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Certification areas (AZ-900)

Study areas	Weight
Describe Cloud Concepts	20-25%
Describe Core Azure Services	15-20%
Describe Core Solutions and Management Tools	10-15%
Describe General Security and Network Security	10-15%
Describe Identity, Governance, Privacy and Compliance	20-25%
Describe Azure cost management and Service Level Agreements	10-15%

- This course maps directly to the exam AZ-900 Microsoft Azure Fundamentals.
- Percentages indicate the relative weight of each area on the exam.
- The higher the percentage, the more questions you are likely to see in that area.

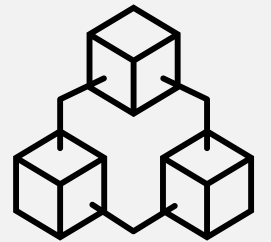
MOD 1: Azure Cloud Concepts

Module 01 - Outline

You will learn the following concepts:

- **Cloud Models**
 - Public, Private, and Hybrid cloud
 - Choosing the best for you
- **Cloud Benefits and Considerations**
 - Benefits of the cloud
 - Cloud considerations
- **Cloud Services**
 - IaaS, PaaS, and SaaS
 - Sharing responsibility

Cloud Models

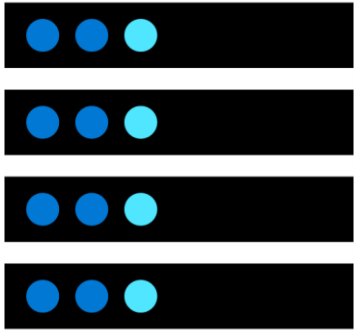


Cloud Models - Objective Domain

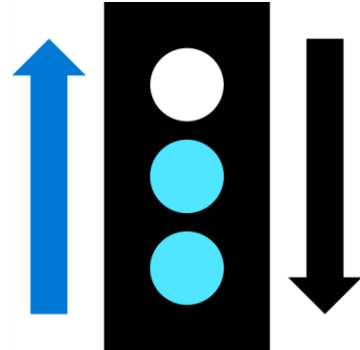
- Define cloud computing
- Describe Public cloud
- Describe Private cloud
- Describe Hybrid cloud
- Compare and contrast the three different cloud models

What is cloud computing?

Cloud Computing is the delivery of computing services over the internet, enabling faster innovation, flexible resources, and economies of scale.



Compute



Networking



Storage



Analytics

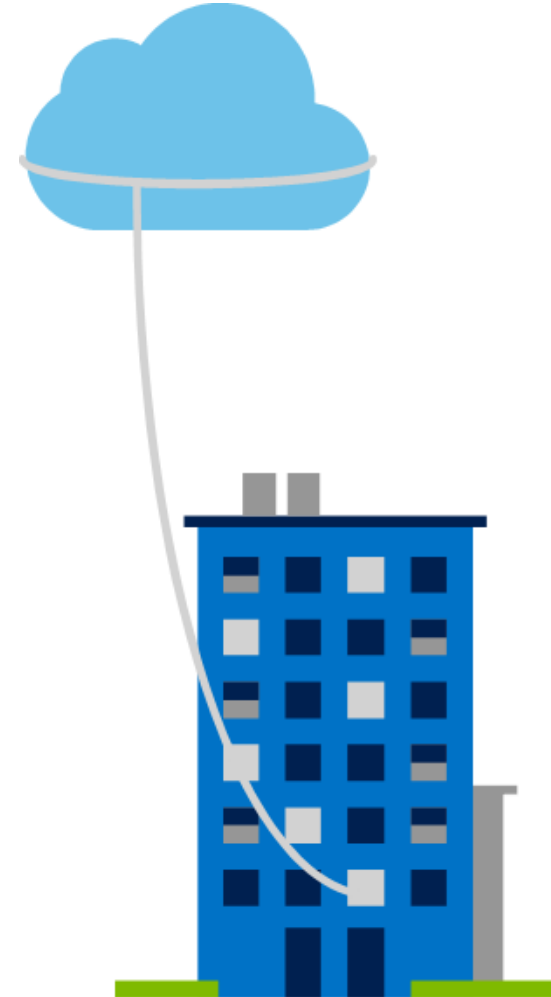
Public cloud

- Owned by cloud services or hosting provider.
- Provides resources and services to multiple organizations and users.
- Accessed via secure network connection (typically over the internet).



Private cloud

- Organizations create a cloud environment in their datacenter.
- Organization is responsible for operating the services they provide.
- Does not provide access to users outside of the organization.



Hybrid cloud



Combines **Public** and **Private** clouds to allow applications to run in the most appropriate location.

Cloud model comparison

Public Cloud

- No capital expenditures to scale up.
- Applications can be quickly provisioned and deprovisioned.
- Organizations pay only for what they use.

Private Cloud

- Hardware must be purchased for start-up and maintenance.
- Organizations have complete control over resources and security.
- Organizations are responsible for hardware maintenance and updates.

Hybrid Cloud

- Provides the most flexibility.
- Organizations determine where to run their applications.
- Organizations control security, compliance, or legal requirements.

Cloud benefits and considerations



Cloud Benefits - Objective Domain

- Identify the benefits of cloud computing such as High Availability, Scalability, Elasticity, Agility, and Disaster Recovery.
- Identify the differences between Capital Expenditure (CapEx) and Operational Expenditure (OpEx).
- Describe the consumption-based model.

Cloud Benefits

High availability

Fault tolerance

Scalability

Elasticity

Global reach

Customer latency capabilities

Agility

Predictive cost considerations

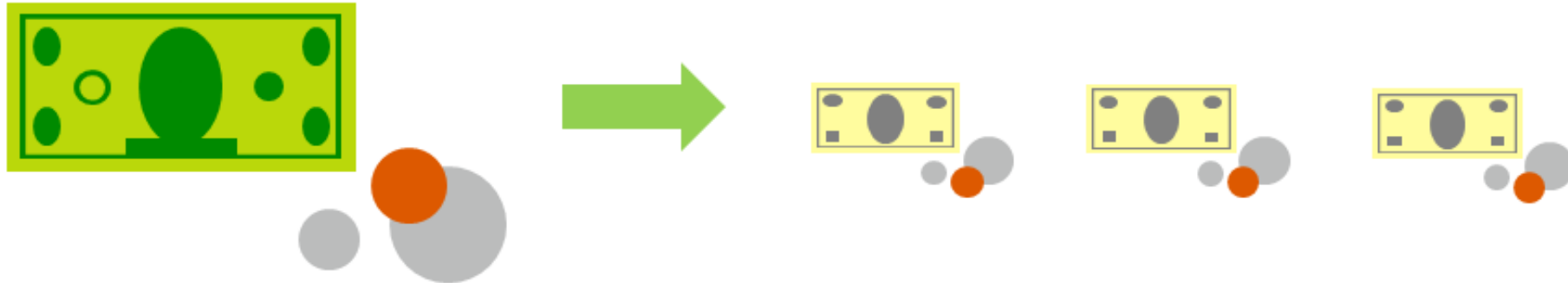
Compare CapEx vs. OpEx

Capital Expenditure (CapEx)

- The up-front spending of money on physical infrastructure.
- Costs from CapEx have a value that reduces over time.

Operational Expenditure (OpEx)

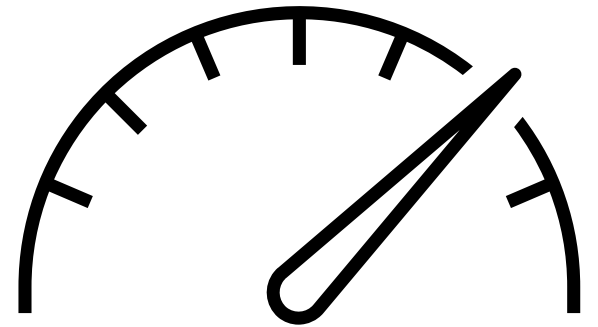
- The spending and billing of services or products as needed.
- Expenses are deducted in the same year.



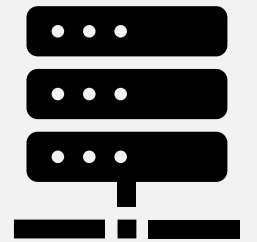
Consumption-based model

Cloud service providers operate on a consumption-based model, which means that end users only pay for the resources that they use. Whatever they use is what they pay for.

- Better cost prediction
- Prices for individual resources and services are provided
- Billing is based on actual usage



Cloud services

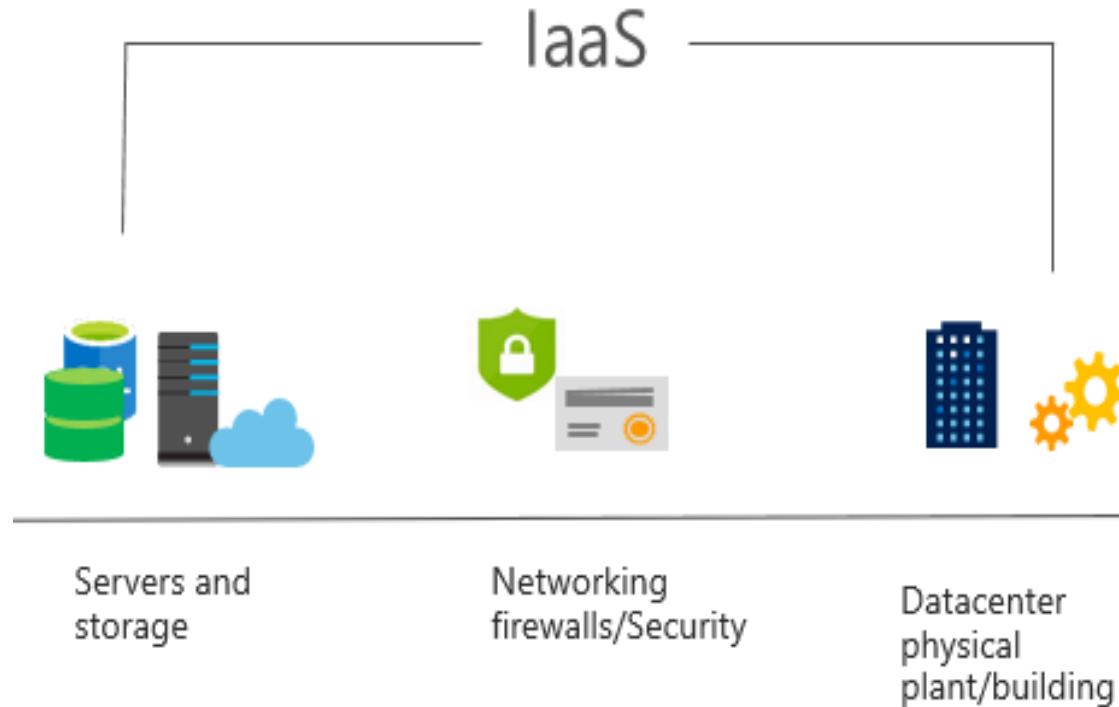


Cloud Services - Objective Domain

- Describe Infrastructure-as-a-Service (IaaS)
- Describe Platform-as-a-Service (PaaS)
- Describe Software-as-a-Service (SaaS)
- Identify a service type based on a use case
- Describe the shared responsibility model
- Describe serverless computing

