

Azure Fundamentals

A Workshop for better understanding

Azure Portal

- Most common & approachable way to interact with Azure



Personalize
Create your own dashboards, layouts, workflows and colors.



One Stop Shop
Single portal, single login for all your Azure assets.



Access Control
Fine-grained access control to all your resources. This will make management and governance much easier.



Constantly Updated
The portal features and products are constantly updated. Good as you get the latest and greatest. Bad because it can be confusing.



Cost Management
Great tooling to keep track of current and projected spend for your Azure resources.



Multi-Platform
The Azure portal functions are available through the web and on various mobile devices.

Azure CLI

- Looks very different from the Portal
- Text-only entry tool
- Used by lot of professionals
 - Stable
 - Structured
 - Cross platform
 - Automation
 - Logging

Resource

Azure PowerShell

- Pre-Installed & Text Only

- Resource

PowerShell

1 Cmdlet

A script that performs a specific task.
"New-AzVm" creates a new Virtual Machine.

2 Azure Resource Manager

PowerShell also uses the Resource Manager, like the Portal, to manipulate Azure resources.

3 Versatile

You can use PowerShell for many other tasks and areas. Not just for Azure.

Cloud Shell



- Interactive, browser-accessible shell for managing Azure resources
 - Standalone
 - Portal component
- Features
 - Access
 - Shell
 - Tools
 - Storage
 - File Editor

Azure Mobile Apps



- Available in iOS and Andriod
- Features
 - Quick Information on the go
 - Alerts, Recently used resources
 - Utilizes ARM to interact with Azure
 - CloudShell



ARM Templates

ARM Templates



Describe Resource Usage

What are you updating, deleting, creating?



Common Syntax

Defined language for all ARM templates, making it easier to formalize and learn.

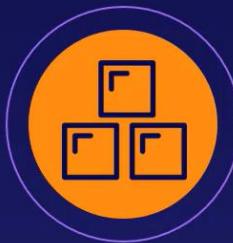


Idempotent

Every ARM template can be applied multiple times, and the result is always the same.

```
{  
  "$schema": "https://schema.management.azure.com/schemas/2019-04-01/deploymentTemplate.json#",  
  "contentVersion": "1.0.0.0",  
  "resources": [  
    {  
      "type": "Microsoft.Storage/storageAccounts",  
      "apiVersion": "2019-04-01",  
      "name": "{provide-unique-name}",  
      "location": "eastus",  
      "sku": {  
        "name": "Standard_LRS"  
      },  
      "kind": "StorageV2",  
      "properties": {  
        "supportsHttpsTrafficOnly": true  
      }  
    }  
  ]  
}
```

ARM Templates Benefits



Idempotent

Run the same templates once, twice, or as many times as you like. It will have the same outcome.



Source Control

Keep track of all changes to the ARM templates.



Reuse

Use a combination of multiple partial ARM templates to achieve glory — or at least complex templates.



Declarative

Specify **what** you want, not **how** it is done.



No Human Errors

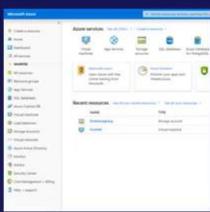
Automation means humans don't repeat the same mistakes.

Session Re-cap



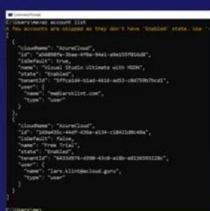
Course Overview

Benefits of certification, course structure, and everything you need to help you pass the AZ-900 exam.



Azure Portal

Intuitive, visual one-stop shop for managing all your Azure resources.



Azure CLI

A text-only way to manage Azure resources. A stable, structured way to manage your Azure environment.



Azure PowerShell

Fully supported by Azure with modules and cmdlets. A tool that fits into many different workflows.



Azure Cloud Shell

Works from anywhere using a browser or mobile app. Many included tools and features, including storage.



Azure Mobile Apps

Use the Android and iOS mobile apps to be alerted and respond to emergencies, or just perform general maintenance.



ARM Templates

Use ARM templates to automate your infrastructure setup and avoid human mistakes. They are idempotent, can be put into source control, and are declarative.

