall

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

DESCRIBE AZURE NETWORK SECURITY



Azure
Firewall

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

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

DESCRIBE AZURE NETWORK SECURITY



Azure DDoS

Standard tier provides enhanced DDoS mitigation features to defend against DDoS attacks.

DESCRIBE AZURE NETWORK SECURITY



Azure DDoS

Standard tier provides enhanced DDoS mitigation features to defend against DDoS attacks.

Also includes logging, alerting, and telemetry not included in the free Basic tier present by default.

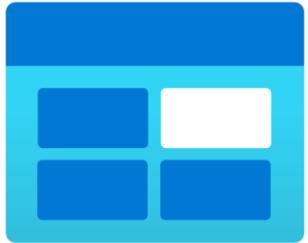
DOMAIN 2: DESCRIBE CORE AZURE SERVICES



- ❖ Compare Azure Storage services
- ❖ Describe **storage tiers**
- ❖ Describe **redundancy options**
- ❖ Describe **storage account options** and **storage types**
- ❖ Identify options for moving files, including **AzCopy**, **Azure Storage Explorer**, and **Azure File Sync**
- ❖ Describe migration options, including **Azure Migrate** and **Azure Data Box**

2.3 Describe Azure storage services

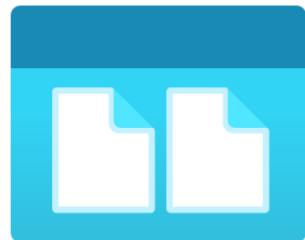
COMPARE AZURE STORAGE SERVICES



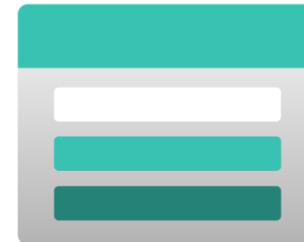
Blob Storage



Disk Storage

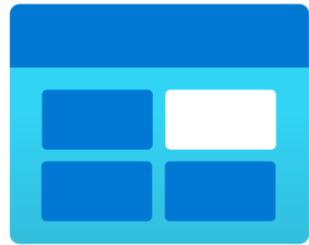


File Storage



Storage Tiers

COMPARE AZURE STORAGE SERVICES



Blob Storage

Storage optimized for storing massive amounts of **unstructured data**

DATA TYPES

Unstructured Images, video files, social media posts

Data that cannot be contained in a row-column database and does not have an associated data model.

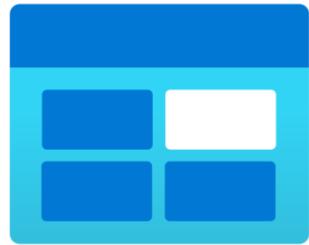
Structured Excel, MSSQL, MySQL, PostgreSQL

Data contained in rows and columns, such as an Excel spreadsheet or relational database.



These terms are not explicitly tested on the exam, but that you should know for storage-related questions!

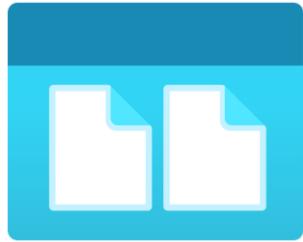
COMPARE AZURE STORAGE SERVICES



Blob Storage

Storage optimized for storing massive amounts of **unstructured data**

COMPARE AZURE STORAGE SERVICES



File Storage

Fully managed **file shares** in Azure accessible via **SMB or NFS**

COMPARE AZURE STORAGE SERVICES



Disk Storage

Azure managed disks are **block-level storage volumes** that are managed by Azure and **used with Azure VMs**

COMPARE AZURE STORAGE SERVICES

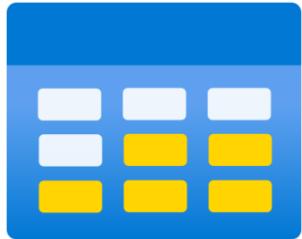
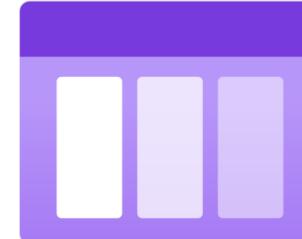


Table Storage



Queue Storage

COMPARE AZURE STORAGE SERVICES

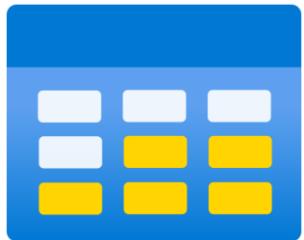
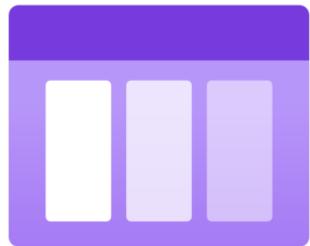


Table Storage

A service that stores **structured NoSQL data** in Azure, including a schemaless key/attribute store

COMPARE AZURE STORAGE SERVICES



Queue Storage

A service for storing large numbers of **messages**, accessible from anywhere via authenticated **HTTP or HTTPS** calls