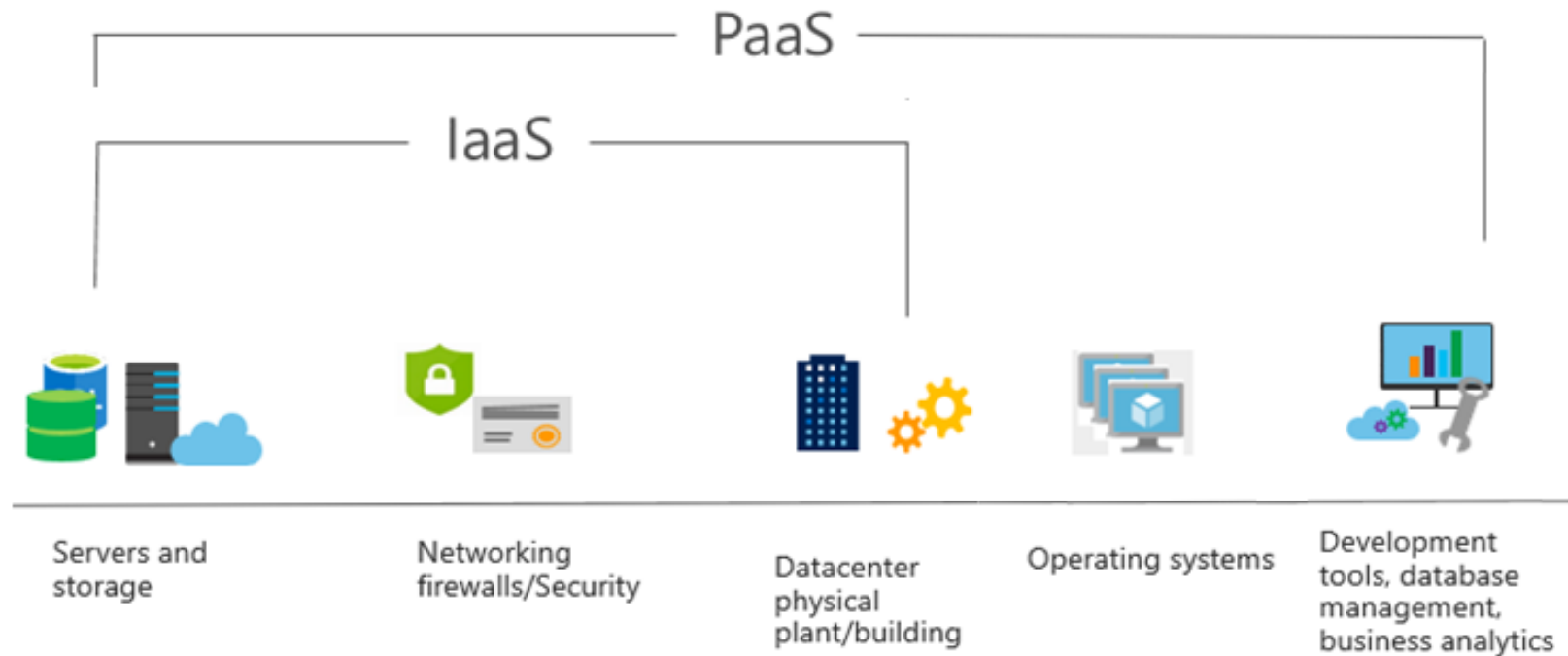
Infrastructure as a Service (IaaS)

Build pay-as-you-go IT infrastructure by renting servers, virtual machines, storage, networks, and operating systems from a cloud provider.



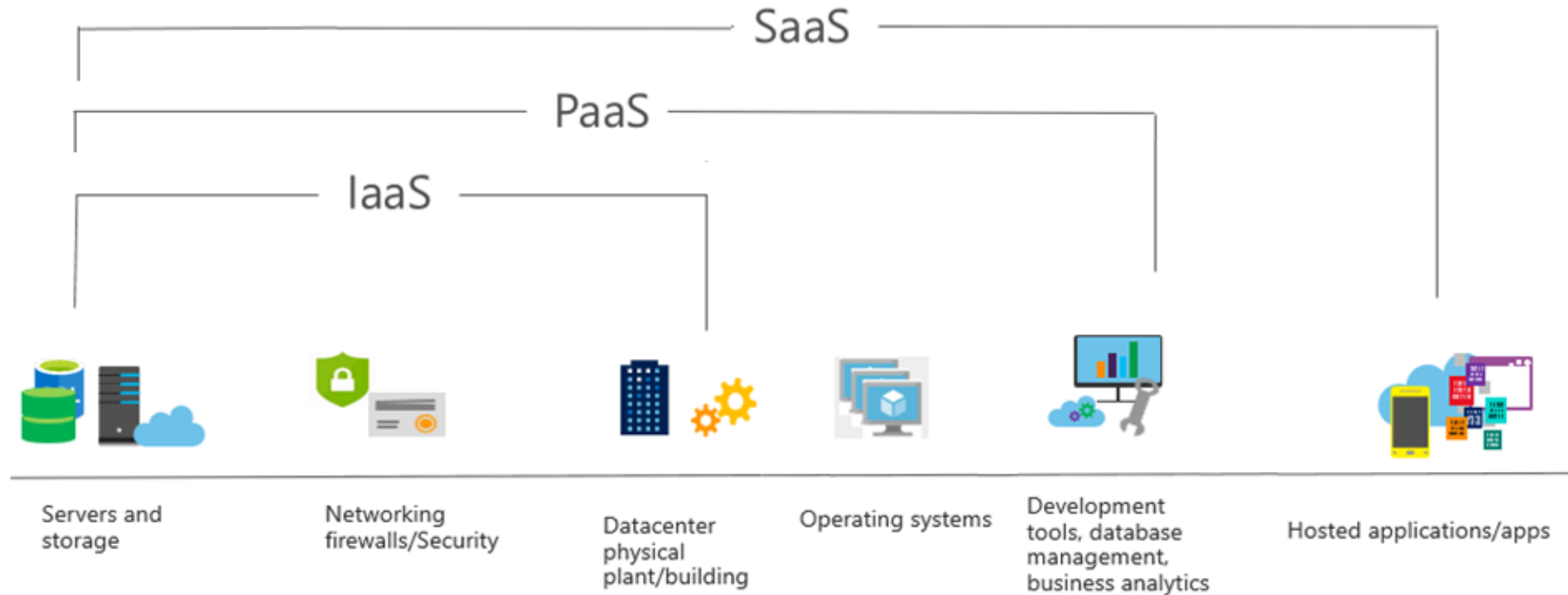
Platform as a Service (PaaS)

Provides environment for building, testing, and deploying software applications; without focusing on managing underlying infrastructure.



Software as a Service (SaaS)

Users connect to and use cloud-based apps over the internet: for example, Microsoft Office 365 email and calendars



Cloud service comparison

IaaS

The most flexible cloud service.

You configure and manage the hardware for your application.

PaaS

Focus on application development.

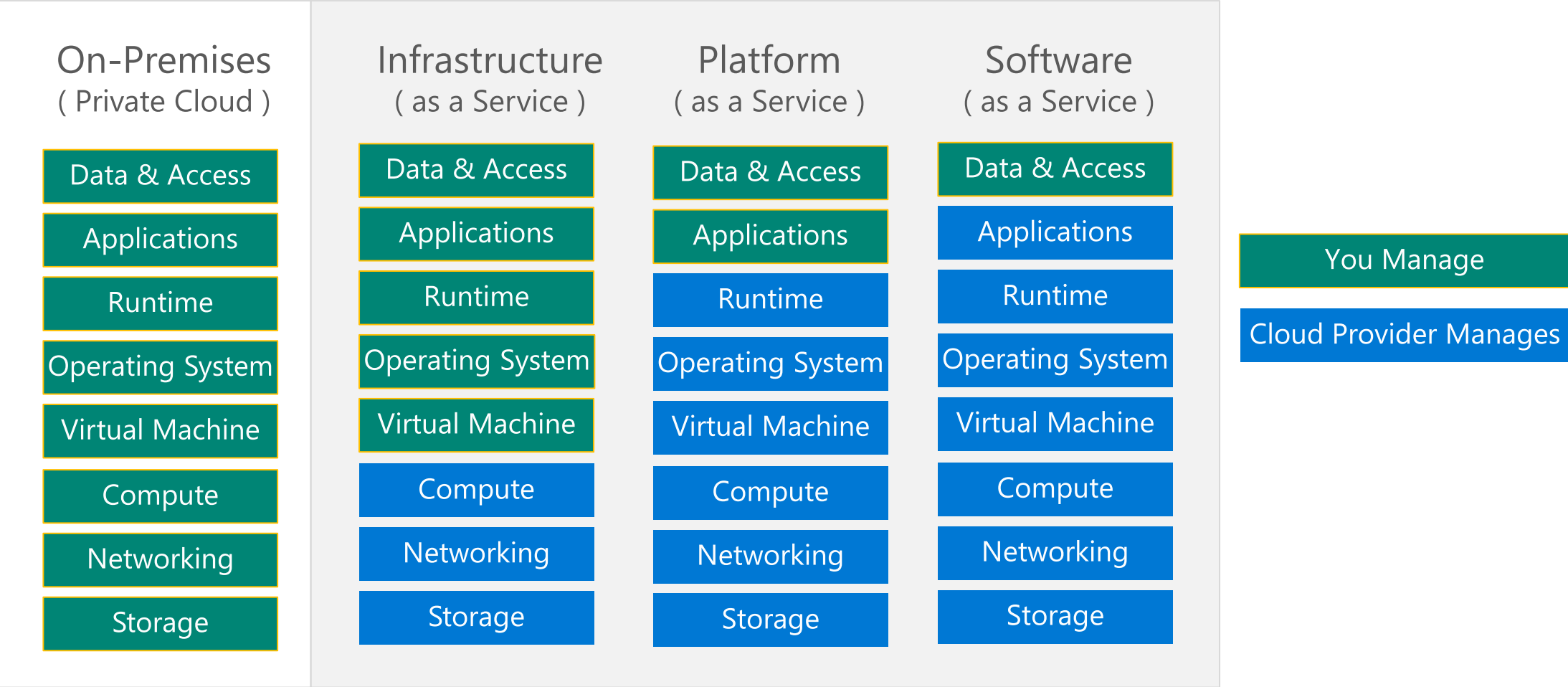
Platform management is handled by the cloud provider.

SaaS

Pay-as-you-go pricing model.

Users pay for the software they use on a subscription model.

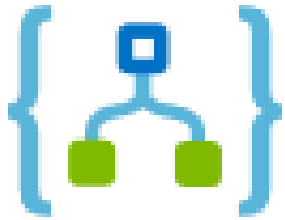
Shared responsibility model



Describe Serverless Computing



Azure Functions is code running your service and not the underlying platform or infrastructure. It creates infrastructure based on an event.



Azure Logic Apps is a cloud service that helps you automate and orchestrate tasks, business processes, and workflows when you need to integrate apps, data, systems, and services.

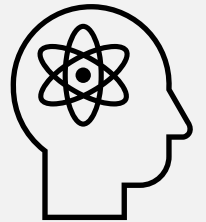
With **serverless computing applications**, the cloud service provider automatically provisions, scales, and manages the infrastructure required to run the code.