Quiz 1

- What is a PowerShell cmdlet?
 - A lightweight version of PowerShell that can run on mobile devices
 - A lightweight command that is used in the PowerShell environment to perform an action
 - A piece of advice from Microsoft about PowerShell updates
 - A PowerShell scripting language specifically for Azure

Quiz 1

- What is a PowerShell cmdlet?
 - A. A lightweight version of PowerShell that can run on mobile devices
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 - C. A piece of advice from Microsoft about PowerShell updates
 - D. A PowerShell scripting language specifically for Azure

Quiz 2

- Why would you use the Azure Cloud Shell?
 - A. Cloud Shell enables access to a browser-based command-line experience built with Azure management tasks in mind.
 - B. The Cloud Shell is free for 12 months.
 - C. You can update the Cloud Shell independently of Azure CLI and Azure PowerShell.
 - D. The Cloud Shell gets new features first.

Quiz 2

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Quiz 3

- What are some of the key advantages of using ARM templates for creating cloud infrastructure?
 - A. Service integrations
 - B. Idempotency
 - C. Declarative
 - D. Source control
 - E. Faster processing in the Azure Resource Manager

Quiz 3

- What are some of the key advantages of using ARM templates for creating cloud infrastructure?
 - A. Service integrations
 - B. **Idempotency**
 - C. **Declarative**
 - D. **Source control**
 - E. Faster processing in the Azure Resource Manager

Quiz 4

- Which Azure products and services are available through the Azure portal?
 - A. All products and services that are generally available and in private or public preview
 - B. Only products and services that aren't free
 - C. Only products that are globally available
 - D. Only products that are not in private or public preview

Quiz 4

- Which Azure products and services are available through the Azure portal?
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Quiz 5

- What is a good reason to use the Azure CLI?
 - A. You can use the Azure CLI with more than one cloud provider.
 - B. It makes it cheaper to use Azure, as you don't have to pay for the Azure portal.
 - C. It rarely changes, and the commands stay the same for the most part.
 - D. You can use products and services that aren't available in the Azure portal.

Quiz 5

- What is a good reason to use the Azure CLI?
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Cloud Computing

Language of Cloud Computing

Economy of Cloud Computing

Cloud Services Model

Azure Market Place

Cloud Architecture Market Place

Language of Cloud Computing



- High availability
- Fault tolerance
- Disaster recovery
- Scalability
- Elasticity
- Agility

Cloud Computing Benefits
Examples of Fiscal Outcomes



High Availability

High availability is core to the cloud

Traditional

- You own the hardware
- Physical access
- You can't "just add servers"

Cloud

- You don't own the hardware
- Add more servers with a click
- If hardware fails, replace instantly
- Use clusters to ensure high availability

VS

Fault Tolerance

Press **Esc** to exit full screen

Fault Tolerance

1

Resilience

Fault tolerance is part of the resilience of cloud computing.

2

Zero Down-Time

Faults caused by Azure are also mitigated by Azure.



Disaster Recovery

Disaster Recovery

1 Catastrophic Disaster

Hurricane, flood, tornado or cyber attacks are real threats.

2 Plan to Recover

Complete plan to recover critical business systems.

3 Specific Points

Designated Time to Recovery (how long does it take to recover?) and Recovery Point (point of time data to recover).



Responsiveness



Scalability

Scale out, scale up or scale down. Use auto-scaling for critical scenarios.



Elasticity

Ability to quickly expand or decrease computing resources, not just VMs.
Elasticity enables scaling.



Agility

The ability to rapidly develop, test and launch software applications that drive business growth.

Cloud Economics



Capital Expenditure

Money spent by a business or organization on acquiring or maintaining fixed assets, such as land, buildings, and equipment.

Large upfront investments.