DESCRIBE STORAGE TIERS

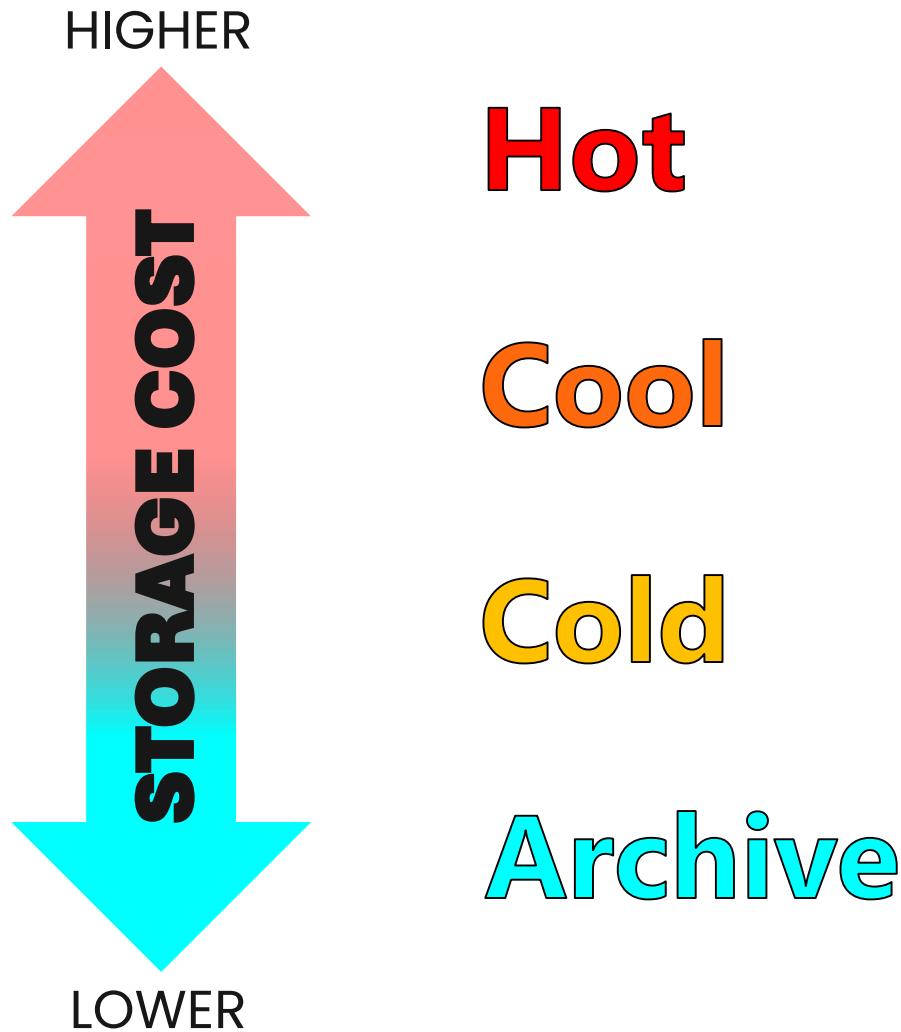


Storage Tiers

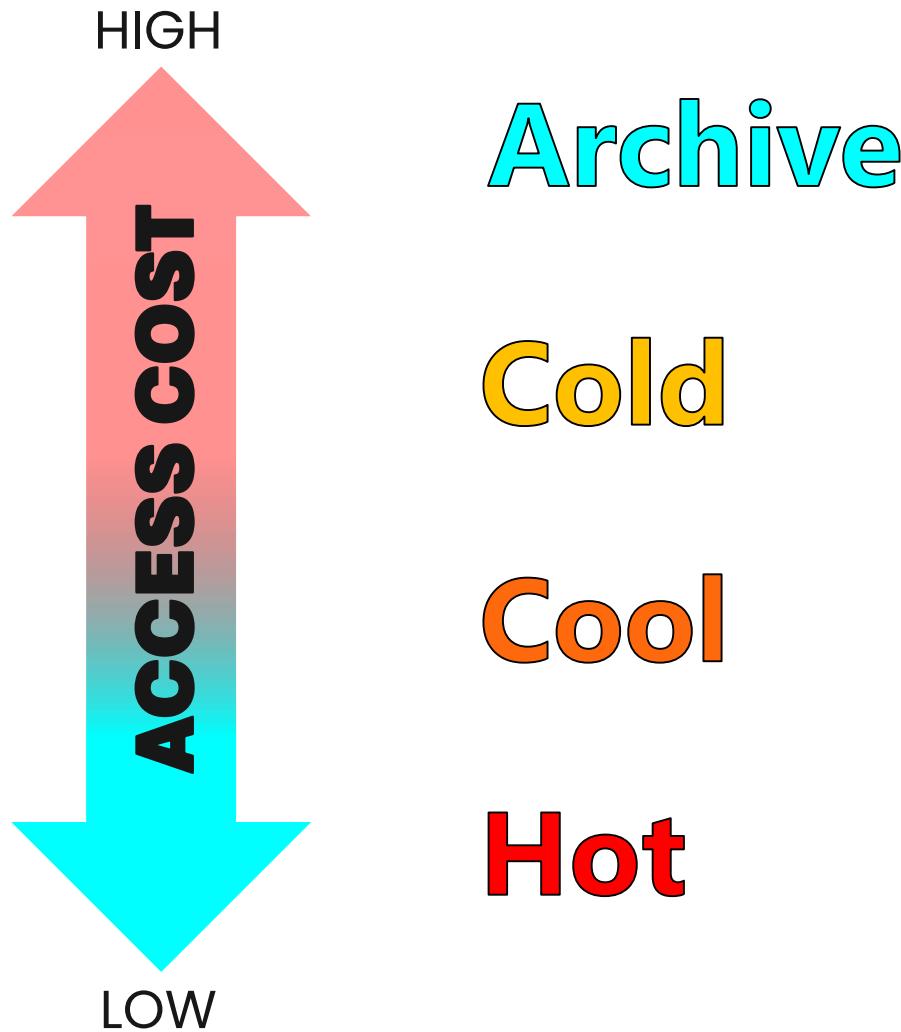
Azure storage **hot**, **cool**, **cold** and **archive** access tiers to store blob object data in a cost-effective manner

Use lifecycle management policies to automate tiers

DESCRIBE STORAGE TIERS



DESCRIBE STORAGE TIERS



DESCRIBE STORAGE TIERS

Archive Lowest storage costs, but high access costs.

An offline tier optimized for storing data that is rarely accessed, and that has flexible latency requirements, on the order of hours.

Cold Lower storage costs and higher access costs compared to Cool..

An online tier optimized for storing data that is rarely accessed or modified, but still requires fast retrieval.

Cool Lower storage costs and higher access costs compared to Hot

An online tier optimized for storing data that is infrequently accessed or modified.

Hot Highest storage costs, but the lowest access costs.

An online tier optimized for storing data that is accessed or modified frequently.

DESCRIBE STORAGE TIERS

Archive Should be stored a minimum of 180 days

An **offline** tier optimized for storing data that is rarely accessed, and that has flexible latency requirements, on the order of hours.

Cold Should be stored a minimum of 90 days

An online tier optimized for storing data that is rarely accessed or modified, but still requires fast retrieval.

Cool Should be stored a minimum of 30 days

An online tier optimized for storing data that is infrequently accessed or modified.

Hot

An online tier optimized for storing data that is accessed or modified frequently.

DESCRIBE STORAGE REDUNDANCY OPTIONS

Four options you should know for the exam

LRS

LOCALLY REDUNDANT
STORAGE

Copies your data synchronously three times within a single physical location in the primary region.

ZRS

ZONE REDUNDANT
STORAGE

Copies your data synchronously across three Azure **availability zones** in the primary region.

With LRS and ZRS, redundancy is limited to the **primary region only!**

DESCRIBE STORAGE REDUNDANCY OPTIONS

Four options you should know for the exam



GEO-REDUNDANT
STORAGE

Copies your data synchronously three times **within a single physical location** in the primary region using LRS.

It then copies it asynchronously to a single physical location in the secondary region. **3 copies using LRS**



GEO-ZONE
REDUNDANT STORAGE

Copies your data synchronously three times **within the primary region** using ZRS.

It then copies it asynchronously to a single physical location in the secondary region.

Recommended by MSFT for apps requiring high availability

With GRS and GZRS, redundancy is extended to the **secondary region!**



AZ-900 EXAM CRAM

THE COMPLETE COURSE

DEMO

Azure Storage Security &
Redundancy Features

INSIDE CLOUD
AND SECURITY

AZURE FILE MOVEMENT OPTIONS

AzCopy

A command-line utility that you can use to copy blobs or files to or from your storage account.

Azure Storage Explorer

A standalone app that provides a graphical interface to manage files and blobs in your Azure Storage Account.

Supports file and blob upload, download, or move between accounts

Azure File Sync

A tool that lets you centralize your file shares in Azure Files and keep the flexibility, performance, and compatibility of a Windows file server.

Once installed on a local Windows servers, it will automatically stay bi-directionally synced with your files in Azure.

AZURE MIGRATION OPTIONS



Azure
Migrate

A service that provides a simplified migration, modernization, and optimization for Azure.

AZURE MIGRATION OPTIONS



Azure
Migrate

A service that provides a simplified migration, modernization, and optimization for Azure.

Includes all pre-migration steps such as discovery, assessments, and right-sizing.

It is a hub of services and tools designed to detect, analyze and facilitate the migration of any type of workload to Azure.

AZURE MIGRATION OPTIONS



Azure Data
Box

A cloud solution that lets you send terabytes of data into and out of Azure in a quick, inexpensive, and reliable fashion.

AZURE MIGRATION OPTIONS



Azure Data
Box

A cloud solution that lets you send terabytes of data into and out of Azure in a quick, inexpensive, and reliable fashion.

Customers are shipped a proprietary Data Box storage device.

Ideally suited to transfer data sizes larger than 40 TBs
In scenarios with limited or no network connectivity

DOMAIN 2: DESCRIBE CORE AZURE SERVICES



- ❖ Describe directory services in Azure, including **Microsoft Entra ID** and **Microsoft Entra Domain Services**
- ❖ Describe authentication methods in Azure, including **single sign-on (SSO)**, **multi-factor authentication (MFA)**, and **passwordless**
- ❖ Describe external identities in Azure, including business-to-business (B2B) and business-to-customer (B2C)

2.4 Describe Azure identity, access, and security

For more exam prep and Azure tutorials, follow us on Youtube at <https://bit.ly/azurevideos>

DOMAIN 2: DESCRIBE CORE AZURE SERVICES



- ❖ Describe **Conditional Access** in Entra ID
- ❖ Describe Azure **role-based access control (RBAC)**
- ❖ Describe the concept of **Zero Trust**
- ❖ Describe the purpose of the **defense-in-depth** model
- ❖ Describe the purpose of **Microsoft Defender for Cloud**

Azure AD has been renamed to Entra ID

2.4 Describe Azure identity, access, and security

IDENTIFY CORE AZURE IDENTITY SERVICES



AuthN and
AuthZ

Authentication (AuthN) is the process of proving that you are who you say you are.

IDENTIFY CORE AZURE IDENTITY SERVICES



AuthN and
AuthZ

Authentication (AuthN) is the process of proving that you are who you say you are.
Authorization (AuthZ) is the act of granting an authenticated party permission to do something.

←
Identity
←
Access

IDENTIFY CORE AZURE IDENTITY SERVICES



Entra ID

Entra is Microsoft's cloud-based identity and access management service....

IDENTIFY CORE AZURE IDENTITY SERVICES



Entra ID

...which helps your employees sign in and access resources, including:

IDENTIFY CORE AZURE IDENTITY SERVICES



Entra ID

...which helps your employees sign in and access resources, including:

Internal resources, such as apps on your corporate network or custom cloud apps

IDENTIFY CORE AZURE IDENTITY SERVICES

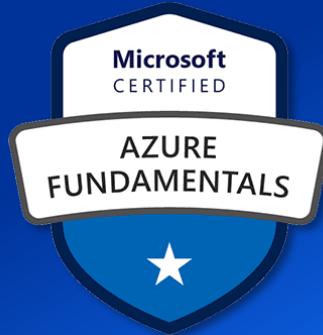


Entra ID

...which helps your employees sign in and access resources, including:

Internal resources, such as apps on your corporate network or custom cloud apps

External resources, such as Microsoft 365, the Azure portal, and many SaaS apps



AZ-900 EXAM CRAM

THE COMPLETE COURSE

DEMO

Entra ID (Azure AD)
User and Groups

INSIDE CLOUD
AND SECURITY

AUTHENTICATION METHODS IN AZURE



Single Sign-on (SSO)

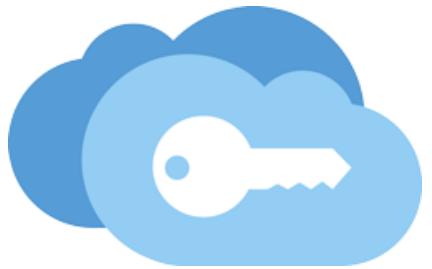


MFA



Conditional Access

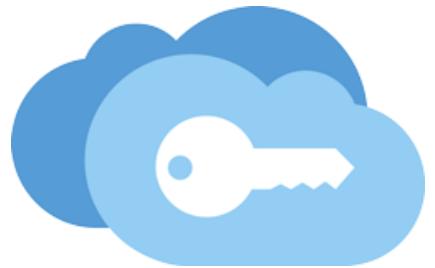
AUTHENTICATION METHODS IN AZURE



Single Sign-on (SSO)

Single sign-on means a user doesn't have to sign into every application they use.