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MOD 2: Core Azure Services

Module Outline

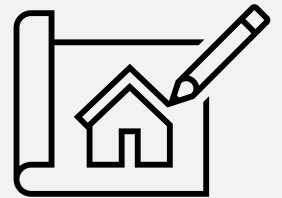


Module 02 – Outline

You will learn the following concepts:

- **Azure Architectural Components**
 - Regions and Availability Zones
 - Subscriptions and Resource Groups
- **Core Azure Resources**
 - Compute
 - Networking
 - Storage
 - Databases

Core Azure architectural components



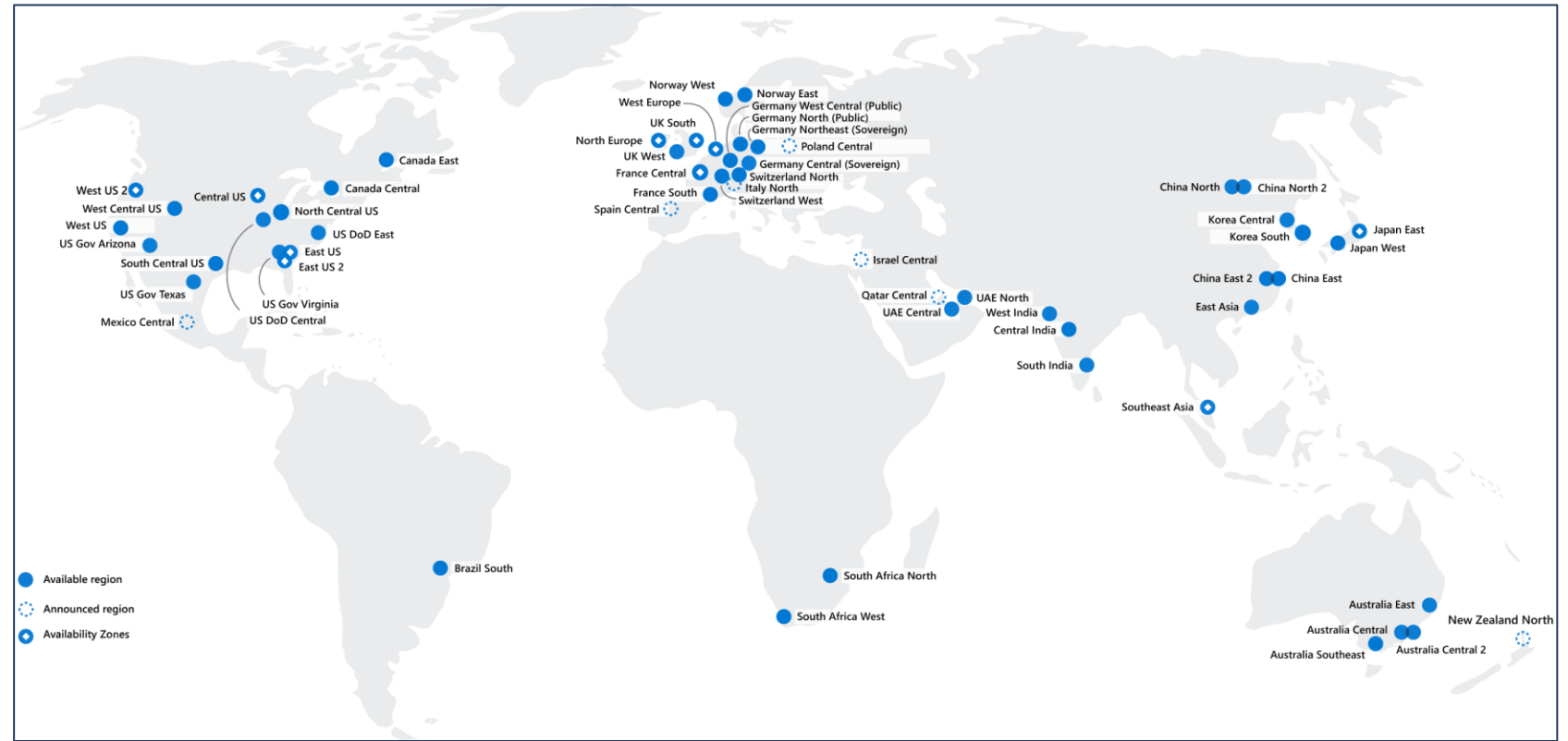
Core Azure architectural components – Objective Domain

Describe the benefits and usage of:

- Regions and Region Pairs
- Availability Zones
- Azure resources
- Resource Groups
- Azure Resource Manager
- Subscriptions
- Azure Management Groups

Regions

Azure offers more global regions than any other cloud provider with 60+ regions representing over 140 countries



- Regions are made up of one or more datacenters in close proximity.
- Provide flexibility and scale to reduce customer latency.
- Preserve data residency with a comprehensive compliance offering.

Region Pairs

- At least 300 miles of separation between region pairs.
- Automatic replication for some services.
- Prioritized region recovery in the event of outage.
- Updates are rollout sequentially to minimize downtime.

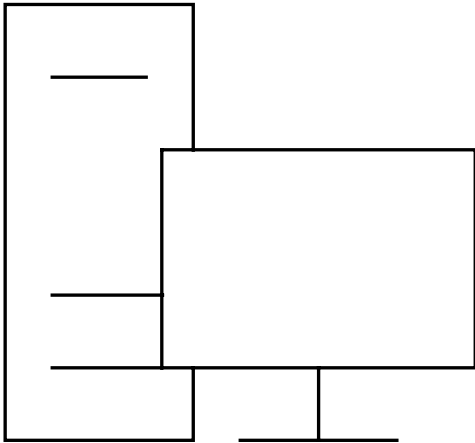
Web Link: <https://aka.ms/PairedRegions>

Region		Region
North Central US		South Central US
East US		West US
West US 2		West Central US
US East 2		Central US
Canada Central		Canada East
North Europe		West Europe
UK West		UK South
Germany Central	↔	Germany Northeast
South East Asia		East Asia
East China		North China
Japan East		Japan West
Australia Southeast		Australia East
India South		India Central
Brazil South (Primary)		South Central US

Availability Options

VM SLA

99.9% with Premium Storage

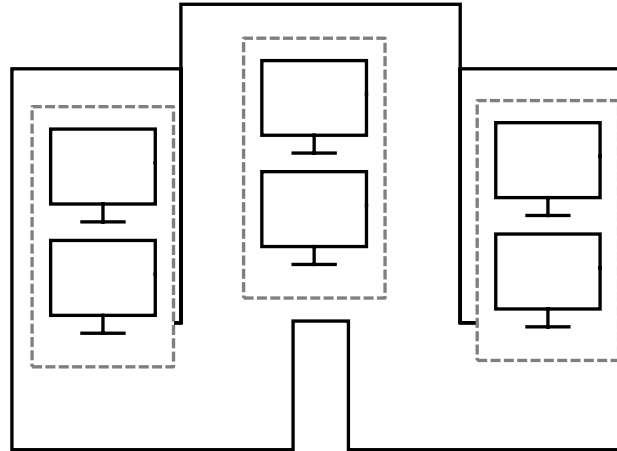


SINGLE VM

Easier lift and shift

VM SLA

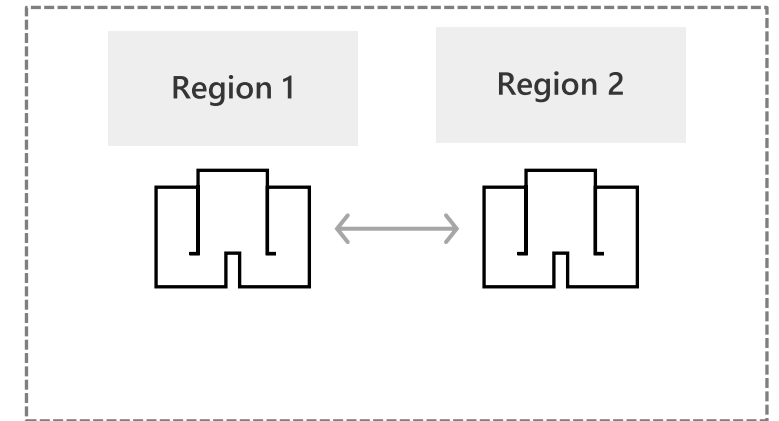
99.99%



AVAILABILITY ZONES

Protection from entire datacenter failures

MULTI-REGION DISASTER RECOVERY

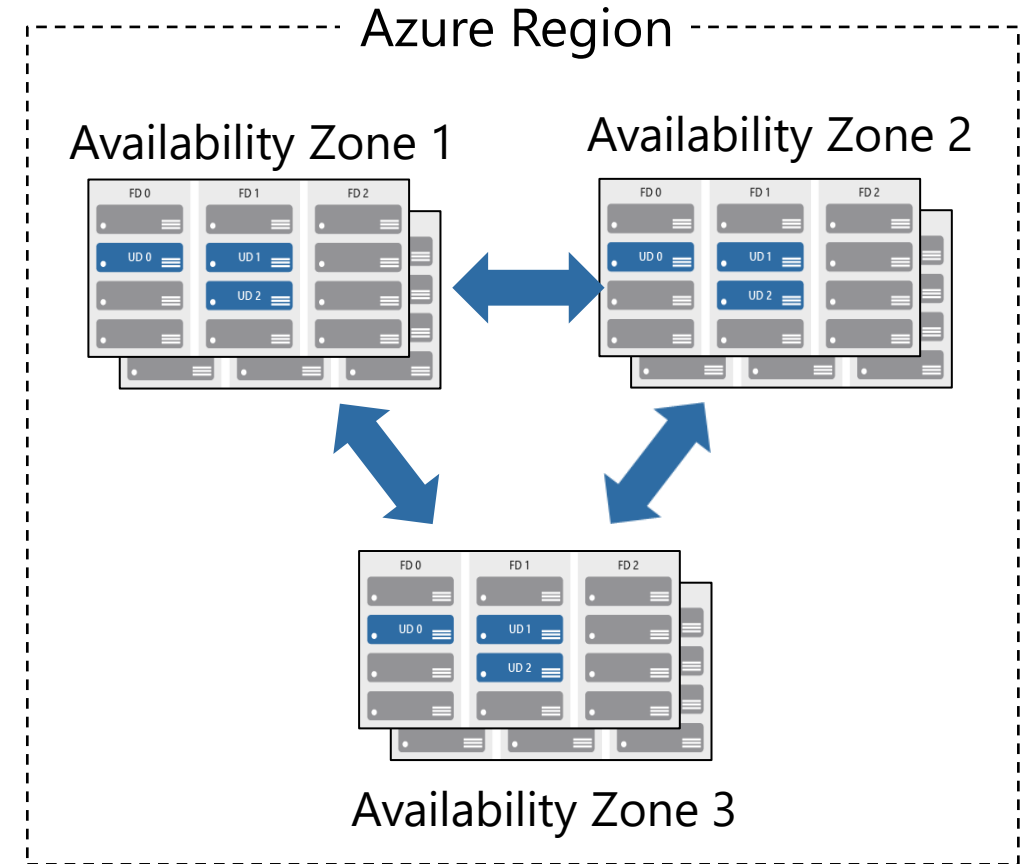


REGION PAIRS

Regional protection within Data Residency Boundaries

Availability zones

- Provide protection against downtime due to datacenter failure.
- Physically separate datacenters within the same region.
- Each datacenter is equipped with independent power, cooling, and networking.
- Connected through private fiber-optic networks.



Azure Resources

Azure **resources** are components like storage, virtual machines, and networks that are available to build cloud solutions.