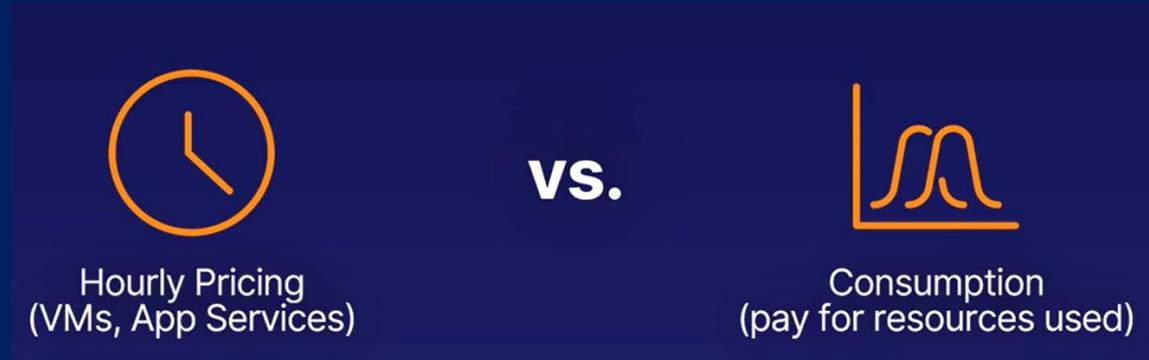


Operational Expenditure

An ongoing cost for running a product, business, or system on a day-to-day basis, including annual costs.

Pay-as-you-go.

Cloud Economics



Cloud Service Models



Cloud Service Models

IAAS

Infrastructure = actual servers

Scaling is fast

No ownership of hardware

IaaS



VMs & Servers



Networks



Physical
Buildings

PAAS

Superset of IaaS

PaaS supports web application life cycle

Avoids software license hell



SAAS

Providing a managed service

Pay an access fee to use

No maintenance and latest features



Serverless

Of course there are servers!

Azure Functions is the best know serverless service

Extreme PaaS

Serverless (Extreme PaaS)

IaaS



VMs & Servers



Networks



Physical
Buildings



Middleware



Tools

Identifying Cloud Services

| Model | Characteristics | Examples |
|-------|---|------------------------------------|
| IaaS | <ul style="list-style-type: none">Organization has complete control of the infrastructure.Dynamic and flexible. You can do almost anything.Cost varies depending on consumption.Services are highly scalable.Multiple users share a single piece of hardware. | VM, VNet, Storage |
| PaaS | <ul style="list-style-type: none">Resources are virtualized and can easily be scaled up or down as needed.Services often assist with the development, testing and deployment of apps.Multi-user access via the same development application.Integrates web services and databases. | App Services, Azure CDN, Cosmos DB |
| SaaS | <ul style="list-style-type: none">Managed from a central location.Hosted on a remote server.Accessible over the internet.Users not responsible for hardware or software updates.Rate limiting/QoS. | Microsoft 365 |

Shared Responsibility



Azure Market Place

Azure Marketplace

1

Solutions and Services

Large selection from Microsoft and partners.
Apps, VMs, templates, services and oh so
much more.

2

Azure App Store

Buy cloud services with a single click (almost).
Many categories of items to acquire.

3

Easy to Integrate

Use from Portal, CLI or PowerShell.
Some are free, some are paid.

4

Publish Your Own

If you are a Microsoft Partner, publish your own
services in the Marketplace.

The screenshot shows the Microsoft Azure Marketplace interface. On the left, a sidebar lists navigation options: Create a resource, Home, Dashboard, All services, FAVORITES, Resource groups, All resources, Recent, App Services, Virtual machines (classic), Virtual machines, SQL databases, Cloud services (classic), Subscriptions, Application Insights, Azure Active Directory, Monitor, Security Center, Cost Management + Billing, Help + support, and Advisor. Below this is a 'Categories' section with links to Get Started, AI + Machine Learning, Analytics, Blockchain, Compute, Containers, Databases, Developer Tools, DevOps, Identity, Integration, Internet of Things, IT & Management Tools, Media, Mixed Reality, Networking, Security, Software as a Service (SaaS), and Storage. The main content area displays several service cards. One card for 'Machine Learning service workspace' by Microsoft is highlighted with a green border. Other visible cards include 'Web App Bot' by Microsoft, 'Ubuntu Server 18.04 LTS' by Canonical, 'Red Hat Enterprise Linux 7' by Red Hat, and 'IoT Central Application' and 'IoT Hub' both by Microsoft. Each card includes a brief description and a 'like' icon.