AUTHENTICATION METHODS IN AZURE

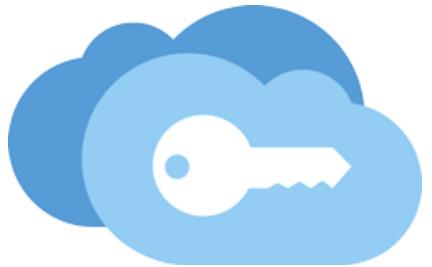


Single Sign-on (SSO)

Single sign-on means a user doesn't have to sign into every application they use.

The user logs in once and that credential is used for multiple apps.

AUTHENTICATION METHODS IN AZURE



Single Sign-on (SSO)

Single sign-on means a user doesn't have to sign into every application they use.

The user logs in once and that credential is used for multiple apps.

Single sign-on based authentication systems are often called "**modern authentication**".

AUTHENTICATION METHODS IN AZURE



MFA

MFA in Entra ID works by requiring two or more of the following authentication methods:

AUTHENTICATION METHODS IN AZURE



MFA

Something you **know** (pin or password)

Something you **have** (trusted device)

Something you **are** (biometric)

AUTHENTICATION METHODS

Password	Password and...	Password and...
Password1 123456 qwerty	SMS	Microsoft Authenticator App
	Voice	Software OATH Tokens OTP
		Hardware OATH Tokens OTP

MICROSOFT AUTHENTICATOR APP

Authenticator App: Use cases and availability

The Microsoft Authenticator app can be used as a primary form of authentication to sign into any Entra ID account.

Can also be used as an additional verification option during self-service password reset (SSPR) or Entra ID MFA events.

To use Microsoft Authenticator, a user must download the phone app and register their account.

The app is available for Android and iOS.

Additional verification = 2nd factor of authentication

OATH TOKENS

What is an OATH token and how does it work?

OATH (Open Authentication) is an open standard that specifies how time-based, one-time password (TOTP) codes are generated.

Software OATH tokens EXAMPLE: Microsoft Authenticator App

Are typically applications. Entra ID generates the secret key, or seed, that's input into the app and used to generate each OTP.

Hardware OATH tokens

Small hardware devices that look like a key fob that displays a code that refreshes every 30 or 60 seconds, with secret key/seed pre-programmed.

AUTHENTICATION METHODS

Password	Password and...	Password and...	Passwordless
Password1 123456 qwerty	SMS	Microsoft Authenticator App	Windows Hello
	Voice	Software OATH Tokens OTP	Microsoft Authenticator App
		Hardware OATH Tokens OTP	FIDO2 Security Key

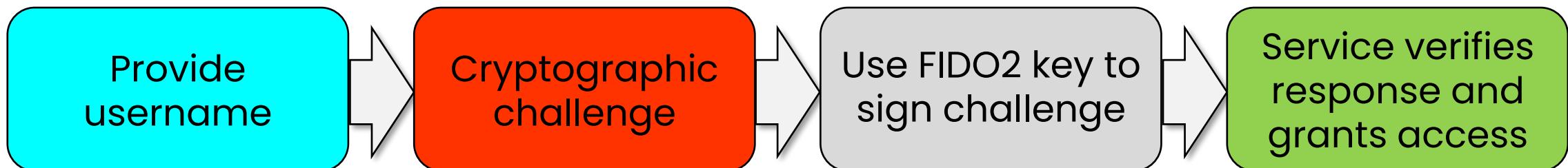
FIDO2/PASSWORDLESS

What is FIDO2 and how does it work?

Uses public-key (asymmetric) cryptography for user authentication

User has a physical device (USB or NFC)

Authentication sequence



Windows Hello for Business

An authentication feature built into Windows 10, replaces passwords with strong two-factor authentication on PCs and mobile devices.



Allows users authenticate to:

- A Microsoft account
- An Active Directory account
- An Entra ID account
- Identity Provider Services OR
- Relying party services that support Fast ID Online (FIDO) v2.0 authentication

>Passwordless

Windows Hello is for personal devices and uses a pin or biometric gesture

Windows Hello for Business leverages key-based or certificate-based authentication

WINDOWS HELLO FOR BUSINESS

Solves the following problems

- Strong passwords can be difficult to remember, and users often reuse passwords on multiple sites.
- Server breaches can expose symmetric network credentials (passwords).
- Passwords are subject to replay attacks.
- Users can inadvertently expose their passwords due to phishing attacks.

Authentication Methods

BAD	GOOD	BETTER	BEST
Password Password1 123456 qwerty	Password and... SMS Voice	Password and... Microsoft Authenticator App Software OATH Tokens OTP Hardware OATH Tokens OTP	Passwordless Windows Hello Microsoft Authenticator App FIDO2 Security Key

Authentication method strength and security

Authentication Method	Security	Usability	Availability
Windows Hello for Business	High	High	High
Microsoft Authenticator app	High	High	High
FIDO2 security key (preview)	High	High	High

Authentication method strength and security

Authentication Method	Security	Usability	Availability
hardware OATH tokens (preview)	Medium	Medium	High
software OATH tokens	Medium	High	Medium
SMS	Medium	High	Medium
Voice	Medium	Medium	Medium

Authentication method strength and security

Authentication Method	Security	Usability	Availability
Password	Low	High	High

EXTERNAL IDENTITIES

B2B collaboration *Supports Entra ID and social identities*

Enable external users to use their preferred identity to sign into your Microsoft or other enterprise applications (SaaS apps, custom-developed apps, etc.).

B2B direct connect *Supports multiple two-way trusts*

Establish a mutual, two-way trust with another Entra ID organization for seamless collaboration.

Useful for heavy, daily collaboration with close business partners.

Business-to-Consumer (B2C) *Supports Entra & social identities*

Publish modern SaaS apps or custom-developed apps to consumers and customers, while using Entra ID B2C for identity and access management.

Entra ID multi-tenant organization

Collaborate with multiple tenants in a single Entra ID organization via cross-tenant synchronization.

Good for conglomerates, mergers, multi-cloud, dept/test/staging tenants

ENTRA ID CONDITIONAL ACCESS



Conditional
Access

Used by Entra ID to bring **signals** together, to make **decisions**, and enforce organizational **policies**