Virtual Machines



Storage Accounts



Virtual Networks



App Services



SQL Databases

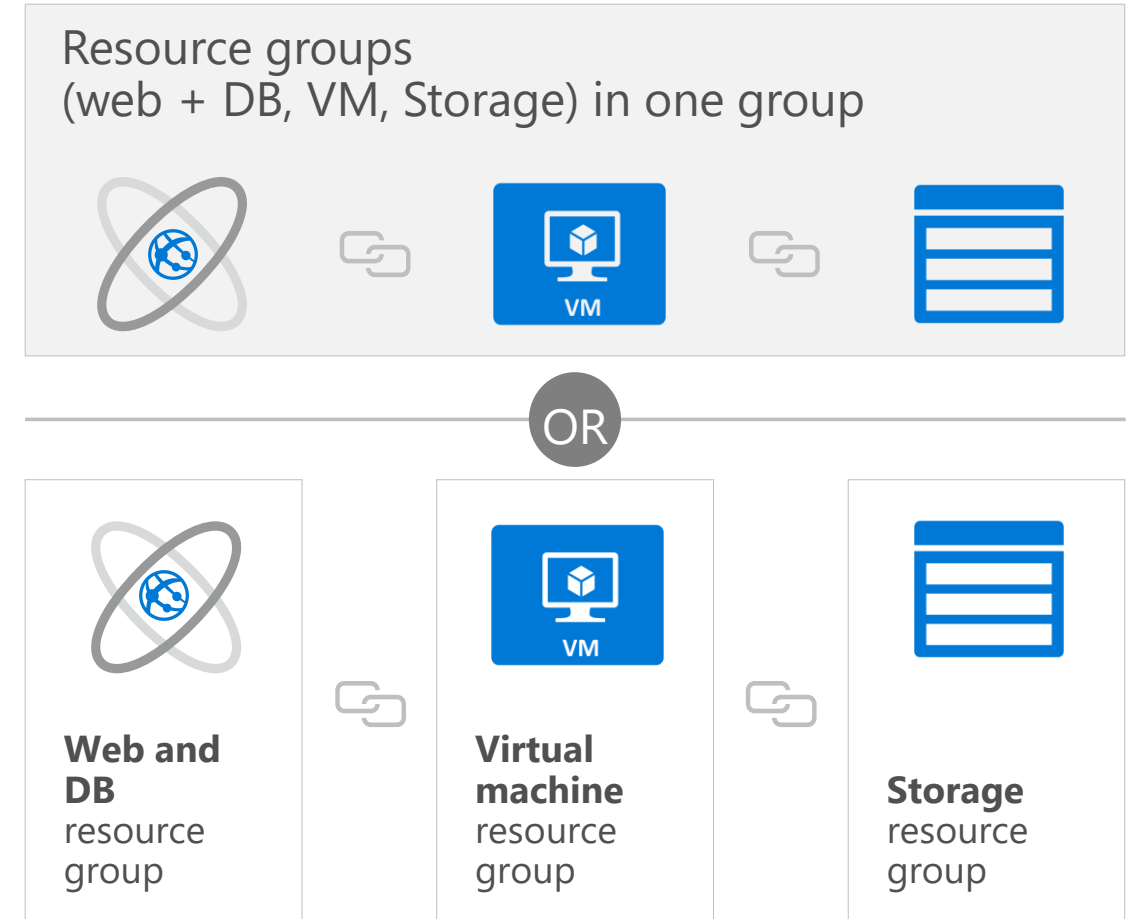


Functions

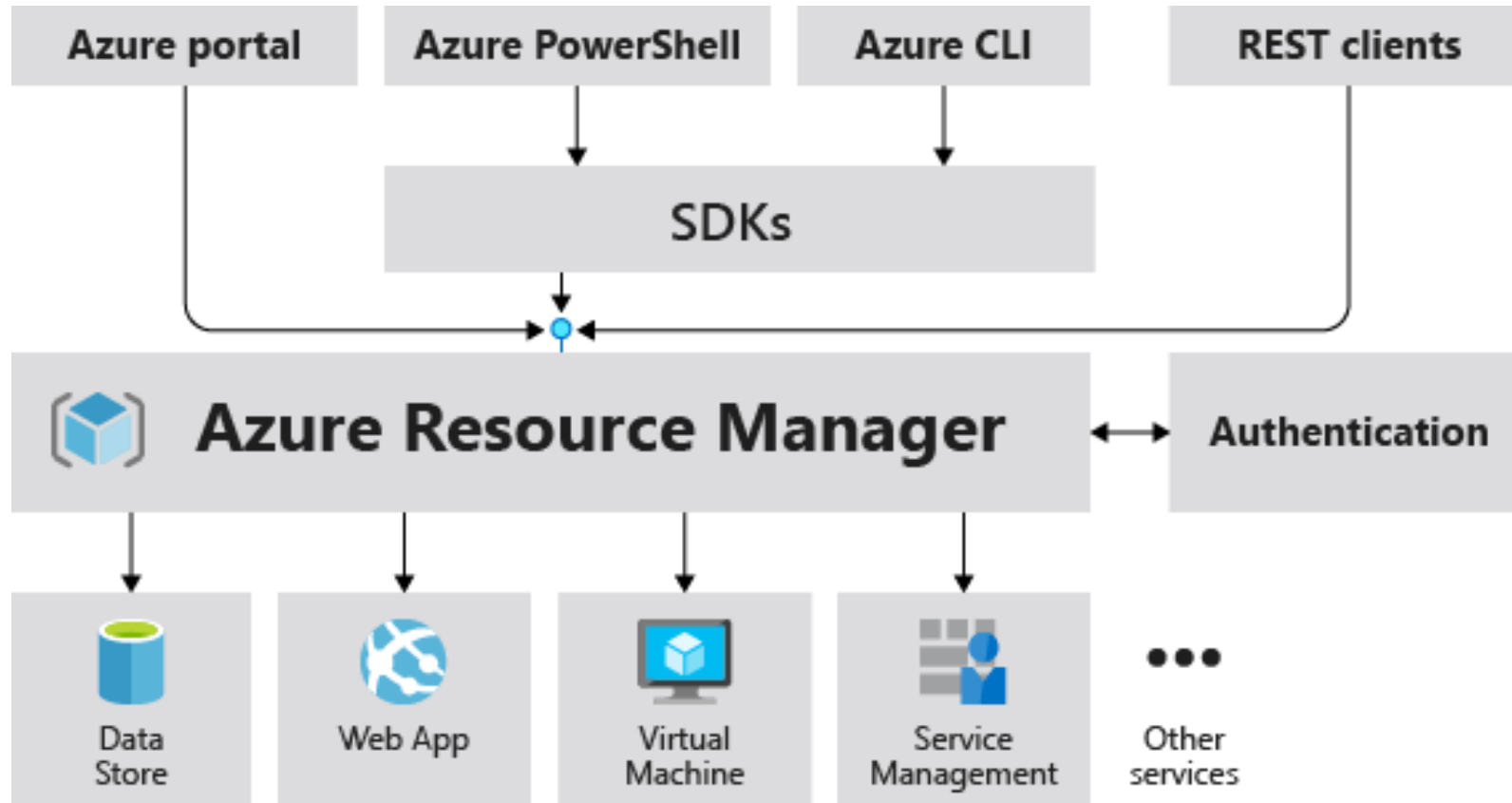
Resource groups

A **resource group** is a container to manage and aggregate resources in a single unit.

- Resources can exist in only one resource group.
- Resources can exist in different regions.
- Resources can be moved to different resource groups.
- Applications can utilize multiple resource groups.



Azure Resource Manager

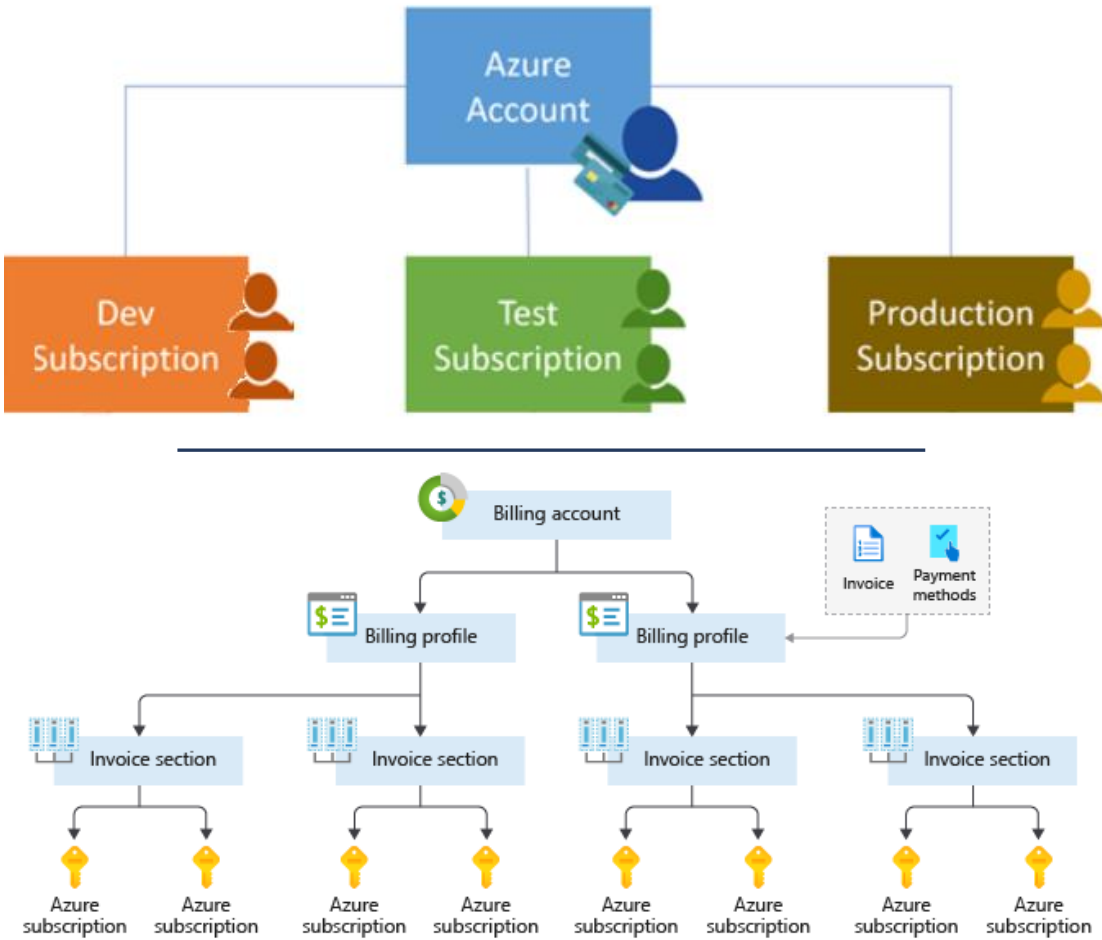


The **Azure Resource Manager (ARM)** provides a management layer that enables you to create, update, and delete resources in your Azure subscription.

Azure Subscriptions

An Azure subscription provides you with authenticated and authorized access to Azure accounts.

- **Billing boundary:** generate separate billing reports and invoices for each subscription.
- **Access control boundary:** manage and control access to the resources that users can provision with specific subscriptions.



Walkthrough – Explore the Azure Portal

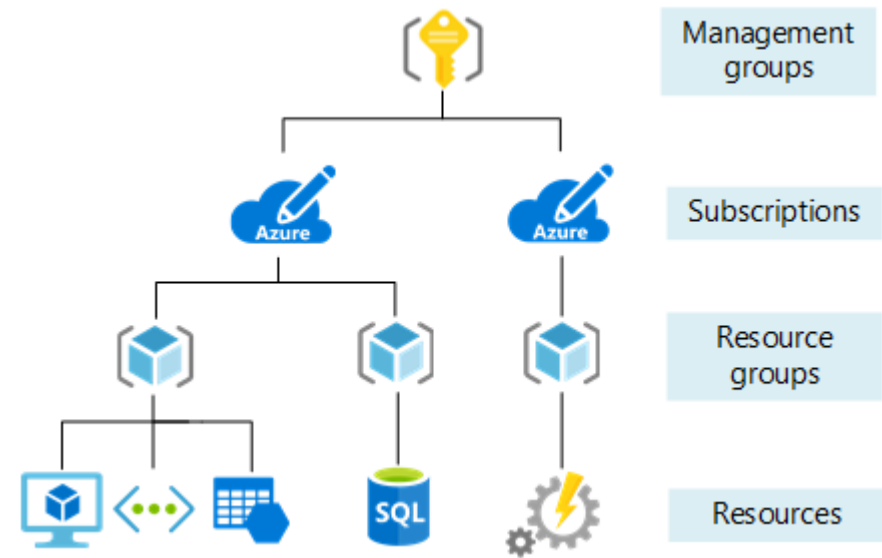
Launch the Azure Portal and have a look at the common components used everyday building cloud solutions

1. Connect to <https://portal.azure.com>
2. Explore the home screen.
3. Find “All Services” and see what is available.

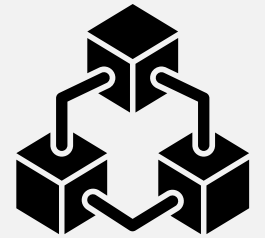


Management Groups

- Management groups can include multiple Azure subscriptions.
- Subscriptions inherit conditions applied to the management group.
- 10,000 management groups can be supported in a single directory.
- A management group tree can support up to six levels of depth.



