



# Linux Academy

## THE BOOK OF BASICS

AZ-900: Microsoft Azure  
Fundamentals



WELCOME

CLOUD CONCEPTS

CORE AZURE SERVICES

SECURITY, PRIVACY, COMPLIANCE, AND TRUST

AZURE PRICING AND SUPPORT

APPENDIX

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## Course Introduction

The Microsoft Azure Fundamentals certification will test your understanding of the fundamental components of Azure. It is the base-level Azure certification, but it is not a prerequisite for any other Microsoft certifications. This certification focuses on four domains:

- Cloud Concepts
- Core Azure Services
- Security, Privacy, Compliance, and Trust
- Azure Pricing and Support

There are several reasons to take the AZ-900 Microsoft Azure Fundamentals certification exam. Whether you're just starting out with cloud services and Microsoft Azure, are studying for one of Microsoft's many Azure, Data, or AI certifications, or are planning to become a certified Azure Administrator, Developer, Architect, or DevOps Engineer, this exam will help you on your way.

## From the Author

Dear students,

It is my pleasure to bring you the new Microsoft Azure Fundamentals certification exam preparation course! This course is a fun way to explore the basics of Azure: what it is, how it works, how we can use it, how we can secure it, and how much it costs. Whether you're just starting out or are a technical veteran, this course is a great way to strengthen your Azure knowledge.

I hope you enjoy the course. Let's get started!

Jason Calton  
Training Architect

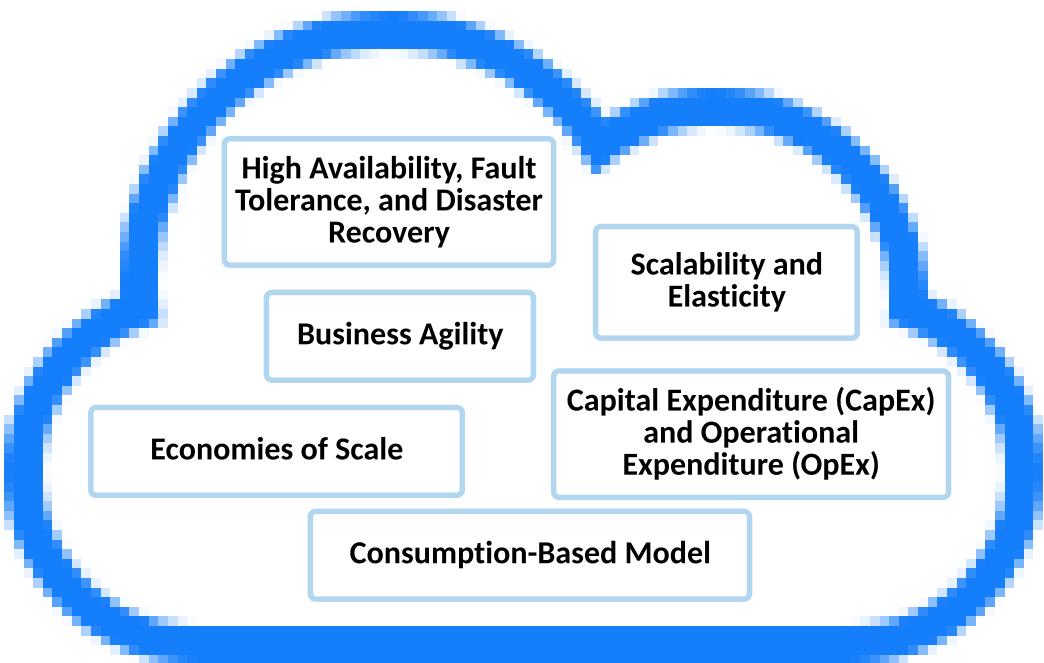


## Cloud Concepts

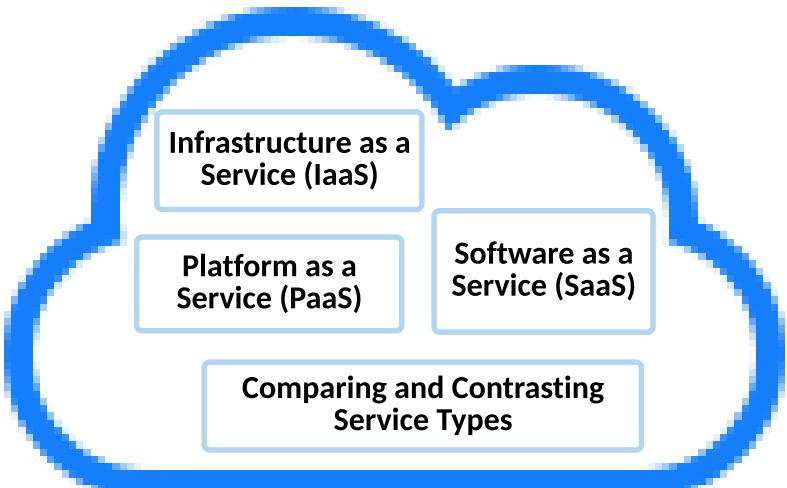
- ▶ Cloud Services: Benefits and Considerations
- ▶ Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS)
- ▶ Cloud Models: Public, Private, and Hybrid

NEXT 

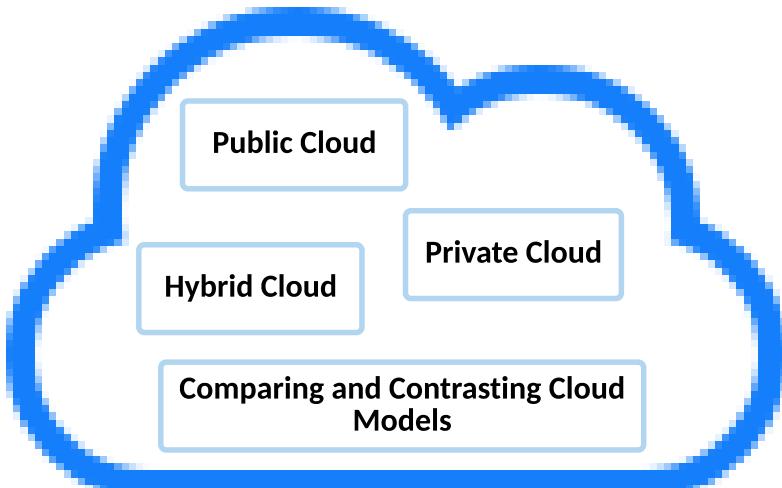
### Cloud Services: Benefits and Considerations



### Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS)



### Cloud Models: Public, Private, and Hybrid





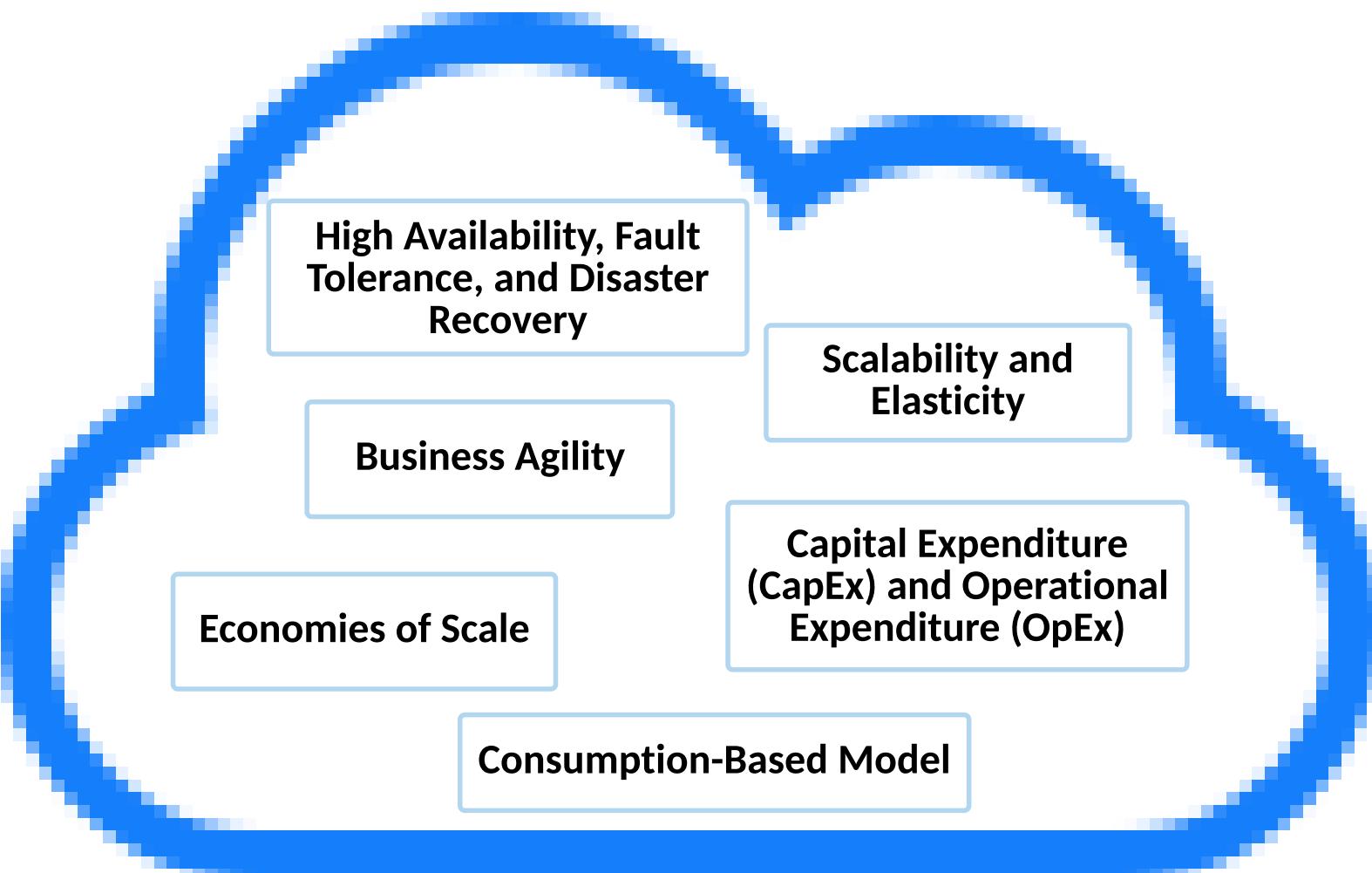
## Cloud Concepts



### Cloud Services: Benefits and Considerations

- ▶ Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS)
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## Cloud Services: Benefits and Considerations





## Cloud Concepts



### Cloud Services: Benefits and Considerations

- ▶ Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS)
- ▶ Cloud Models: Public, Private, and Hybrid

High Availability

Fault Tolerance

Disaster Recovery

## Cloud Concepts



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High Availability

Fault Tolerance

Disaster Recovery

### High Availability

Maintaining acceptable continuous performance despite temporary load fluctuations or failures in services, hardware, or data centers.

#### Data Center Redundancies

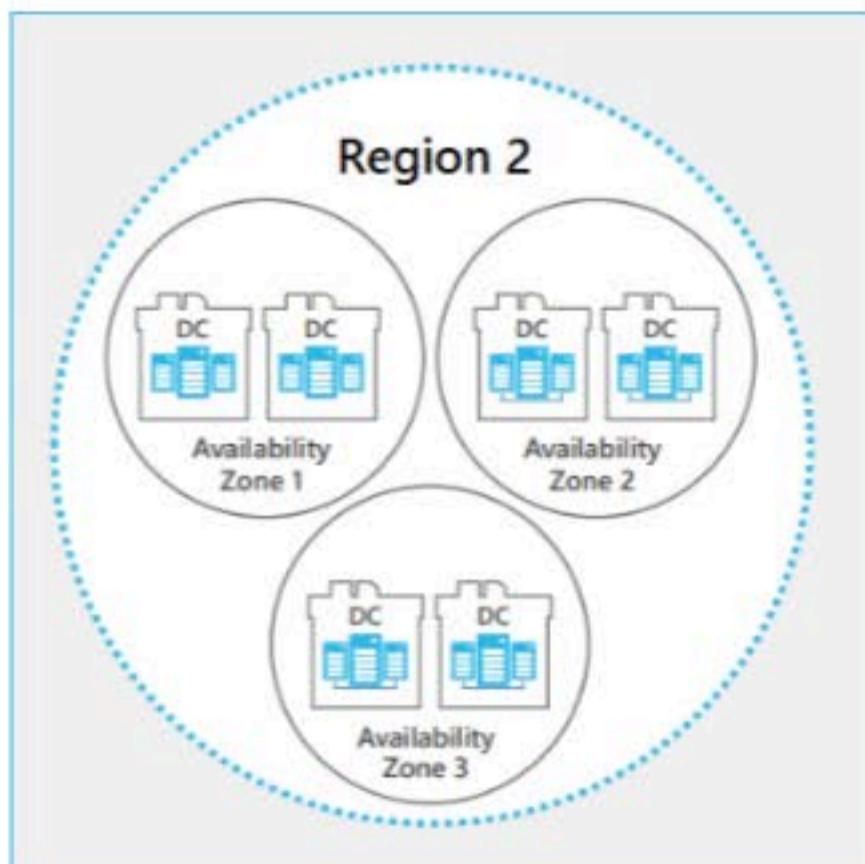
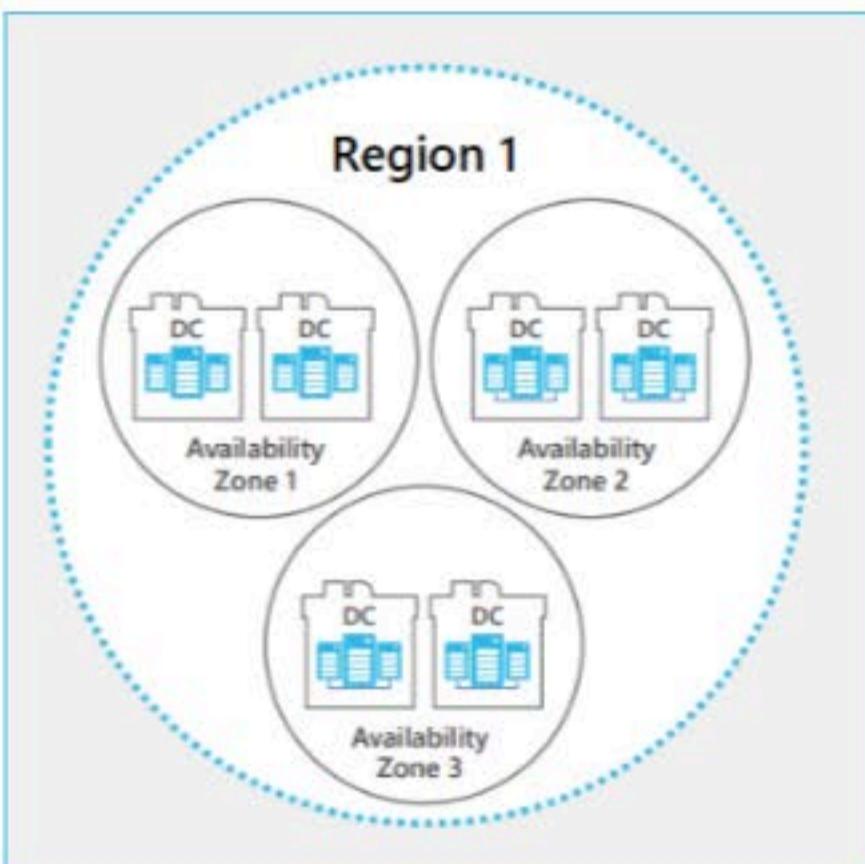
- ▶ Power
- ▶ Cooling
- ▶ Networking
- ▶ Etc.

#### Availability Zone Redundancies

- ▶ 1 or more data centers

#### Region Redundancies

- ▶ Multiple availability zones



## Cloud Concepts



### Cloud Services: Benefits and Considerations

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High Availability

Fault Tolerance

Disaster Recovery

### Fault Tolerance

A system's ability to **continue operating properly** when one or more of its components fails.

#### Proactive

- ▶ Regularly back up data/apps/resources
- ▶ Deploy to multiple availability zones or regions
- ▶ Load balance across multiple availability zones or regions
- ▶ Monitor health of data/apps/resources

#### Reactive

- ▶ Restore data/apps/resources to different availability zones or regions
- ▶ Deploy to different availability zones or regions

## Cloud Concepts



### Cloud Services: Benefits and Considerations

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High Availability

Fault Tolerance

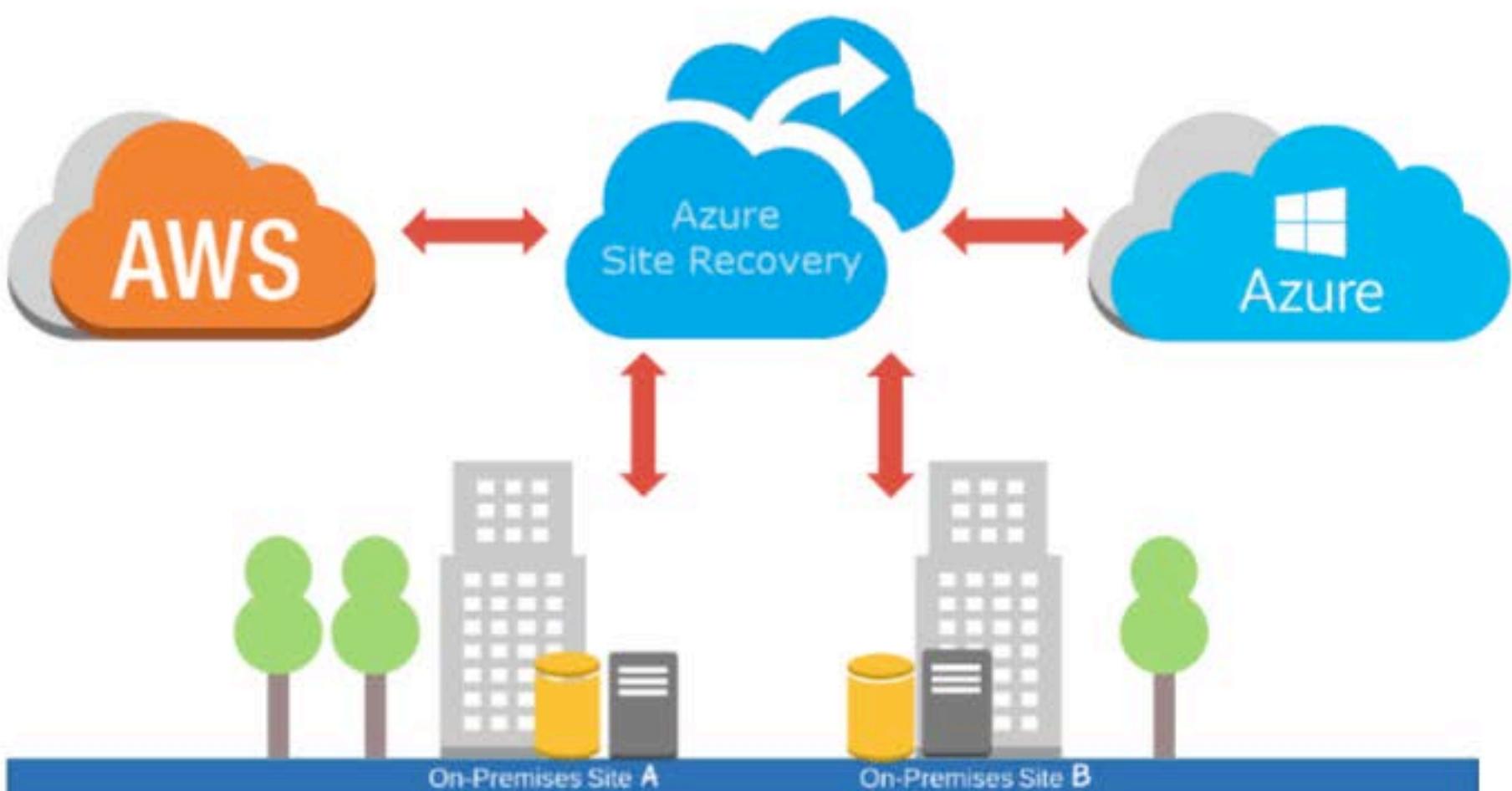
Disaster Recovery

### Disaster Recovery

A system's ability to back up and restore data/apps/resources when needed.