ENTRA ID CONDITIONAL ACCESS

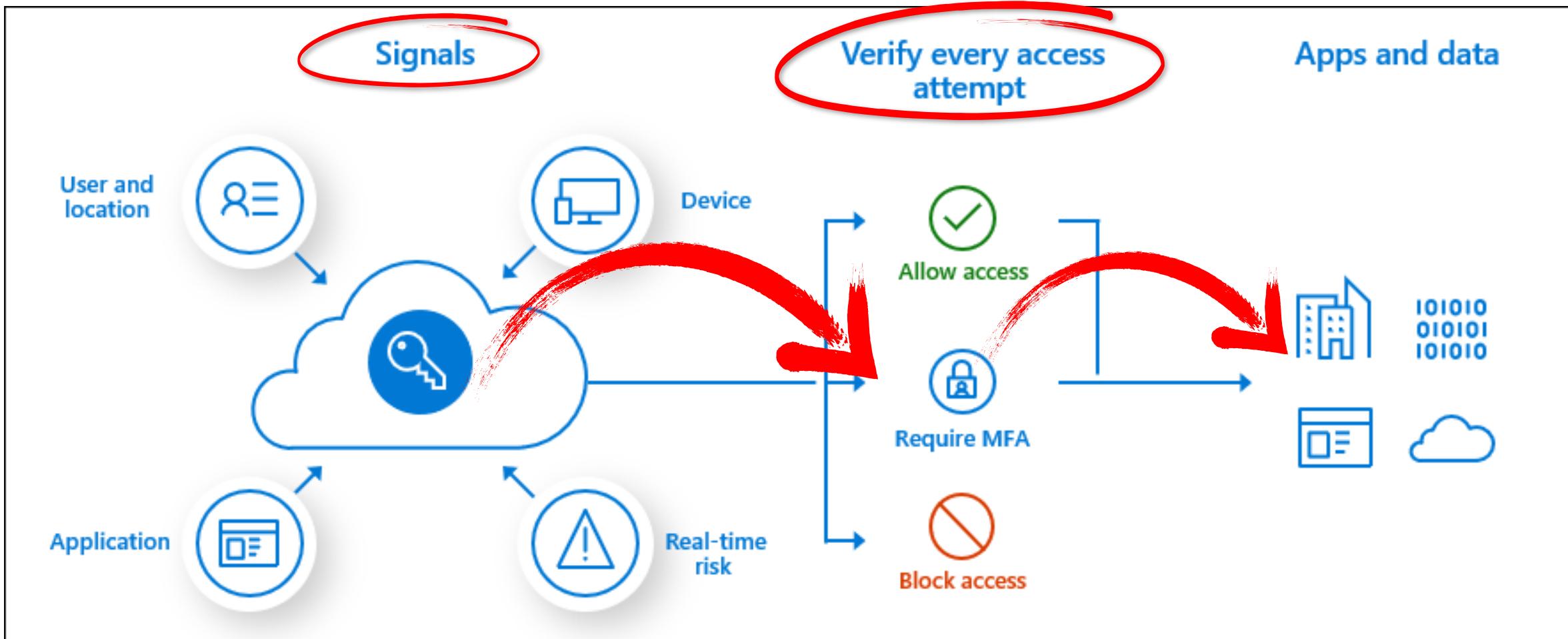


image credit: Microsoft

CORE AZURE IDENTITY SERVICES



Azure RBAC

Azure RBAC helps you manage:

- who** has access to Azure resources,
- what** they can do with those resources
- which** resources/areas they have access to

CORE AZURE IDENTITY SERVICES

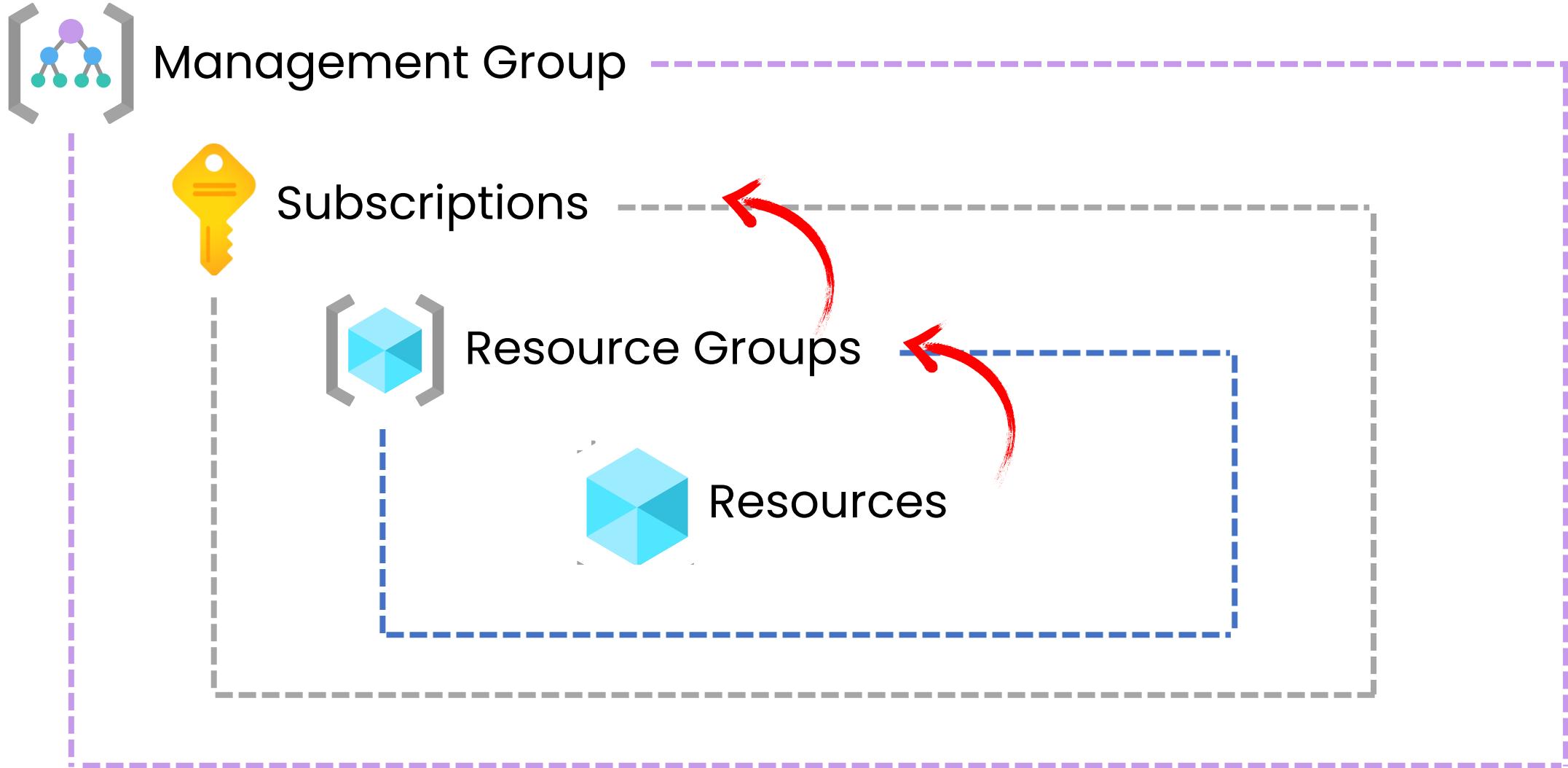


Azure RBAC

Built on Azure Resource Manager and provides **fine-grained access management** of Azure resources.

one element of implementing "least privilege"

DESCRIBE CORE ARCHITECTURE COMPONENTS



ZERO TRUST

The three principles of Zero Trust

Verify explicitly

Always authenticate and authorize based on all available data points.

Use least privilege access

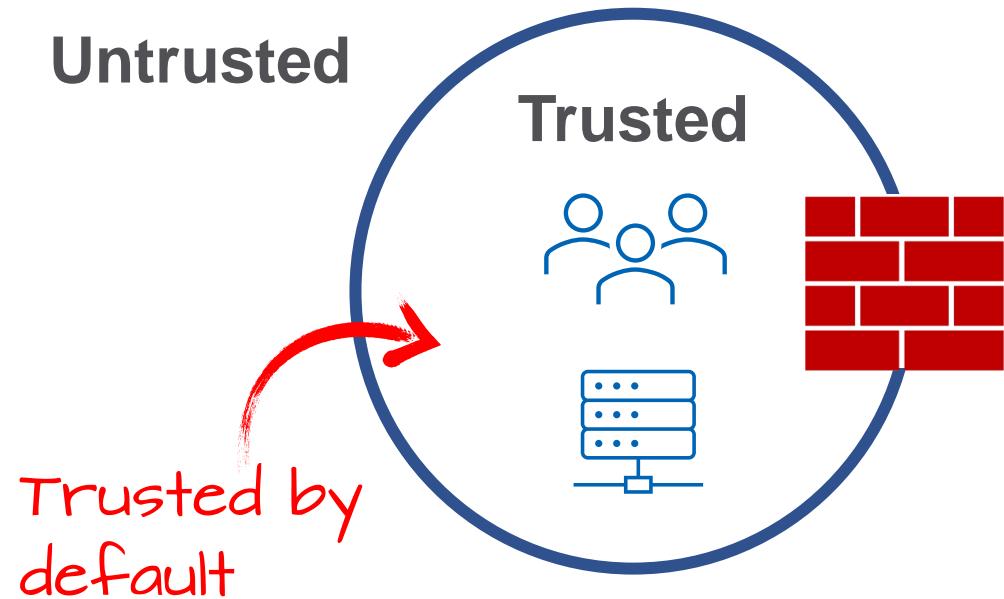
Limit user access with Just-In-Time and Just-Enough-Access (JIT/JEA), risk-based adaptive policies, and data protection.

Assume breach

Segment access to minimize blast radius

Verify end-to-end encryption and use analytics to get visibility, drive threat detection, and improve defenses.