Core Azure workload products



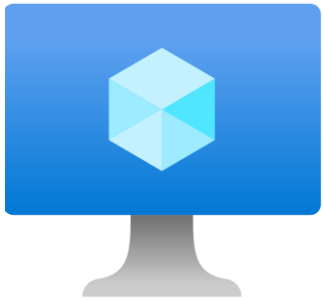
Core Azure Workloads - Objective Domain

Describe the benefits and usage of:

- Virtual Machines, Azure App Services, Azure Container Instances (ACI), Azure Kubernetes Service (AKS), and Windows Virtual Desktop
- Virtual Networks, VPN Gateway, Virtual Network peering, and ExpressRoute
- Container (Blob) Storage, Disk Storage, File Storage, and storage tiers
- Cosmos DB, Azure SQL Database, Azure Database for MySQL, Azure Database for PostgreSQL, and SQL Managed Instance
- Azure Marketplace

Azure compute services

Azure **compute** is an on-demand computing service that provides computing resources such as disks, processors, memory, networking, and operating systems.



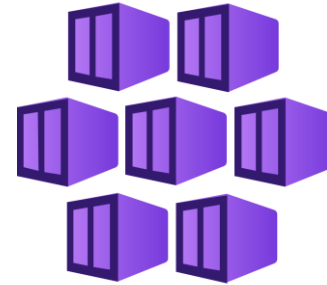
Virtual
Machines



App
Services



Container
Instances



Azure Kubernetes
Services (AKS)

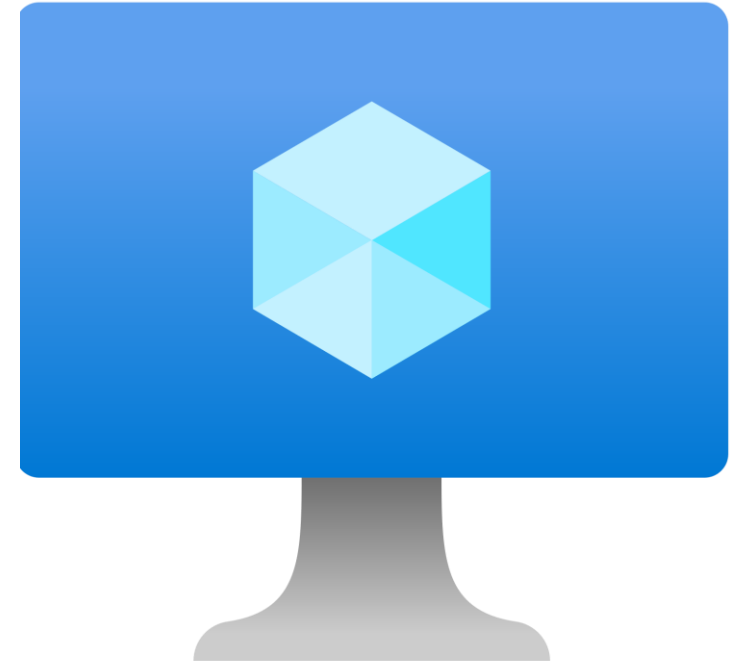


Windows Virtual
Machines

Azure virtual machines

Azure **Virtual Machines (VM)** are software emulations of physical computers.

- Includes virtual processor, memory, storage, and networking.
- IaaS offering that provides total control and customization.



Walkthrough – Create a Virtual Machine

Create a virtual machine in the Azure Portal, connect to the virtual machine, install the web server role, and test.

1. Create the virtual machine.
2. Connect to the virtual machine.
3. Install the web server role and test.



Azure App Services



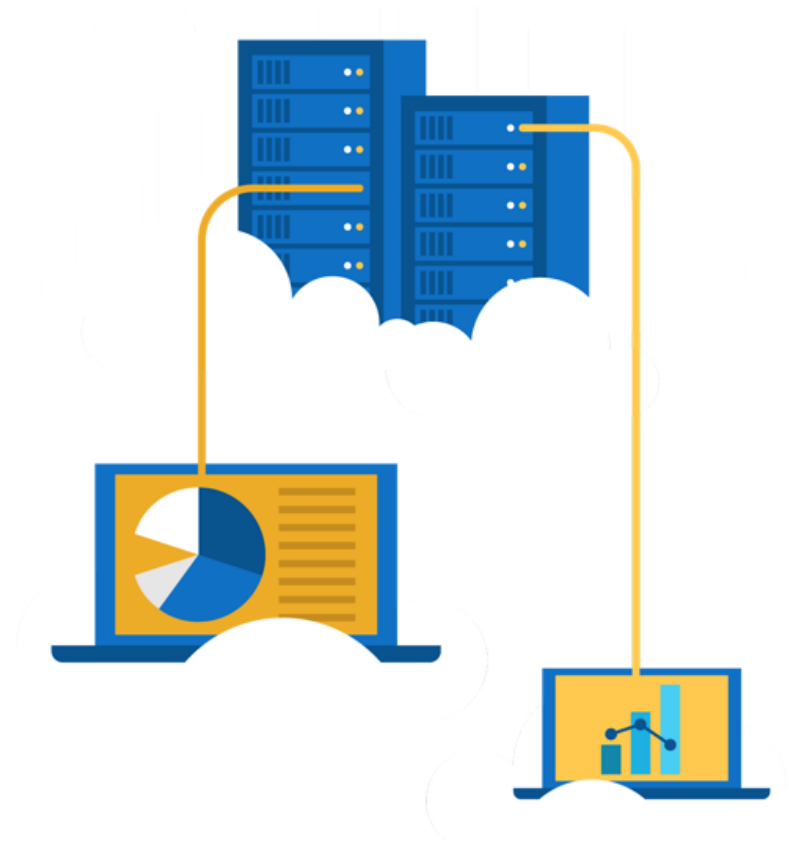
Azure **App Services** is a fully managed platform to build, deploy, and scale web apps and APIs quickly.

- Works with .Net, .NetC Core, Node.js, Java, Python, or php.
- PaaS offering with enterprise-grade performance, security, and compliance requirements.

Walkthrough – Create an App Service

Create a new Web App by using a Docker image stored in Azure Container Registry.

1. Create a Web App using a Docker image.
2. Test the Web App.



Azure Container Services

Azure **Containers** are a light-weight, virtualized environment that does not require operating system management, and can respond to changes on demand.



Azure Container Instances: a PaaS offering that runs a container in Azure without the need to manage a virtual machine or additional services.

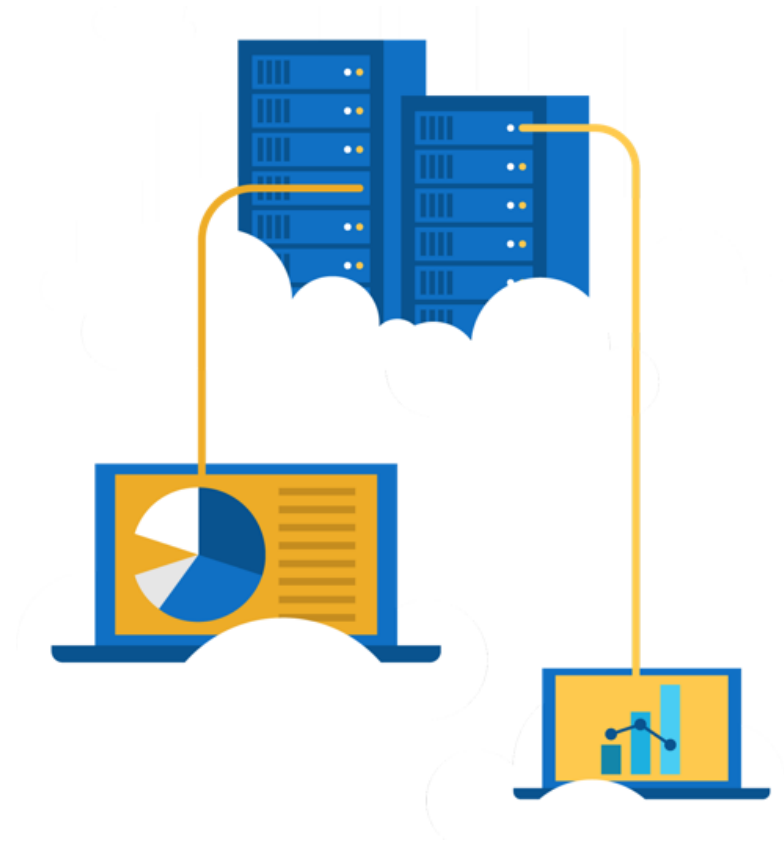


Azure Kubernetes Service: an orchestration service for containers with distributed architectures and large volumes of containers.

Walkthrough - Deploy Azure Container Instances

Using the Azure Portal create, configure, and deploy a Docker container to an Azure Container Instance. The container will deploy a Hello HTML page.

1. Create a container instance.
2. Deploy the container and test.



Windows Virtual Desktop

Windows Virtual Desktop is a desktop and app virtualization that runs in the cloud.

- Create a full desktop virtualization environment without having to run additional gateway servers.
- Publish unlimited host pools to accommodate diverse workloads.
- Reduce costs with pooled, multi-session resources.



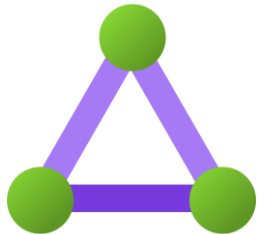
Azure networking services



Azure Virtual Network (VNet) enables Azure resources to communicate with each other, the internet, and on-premises networks.



Virtual Private Network Gateway (VPN) is used to send encrypted traffic between an Azure virtual network and an on-premises location over the public internet.