#### Can use Azure to restore:

- ▶ On-premises to on-premises
- ▶ On-premises to Azure
- ▶ Other cloud to Azure
- ▶ Azure to Azure





## Cloud Concepts



### Cloud Services: Benefits and Considerations

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Scalability

Elasticity

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## Cloud Concepts



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Scalability

Elasticity

### Scalability

The ability to increase the **instance count or size** of existing resources.

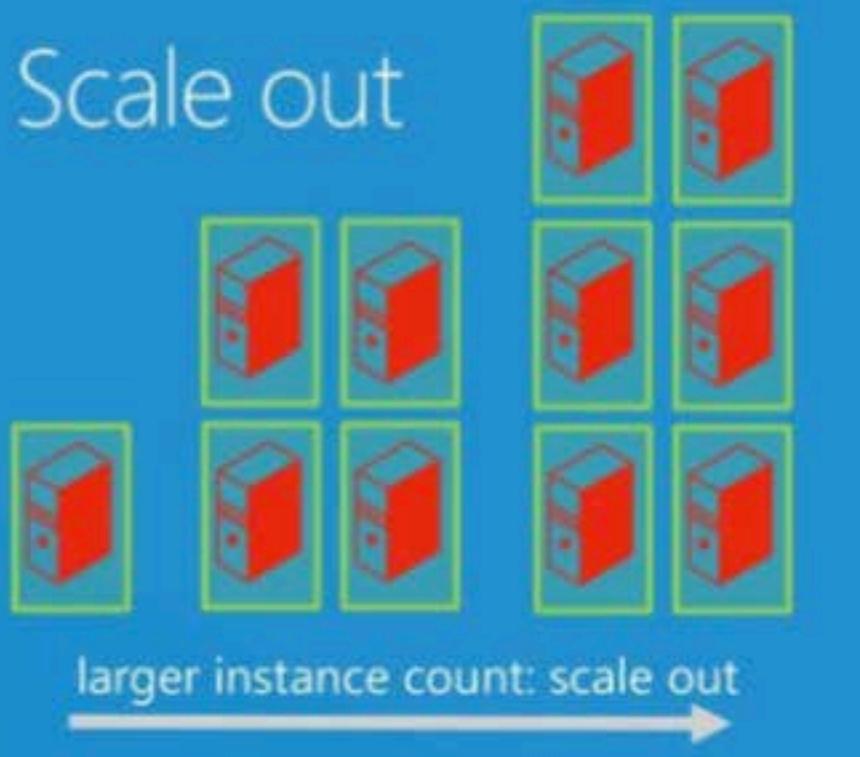
#### Scaling Out

- ▶ Increase **instance count** of existing resources
- ▶ Non-disruptive

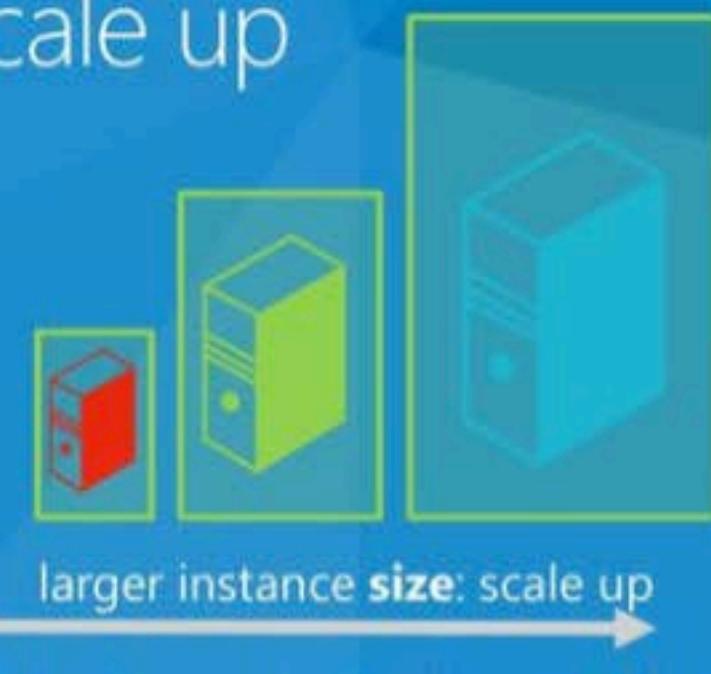
#### Scaling Up

- ▶ Increase **instance size** of existing resources
- ▶ Disruptive

Scale out



Scale up



## Cloud Concepts



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Scalability

Elasticity

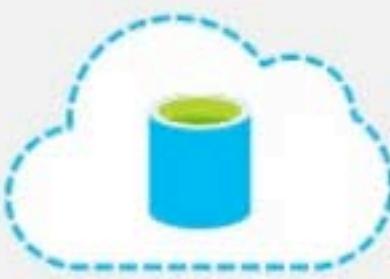
### Elasticity

The ability to increase or decrease the **instance count or size** of existing resources based on fluctuations in traffic, load, or resource workload.

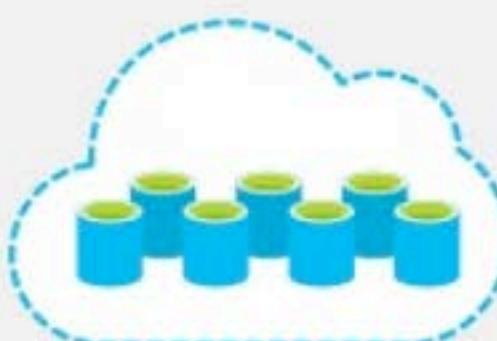
- ▶ Ability to scale in both directions (in + out, up + down)
- ▶ Can be manual or automatic
- ▶ Based on changes in load or workload
- ▶ Pay only for what you use

Real-time elasticity

Expand or reduce  
as needed



Resize in <1 minute



On-demand compute

## Cloud Concepts



### Cloud Services: Benefits and Considerations

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## Business Agility

An organization's ability to **rapidly adapt** to market and environmental changes in productive and cost-effective ways and take advantage of available resources to meet customer demands.





# Cloud Concepts



## Cloud Services: Benefits and Considerations

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## Economies of Scale

### Supply-Side Savings

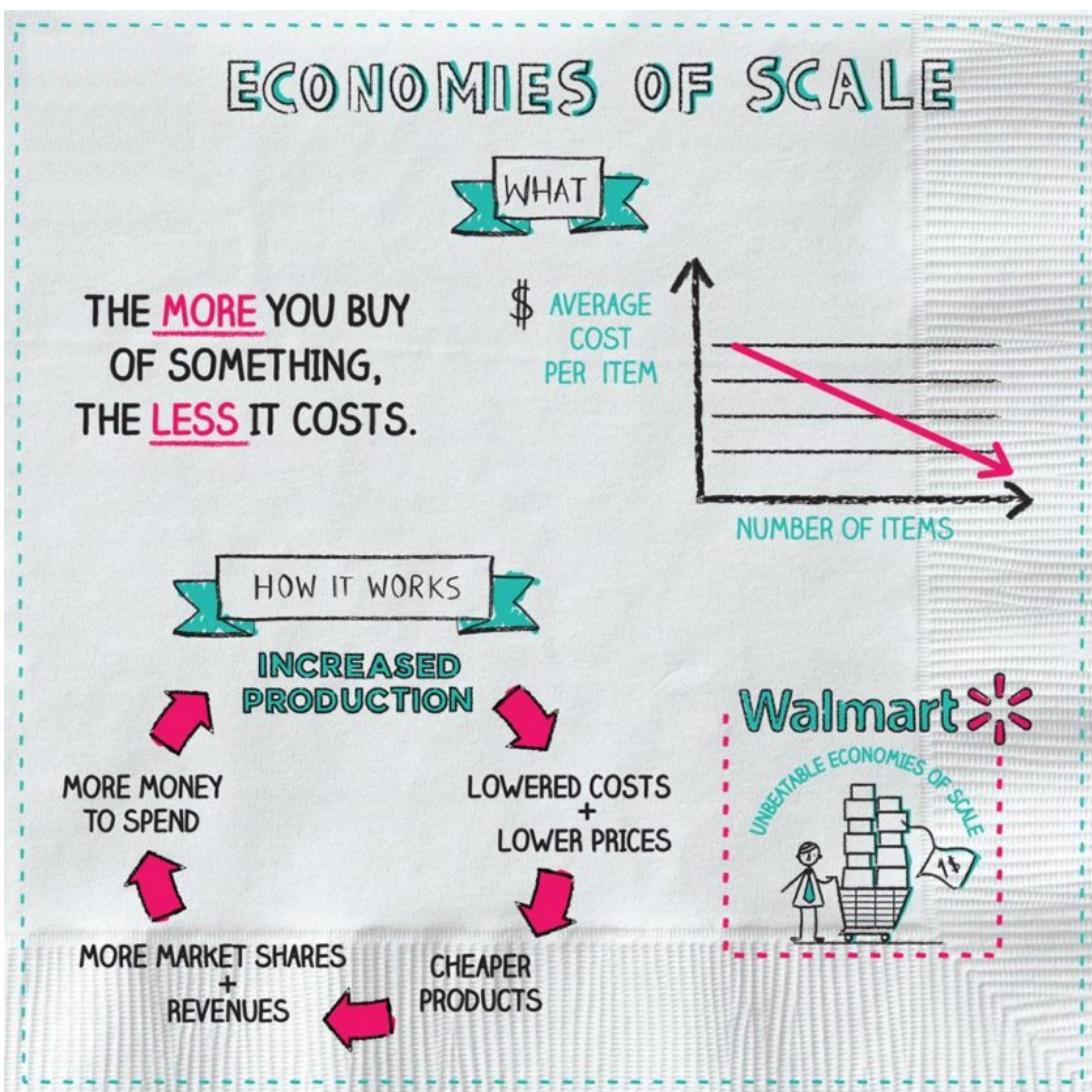
- ▶ Lower costs of land, servers, power, labor, etc.
- ▶ Higher buying power, security, reliability, etc.

### Demand-Side Savings

- ▶ Serving more customers means using more server resources (e.g., 80% CPU).
- ▶ Higher server utilization rates means lower costs

### Multi-Tenancy Savings

- ▶ More tenants (customers or users) lowers the cost of servers and management per tenant





## Cloud Concepts



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## Capital Expenditure (CapEx) and Operational Expenditure (OpEx)

### Capital Expense (CapEx)

- ▶ Up-front investment
- ▶ Creates benefits over a long period of time
- ▶ Usually non-recurring
- ▶ Usually related to purchase of permanent assets

### Operating Expense (OpEx)

- ▶ No up-front investment
- ▶ Creates immediate benefits
- ▶ Recurring cost of doing business
- ▶ Usually not related to purchase of permanent assets

### On-Premise

Capex is high, Opex is low

Software Licensing

Hardware

Power  
(Utilities & Generators)

Cooling  
(Capex & Maintenance)

Real Estate  
(Capex & Maintenance)



**Hidden Costs**

Subscription

Physical Security  
(Capex & Maintenance)

Disaster Recovery

IT Support Headcount  
(Configuration, Customization,  
Maintenance)

Training

### Cloud

Capex is low, Opex is high



**Transparent Costs**

Includes: Hardware, Power,  
Cooling, Real Estate, Physical  
Security, Disaster, Recovery

IT Support Headcount  
(Configuration, Customization,  
Maintenance)

Training



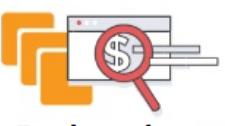
# Cloud Concepts



## Cloud Services: Benefits and Considerations

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## Consumption-Based Model



No up-front investment

Pay as you go

Pay less when you reserve

Pay less by using more

Pay per use

Pay less when Azure grows

### Compute

Pay by CPU/hour

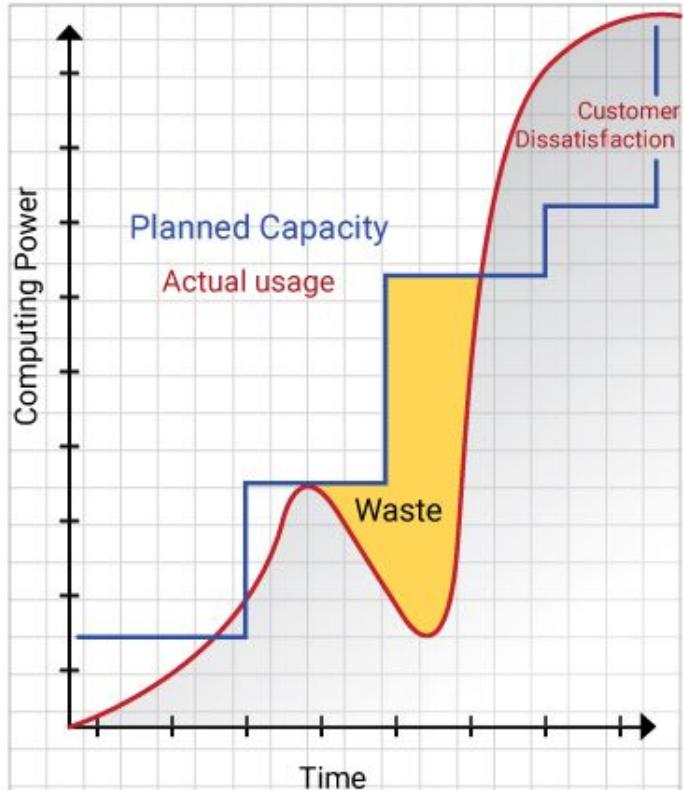
### Storage

Pay by GB

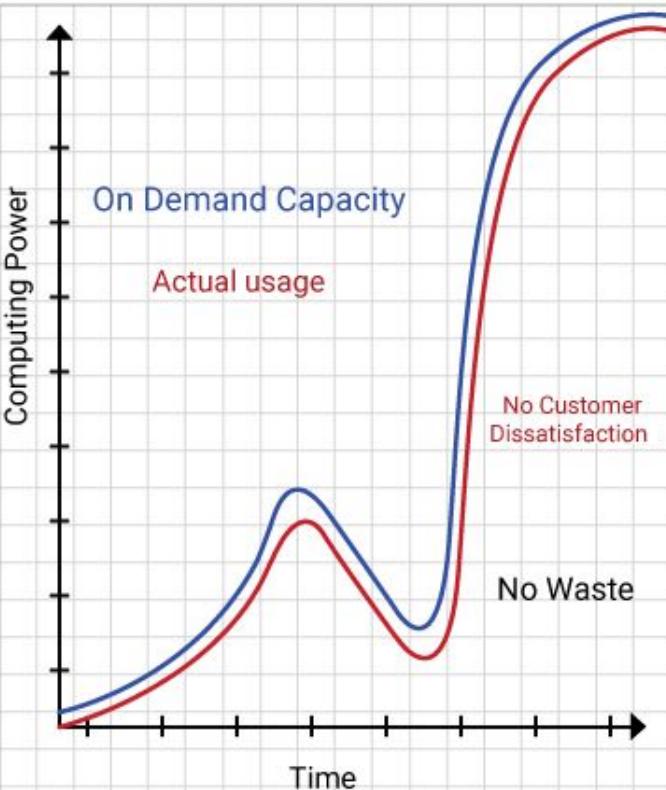
### Data Transfer

Pay by GB for data out, not in

## Traditional Data Center



## Azure



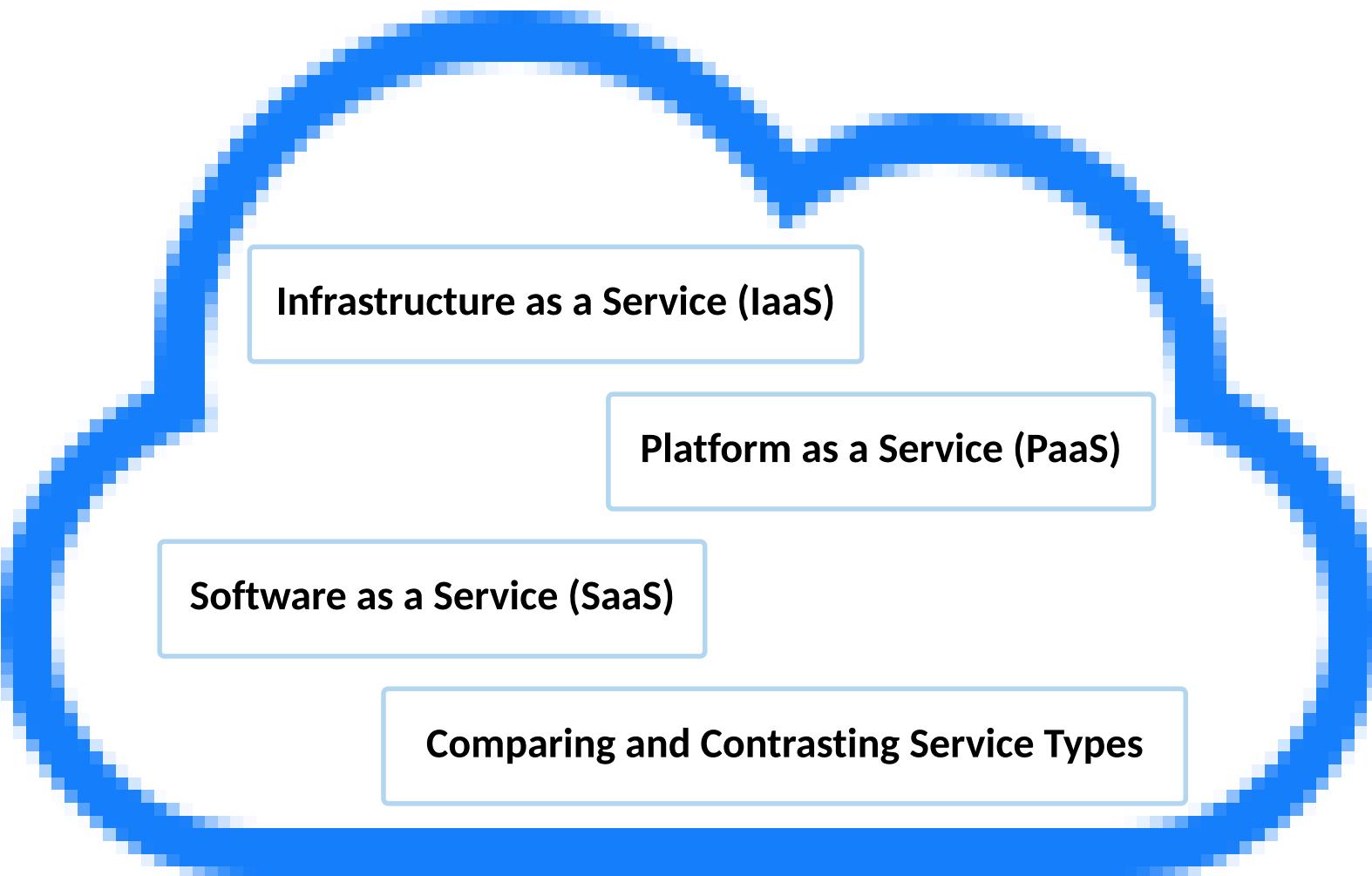


## Cloud Concepts



- ✓ Cloud Services: Benefits and Considerations
- Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS)
- ▶ Cloud Models: Public, Private, and Hybrid

### Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS)





# Cloud Concepts



✓ Cloud Services: Benefits and Considerations

→ Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS)

► Cloud Models: Public, Private, and Hybrid

## Infrastructure as a Service (IaaS)

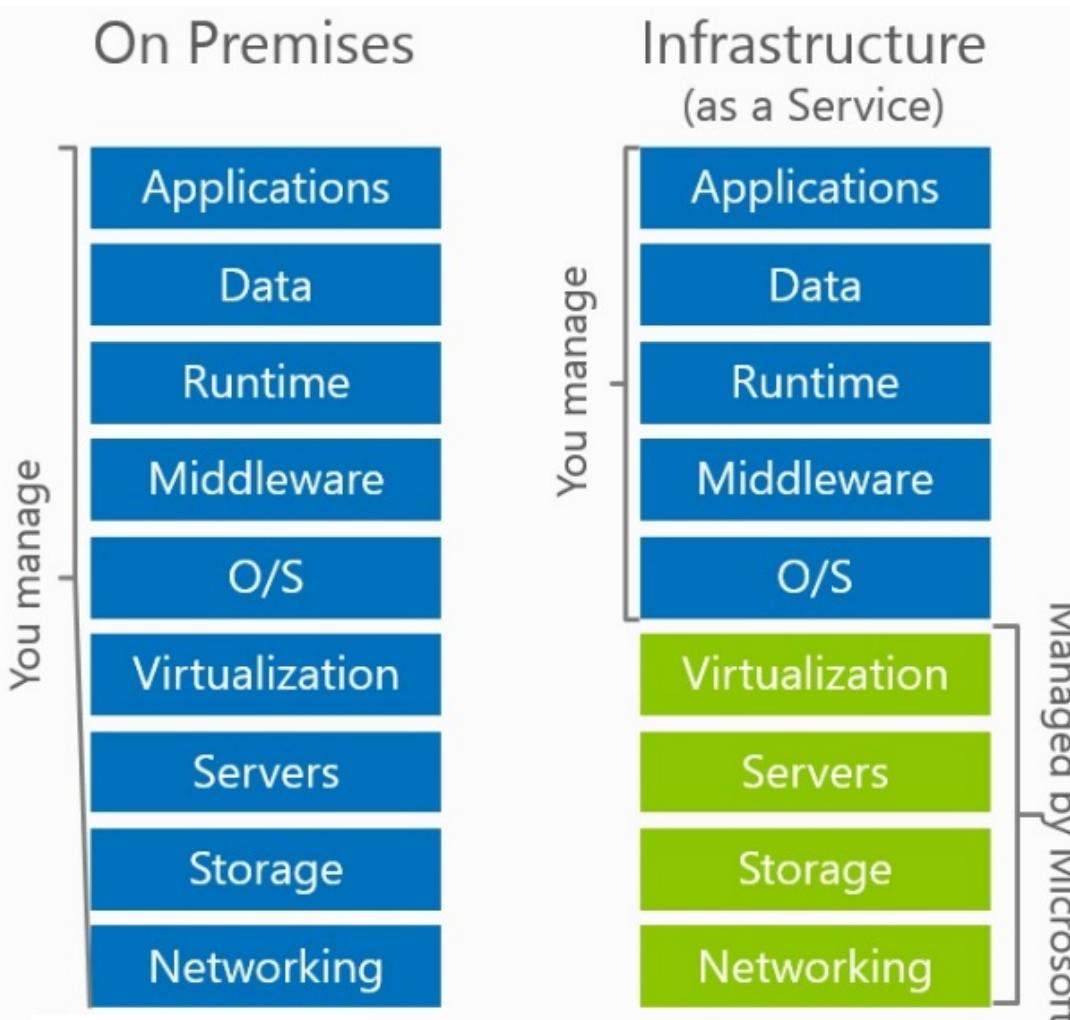


### Pros:

- Total control over most resources
- No up-front costs; pay-as-you-go
- No physical infrastructure to manage
- Easy way to transition to the cloud
- Easy scaling options

### Cons:

- More management & administration
- Requires more staff
- Higher costs





# Cloud Concepts

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✓ Cloud Services: Benefits and Considerations

→ Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS)

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## Platform as a Service (PaaS)



Storage



Search



SQL



App Service

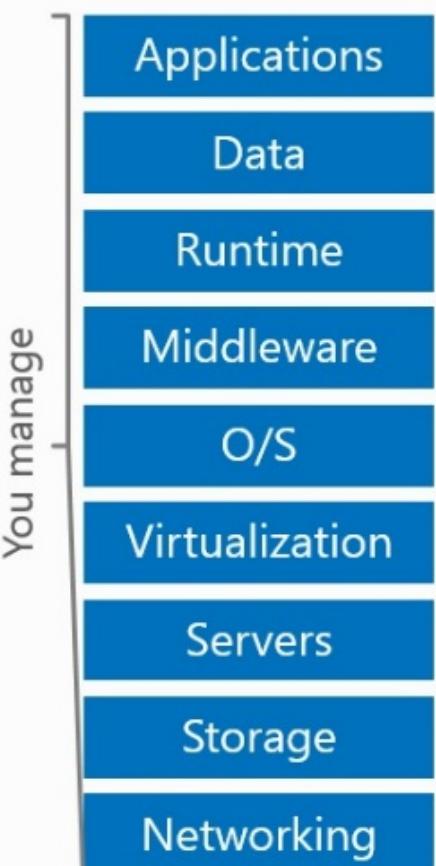
### Pros:

- Less management & administration
- No up-front costs; pay-as-you-go
- No OS/middleware to manage
- Easier to replicate environments
- Easy scaling
- Faster development & deployment

### Cons:

- Less control over resources
- Data is stored off-site; must consider security & compliance

## On Premises



## Platform (as a Service)





## Cloud Concepts



✓ Cloud Services: Benefits and Considerations

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### Software as a Service (SaaS)



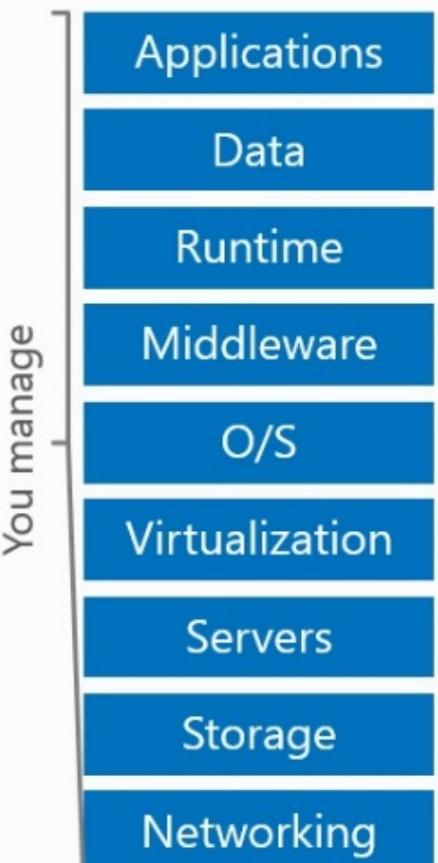
#### Pros:

- No management & administration
- No up-front costs; pay-as-you-go
- No physical infrastructure to manage
- Fast setup
- Anyone can use it

#### Cons:

- Usually less customizable
- No control over software or infrastructure
- Integration with other software may be difficult
- Vendor may have access to customer data

### On Premises



### Software (as a Service)





# Cloud Concepts



## Cloud Services: Benefits and Considerations

## Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS)

### Cloud Models: Public, Private, and Hybrid

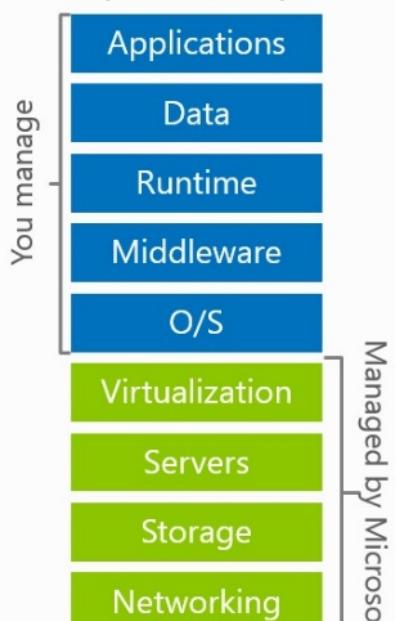
## Comparing and Contrasting the Three Service Types



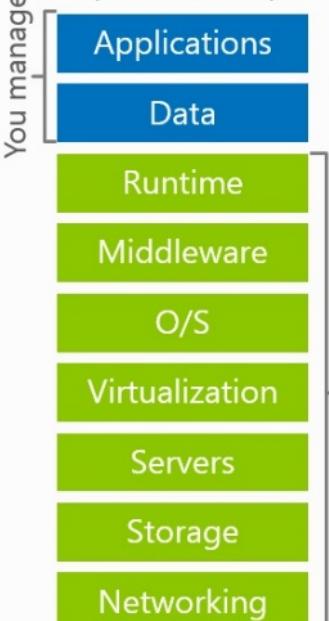
## On Premises



## Infrastructure (as a Service)



## Platform (as a Service)



## Software (as a Service)





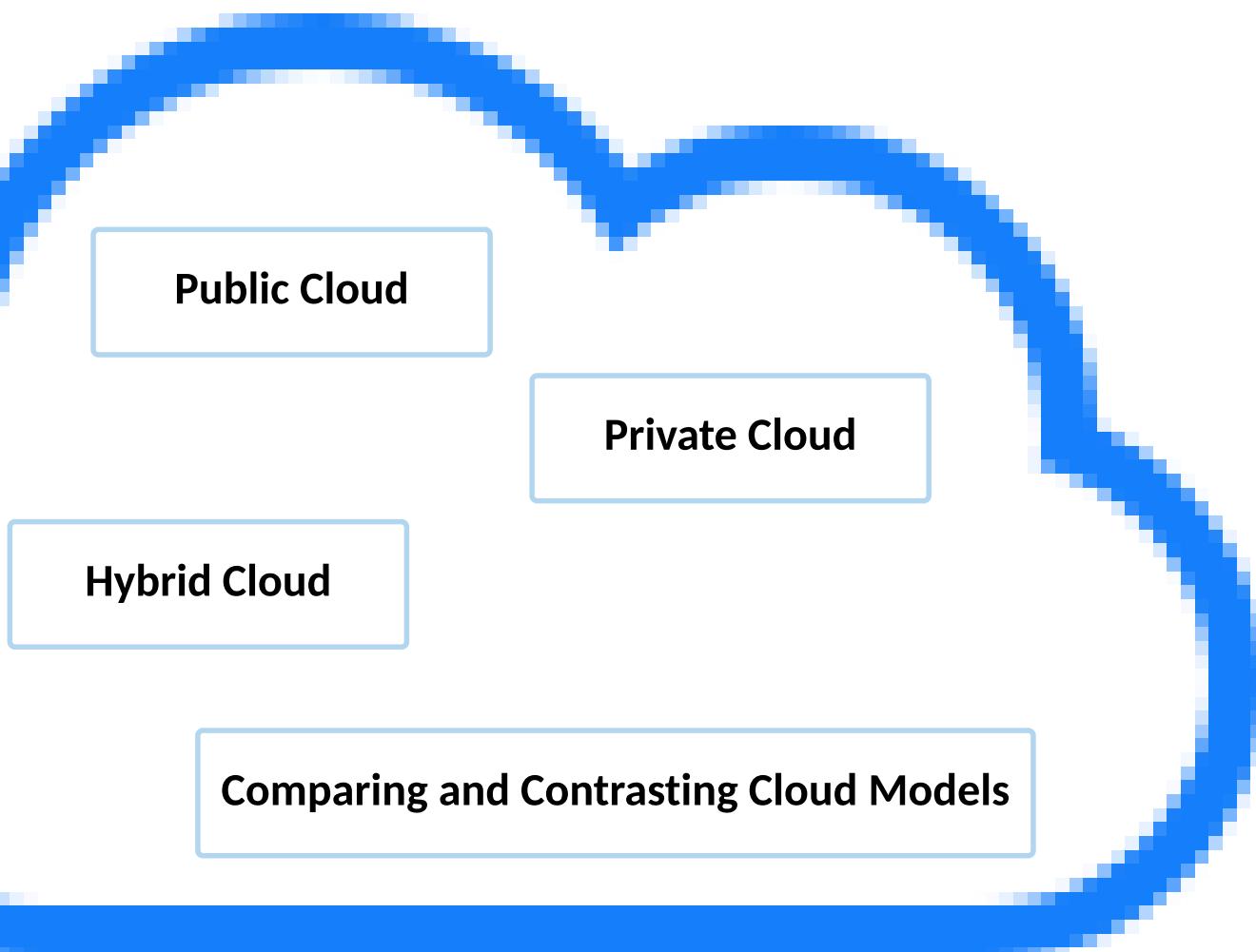
## Cloud Concepts



NEXT

- ✓ Cloud Services: Benefits and Considerations
- ✓ Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS)
- Cloud Models: Public, Private, and Hybrid

### Cloud Models: Public, Private, and Hybrid





# Cloud Concepts



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- ▶ Cloud Models: Public, Private, and Hybrid

## The Public Cloud Model

### Pros:

- ▶ No up-front capital expenses
- ▶ No maintenance required
- ▶ Highly reliable
- ▶ Easily scalable

### Cons:

- ▶ Less customizable
- ▶ Potential latency
- ▶ Potential governance issues



### Public

- Multi-tenant implementation
- Owned and operated by Service Provider
- Bound by multi-tenant data management policies
- Similar self-service and automation capabilities as Private Cloud



## Cloud Concepts



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### The Private Cloud Model

**Pros:**

- ▶ Fully customizable
- ▶ Higher level of security
- ▶ Better performance

**Cons:**

- ▶ Higher up-front capital expense
- ▶ Risk of under-utilizing resources
- ▶ Higher ongoing costs
- ▶ More maintenance required



#### Private

- Single tenant implementation
- Owned and operated by IT organization
- Define your own data management policies
- Self-service and automation capabilities provide new agility



## Cloud Concepts



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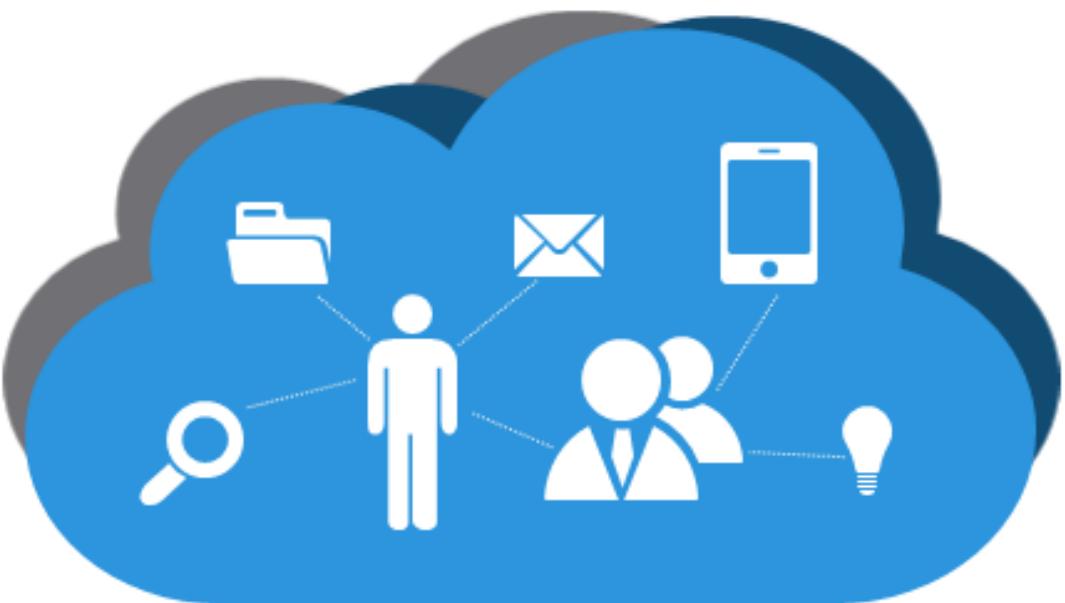
### The Hybrid Cloud Model

#### Pros:

- ▶ Greater flexibility
- ▶ Resilience to outages
- ▶ No capacity ceiling
- ▶ Manageable security

#### Cons:

- ▶ Higher up-front capital expense
- ▶ Risk of under-utilizing resources
- ▶ Higher ongoing costs
- ▶ More maintenance required
- ▶ Risk of compatibility issues



### Hybrid

- Combination for Private & one or more public clouds
- Allows IT organizations to become brokers of services



## Cloud Concepts



✓ Cloud Services: Benefits and Considerations

✓ Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS)

► Cloud Models: Public, Private, and Hybrid

## Comparing and Contrasting the Three Cloud Models

### Best For:

- Transitioning to the cloud
- New applications or systems
- Standard workloads
- Systems that don't need much customization

### Best For:

- Transitioning to the cloud
- Systems that need enhanced security
- Systems that need some data, apps, or systems on-premises

### Best For:

- Highly secure applications or systems
- Systems that need some customization



### Public

- Multi-tenant implementation
- Owned and operated by Service Provider
- Bound by multi-tenant data management policies
- Similar self-service and automation capabilities as Private Cloud