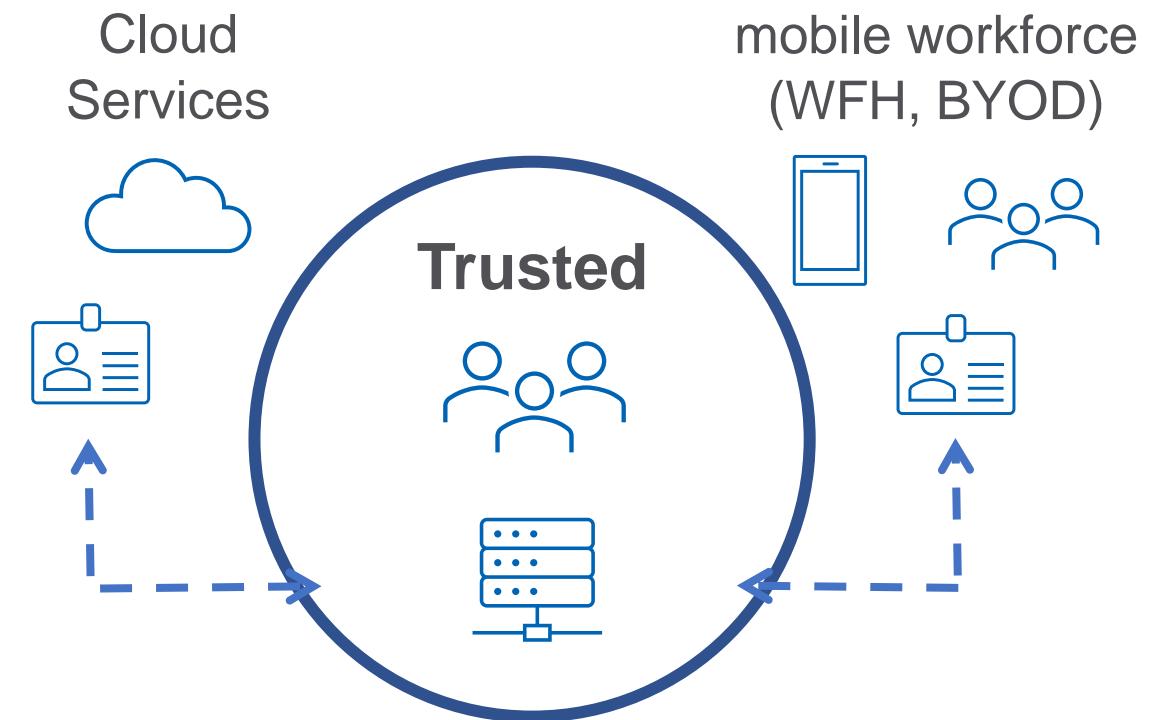
Traditional Architecture



Network security perimeter
surrounds the organization

Trust but verify

Zero Trust Architecture

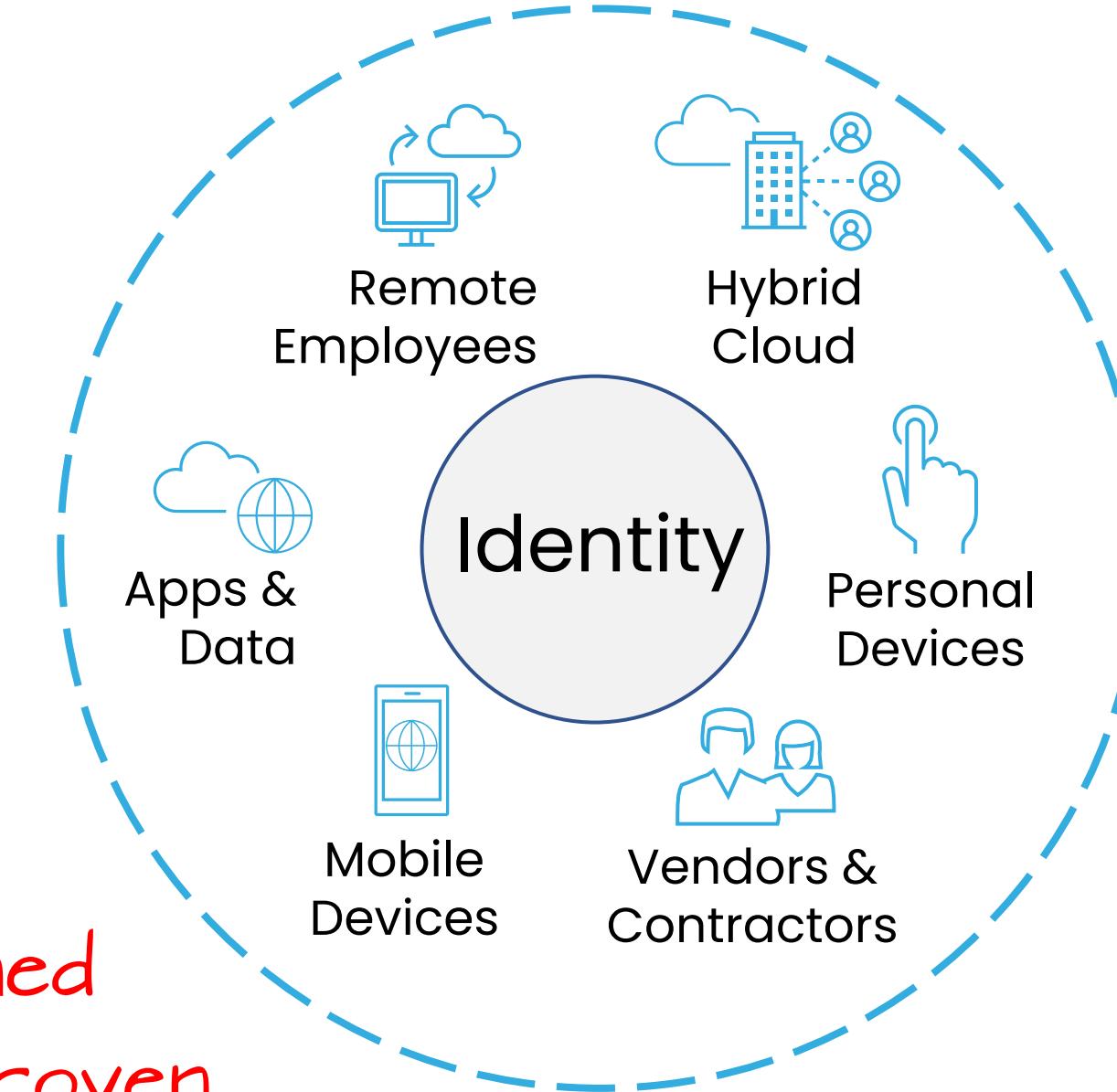


Security based on **identity**,
not on network perimeter

Must prove everything

ZERO TRUST SECURITY MODEL

trust must be earned
compliance must be proven



Zero Trust Security

Unlike the “trust but verify” approach, in Zero Trust, **no entity is trusted by default.**

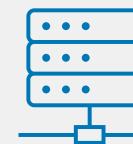
It is based on three principles: assume breach, verify explicitly, and least privilege access.



Identities



Apps



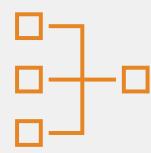
Infrastructure



Devices



Data



Networks

Zero Trust Security

Identities should be explicitly verified with **strong authentication** using all available data points.

Users should be granted **least privilege access**.



Identities



Apps



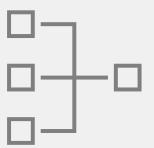
Infrastructure



Devices



Data



Networks

Zero Trust Security

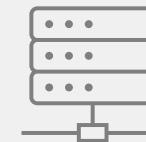
Devices should be monitored for **health and compliance** and updated when necessary.



Identities



Apps



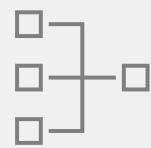
Infrastructure



Devices



Data



Networks

Zero Trust Security

Only **approved apps** should be allowed to access company data, and permissions managed.



Identities



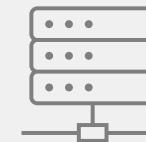
Apps



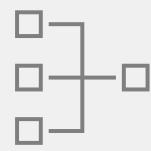
Devices



Data



Infrastructure



Networks

Zero Trust Security

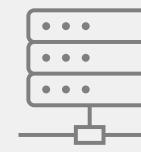
Data should be **classified, labeled, and encrypted** based on its attributes, at rest and in motion.



Identities



Apps



Infrastructure



Devices



Data



Networks

Zero Trust Security

Infrastructure **version, configuration, JIT access,**
should be managed.

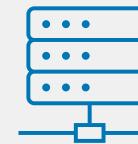
Telemetry should be used to detect anomalous activity that may indicate attack.



Identities



Apps



Infrastructure



Devices



Data



Networks

Zero Trust Security

Networks should be segmented to limit data access
and reduce threat exposure.

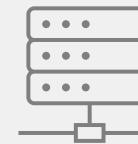
Real-time threat protection, end-to-end encryption,
monitoring, and analytics should be employed.