Azure Market Place - Benefits



Certified and Less Maintenance

Less maintenance than creating your own service or application from scratch. All Marketplace offerings are certified by Microsoft.



Efficient

It is much faster to build a project prototype by using ready-to-go services on the Marketplace.



New Markets

You can venture into new markets by getting the full exposure of the Marketplace.



Support

There is both technical, design and architectural design support available when you list a service on the Marketplace.

Cloud Architecture Models



The diagram illustrates a Private Cloud architecture model. It features a large orange circle containing a blue cloud icon with a gear-like connection symbol. To the right of the circle, three orange-outlined human silhouettes are arranged in a triangular formation, representing users or stakeholders.

Pros

- Complete control of infrastructure
- Benefits of public cloud
- Better security and privacy

Cons

- Maintenance
- Staffing

Cloud Architecture Models



Public Cloud



Pros

- No purchase of hardware
- Low monthly fees

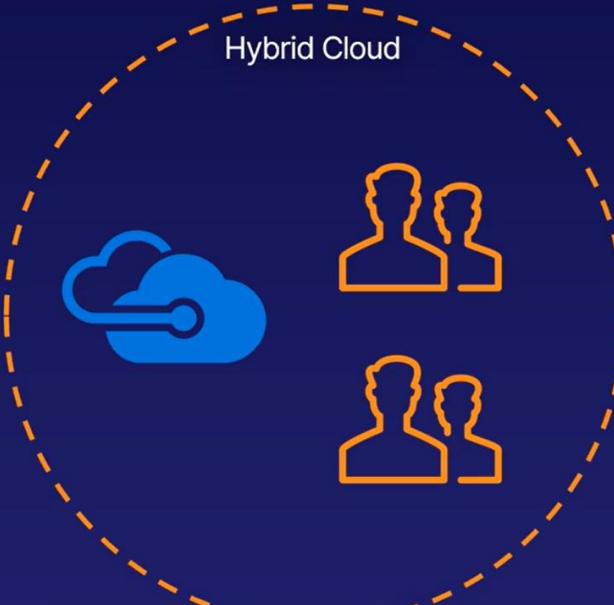
Cons

- No control over features and versions
- No physical access

Cloud Architecture Models

CLOUD ARCHITECTURE MODELS

Hybrid Cloud



A diagram illustrating a Hybrid Cloud architecture. It features a central blue cloud icon with a gear inside, connected by lines to two orange user profile icons. This central arrangement is enclosed within a dashed orange circle labeled "Hybrid Cloud" at the top.

A CLOUD GURU

Pros

- Avoid disruptions and outages
- Adhere to regulation, governance etc.
- Span both public and private cloud
- Alleviate CapEx investments

Cons

- Complex infrastructure

Session Re-cap

1

Language of Cloud Computing

High availability, fault tolerance, disaster recovery, scalability, elasticity and agility. Describes stable and dependable cloud computing, the ability to adapt to changes in resource demand, user base and application usage.

2

Language of Cloud Economics

CapEx and OpEx describe costs for computing. OpEx is cloud computing with a pay-as-you-go model.

3

Cloud Service Models

IaaS, PaaS and SaaS are cloud service models that pretty much all Azure products and services fall under.

The shared responsibility model dictates whether you or Microsoft is responsible for a cloud service.

4

Azure Marketplace

An extra layer of functionality for your cloud applications, by letting users use and integrate third-party products and services.

5

Cloud Architecture Models

Private, public and hybrid approaches to using cloud computing for your business.

Quiz 1

- What is "serverless" computing?
 - A. A complete development and deployment environment in the cloud
 - B. An application that is running on the cloud platform without the use of servers
 - C. A way for developers to build applications faster by eliminating the need for them to manage infrastructure
 - D. A theory for making computing completely cloud-based for certain scenarios

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Quiz 2

- Why is cloud agility important for businesses?
 - A. To automatically improve the fidelity of resource usage and utilize the platform better
 - B. To increase the return on investment from using cloud elasticity
 - C. To be able to quickly scale resources when needed at short notice
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Quiz 3

- Select all the true statements per Microsoft's definitions of cloud types. (Choose 3)
 - A hybrid cloud combines a public cloud (such as Azure) with on-premises infrastructure (private cloud).
 - In private clouds, services and infrastructure are always maintained on a private network, and the hardware and software are dedicated solely to your organization.
 - Private clouds can be hosted at your datacenter or hosted by a third-party service. Private clouds offer advantages of flexibility, control, and scalability.
 - Public clouds typically cost more than private clouds, but they are generally less reliable than on-premises infrastructure (private cloud).