### Hybrid

- Combination for Private & one or more public clouds
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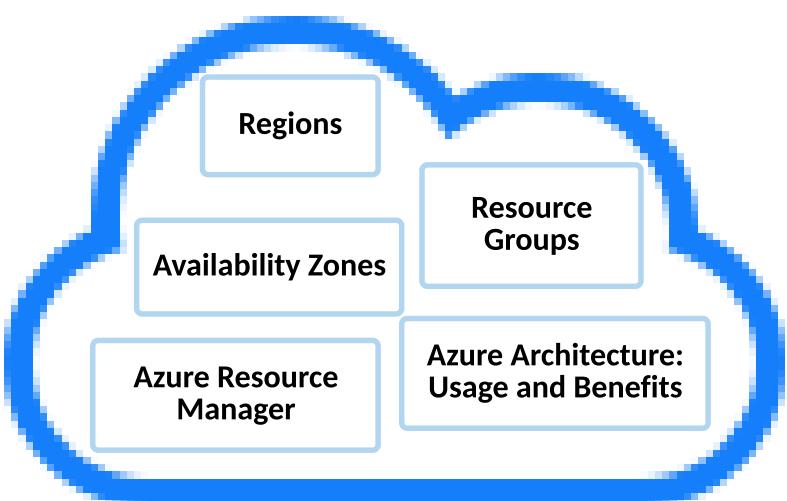


## Core Azure Services

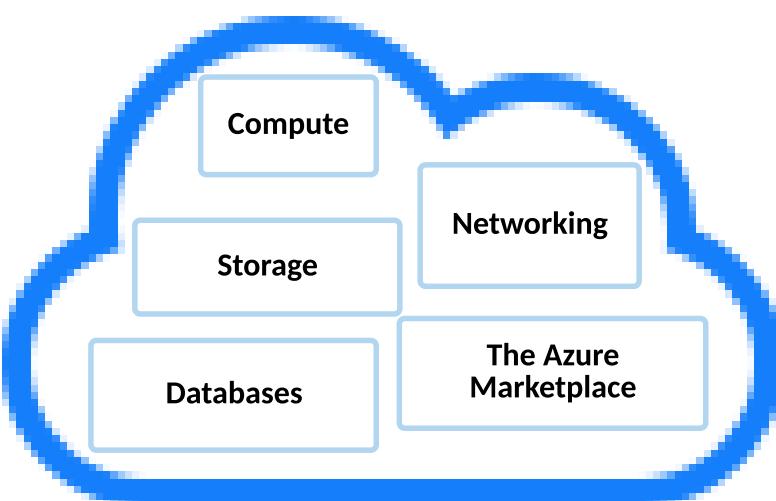
- ▶ Azure Architecture
- ▶ Azure Products and Services
- ▶ Azure Solutions
- ▶ Azure Management Tools

NEXT 

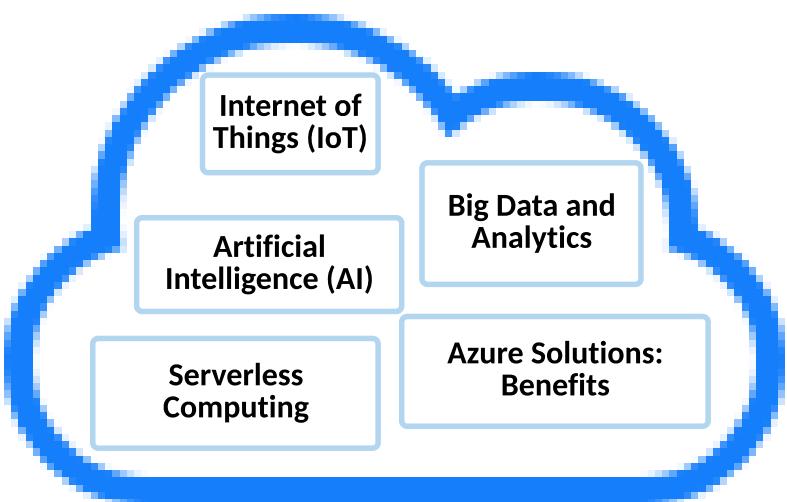
### Azure Architecture



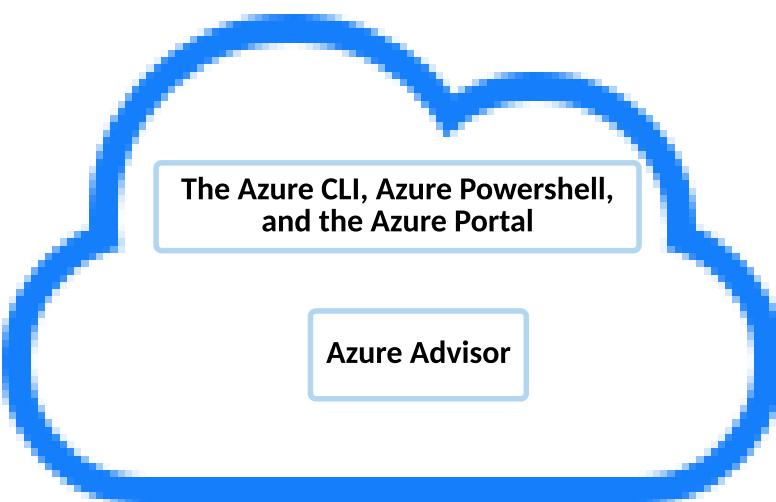
### Azure Products and Services



### Azure Solutions



### Azure Management Tools





## Core Azure Services

- Azure Architecture**
  - ▶ Azure Products and Services
  - ▶ Azure Solutions
  - ▶ Azure Management Tools

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WELCOME

CLOUD CONCEPTS

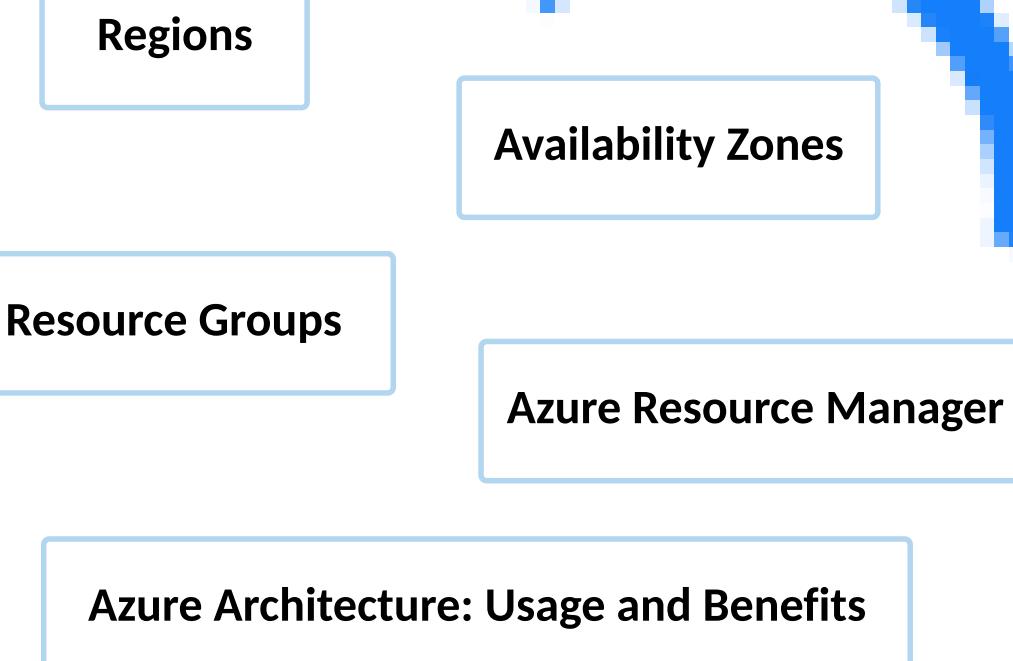
CORE AZURE SERVICES

SECURITY, PRIVACY, COMPLIANCE, AND TRUST

AZURE PRICING AND SUPPORT

APPENDIX

### Azure Architecture





# Core Azure Services



## Azure Architecture

- ▶ Azure Products and Services
- ▶ Azure Solutions
- ▶ Azure Management Tools

## Regions

Groups of **multiple Azure data centers** within a latency-defined perimeter and connected through a dedicated regional low-latency network.

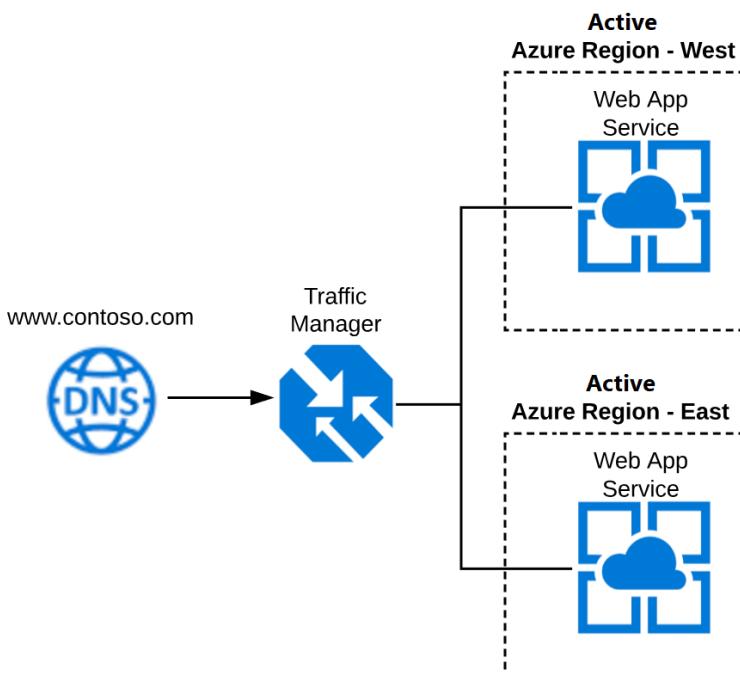
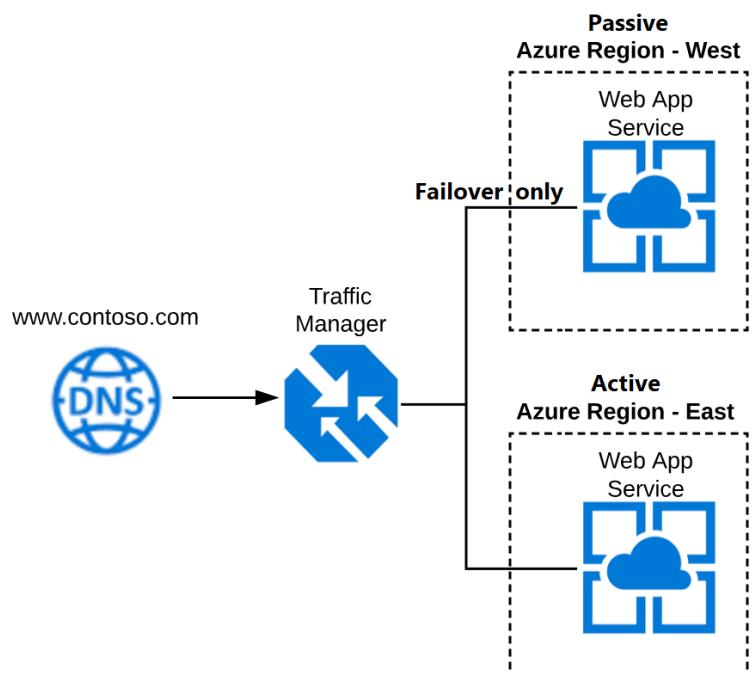
Deploying your applications/systems to multiple regions allows for **resiliency to region-wide outages**.

### Multi-Region Failover (Active/Passive):

- ▶ Failover across regions instantly
- ▶ Resiliency to region-wide outages
- ▶ Best when all users are in the same region

### Multi-Region Deployments (Active/Active):

- ▶ Distribute traffic/load across regions
- ▶ Resiliency to region-wide outages
- ▶ Best when all users are in different regions





## Core Azure Services

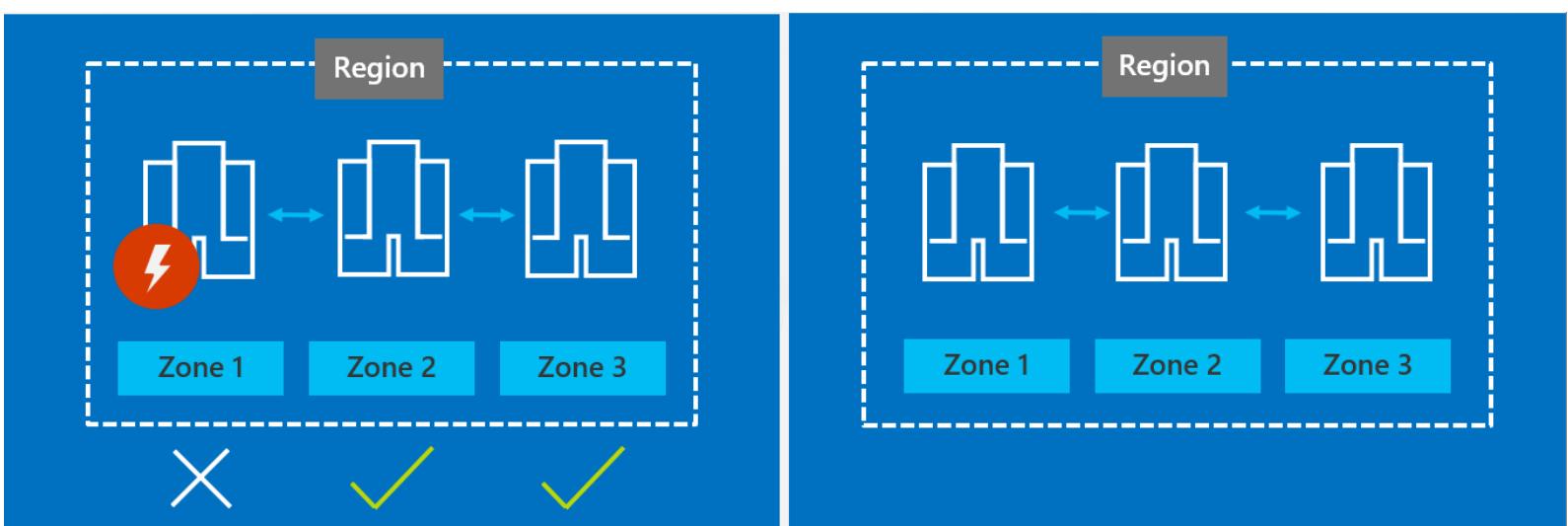


### Azure Architecture

- ▶ Azure Products and Services
- ▶ Azure Solutions
- ▶ Azure Management Tools

## Availability Zones

- ▶ **Unique physical locations** within an Azure region made up of one or more data centers.
- ▶ Allow for high availability by protecting your applications and data from data center failures.
- ▶ Some Azure services can be deployed to two or more Availability Zones within an Azure region.





## Core Azure Services

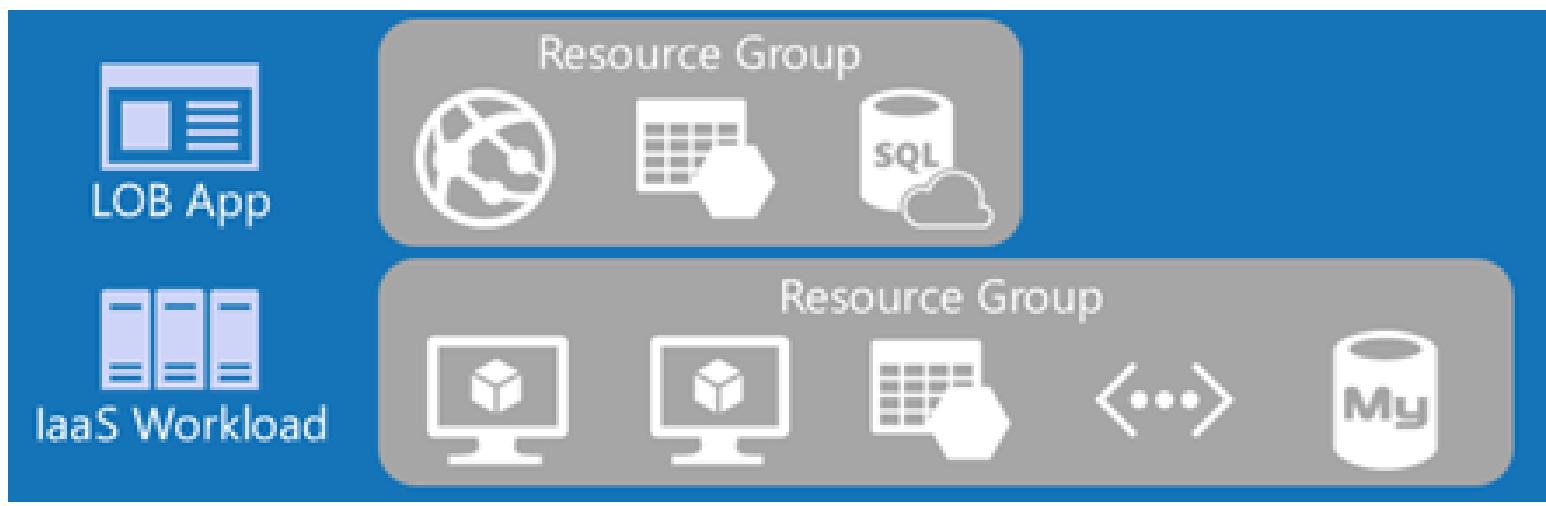


- ▶ Azure Architecture
- ▶ Azure Products and Services
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## Resource Groups

Containers of **related Azure services** grouped together.

- ▶ All the resources in the group should share the same lifecycle — they should be deployed, updated, and deleted together.
- ▶ A resource can only exist in one resource group.
- ▶ A resource group can contain resources that are located in different regions.
- ▶ A resource group can be used to scope access control for administrative actions.
- ▶ A resource can interact with resources in other resource groups. (When two resources are related but don't share the same lifecycle; for example, web apps connecting to a database.)