Identities



Apps



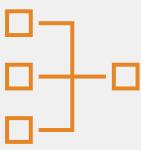
Infrastructure



Devices



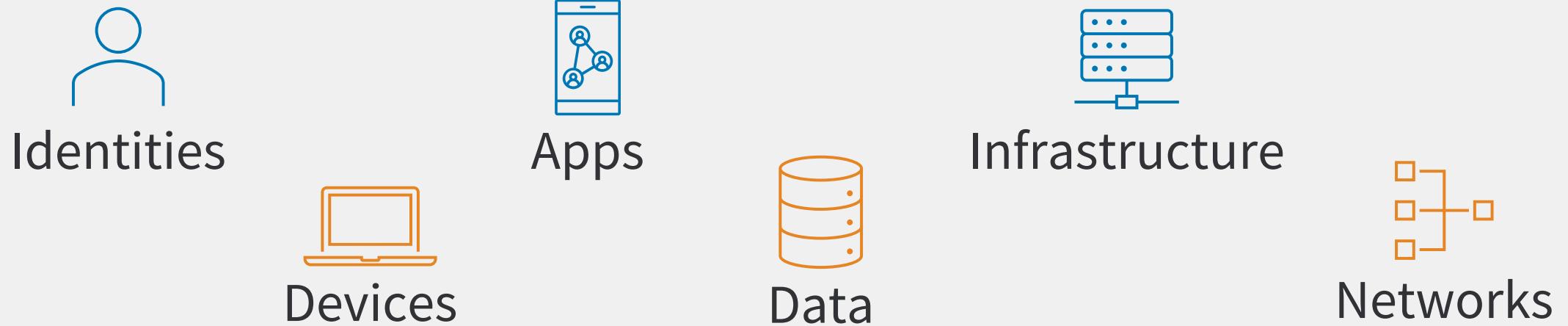
Data



Networks

Zero Trust Security

Notice the layered approach (“defense in depth”) present in Zero Trust security?



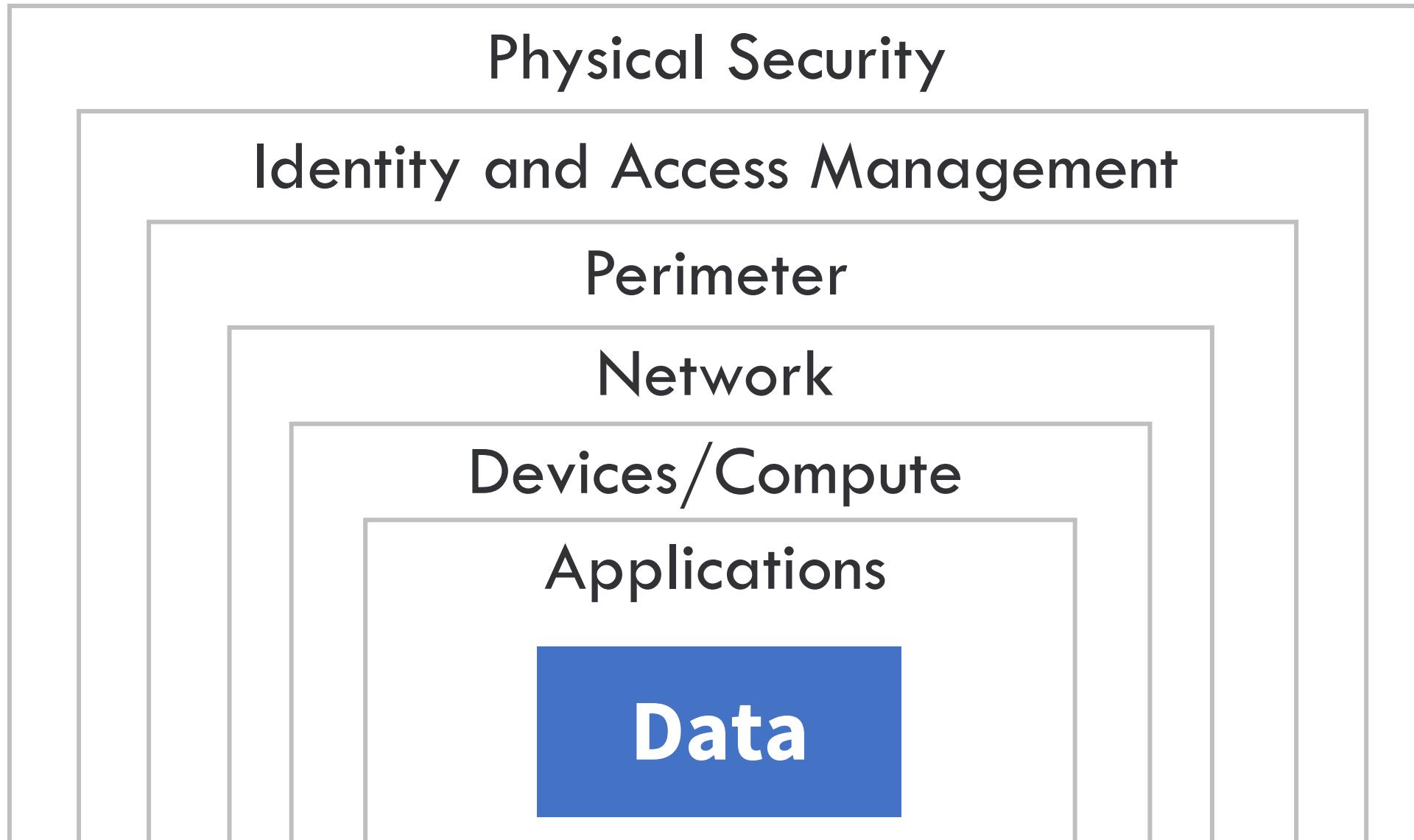
DESCRIBE AZURE NETWORK SECURITY

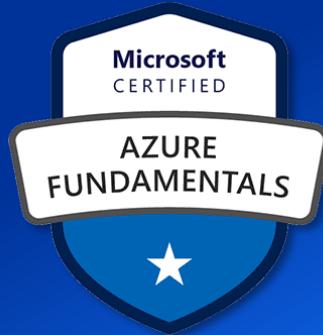


Defense
in-Depth

A layered (defense in depth) approach that does not rely on one method to completely protect your environment.

Defense in Depth





AZ-900 EXAM CRAM

THE COMPLETE COURSE

DEMO

Entra ID (Azure AD)
Conditional Access

INSIDE CLOUD
AND SECURITY

DESCRIBE AZURE GOVERNANCE FEATURES



Defender for
Cloud

A unified infrastructure security management system that strengthens the **security posture** of your cloud and on-premises data centers.

DESCRIBE AZURE GOVERNANCE FEATURES



Defender for
Cloud

A unified infrastructure security management system that strengthens the **security posture** of your cloud and on-premises data centers.

Provides security guidance for **compute, data, network, storage, app**, and other services.

DESCRIBE AZURE GOVERNANCE FEATURES

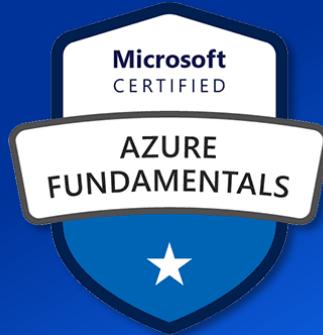


Defender for
Cloud

A unified infrastructure security management system that strengthens the **security posture** of your **cloud and on-premises data centers**.

Provides security guidance for **compute, data, network, storage, app**, and other services.

Includes support for both Azure and on-premises workloads, as well as other public clouds (AWS, GCP). **Multi-cloud support**



AZ-900 EXAM CRAM

THE COMPLETE COURSE

DEMO

Tour of Microsoft
Defender for Cloud

INSIDE CLOUD
AND SECURITY

EXAM DOMAINS FOR AZ-900

- 01** Describe Cloud Concepts
- 02** Describe Azure Architecture and Services
- 03** Describe Azure Management and Governance

EXAM DOMAINS FOR AZ-900

03

Describe Azure Management and Governance

3.1 Describe **cost management** in Azure

3.2 Describe features and tools in Azure for
governance and compliance

3.3 Describe features and tools for **managing and
deploying Azure resources**

3.4 Describe **monitoring tools** in Azure

DOMAIN 3: DESCRIBE COST MANAGEMENT IN AZURE



- ❖ Describe factors that can affect **costs** in Azure
- ❖ Compare the **pricing calculator** and the **Total Cost of Ownership (TCO) Calculator**
- ❖ Describe **cost management** capabilities in Azure
- ❖ Describe the purpose of **tags**

3.1 Describe cost management in Azure

DESCRIBE FACTORS THAT CAN AFFECT COSTS



Cost
Impacts

Factors that can affect Azure resource costs include **resource types, services, locations, ingress and egress traffic**

DESCRIBE FACTORS THAT CAN AFFECT COSTS



Reducing
Costs

Factors that can reduce costs include **reserved instances, reserved capacity, hybrid use benefit, spot pricing**

DESCRIBE METHODS FOR PLANNING AND MANAGING COSTS

Reserved Instances

Reserve **virtual machines** in advance and save up to 72 percent compared to PAYG pricing with **1-yr or 3-yr commitment**

DESCRIBE METHODS FOR PLANNING AND MANAGING COSTS

Reserved Capacity

discount is product-specific!