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Quiz 4

- What are the two types of scaling on Azure
 - A. There is only one type of scaling: scaling up/down.
 - B. Scaling up/down and scaling out
 - C. Scaling out and scaling across
 - D. Scale sets and high availability

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Quiz 5

- What is consumption-based pricing on Azure?
 - A. Consumption-based pricing is when you are charged for only what you use (pay-as-you-go rate).
 - B. Any service you use on Azure has a consumption component as part of the pricing.
 - C. Some core services on Azure are consumed constantly to keep your applications running. You pay for this consumption.
 - D. Consumption-based pricing is the model for paying for any services on a free Azure account.

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Quiz 6

- What is high availability in cloud computing?
 - A. Microsoft guarantees you will always have access to the resources on Azure.
 - B. Azure will provide an infinite number of resources to your application to make sure it always runs optimally.
 - C. High availability refers to the availability of the Azure portal. You can always get access to an overview of what your Azure services are doing.
 - D. If one resource on Azure dies unexpectedly, another resource will almost instantly take over the workload.

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Quiz 7

- Which cloud ability does elasticity describe?
 - A. The same as scalability and describes an increase in resources
 - B. The ability to quickly expand or decrease computer processing, memory, and storage resources
 - C. The ability to turn resources on and off quickly across regions
 - D. The ability to create identical resources in multiple locations globally

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Quiz 8

- What does Infrastructure as a Service describe?
 - A type of cloud computing service that offers essential compute, storage, and networking resources on demand, on a pay-as-you-go basis
 - A complete development and deployment environment in the cloud, with resources that enable you to deliver everything from simple cloud-based apps to sophisticated, cloud-enabled enterprise applications
 - A type of cloud computing service that allows users to connect to and use cloud-based apps over the internet
 - Any service on Azure that you can rent or buy upfront

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Quiz 9

- What is a benefit of a hybrid cloud approach?
 - A. It enables companies to use a mix of private and public cloud components.
 - B. It requires no changes to existing code or applications, allowing companies to scale their infrastructure into the cloud.
 - C. All maintenance is handled by Microsoft Azure, so it reduces support costs.
 - D. Using alternative energy sources for powering some services can create tax benefits in some regions.

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Quiz 10

- What does fault tolerance describe for cloud computing?
 - A system within Azure that uses cloud computing resources to mitigate faults quickly
 - The ability for multiple regions within Azure to "cover" each other in case of an outage
 - Ensuring services and applications remain available in the event of a failure
 - A complete plan to recover critical business systems and normal operations, in case of a disaster

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Quiz 11

- What is the difference between OpEx and CapEx?
 - A. OpEx is better return on investment in the short term. CapEx is better return on investment in the long term.
 - B. OpEx is a cost on services you don't own, such as cloud computing. CapEx is a cost of ownership.
 - C. OpEx is an ongoing cost for running a business. CapEx is the cost of acquiring and maintaining assets.
 - D. OpEx is costs for acquiring assets. CapEx is an ongoing cost for running a business.

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Quiz 12

- What's the best definition for scalability on Azure?
 - A. Scaling of resources on Azure is currently not possible.
 - B. Scalability is the ability to quickly expand or decrease computer processing, memory, and storage resources to meet changing demands without worrying about capacity planning and engineering for peak usage.
 - C. If an account has more than one Azure region active, resources can be copied between these regions.
 - D. Scalability is the ability of a system to handle increased load. Services covered by Azure Autoscale can scale automatically to match demand to accommodate workload.

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Azure Architecture

Region

Availability Zones

Resource Groups

Azure Resource Manager

Regions

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



"A set of datacenters"

Each region has more than one data center, which is a physical location.