## Core Azure Services

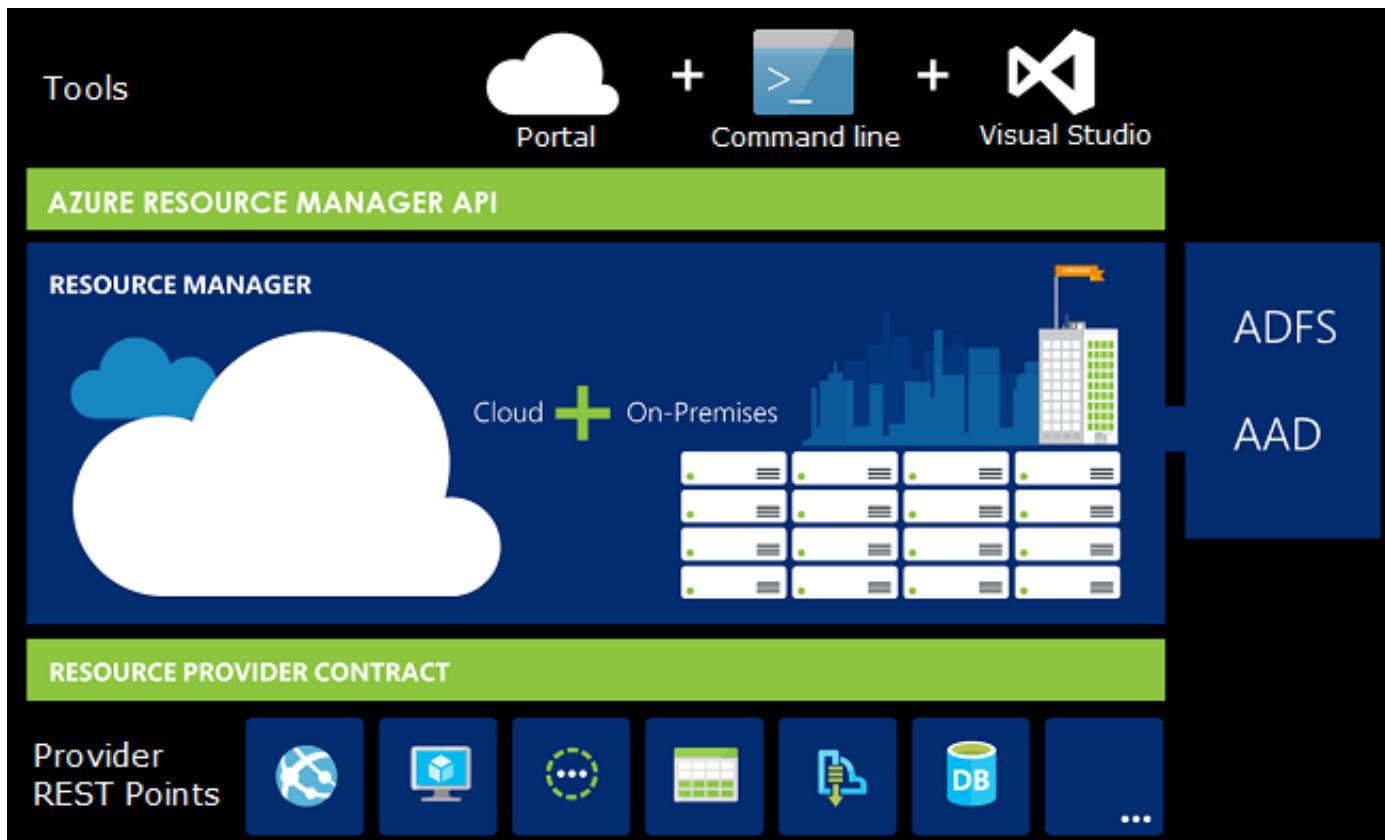


### Azure Architecture

- ▶ Azure Products and Services
- ▶ Azure Solutions
- ▶ Azure Management Tools

## Azure Resource Manager

- ▶ The Azure **deployment and management service**.
- ▶ Provides a consistent management layer that enables you to **create, update, and delete resources** in your Azure subscription, including with templates.
- ▶ You can use its **access control, auditing, and tagging** features to secure and organize your resources after deployment.





## Core Azure Services



### Azure Architecture

- ▶ Azure Products and Services
- ▶ Azure Solutions
- ▶ Azure Management Tools

## Azure Architecture: Usage and Benefits

### Availability Zones

Allow for high availability by protecting your applications and data from single data center failures.

### Regions

Deploying your applications/systems to multiple regions allows for high availability and resiliency to region-wide outages.

### Resource Groups

Containers of related Azure services grouped together for administrative and access control actions.

### Azure Resource Manager

Single, centralized deployment and management service that enables you to create, update, and delete resources in your Azure subscription.

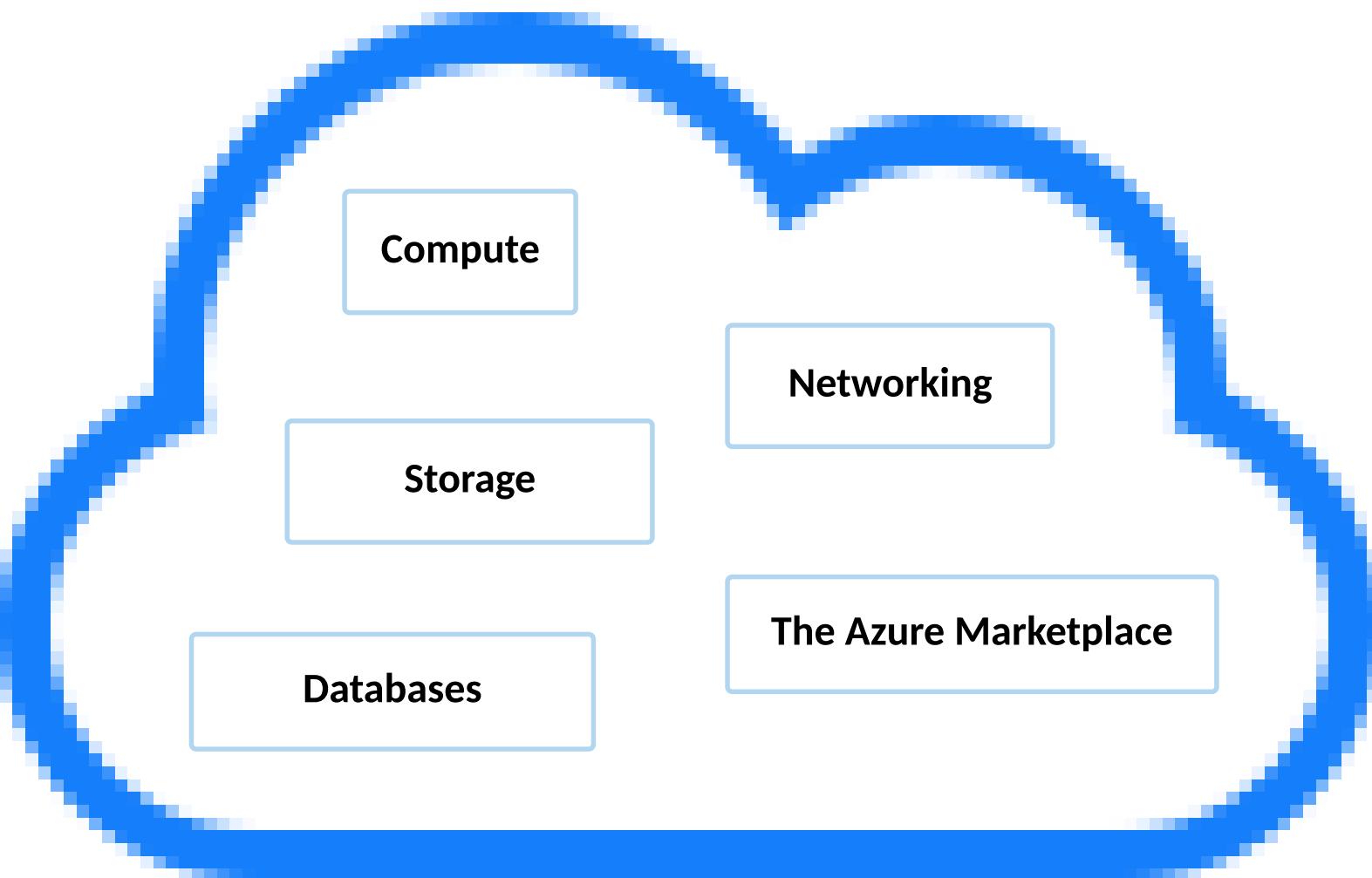


## Core Azure Services



- ✓ Azure Architecture
- ▶ Azure Products and Services
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## Azure Products and Services





## Core Azure Services



- ✓ Azure Architecture
- ▶ Azure Products and Services
  - ▶ Azure Solutions
  - ▶ Azure Management Tools

## Compute

### Virtual Machines

On-demand, scalable computing resource

Choose the CPU/RAM size(s) you need

Most control over server



Virtual machine

### Virtual Machine Scale Sets

Auto-scaling pool of virtual machines

Centrally manage, configure, and update a large number of VMs

### App Service

On-demand, auto-scaling web/mobile/API app hosting

Linux & Windows platforms

### Serverless Functions

Event-driven, serverless compute resources

Auto-scale on demand

Pay only for what you consume

IaaS  
More Control

Virtual Machines

Virtual Machine Scale Sets

App Services

Serverless



PaaS  
Less Control



## Core Azure Services



### Azure Architecture

- ▶ Azure Products and Services
  - ▶ Azure Solutions
  - ▶ Azure Management Tools

## Networking

### Azure Virtual Network

Enables Azure resources, such as Azure Virtual Machines (VMs), to securely communicate with each other, the internet, and on-premises networks.

### Azure VPN Gateway

Used to send encrypted traffic between an Azure virtual network and an on-premises location over the public internet or between Azure virtual networks over the Microsoft network.

### Azure Load Balancer

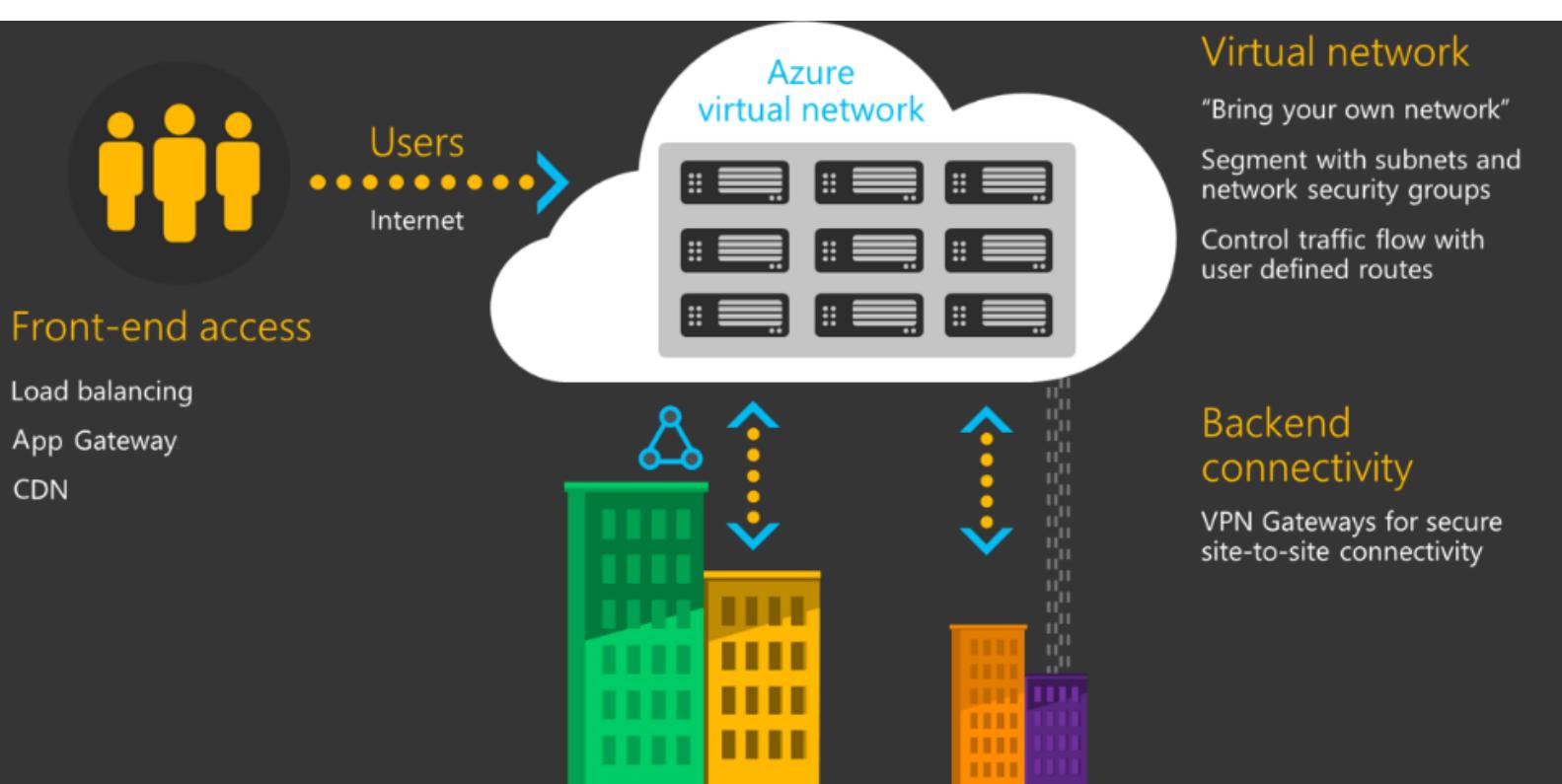
Enables you to load-balance incoming internet traffic to your VMs.

### Azure App Gateway

A web traffic load balancer that is even more customizable than Azure Load Balancer.

### Azure Content Delivery Network

Efficiently delivers web content from locations that are close to end users to minimize latency.





## Core Azure Services



✓ Azure Architecture

➡ Azure Products and Services

▶ Azure Solutions

▶ Azure Management Tools

## Storage

### Azure Storage Services

IaaS	PaaS			
Disks	Files	Blobs	Tables	Queues
Persistent disks for Azure IaaS VMs  Premium Storage Disks option: SSD based, high IOPS, low latency	Fully Managed File Shares in the Cloud  SMB and REST access  "Lift and shift" legacy apps	Highly scalable, REST based object store  Unstructured data	Massive auto-scaling NoSQL store  Dynamic scaling based on load  Scale to PBs of table data  Fast key/value lookups	Reliable queues at scale for cloud services  Decouple and scale components

### Azure Storage Tiers

HIGH

Storage Cost

LOW

**HOT TIER**

**COOL TIER**

**ARCHIVE TIER**

HIGH

Data Access Speed

LOW



## Core Azure Services



### Azure Architecture

### Azure Products and Services

- ▶ Azure Solutions
- ▶ Azure Management Tools



### Azure Cosmos DB

Globally distributed, multi-model NoSQL database service.

PaaS service — auto-scalable across multiple regions.

Supports multiple APIs, including SQL, MongoDB, Cassandra, Tables, & Gremlin.

Supports analytics through Apache Spark.

## Databases



### Azure SQL Database

#### IaaS

SQL server on Azure Virtual Machines.

Pay-as you-go for a SQL server license or use an existing license.

#### PaaS

Fully managed SQL database engine.

Available as single database, elastic pool, and managed instances.



### Azure SQL Data Warehouse

Cloud-based Enterprise Data Warehouse (EDW).

Leverages massively parallel processing (MPP) to quickly run complex queries across petabytes of data.

Key component of a Big Data solution.



### Azure Database Migration Service

Enables seamless migrations from multiple database sources to Azure data platforms with minimal downtime.

Offline migration: Application downtime starts when the migration starts.

Online migration: Downtime is limited to the time to cut over at the end of the migration.

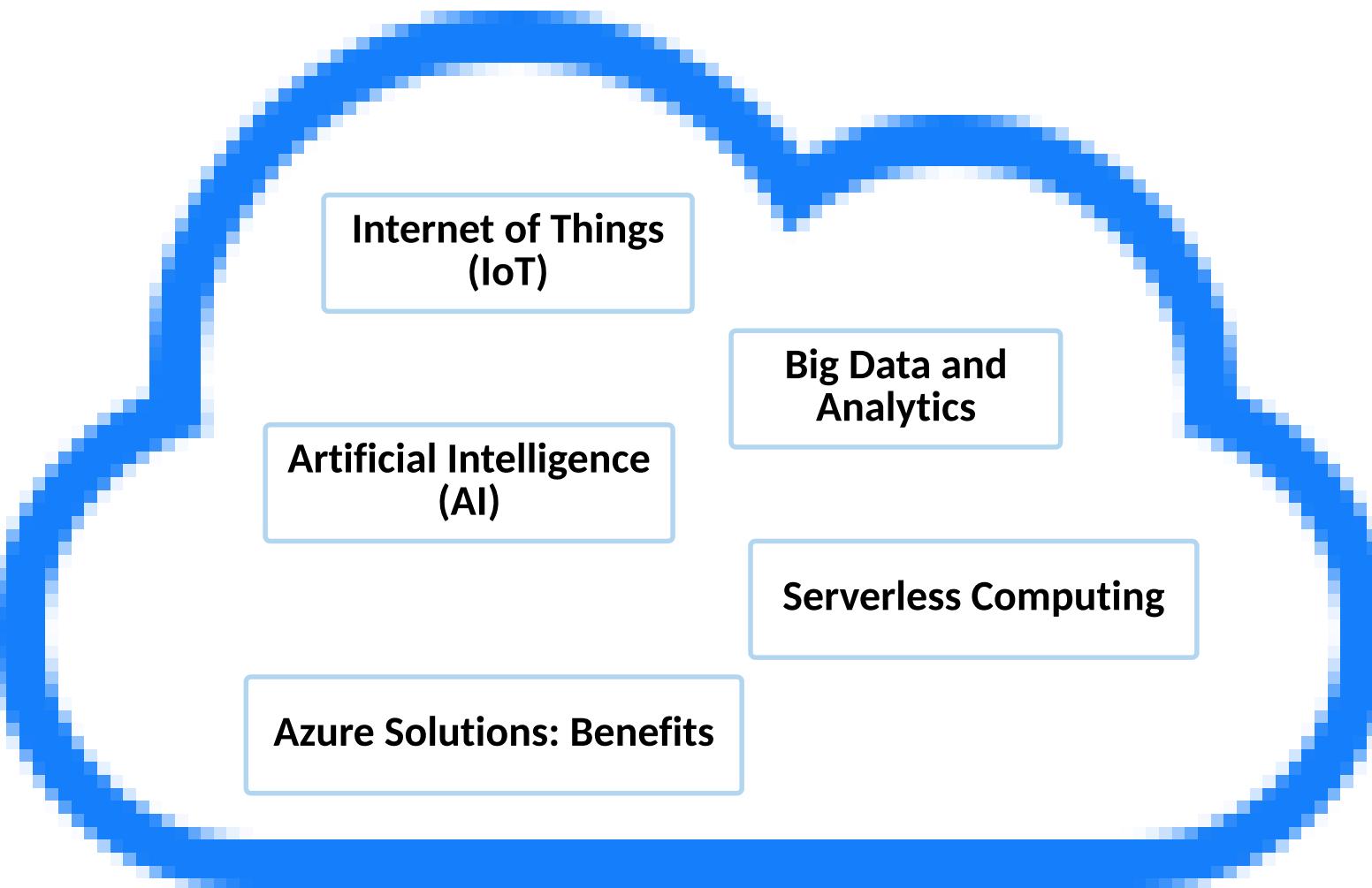


## Core Azure Services



- Azure Architecture
- Azure Products and Services
- Azure Solutions
  - ▶ Azure Management Tools

## Azure Solutions





## Core Azure Services



- Azure Architecture
- Azure Products and Services
- Azure Solutions
  - ▶ Azure Management Tools

## Internet of Things (IoT)

- ▶ An IoT solution is made up of one or more IoT devices and one or more back-end services running in the cloud that communicate with each other.
- ▶ Devices usually have sensors and connect to the internet.

### Azure IoT Central

- ▶ Fully managed SaaS solution.
- ▶ Easily connect, monitor, and manage your IoT devices/assets at scale.
- ▶ Collaborative, drag-and-drop visual workspace where you can build, test, and deploy IoT solutions without the need to write code.