Achieve significant savings on **Azure SQL Database**, **Azure Cosmos DB** and **Azure Synapse Analytics** and **Azure Cache for Redis**

DESCRIBE METHODS FOR PLANNING AND MANAGING COSTS

Reserved Capacity

Enables you to more easily **manage costs** across **predictable** and **variable** workloads and help optimize budgeting and forecasting.

also includes 1-year and 3-year options

DESCRIBE METHODS FOR PLANNING AND MANAGING COSTS

Hybrid Use Benefit

A **licensing benefit** that helps you to significantly reduce the costs of running your workloads in the cloud.

DESCRIBE METHODS FOR PLANNING AND MANAGING COSTS

Windows Server, SQL Server, Redhat and Suse Linux

Hybrid Use Benefit

Let's you use your **on-premises** **Software Assurance-enabled** Windows Server and SQL Server licenses on Azure

DESCRIBE METHODS FOR PLANNING AND MANAGING COSTS

applies to Azure VMs only!

Spot Pricing

Access **unused Azure compute capacity** at deep discounts—up to 90 percent compared to pay-as-you-go prices

Use for workloads that can be interrupted without harm

DESCRIBE METHODS FOR PLANNING AND MANAGING COSTS



Pricing
Calculator

Interactive calculator that allows you to estimate the expected monthly Azure costs.

DESCRIBE METHODS FOR PLANNING AND MANAGING COSTS

BEFORE you deploy



Pricing
Calculator

Interactive calculator that allows you to estimate the expected monthly Azure costs.

Choose regions, services, options, and SKUs.

DESCRIBE METHODS FOR PLANNING AND MANAGING COSTS



TCO
Calculator

A tool that helps estimate cost savings you can achieve by migrating application workloads to Azure.

DESCRIBE METHODS FOR PLANNING AND MANAGING COSTS

BEFORE you deploy



TCO
Calculator

A tool that helps estimate cost savings you can achieve by migrating application workloads to Azure.

Allows you to compare the TCO of different Azure services and regions and provides a detailed breakdown of cost of components and potential savings.

DESCRIBE METHODS FOR PLANNING AND MANAGING COSTS

AFTER you deploy



Azure Cost
Management

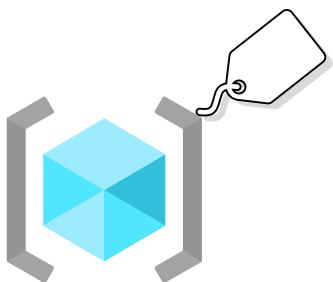
A suite of tools provided by Microsoft
that help you **analyze, manage, and**
optimize costs of your workloads.

DESCRIBE METHODS FOR PLANNING AND MANAGING COSTS



A **name and a value pair** used to **logically organize** Azure resources, resource groups, and subscriptions into a logical taxonomy.

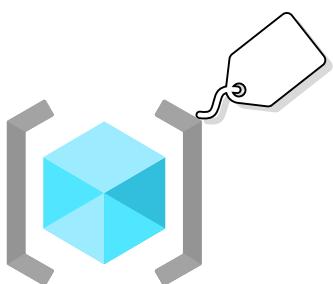
DESCRIBE METHODS FOR PLANNING AND MANAGING COSTS



Tags

Tags can be the basis for **applying business policies or tracking costs**

DESCRIBE METHODS FOR PLANNING AND MANAGING COSTS



Tags

Tags can be the basis for **applying business policies or tracking costs**

You can also **enforce tagging rules** with Azure policies

Examples of common tags include owner, cost center, app/service, and environment

DOMAIN 3: DESCRIBE CORE SOLUTIONS & TOOLS



- ❖ Describe the purpose of **Microsoft Purview** in Azure
- ❖ Describe the purpose of **Azure Policy**
- ❖ Describe the purpose of **resource locks**

3.2 Describe features and tools in Azure for governance and compliance

DESCRIBE AZURE GOVERNANCE FEATURES



Microsoft
Purview

A **unified data governance service** that helps organizations manage and govern their on-premises, multi-cloud, and SaaS data.

DESCRIBE AZURE GOVERNANCE FEATURES



Microsoft
Purview

A **unified data governance service** that helps organizations manage and govern their on-premises, multi-cloud, and SaaS data.

Automates data discovery by providing data scanning and classification for assets across the organization's data estate.



BASICS OF AZURE **GOVERNANCE**

CLOUD GOVERNANCE



POLICY

INITIATIVE

BLUEPRINT

CLOUD GOVERNANCE



POLICY

INITIATIVE

BLUEPRINT

The **definition of the conditions** which you want to control/govern.

CLOUD GOVERNANCE



POLICY INITIATIVE BLUEPRINT

A **collection of Azure policy definitions** that are grouped together towards a specific goal

CLOUD GOVERNANCE



POLICY INITIATIVE **BLUEPRINT**

A container for composing **sets of standards, patterns, and requirements** for implementation of Azure cloud services, security, and design

CLOUD GOVERNANCE



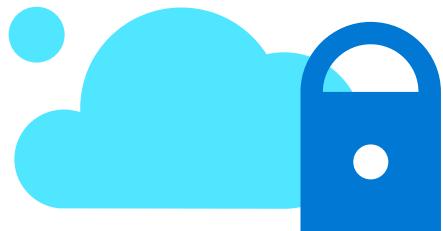
POLICY

INITIATIVE

BLUEPRINT

Often used in the same sentence as the phrase **“new environments”**

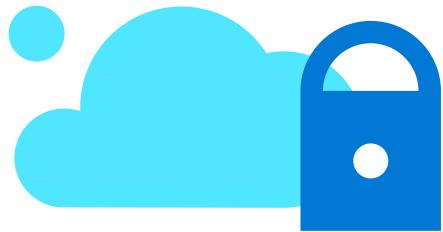
DESCRIBE AZURE GOVERNANCE FEATURES



Resource
Locks

Prevent other users in your organization from accidentally **deleting or modifying** critical resources.

DESCRIBE AZURE GOVERNANCE FEATURES



Resource
Locks

Prevent other users in your organization from accidentally **deleting or modifying** critical resources.

The **lock overrides any permissions** the user might have.

DOMAIN 3: DESCRIBE CORE SOLUTIONS & TOOLS



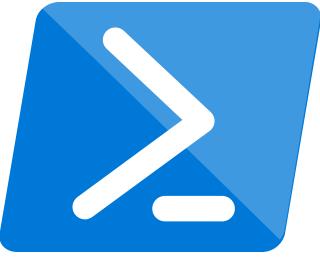
- ❖ Describe the **Azure portal**
- ❖ Describe **Azure Cloud Shell**, including Azure Command-Line Interface (CLI) and Azure PowerShell
- ❖ Describe the purpose of **Azure Arc**
- ❖ Describe **infrastructure as code (IaC)**
- ❖ Describe **Azure Resource Manager (ARM)** and **ARM templates**

3.3 Describe features and tools for managing and deploying Azure resources

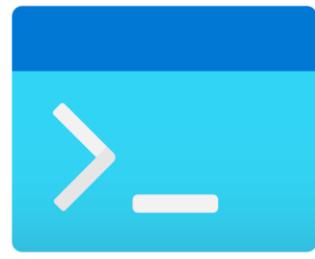
DESCRIBE AZURE MANAGEMENT TOOLS



Azure
Portal



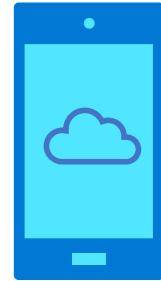
Azure
PowerShell



Azure CLI



Azure Cloud
Shell



Azure Mobile
App

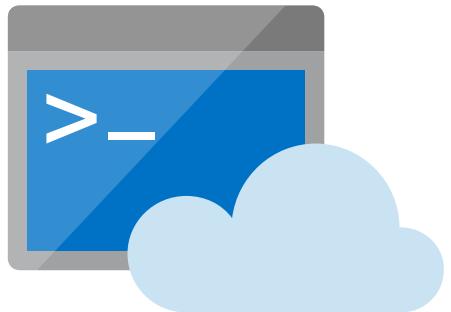
DESCRIBE CORE SOLUTIONS IN AZURE



Azure
Portal

A **web-based, unified console** where you can manage your Azure subscription using a graphical user interface.

DESCRIBE CORE SOLUTIONS IN AZURE



Azure Cloud
Shell

An interactive, authenticated, **browser-accessible shell** for managing Azure resources.

DESCRIBE CORE SOLUTIONS IN AZURE

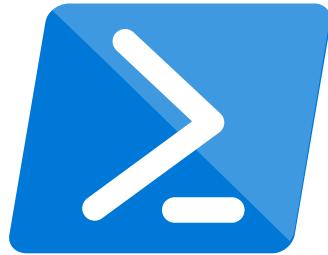


Azure Cloud
Shell

An interactive, authenticated, **browser-accessible shell** for managing Azure resources.