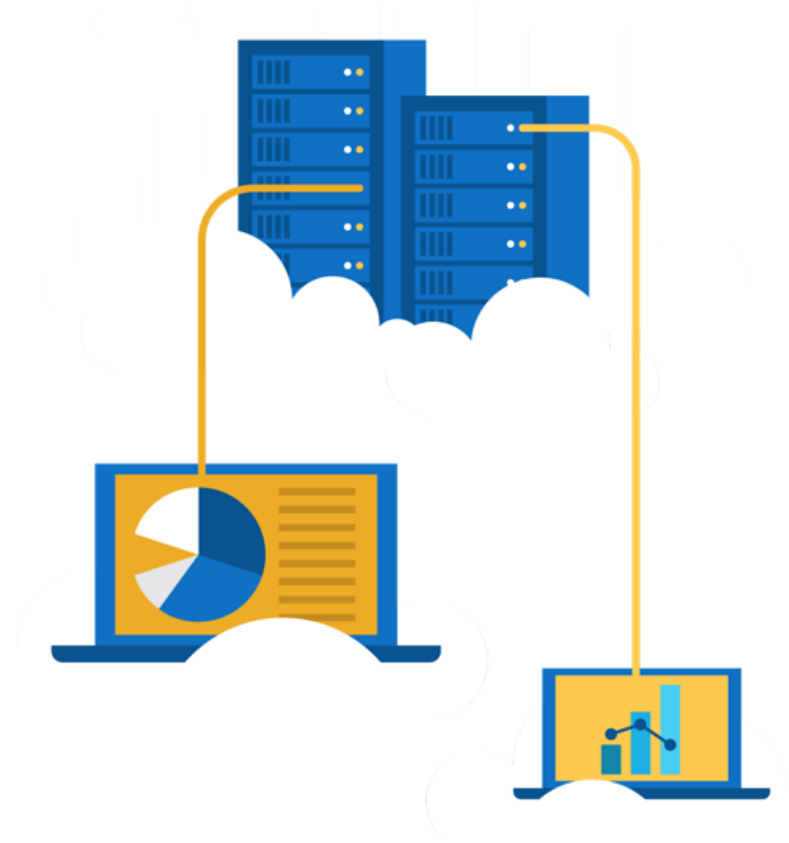


Azure Express Route extends on-premises networks into Azure over a private connection that is facilitated by a connectivity provider.

Walkthrough - Create a virtual network

Create a virtual network with two virtual machines and then test connection between the machines.

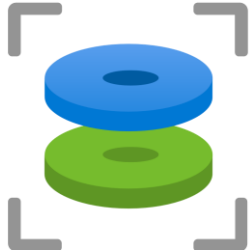
1. Create a virtual network.
2. Create two virtual machines.
3. Test the connection.



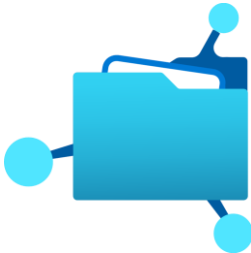
Azure storage services



Container storage (blob) is optimized for storing massive amounts of unstructured data, such as text or binary data.


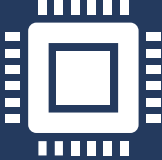



Disk storage provides disks for virtual machines, applications, and other services to access and use.



Azure Files sets up a highly available network file shares that can be accessed by using the standard Server Message Block (SMB) protocol.

Azure storage access tiers

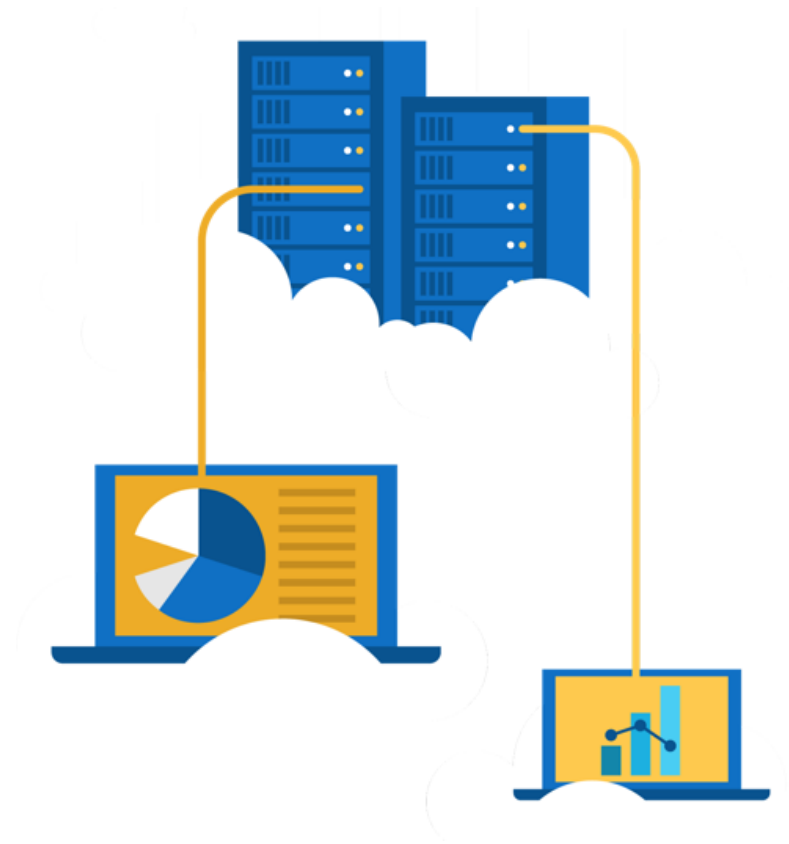
 Hot	 Cool	 Archive
<p>Optimized for storing data that is accessed frequently.</p>	<p>Optimized for storing data that is infrequently accessed and stored for at least 30 days.</p>	<p>Optimized for storing data that is rarely accessed and stored for at least 180 days with flexible latency requirements.</p>

You can switch between these access tiers at any time.

Walkthrough - Create blob storage

Create a storage account with a blob storage container. Work with blob files.

1. Create a storage account.
2. Work with blob storage.
3. Monitor the storage account.



Azure database services



Azure Cosmos Database is a globally-distributed database service that elastically and independently scales throughput and storage.



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



Azure Database for MySQL is a fully-managed MySQL database service for app developers.



Azure Database for PostgreSQL is a relational database service based on the open-source Postgres database engine.

Azure SQL Managed Instance

Azure SQL Managed Instance allows existing SQL Server customers to lift and shift their on-premises applications to the cloud with minimal application and database changes.

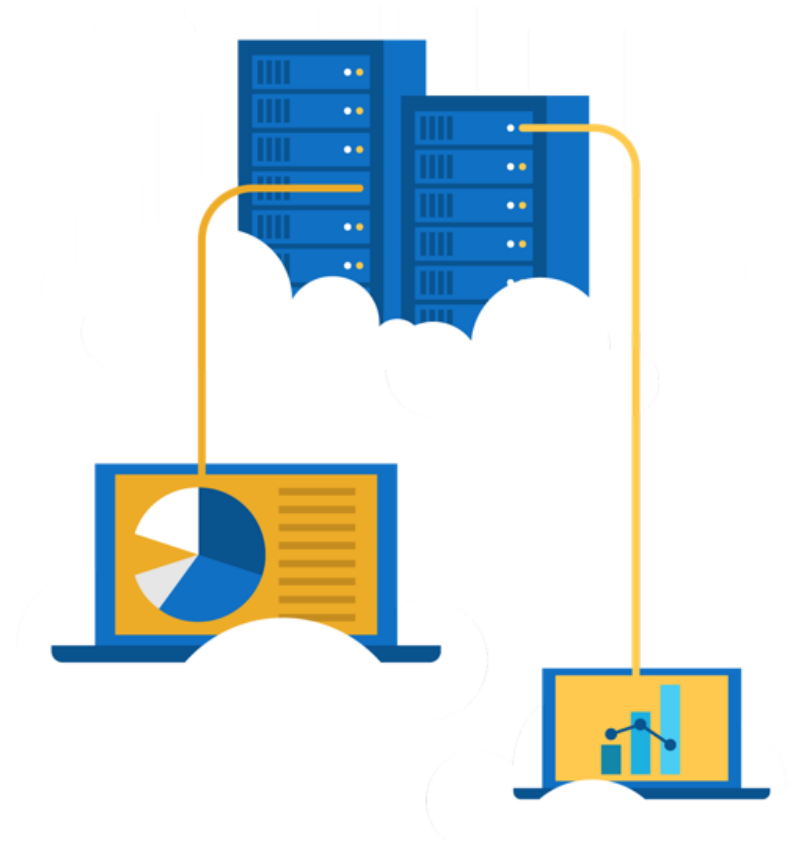
- Fully managed and evergreen platform as a service.
- Preserves all PaaS capabilities (automatic patching and version updates, automated backups, and high availability)
- Exchange existing licenses for discounted rates on SQL Managed Instance using the Azure Hybrid Benefit



Walkthrough-Create a SQL database

Create a SQL database in Azure and then query the data in that database.

1. Create the database.
2. Query the database.



Explore Azure Marketplace

Azure Marketplace allows customers to find, try, purchase, and provision applications and services from hundreds of leading service providers, which are all certified to run on Azure.

- Open source container platforms.
- Virtual machine and database images.
- Application build and deployment software.
- Developer tools.
- And much more, with 10,000+ listings!



Module 02 Review



Microsoft Learn Modules
(docs.microsoft.com/Learn)

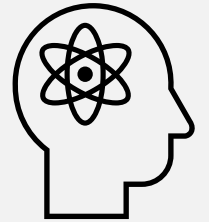
- Microsoft provides more global presence than any other cloud provider with over 60 regions distributed worldwide
- Azure Management tools
- Azure's multiple services (compute, networking, storage, and databases)
- Azure Marketplace

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MOD 3: Azure Solutions and Management Tools

Module Outline

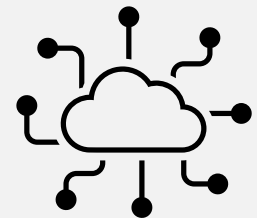


Module 03 – Outline

You will learn the following concepts:

- **Core Azure solutions**
 - IoT to Azure Sphere
 - Synapse Analytics to Databricks
 - AI / ML
- **Azure management tools**
 - Portal, PowerShell, CLI, and others
 - Advisor, Monitor, and Service Health

Azure solutions



Azure Solutions - Objective Domain

Describe the benefits and usage of:

- Internet of Things (IoT) Hub, IoT Central, and Azure Sphere
- Azure Synapse Analytics, HDInsight, and Azure Databricks
- Azure Machine Learning, Cognitive Services, and Azure Bot Service
- Serverless computing solutions that include Azure Functions and Logic Apps
- Azure DevOps, GitHub, GitHub Actions, and Azure DevTest Labs

Azure Internet of Things

Internet of Things (IoT) is the ability for devices to garner and then relay information for data analysis.



Azure IoT Central is a fully managed global IoT SaaS solution that makes it easy to connect, monitor, and manage IoT assets at scale.



Azure IoT Hub is a managed service hosted in the cloud that acts as a central message hub for bi-directional communication between IoT applications and the devices it manages.



Azure Sphere is a secured, high-level application platform with built-in communication and security features for internet-connected devices.

Walkthrough - Implement the Azure IoT Hub

Create an Azure IoT Hub in Azure Portal and configure the hub to authenticate a connection to an IoT device using the Raspberry Pi device simulator.

1. Create an IoT Hub.
2. Add an IoT device.
3. Test the device using the Raspberry Pi Simulator.



Big data and analytics

Azure Synapse Analytics



A cloud-based Enterprise Data Warehouse.

Azure HDInsight



A fully-managed, open-source analytics service for enterprises.

Azure Databricks



Apache Spark based analytics service.

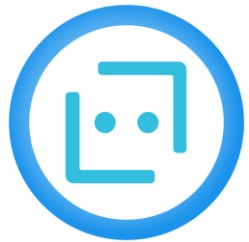
Artificial Intelligence & Machine Learning



Azure Machine Learning: cloud-based to develop, train, and deploy machine learning models.



Cognitive Services: quickly enable apps to see, hear, speak, understand, and interpret a user's needs.



Azure Bot Service: develop intelligent, enterprise-grade bots.

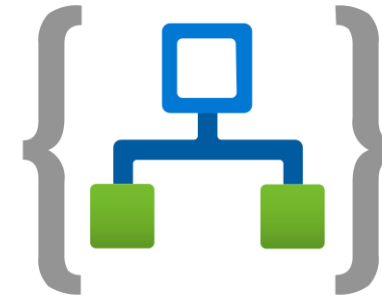
Serverless Computing

Azure Functions



Event based code running your service and not the underlying infrastructure.