### Azure IoT Hub

- ▶ Core Azure PaaS messaging service used by Azure IoT Central.
- ▶ Enables reliable and secure bidirectional communications between millions of IoT devices and a cloud solution.

## Azure IoT Technologies and Solutions

### (PaaS) Solutions

#### Azure IoT solution accelerators (PaaS)

Preconfigured solutions for common IoT scenarios

### (SaaS) Solutions

#### Azure IoT Central (SaaS)

#### Microsoft Dynamics Connected Field Service (SaaS)

### (PaaS) Technologies

#### Device support

Azure IoT Device SDK
Azure IoT certified devices
Security Program for Azure IoT
Windows 10 IoT

#### IoT

Azure IoT Hub	Azure Maps
Azure IoT Edge	IoT Hub Device Provisioning Service
Azure Time Series Insights	
Azure Sphere	Azure Functions
Azure Digital Twins	Azure Machine Learning

#### Data and Analytics

Azure HD Insight
Azure Data Lake
Azure Cosmos DB

#### Visualization and Integration

Microsoft Flow	Azure Active Directory
Azure Logic Apps	Microsoft Power BI
Azure Web App	Azure Monitor
Notification Hubs	

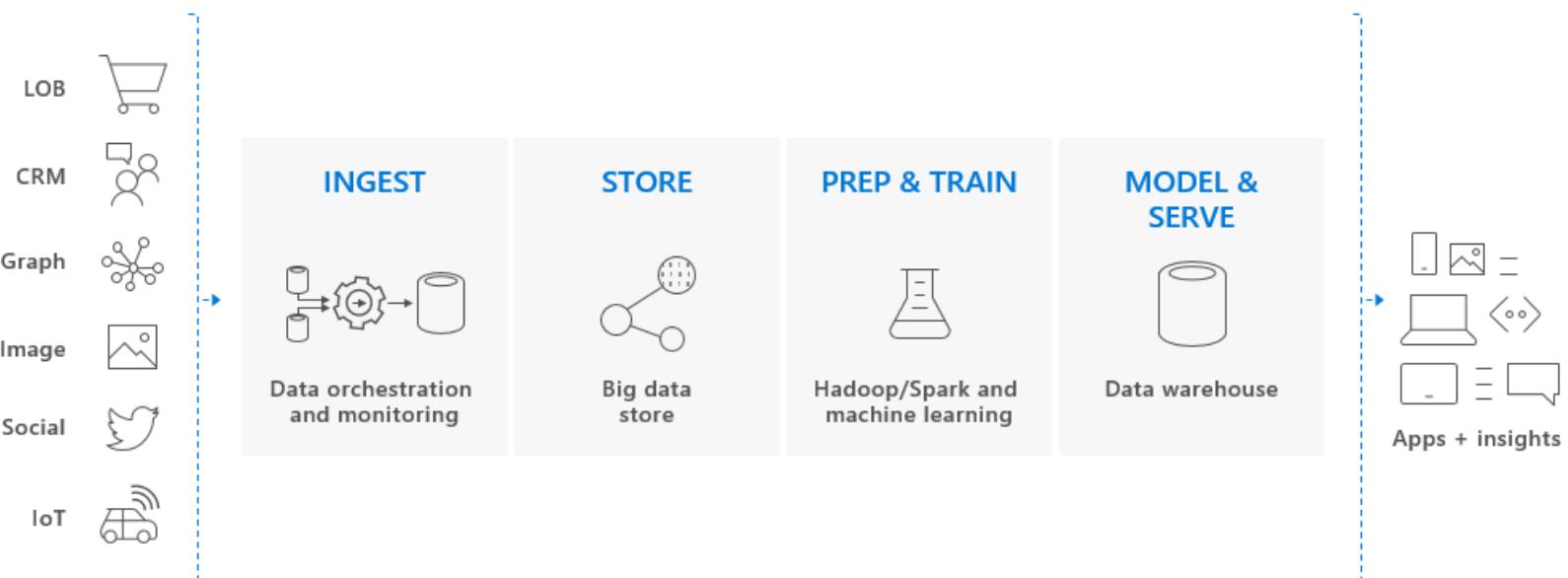


## Core Azure Services

- ✓ Azure Architecture
- ✓ Azure Products and Services
- ▶ Azure Solutions
  - ▶ Azure Management Tools

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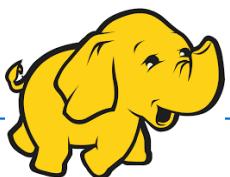
## Big Data and Analytics



### Azure SQL Data Warehouse

Cloud-based enterprise data warehouse (EDW).

Leverages massively parallel processing (MPP) to quickly run complex queries across petabytes of data.



### Azure HDInsight

Open-source framework for distributed processing and analysis of Big Data sets on clusters.

Easy, fast, and cost-effective to process massive amounts of data.



### Azure Data Lake

On-demand analytics job service.

Easily develop and run massively parallel data transformation and processing over petabytes of data.

Process data on demand, scale instantly, and only pay per job.



## Core Azure Services

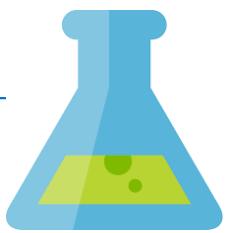


- Azure Architecture
- Azure Products and Services
- Azure Solutions
  - ▶ Azure Management Tools

## Artificial Intelligence (AI)

### What Is Machine Learning?

- ▶ Machine learning is a data science technique that allows computers to use existing data to forecast future behaviors, outcomes, and trends.
- ▶ With machine learning, computers learn without being explicitly programmed.



#### Azure Machine Learning Service

- ▶ Azure Machine Learning Service provides a cloud-based environment you can use to prep data and train, test, deploy, manage, and track machine learning models.
- ▶ Fully supports open-source technologies; tens of thousands of open-source machine learning components are available.
- ▶ **Use Machine Learning Service** if you work in a Python environment, you want more control over your machine learning algorithms, or you want to use open-source machine learning libraries.

#### Azure Machine Learning Studio



- ▶ Collaborative, drag-and-drop visual workspace where you can build, test, and deploy machine learning solutions without the need to write code.
- ▶ Uses prebuilt and preconfigured machine learning algorithms and data handling modules.
- ▶ **Use Machine Learning Studio** if you want to experiment with machine learning models quickly and easily, and the built-in machine learning algorithms are sufficient for your solutions.

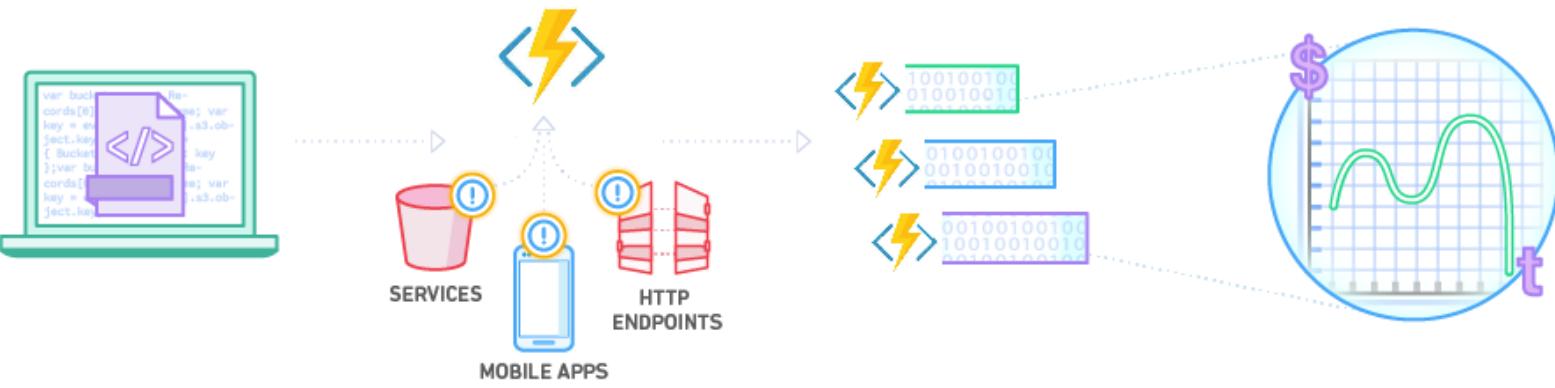


## Core Azure Services

- ✓ Azure Architecture
- ✓ Azure Products and Services
- ▶ Azure Solutions
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## Serverless Computing



Upload your code

Set up your code to be triggered by other Azure services, HTTP endpoints, etc.

Your code is run only when triggered, using only the compute resources needed.

Pay just for the compute time you use.

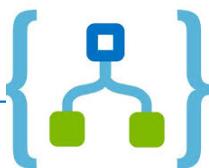


### Azure Functions

Configure your code to load and run only when triggered.

Triggers can be HTTP requests, data from other Azure services, etc.

Can return data or call other Azure services.



### Azure Logic Apps

Visual designer for automating and orchestrating tasks, processes, and workflows.

Connect 100+ Azure and third-party services.

Great for integrating apps/data/systems and for business-to-business (B2B) integrations.



### Azure Event Grid

Fully managed event routing service.

Greatly simplifies the development of event-based applications and serverless workflows.

Handles all event routing from any source, to any destination, for any application.



## Core Azure Services

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- Azure Architecture
- Azure Products and Services
- Azure Solutions
  - ▶ Azure Management Tools

### Azure Solutions: Benefits

- ▶ Using pre-built or pre-packaged solutions reduces costs and shortens the time it takes to set up, configure, and deploy your applications.
- ▶ Lower skill level needed to set up and administer solutions.
- ▶ Spend more time focusing on your business and apps, not connecting various Azure services together.





## Core Azure Services

- Azure Architecture
- Azure Products and Services
- Azure Solutions
- Azure Management Tools

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WELCOME

CLOUD CONCEPTS

CORE AZURE SERVICES

SECURITY, PRIVACY, COMPLIANCE, AND TRUST

AZURE PRICING AND SUPPORT

APPENDIX

## Azure Management Tools

The Azure CLI, Azure Powershell,  
and the Azure Portal

Azure Advisor



## Core Azure Services

- Azure Architecture
- Azure Products and Services
- Azure Solutions
- Azure Management Tools

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## The Azure CLI, Azure Powershell, and the Azure Portal



### The Azure CLI

Command line experience for managing Azure resources.

You can use it in your browser with Azure Cloud Shell (interactive, browser-accessible shell that runs Bash or PowerShell).

You can install it on macOS, Linux, and Windows and run it from the command line.



### Azure PowerShell

Set of PowerShell cmdlets for managing Azure resources.

You can use it in your browser with Azure Cloud Shell.

Uses .NET standard, making it available for Windows, macOS, and Linux.



### The Azure Portal

Build, manage, and monitor every Azure resource in a single, unified console.

Browse active resources, modify settings, provision new resources, and view basic monitoring data from all your Azure products and services.

<https://portal.azure.com>



# Core Azure Services



- Azure Architecture
- Azure Products and Services
- Azure Solutions
- Azure Management Tools

## Azure Advisor

- Personalized cloud consultant that helps you follow best practices to optimize your Azure deployments
- Analyzes your resource configuration and usage telemetry
- Recommends solutions to help improve the cost effectiveness, performance, security, and availability of your resources

Overview

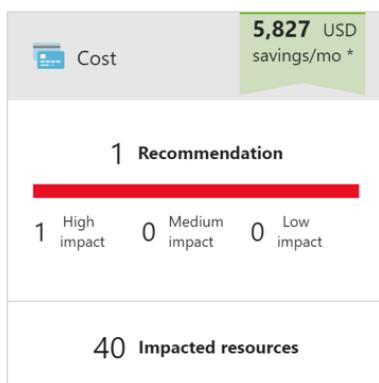
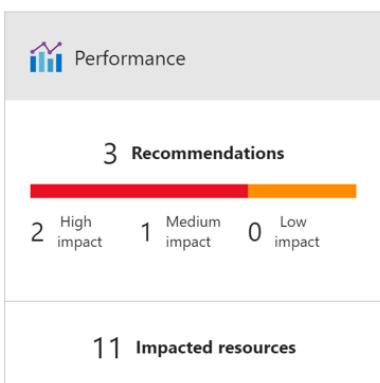
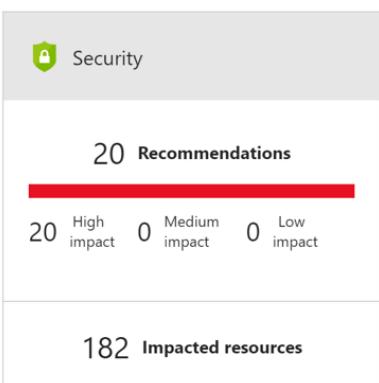
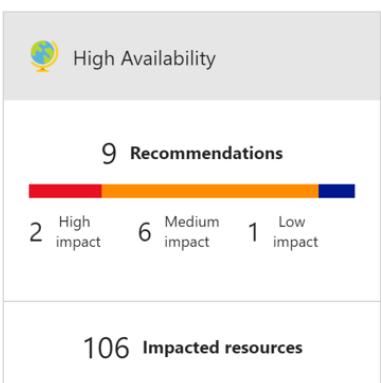
High Availability (9)

Security (20)

Performance (3)

Cost (1)

All (33)



### Tips & tricks

- You can customize Advisor to process recommendations for resources that matter to you the most.
- You can improve the performance of your SQL Azure databases.
- You can use Managed Disks to ensure data resilience.

Download recommendations as PDF

Download recommendations as CSV

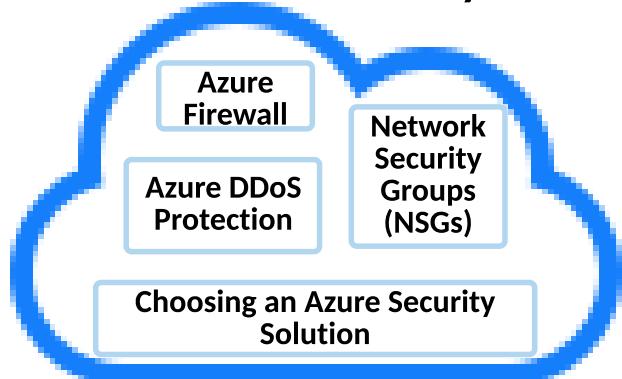


# Security, Privacy, Compliance, and Trust

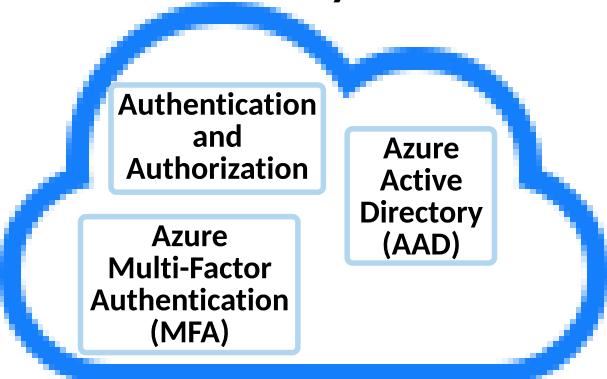
NEXT 

- ▶ Network Security
- ▶ Azure Identity Services
- ▶ Azure Security Tools and Features
- ▶ Azure Governance
- ▶ Monitoring and Reporting in Azure
- ▶ Azure Privacy, Compliance, and Data Protection Standards