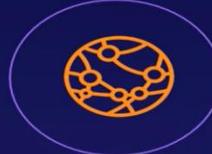
"Latency defined perimeter"

Latency is the time it takes data to travel.
Also means that datacenters are not "too far" from each other.

"Regional low-latency network"

A fiber connection between data centers in the region.

Two or more data centers not too far from each other connected with a fiber connection



Location

Choose a region closest to your users to minimize latency.



Features

Some features aren't in all regions. If you need a specific feature, some regions might be unavailable.



Price

The price of services vary from region to region.

You will often have to choose which is the most important: location, feature or price.

Paired Region

Paired Region

1 Each Region is Paired

Paired within same geographic area except Brazil South.

2 Outage Failover

If the primary region has an outage you can failover to the secondary region.

3 Planned Updates

Only one region in a pair is updated at any one time.

4 Replication

Some services used paired regions for replication.



Availability Zone



Physical Location

Each availability zone is a physical location within a region.



Independent

Each zone has its own power, cooling and networking.



Zones

Each region has a minimum of three zones.

Region



Zone



Zone



Re-Cap



Azure Region

A set of data centers that are close enough to each other that it doesn't matter which datacenter your data is in. Latency is the time it takes for data to travel.



Availability Zone

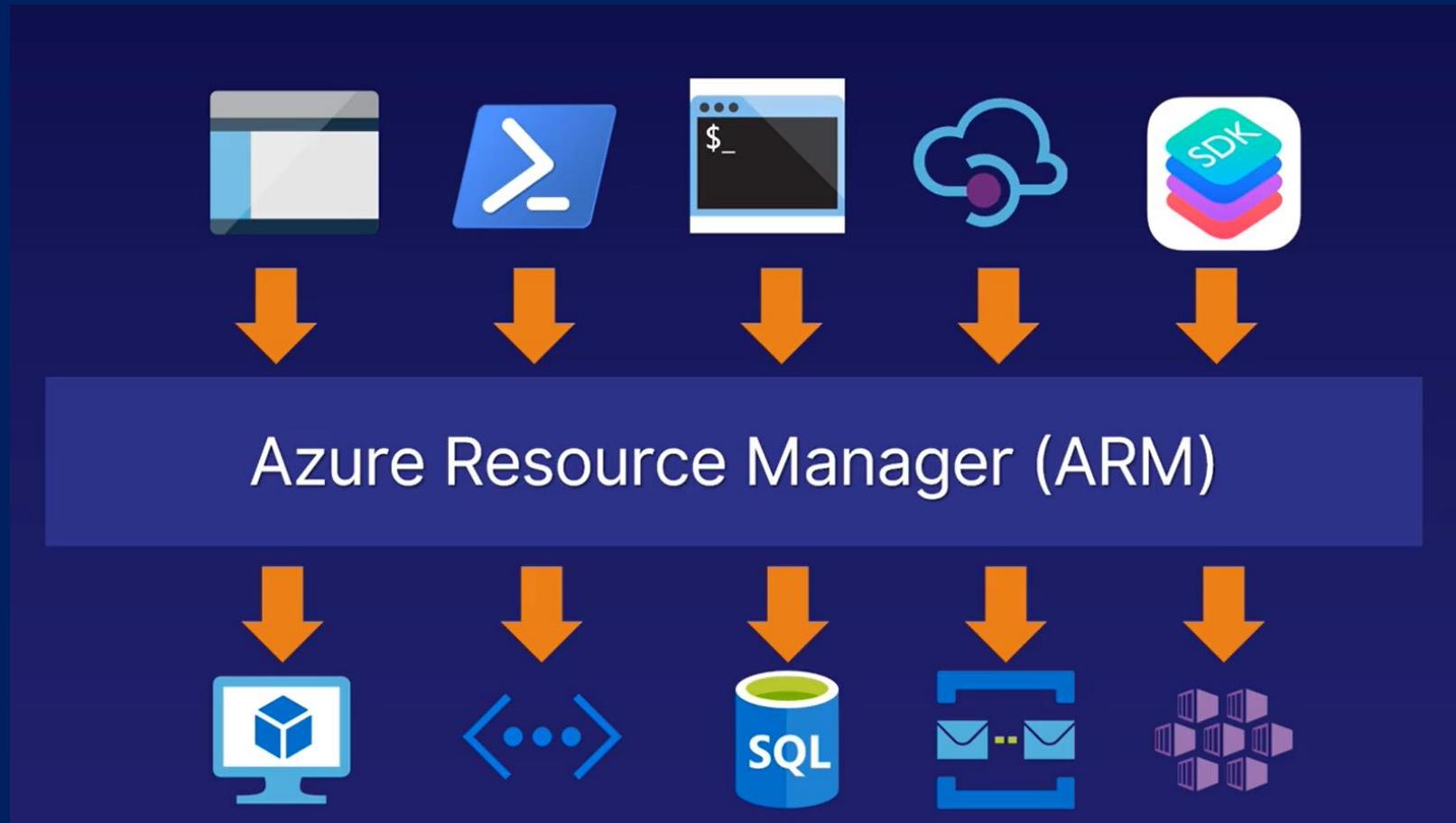
Within a region and each zone has its own separate power, cooling and networking.
Used for protecting data from failures.