Azure Logic Apps

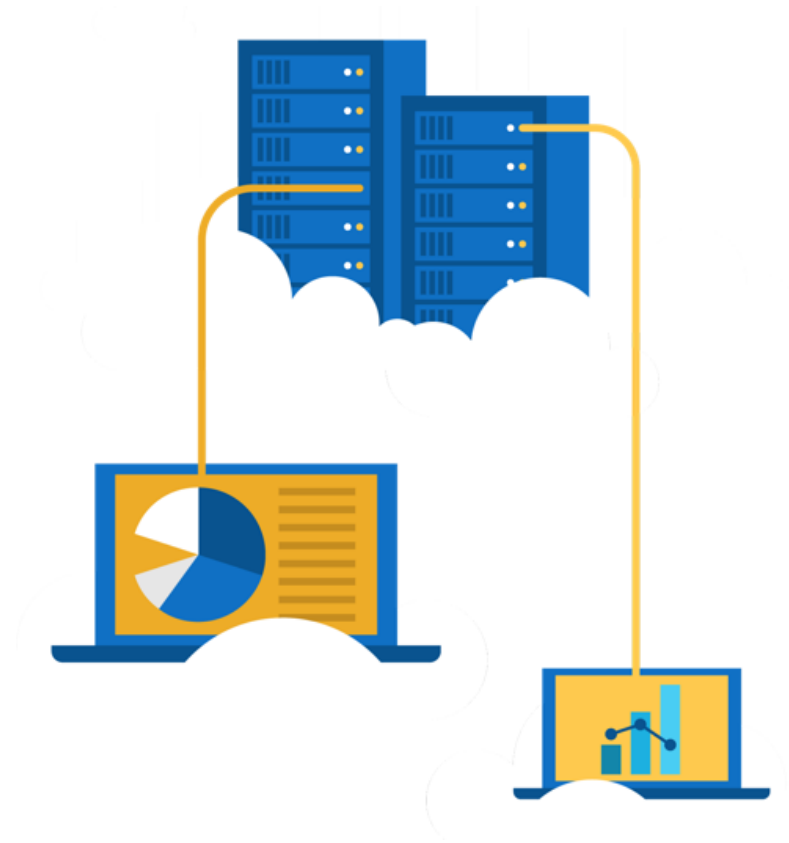


Automate and orchestrate tasks, business processes, and workflows to integrate apps.

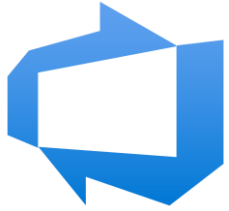
Walkthrough - Implement Azure Functions

Create a Function app with a Webhook to provide a Hello message with your name.

1. Create a Function app.
2. Create a HTTP triggered event function and test.



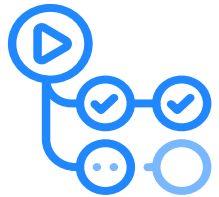
Develop your apps with DevOps and GitHub



Azure DevOps: development collaboration tools including pipelines, Kanban boards, and automated cloud-based load testing.



GitHub: software development hosting with version control, source code management, and bug/task management.



GitHub Actions for Azure: automate software workflow to build, test, and deploy from within GitHub.



Azure DevTest Labs: quickly create environments in Azure while minimizing waste and controlling cost.

Azure management tools

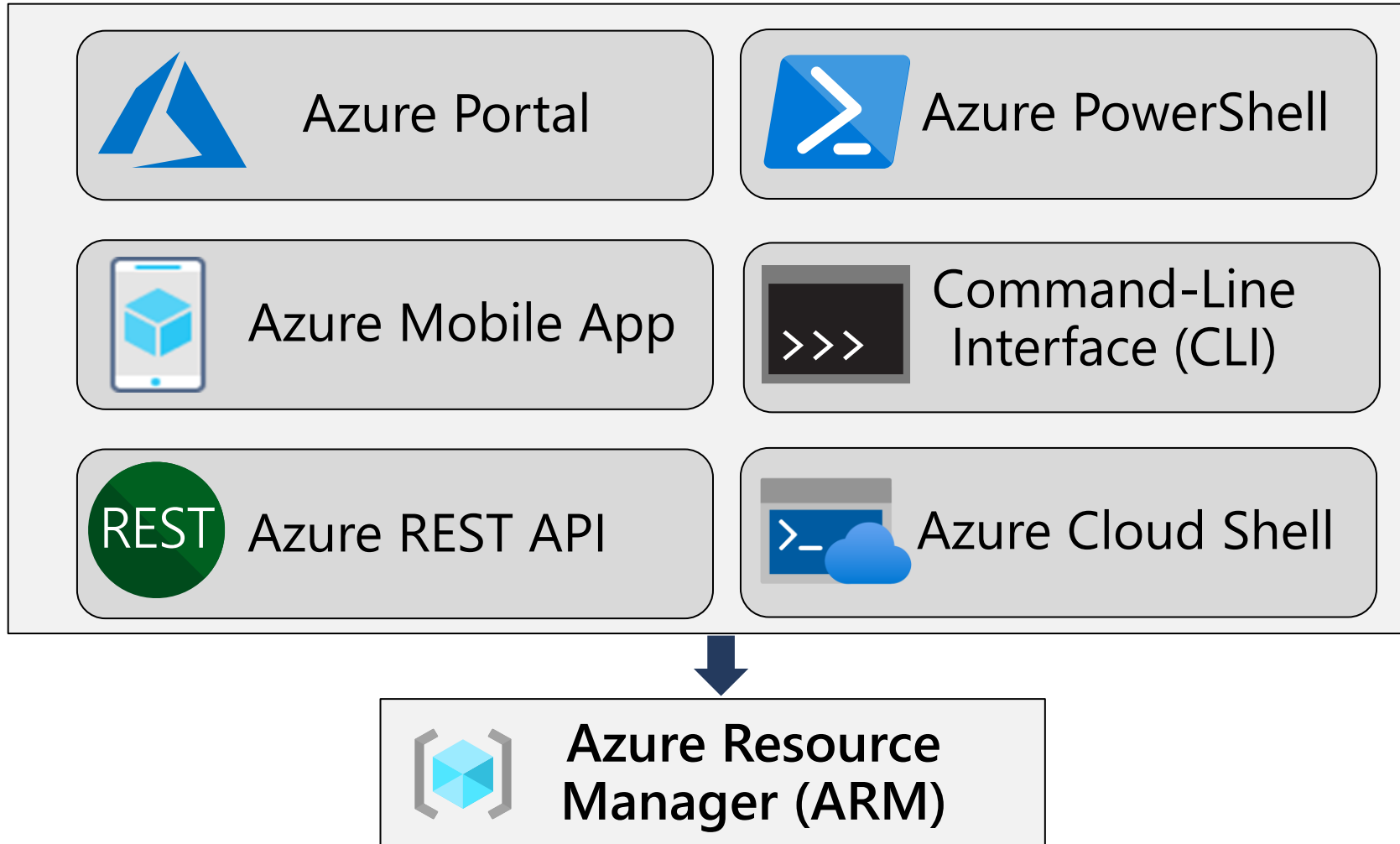


Azure Management Tools - Objective Domain

Describe the functionality and usage of:

- Azure Portal, Azure PowerShell, Azure CLI, Cloud Shell, and Azure Mobile App.
- Azure Advisor.
- Azure Resource Manager (ARM) templates.
- Azure Monitor.
- Azure Service Health.

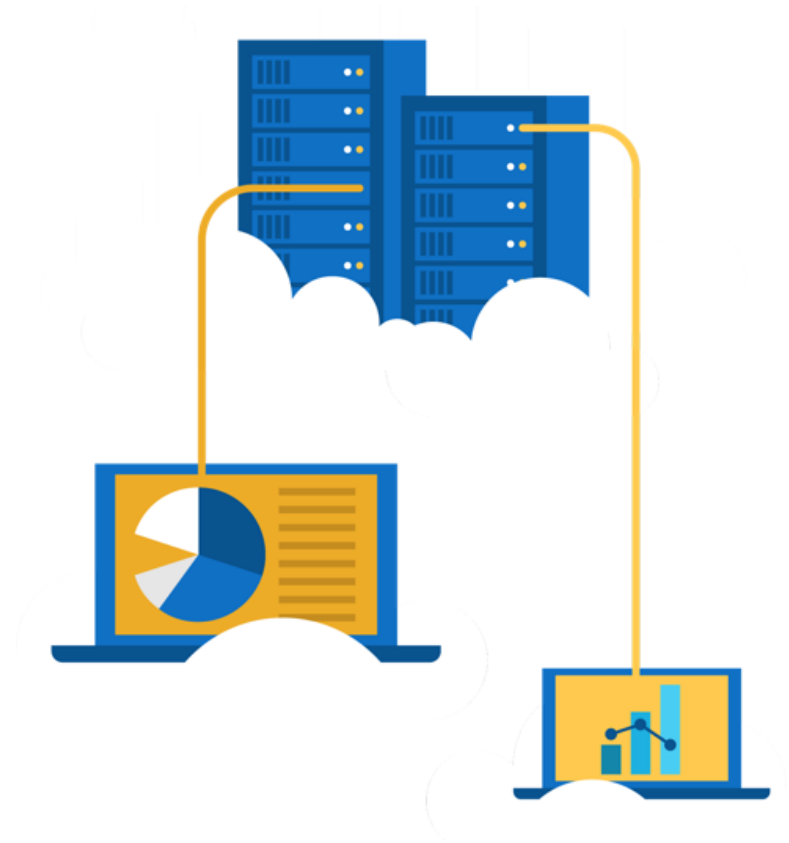
Azure management tools



Walkthrough – Create a VM with an ARM Template

Use the Azure QuickStart gallery to deploy a template that creates a virtual machine.

1. Explore the gallery and deploy a template.
2. Verify your virtual machine deployment.



Walkthrough - Create a VM with PowerShell

Install PowerShell locally, create a resource group and virtual machine, access and use the Cloud Shell, and review Azure Advisor recommendations.

Use PowerShell to create a resource group and virtual machine.

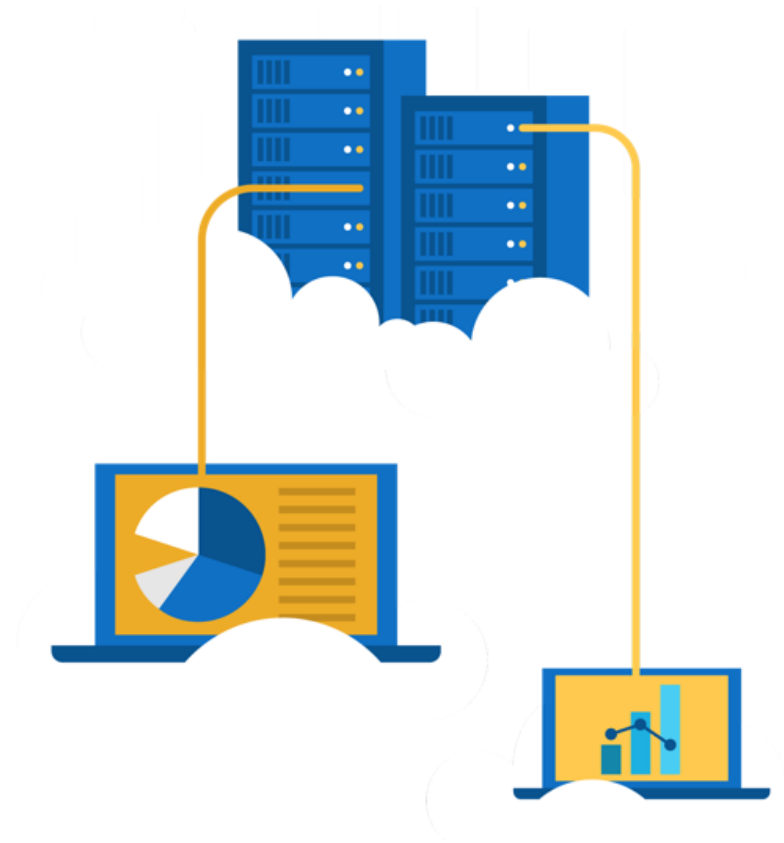
1. Execute PowerShell commands in the Cloud Shell.
2. Review Azure Advisor Recommendations.