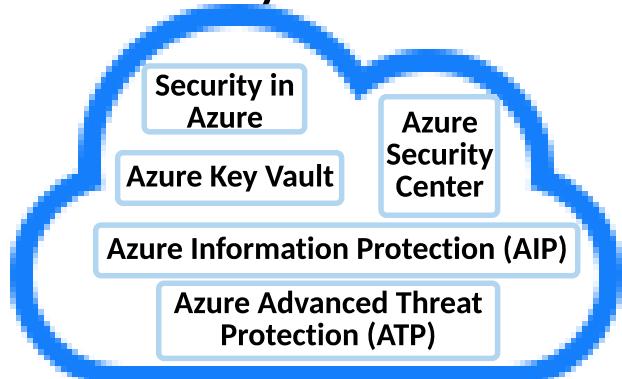
## Network Security



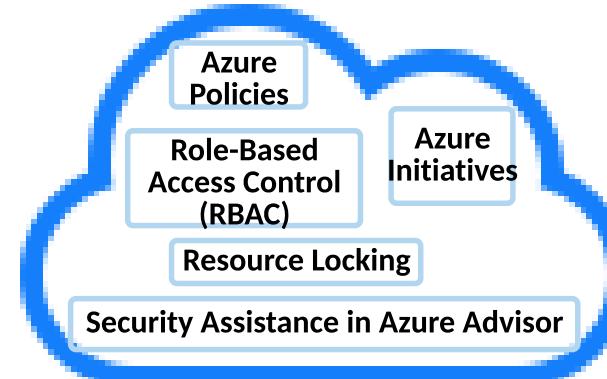
## Azure Identity Services



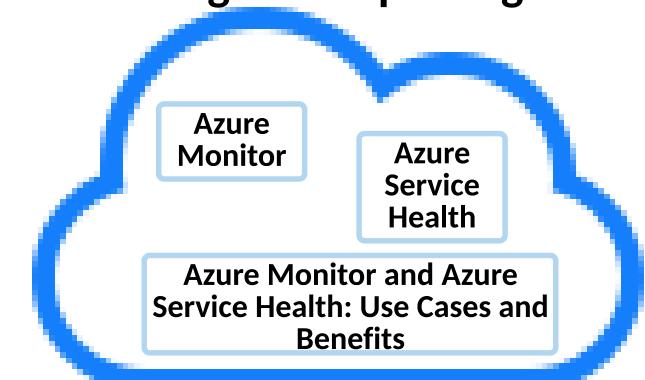
## Azure Security Tools and Features



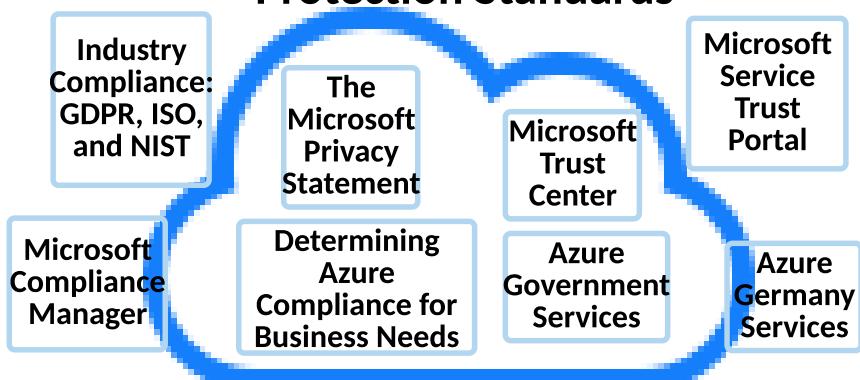
## Azure Governance



## Monitoring and Reporting in Azure



## Azure Privacy, Compliance, and Data Protection Standards





# Security, Privacy, Compliance, and Trust

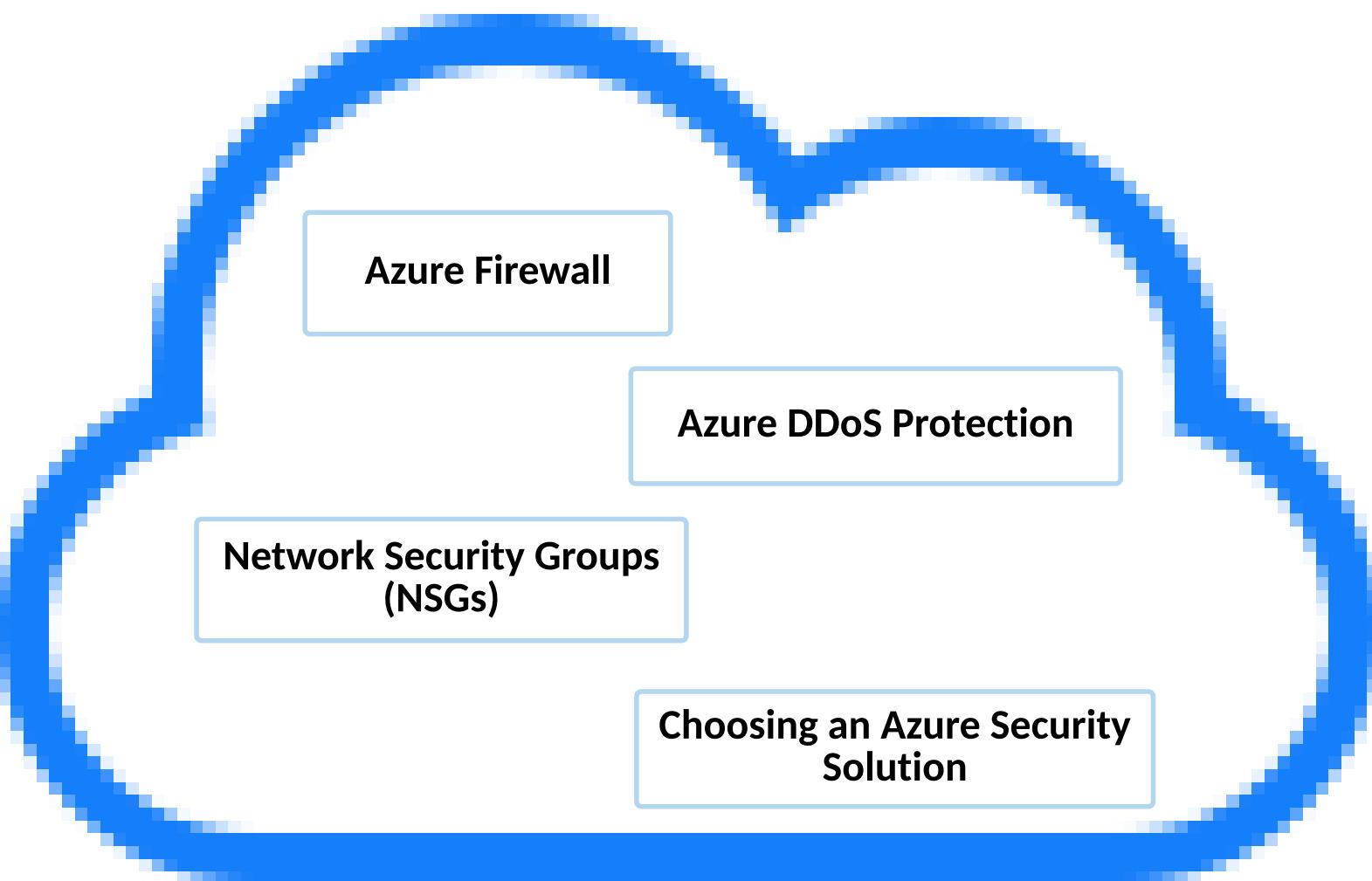
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## Network Security

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## Network Security





# Security, Privacy, Compliance, and Trust

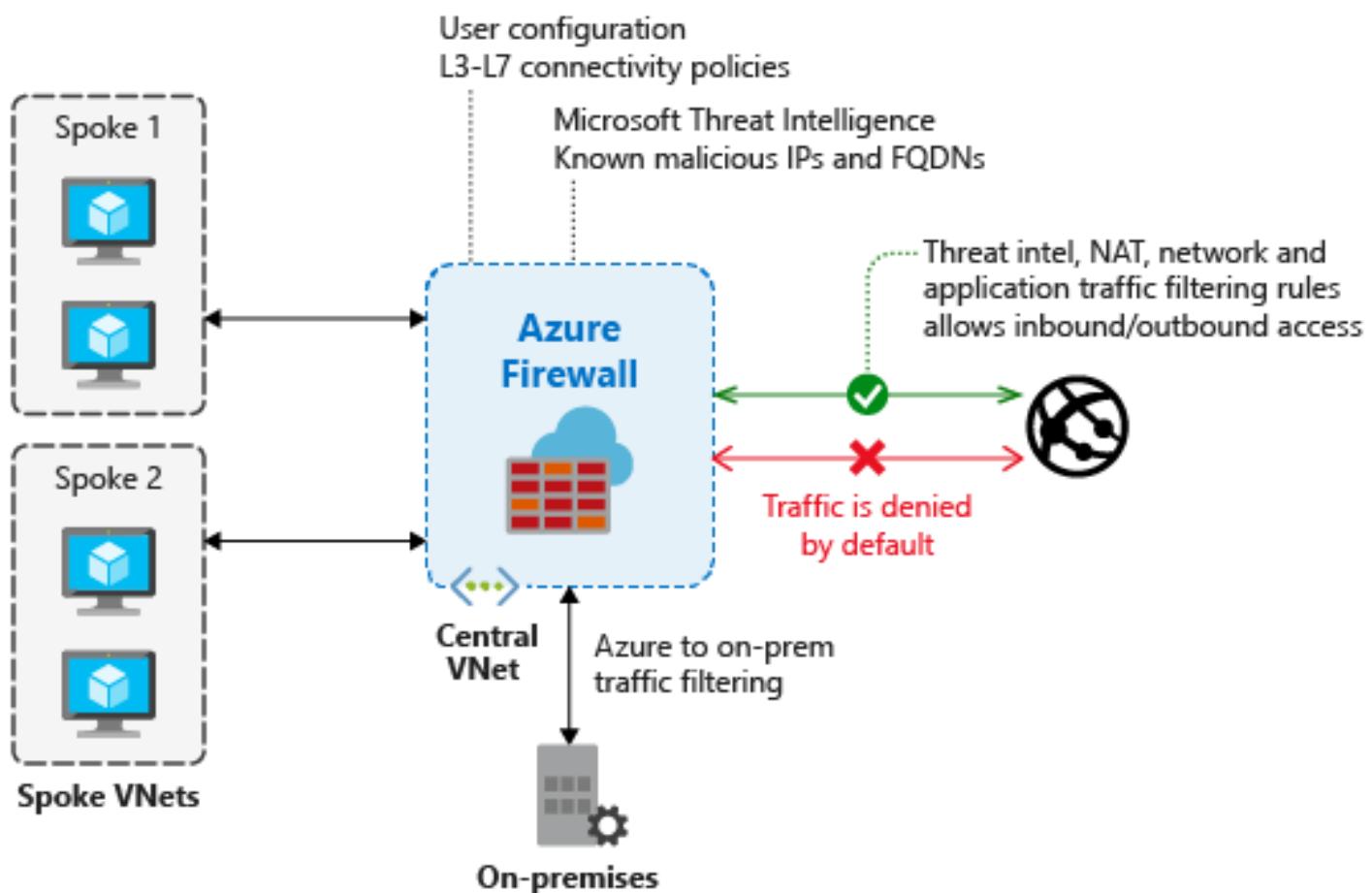
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## Network Security

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## Azure Firewall

- Managed, cloud-based network security service that protects your Azure Virtual Network resources.
- Centrally create, enforce, and log application and network connectivity policies across subscriptions and virtual networks.
- Fully integrated with Azure Monitor for logging and analytics.





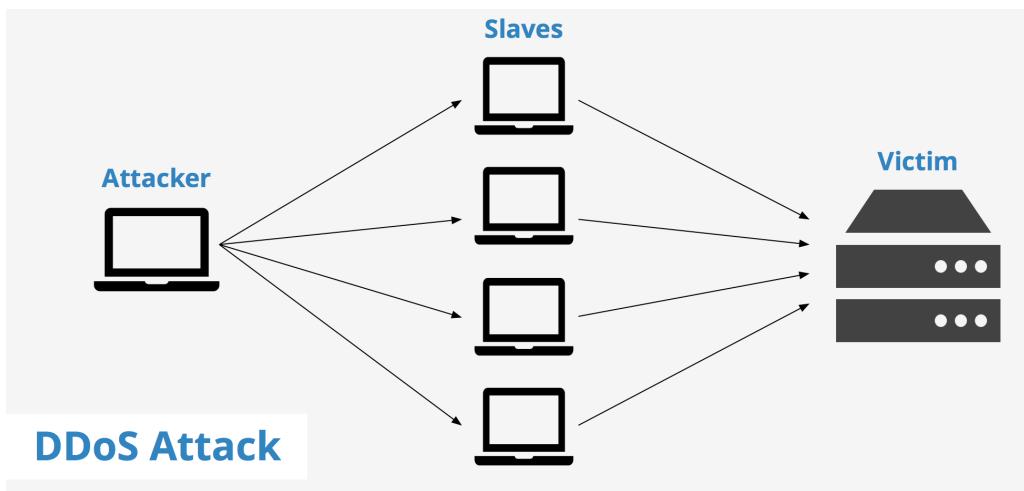
# Security, Privacy, Compliance, and Trust



## Network Security

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## Azure DDoS Protection



Feature	DDoS Protection Basic	DDoS Protection Standard
🔍 Active traffic monitoring & always on detection	Yes	Yes
🚫 Automatic attack mitigations	Yes	Yes
🕒 Availability guarantee	Azure region	Application
📝 Mitigation policies	Tuned for Azure region traffic volume	Tuned for application traffic volume
ℹ️ Metrics & alerts	No	Real time attack metrics & diagnostic logs via Azure monitor
💬 Mitigation reports	No	Post attack mitigation reports
☰ Mitigation flow logs	No	NRT log stream for SIEM integration
📝 Mitigation policy customizations	No	Engage DDoS experts
👤 Support	Best effort	Access to DDoS Experts during an active attack
📄 SLA	Azure region	Application SLA guarantee & cost protection
💲 Pricing	Free	Monthly & usage based



# Security, Privacy, Compliance, and Trust

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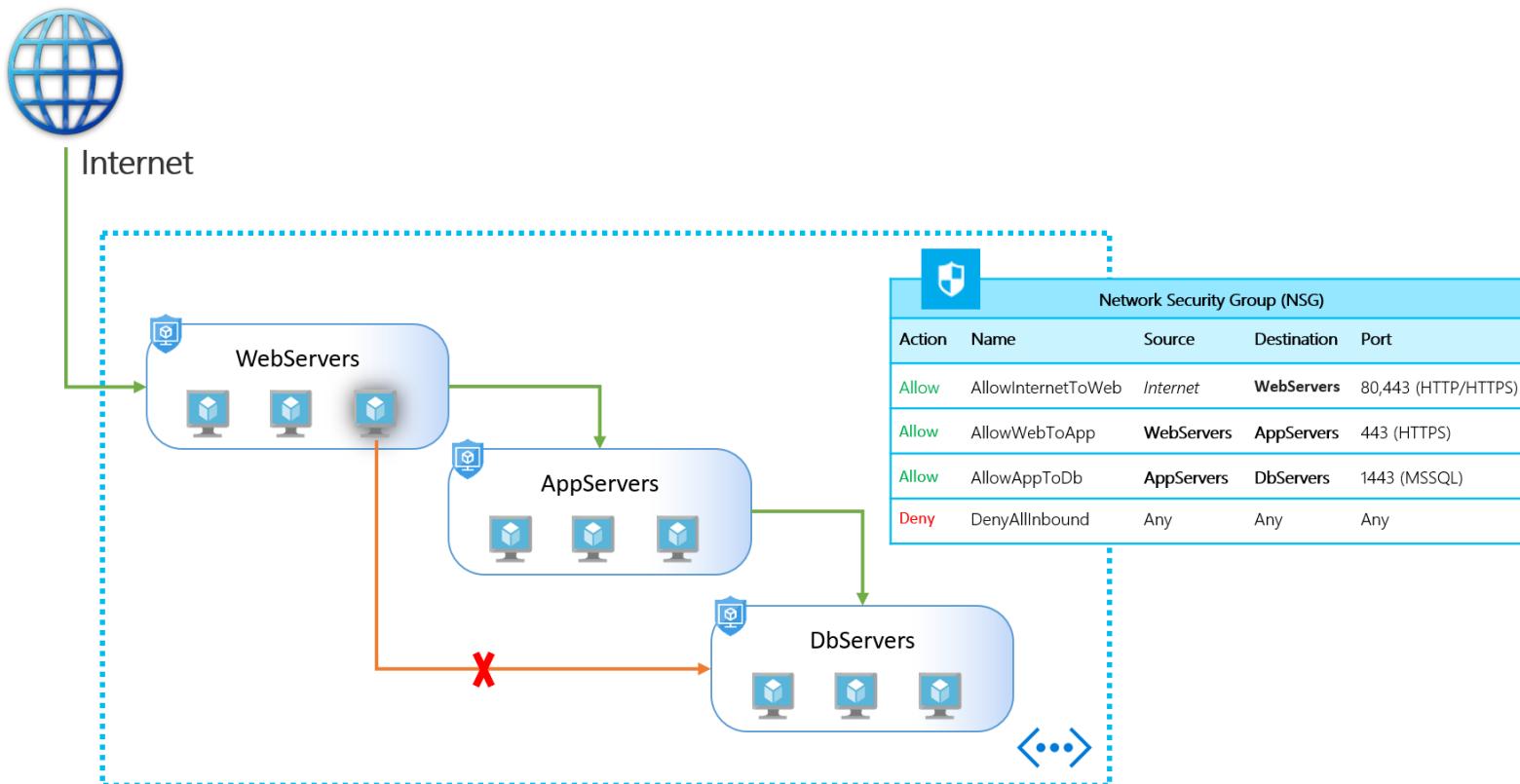
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## Network Security

- ▶ Azure Identity Services
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## Network Security Groups (NSGs)

- Enforce and control network traffic rules at the networking level.
- Security rules allow or deny inbound network traffic to, or outbound network traffic from, several types of Azure resources.
- For each rule, you can specify a source, destination, port, and protocol.





## Security, Privacy, Compliance, and Trust



### Network Security

- ▶ Azure Identity Services
- ▶ Azure Security Tools and Features
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## Choosing an Azure Security Solution

### Isolation

Use different virtual networks, or virtual network subnets, to segment your network or isolate resources when required.

### Principle of Least Privilege

Limit each user's access rights to the bare minimum permissions they need to perform their work.

### Use NSGs for Bare Minimum Network Connectivity

Use Network Security Groups (NSGs) to enforce rules allowing only the minimum network access needed.

### Use Azure Firewall and Azure DDoS Protection

Use Azure Firewall and Azure DDoS protection to protect your resources and prevent large unanticipated costs.



# Security, Privacy, Compliance, and Trust

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## Azure Identity Services

Azure Active Directory (AAD)

Authentication and Authorization

Azure Multi-Factor Authentication (MFA)



# Security, Privacy, Compliance, and Trust

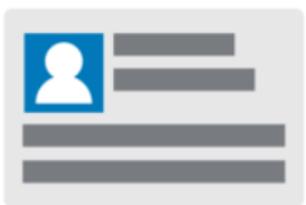


## Network Security

### Azure Identity Services

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## Authentication and Authorization



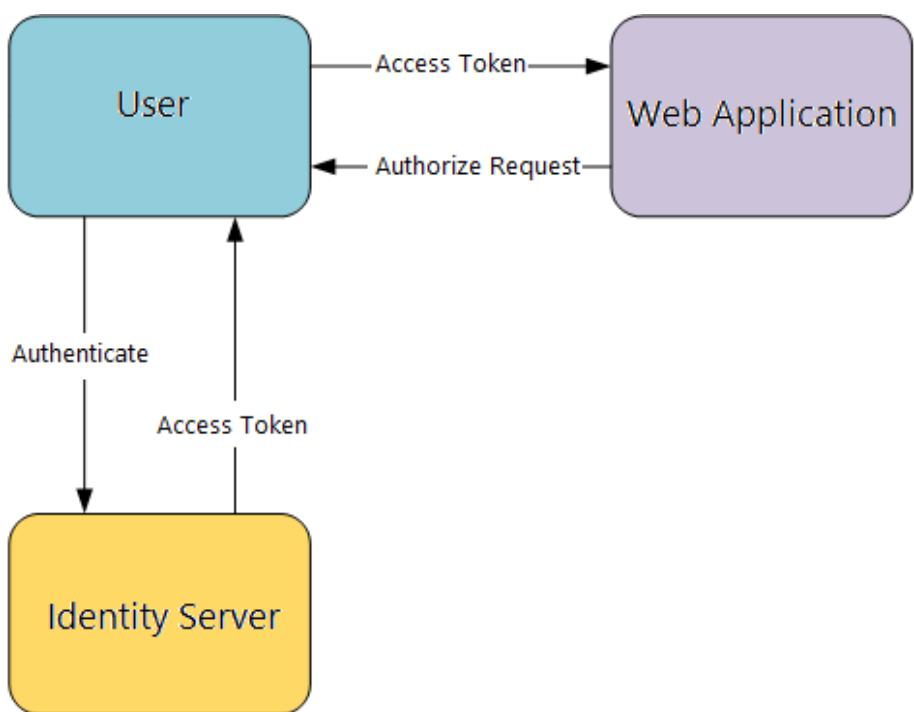
### Authentication

Who you are



### Authorization

What you can do





# Security, Privacy, Compliance, and Trust

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## Network Security

## Azure Identity Services

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## Azure Active Directory (AAD)

- Comprehensive, highly available Identity and Access Management (IAM) cloud solution.
- Fully managed identity service — requires no hardware, virtual machines, etc.
- Main objects are Users (pay per user) and Groups (free).
- Users are assigned a license based on which edition of Azure AD they should have.
- Groups can be assigned multiple licenses, which are inherited by all Users in the Group.