Resource Group



- 1 One Resource
Each resource can only exist in a single resource group.
- 2 Add/Remove
You can add or remove resources to any resource group at any time.
- 3 Move Resource
You can move a resource from one resource group to another.
- 4 Multiple Regions
Resources from multiple regions can be in one resource group.
- 5 Access Control
You can give users access to a resource group and everything in it.
- 6 Interact
Resources can interact with other resources in different resource groups.
- 7 Location
A resource group has a location, or region, as it stores meta data about the resources in it.

Azure Resource Manager



ARM Benefits



Group Resource Handling

You can deploy, manage and monitor resources as a group.



Access Control

Built-in features in the ARM make it easy to assign access rights to users.



Consistency

Deploying resources from various tools will always result in the same consistent state.



Tagging

Tag resources to easily identify them for future scenarios. Tagging is a way to label individual resources.



Dependencies

Define dependencies between resources to make sure they don't get in a fight.



Billing

Use tagging to stay on top of billing for groups of resources.

Re-Cap



Resource Groups

All resources belong to a resource group. It isn't a resource, but helps structure your Azure architecture.



Azure Resource Manager

All interaction with Azure resources go through the ARM.
It is the main Azure Architecture component for creating, updating and manipulating resources.

Session Resources



- [Azure Architecture - Video](#)
- [Principles of Resource Groups](#)