It includes both **Bash** and **PowerShell** options

DESCRIBE CORE SOLUTIONS IN AZURE



Azure
PowerShell

A set of cmdlets for managing Azure resources directly from the PowerShell command line.

MSFT provides Azure-specific modules and cmdlets

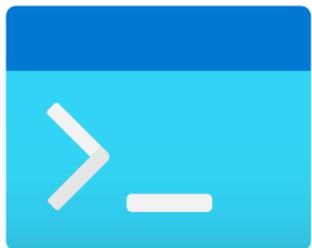
DESCRIBE CORE SOLUTIONS IN AZURE



Azure Mobile
App

App for iOS and Android that enables **managing**, tracking **health** and **status**, and **troubleshooting** your Azure resources

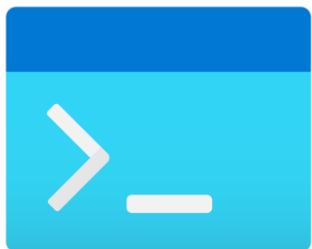
DESCRIBE CORE SOLUTIONS IN AZURE



Azure CLI

The Azure **command-line interface** (Azure CLI) is a set of commands used to create and manage Azure resources.

DESCRIBE CORE SOLUTIONS IN AZURE



Azure CLI

The Azure **command-line interface** (Azure CLI) is a set of commands used to create and manage Azure resources.

Available on **Windows**, **macOS**, and **Linux**, **Docker**, and **Azure Cloud Shell**.



AZ-900 EXAM CRAM

THE COMPLETE COURSE

DEMO

Introduction to the
Azure Cloud Shell

INSIDE CLOUD
AND SECURITY

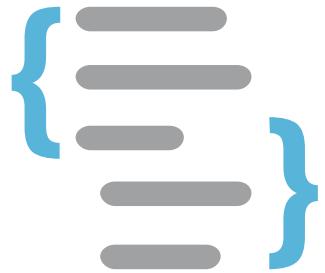
DESCRIBE AZURE MANAGEMENT FEATURES AND TOOLS



ARM
Templates

A JavaScript Object Notation (**JSON**) file that defines the infrastructure and configuration for your project.

DESCRIBE AZURE MANAGEMENT FEATURES AND TOOLS



ARM
Templates

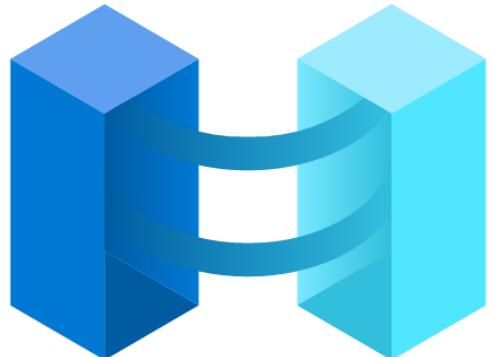
A JavaScript Object Notation (**JSON**) file that defines the infrastructure and configuration for your project.

Templates use **declarative** syntax and are **idempotent**, which means you can deploy many times and get same resources and state.

Used in deployment automation in infrastructure as code

DESCRIBE THE PURPOSE OF AZURE ARC

A platform that extends Azure services to run applications across datacenters, edge, and multi-cloud environments.

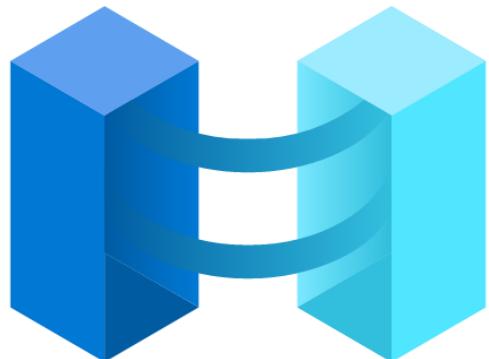


Azure Arc

Provides a consistent development, operations, and security model to run applications on new and existing hardware.

DESCRIBE THE PURPOSE OF AZURE ARC

A platform that **extends Azure services** to run applications across **datacenters, edge, and multi-cloud environments**.



Azure Arc

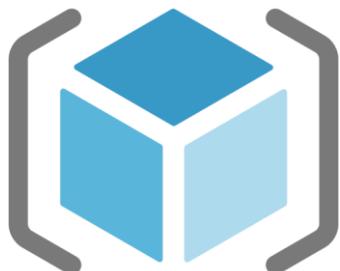
Provides a **consistent development, operations, and security model** to run applications on new and existing hardware.

Simplifies governance and management by delivering a consistent **multi-cloud** and **on-premises** management platform.

Extends ARM capabilities to Linux and Windows servers, as well as Kubernetes clusters on any infrastructure across **on-premises, multi-cloud**, and the **edge**.

DESCRIBE AZURE MANAGEMENT FEATURES AND TOOLS

What is Azure Resource Manager?



Azure Resource
Manager

Azure Resource Manager (ARM) is the deployment and management service for Azure.

It provides a management layer that enables you to create, update, and delete resources in your Azure account.

INFRASTRUCTURE AS CODE

IaC
Infrastructure
as Code

is the management of infrastructure (networks, VMs, load balancers, and connection topology) described in code

just as the same source code generates the same binary, code in the IaC model results in the same environment every time it is applied.

IaC is a key DevOps practice and is used in conjunction with continuous integration and continuous delivery (CI/CD).

IaC, CI/CD, DevOps, and DevSecOps are part of daily life in the cloud!

DOMAIN 3: DESCRIBE CORE SOLUTIONS & TOOLS



- ❖ Describe the purpose of **Azure Advisor**
- ❖ Describe **Azure Service Health**
- ❖ Describe **Azure Monitor**, including **Log Analytics**,
Azure Monitor alerts, and **Application Insights**

3.4 Describe monitoring tools in Azure

DESCRIBE AZURE MANAGEMENT TOOLS



Azure Advisor

Scans your Azure configuration and recommends changes to **optimize** deployments, increase **security**, and save you **money**.

DESCRIBE AZURE MANAGEMENT TOOLS



Azure Advisor

Scans your Azure configuration and recommends changes to **optimize** deployments, increase **security**, and save you **money**.
Analyzes the configuration of the resource deployed in the Azure subscriptions

high availability, security, performance, costs

DESCRIBE AZURE MANAGEMENT TOOLS



Azure Monitor

A service that **collects monitoring telemetry** from a variety of on-premises and Azure sources.

DESCRIBE AZURE MANAGEMENT TOOLS



Azure Monitor

A service that **collects monitoring telemetry** from a variety of on-premises and Azure sources.

Can monitor resources like app, VMs, guest OS, containers, DBs, security, and network events

DESCRIBE AZURE MANAGEMENT TOOLS



Azure Monitor

A service that **collects monitoring telemetry** from a variety of on-premises and Azure sources.

Can monitor resources like app, VMs, guest OS, containers, DBs, security, and network events

Azure Monitor **aggregates and stores** this telemetry in an **Azure Log Analytics** instance

backend data store

DESCRIBE AZURE MANAGEMENT TOOLS



Azure Monitor Alerts

e.g. Azure Functions or Azure Automation runbooks

A proactive way to **detect and address issues** before they become critical.

You can create alerts on **any metric or log data source** in the Azure Monitor data platform.

Types include metric, log, activity, service health, resource health, smart detection, and Prometheus.

View alerts in the portal, **send notifications**, or **initiate automated responses**

DESCRIBE AZURE MANAGEMENT TOOLS



Application Insights

An extension of Azure Monitor and provides application performance monitoring (APM) features.

Monitors the availability, performance, and usage of your web applications.



Enables **proactive** understanding of app performance and **reactive** review of app execution to determine root cause

DESCRIBE AZURE MANAGEMENT TOOLS



Azure Service
Health

Notifies you about **Azure service incidents** and planned maintenance so you can take action to mitigate downtime.



AZ-900 EXAM CRAM

THE COMPLETE COURSE

DEMO

A brief introduction to
Azure Log Analytics

INSIDE CLOUD
AND SECURITY

BONUS

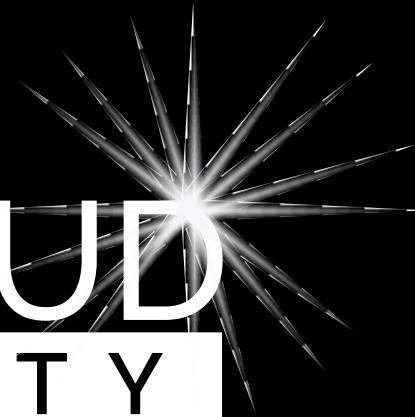
to assess your readiness

FREE PRACTICE QUESTIONS

for the AZ-900 exam



INSIDE CLOUD AND SECURITY



THANKS
FOR WATCHING!