Walkthrough - Create a VM with the Azure CLI

Install the Azure CLI locally, create a resource group and virtual machine, use the Cloud Shell, and review Azure Advisor recommendations.

1. Install the CLI locally.
2. Use the CLI to create a resource group and virtual machine.
3. Execute commands in the Cloud Shell.
4. Review Azure Advisor Recommendations.

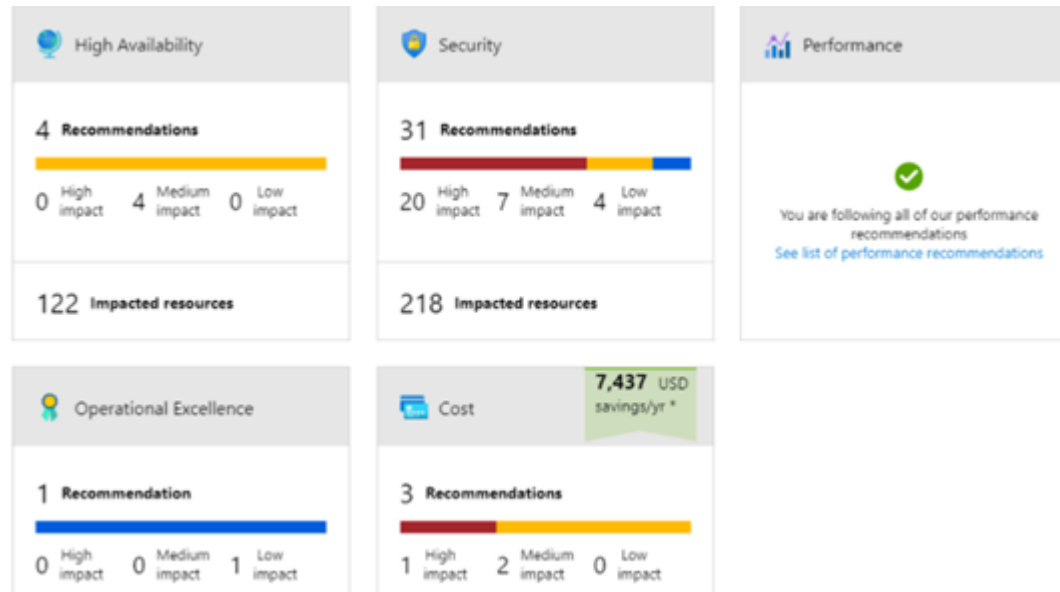


Azure Advisor



Azure Advisor analyzes deployed Azure resources and makes recommendations based on best practices to optimize Azure deployments.

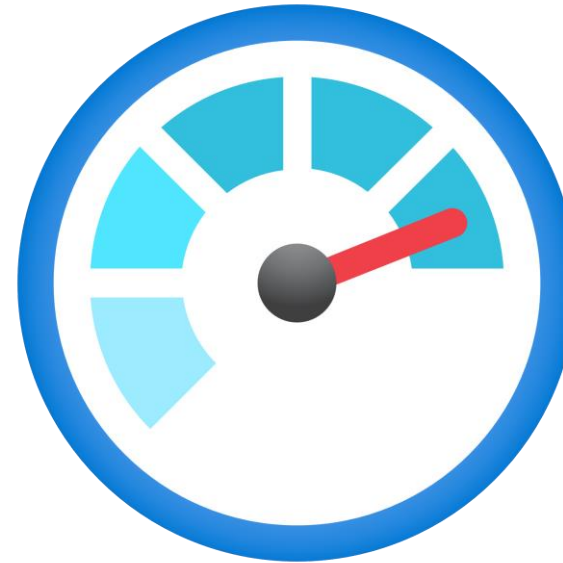
- Reliability
- Security
- Performance
- Cost
- Operational Excellence



Azure Monitor

Azure Monitor maximizes the availability and performance of applications and services by collecting, analyzing, and acting on telemetry from cloud and on-premises environments.

- Application Insights
- Log Analytics
- Smart Alerts
- Automation Actions
- Customized Dashboards



Azure Service Health

Microsoft Azure

Search resources, services, and docs (G+)

Home

Service Health | Service issues

Search (Ctrl+)

Save View

Delete View

Add service health alert

ACTIVE EVENTS

Service issues (4)

Planned maintenance (3)

Health advisories (5)

Security advisories (1)

HISTORY

Health history

RESOURCE HEALTH

Resource health

ALERTS

Health alerts

Subscription

28 selected

Region

28 selected

Service

170 selected

Issue Name	Tracking ID	Service(s)	Region(s)	Start Time	Updated
Availability issues – Storage	DTTL-HP8	Storage	West US, West US 2	2020-06-24T00:00:00Z (6 days ago)	3 hours ago
Allocation Failures – Virtual Machi...	TTTL-H90	SQL Database:Virtual...	East US, West Central...	2020-06-24T00:00:00Z (6 days ago)	3 hours ago

No permissions to read Service Health events for 22 subscription(s). To view Service Health events, users must have the [reader role](#) on a subscription. See 2 [service issue\(s\)](#) outside of your filter.

Service issue : Availability issues – Storage

Summary

Potential impact

Issue updates

Tracking ID

DTTL-HP8

Share the below link with your team or use it for reference in your problem management system

https://app.azure.com/h/DTTL-HP8/76c813

Impacted service(s)

Storage

Impacted region(s)

West US; West US 2

Impacted subscription(s)

Last update (3 hours ago)

Customers may have experience difficulties connecting to resources hosted in Central India. A number of Storage and Compute scale units had gone offline, impacting Virtual Machines and other Azure services with dependencies on these.

See all updates

Potential impact

60 resource(s) in 1 subscription(s)

View details

Download the issue summary as a PDF.

Request root cause

Track this issue on mobile.

Quickly connect with our problem-solving experts.

Contact Azure Support if you need additional help with this issue.

Tweet @AzureSupport

Create a support request

Was this helpful?



Evaluate the impact of Azure service issues with personalized guidance and support, notifications, and issue resolution updates.

Azure Service Health

Azure Service Health provides a personalized view of the health of Azure services and the regions being used.

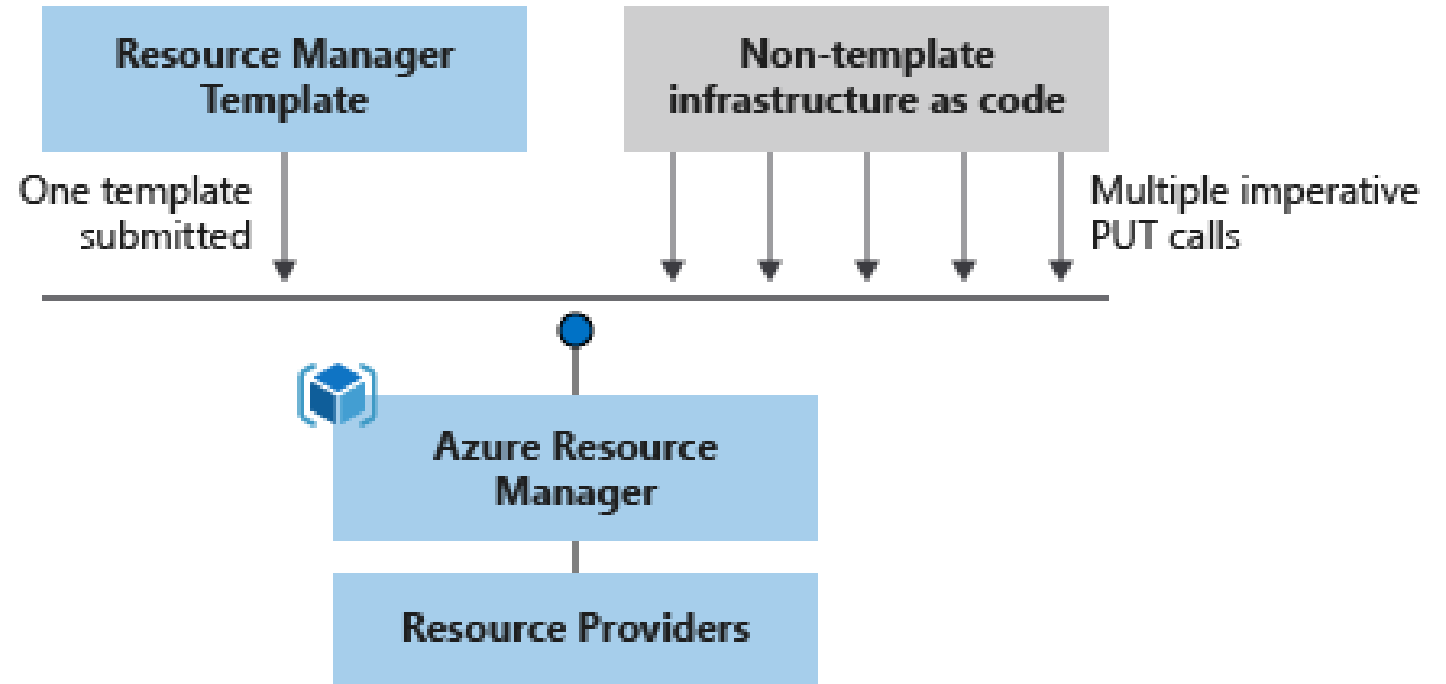
- Communication regarding outages
- Planned maintenance
- Other health advisories

Microsoft Azure	Health Advisory Summary	2020-08-22T19:43:35Z
Title:	We have important information regarding your ExpressRoute service	
Tracking ID:	PLWN-F80	
Event type:	Health Advisory	
Status:	Ongoing as of 2020-08-22T19:43:34Z	
Service(s):	ExpressRoute \ ExpressRoute Circuits	
Region(s):	Australia Central, Australia Central 2, Australia East, Australia Southeast, Brazil South, Canada Central, Canada East, Central India, Central US, Central US EUAP, East Asia, East US, East US 2, East US 2 EUAP, France Central, France South, Germany North, Germany West Central, Global, Japan East, Japan West, Korea Central, Korea South, North Central US, North Europe, South Africa North, South Africa West, South Central US, Southeast Asia, South India, Switzerland North, Switzerland West, UAE Central, UAE North, UK South, UK West, West Central US, West Europe, West India, West US, West US 2	
Start time:	2020-08-18T00:00:00Z	
Resolve time:	Ongoing as of 2020-08-22T19:43:34Z	
Last update time:	2020-08-19T07:19:29Z	
Impacted subscriptions:	5733bcb3-7fde-4caf-8629-41dc15e3b352 (Contoso Hotels)	

Azure Resource Manager (ARM) templates

Azure Resource Manager (ARM) templates are JavaScript Object Notation (JSON) files that can be used to create and deploy Azure infrastructure without having to write programming commands.

- Declarative syntax
- Repeatable results
- Orchestration
- Modular files
- Built-in validation
- Exportable code



Module 03 Review



Microsoft Learn Modules
(docs.microsoft.com/Learn)

- Azure services: IoT, big data, analytics, and development tools.
- Azure Resource Manager.
- Azure Monitoring tools.