Compute

Virtual Machines

Scale Sets

App Services

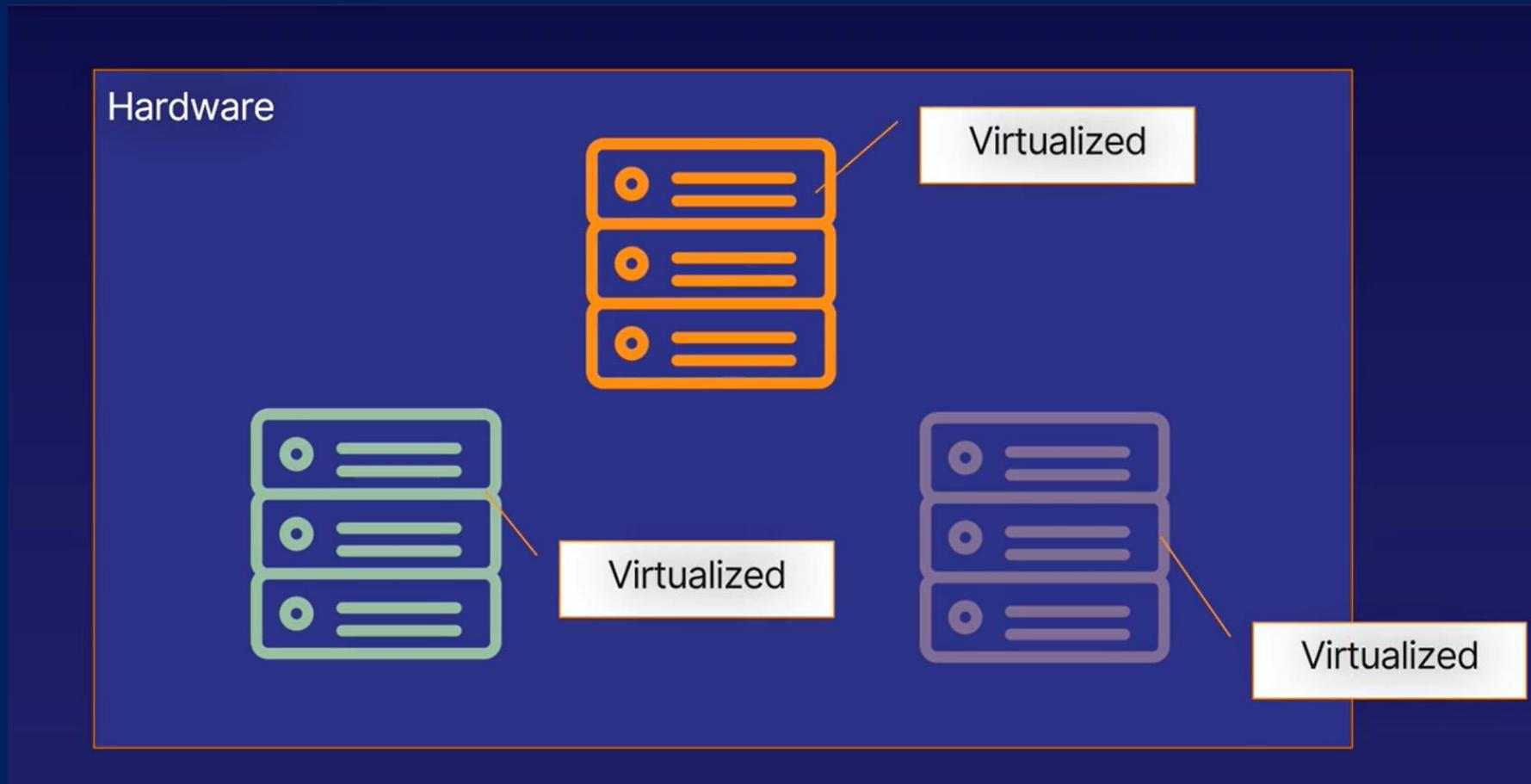
Container Instances

Azure Kubernetes Service

Windows Virtual Desktop

Functions

Virtual Machines



Virtual Machine - Features



Infrastructure-as-a-Service (IaaS)
Manage everything except the hardware.
This includes the networking components.



Tools
Use the Azure Portal to manage large numbers of VMs and even hybrid clouds.



Compliance
Use Azure blueprints to make your VMs comply with company guidelines.



Recommendations
Azure will recommend improvements to ensure better security, higher availability and greater performance.



Choice
Choose amount of RAM, number of CPUs, Windows or Linux.

Pricing



Calculated Hourly



Resources

Use Cases

| | | | | | | |
|--|--------------|---|--|--|---|---|
|  | Pros: | Control Use virtual machines when you need to control all aspects of an environment or machine. |  | Application Install specific applications on your Windows or Linux machines. |  | Existing Infrastructure You can move existing resources and virtual machines to Azure from on-premises or another cloud provider. |
| <hr/> | | | | | | |
|  | Cons: | Not for Everything If you can use another Azure service instead, it is often worth it. |  | Maintenance A lot of maintenance with VMs. Operating system updates, patches, security concerns. | | |

Scale Sets



A group of identical, load balanced VMs

Scale Sets - Benefits



Multiple VMs

Simple to manage multiple identical VMs using a load balancer.



High Availability

If one VM fails or stops, the others in the scale set will keep working.



Auto Scaling

Automatically match demand by adding or removing VMs from the scale set.



Large Scale

Run up to 1000 VMs in a single scale set.



No Extra Cost

No added cost for using scale sets.

Re-Cap



- Identical Virtual Machines
- A baseline VM needed to grow scale set
- Ensures application availability
- Pay only for the Virtual Machine, Networking and Storage usage

Session Resources



- Explore Azure Compute Service



Thank You !

Have a Great Day !!