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## Azure Multi-Factor Authentication (MFA)

- Requires two or more of the following authentication methods:
  - Something you know (typically a password)
  - Something you have (a trusted device that is not easily duplicated, like a phone)
  - Something you are (biometrics)



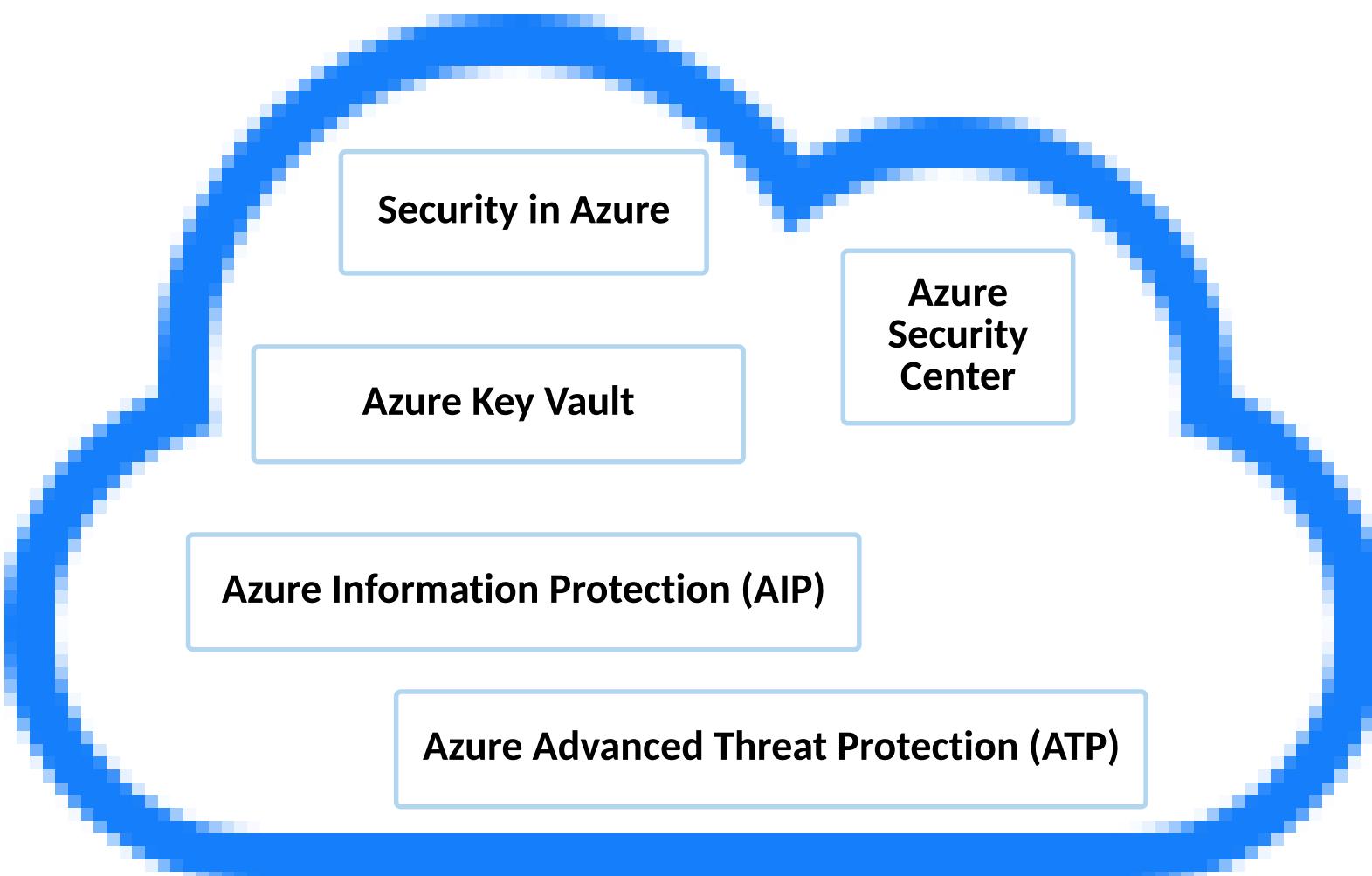


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## Azure Security Tools and Features





## Security, Privacy, Compliance, and Trust



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### Security in Azure

Security is built into every layer of Azure.

#### Secure Foundation

State-of-the-art security in Azure data centers around the world, integrated security controls in Azure hardware and firmware components, and protection against threats such as DDoS.

#### Simplify Security with Built-In Services

Easily manage identity and control access, secure your network, safeguard data, manage secrets and certificates, prevent attacks, and gain centralized visibility.

#### Detect Threats Early with Unique Intelligence

Identify new threats and respond quickly with services that are informed by real-time global cybersecurity intelligence.



# Security, Privacy, Compliance, and Trust

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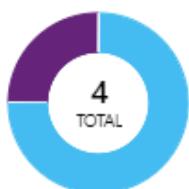
▶ Azure Privacy, Compliance, and Data Protection Standards

## Azure Security Center

- Protects Azure and non-Azure servers and virtual machines — including Windows and Linux servers — when the Microsoft Monitoring Agent is installed.
- Events collected from Azure and the agents are sent to the security analytics engine, which provides threat detection alerts and tailored recommendations for securing workloads.
- Azure PaaS services — including SQL databases and storage accounts — are automatically monitored and protected by Azure Security Center.

### Policy & compliance

#### Subscription coverage



394 Covered resources

#### Policy compliance

##### Overall compliance



Show policy compliance of your environment >

##### Least compliant subscriptions

Contoso IT - demo	13%
ASC DEMO	27%



# Security, Privacy, Compliance, and Trust



✓ Network Security

✓ Azure Identity Services

➡ Azure Security Tools and Features

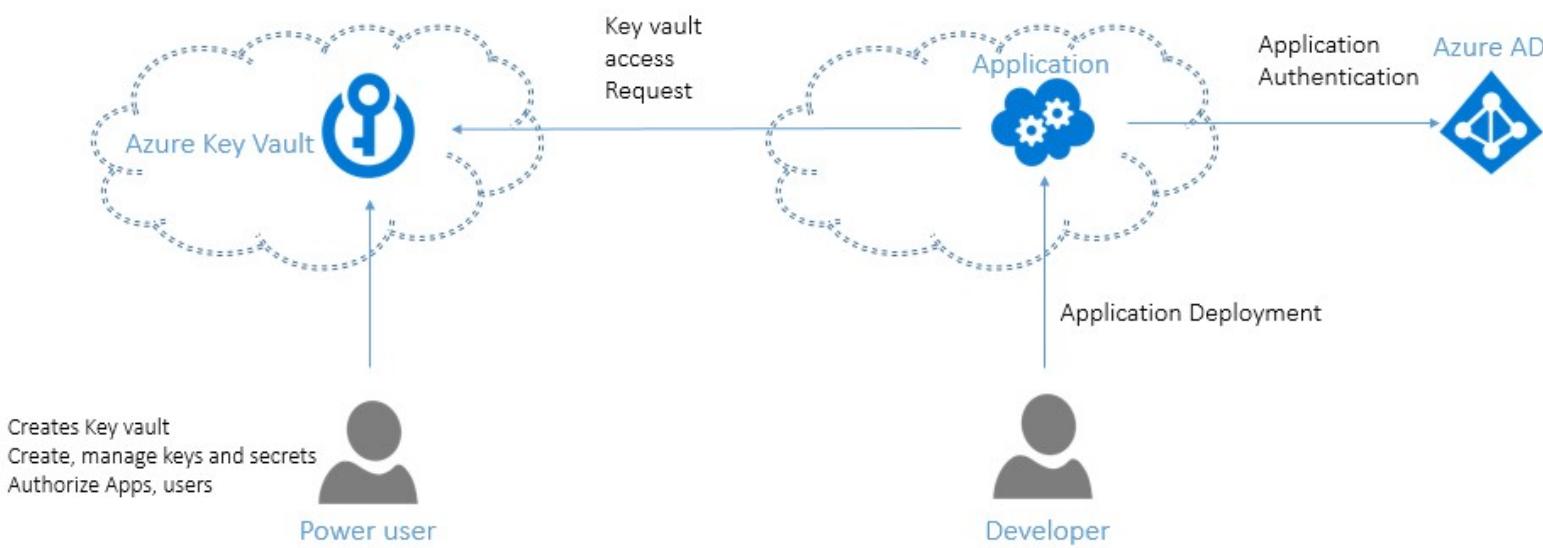
▶ Azure Governance

▶ Monitoring and Reporting in Azure

▶ Azure Privacy, Compliance, and Data Protection Standards

## Azure Key Vault

- Encrypt and safeguard authentication keys, storage account keys, data encryption keys, certificates, and passwords.
- Data is protected by hardware security modules (HSMs).
- Control access to keys using Azure Active Directory.
- Grant access to individual users or to applications and systems.





# Security, Privacy, Compliance, and Trust



- ✓ Network Security
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## Azure Information Protection (AIP)

- Cloud-based solution that helps organizations classify and protect documents and emails.
- Manually or automatically classify sensitive data using 80+ built-in data types (credit card numbers, ID/SSN numbers, etc.).
- Enforce policies on classified data — e.g., require credit card numbers to be encrypted.
- Can be retroactively applied to existing documents and emails.



Classification & labeling

Protect

Monitor & respond



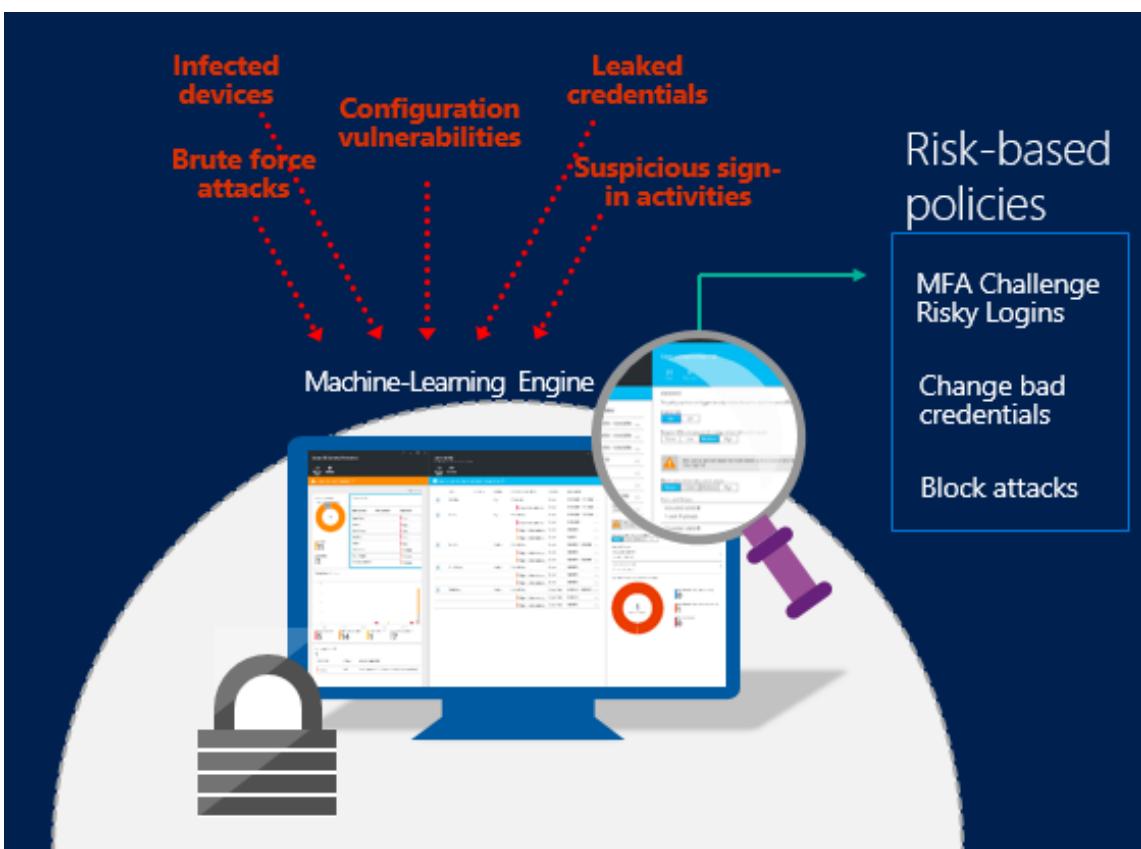
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## Azure Advanced Threat Protection (ATP)

- Cloud-based security solution that identifies, detects, and helps you investigate advanced threats, compromised identities, and malicious insider actions.
- Built-in advanced threat detection using data from Azure Active Directory (Azure AD), Azure Monitor logs, and Azure Security Center.





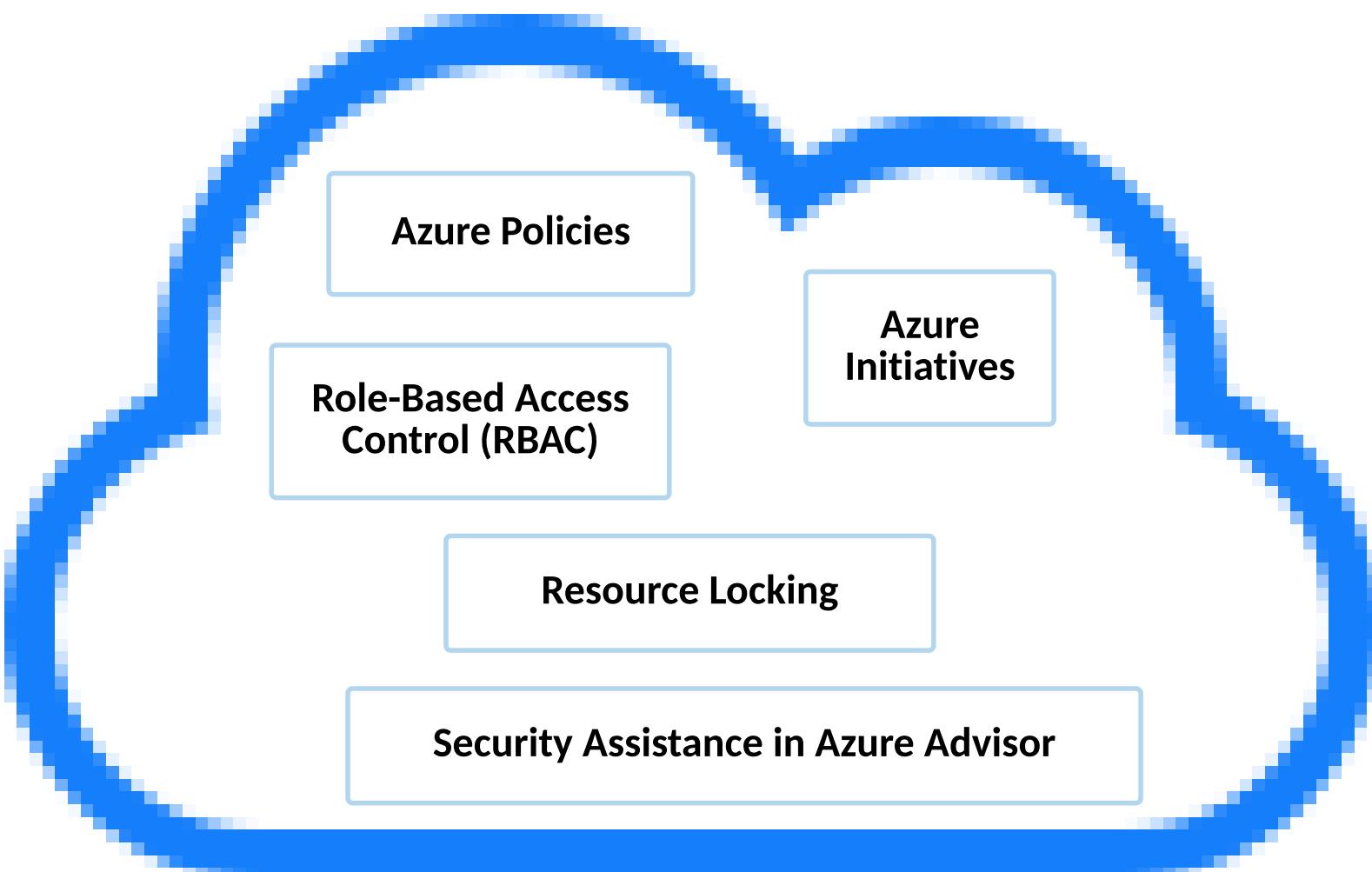
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## Azure Governance





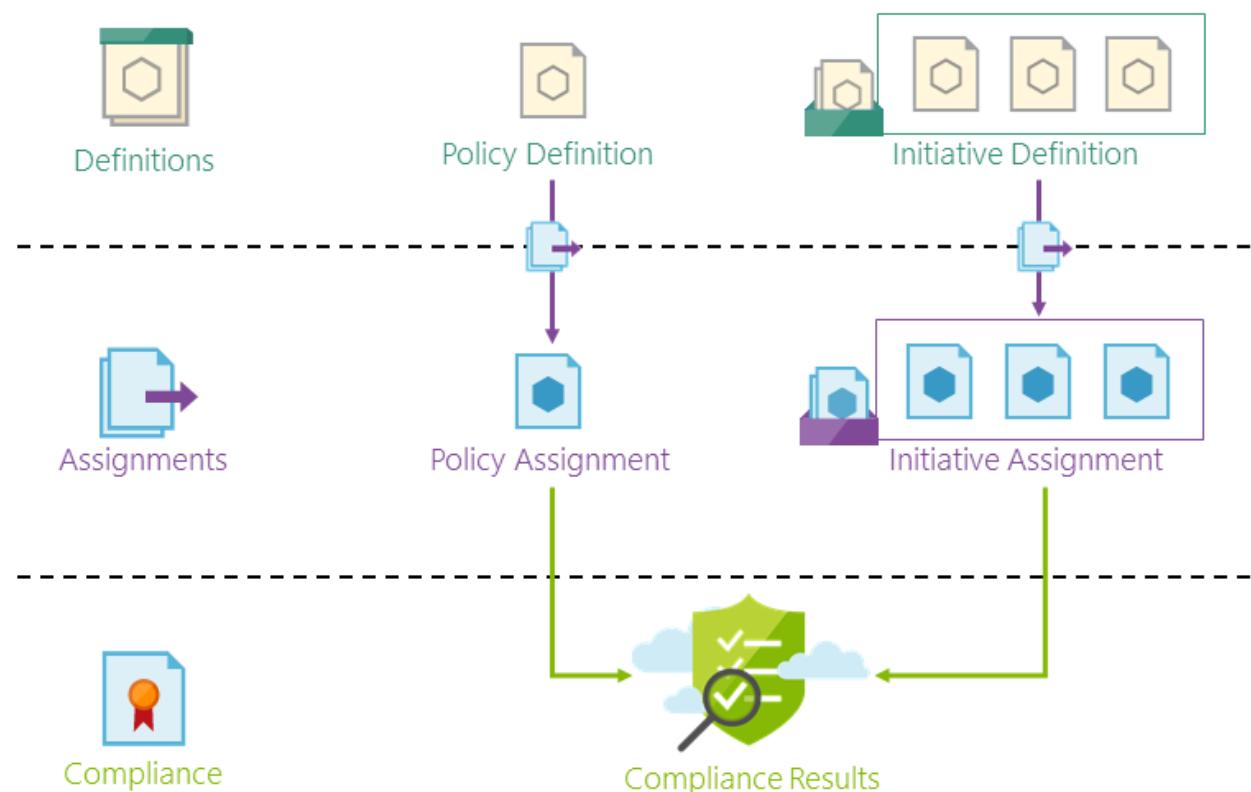
# Security, Privacy, Compliance, and Trust



- ✓ Network Security
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## Azure Policies

- Service in Azure that you use to create, assign, and manage policies.
- Policies enforce different rules for your resources.
- Policies can be assigned to Management Groups, Subscriptions, or Resource Groups and are inherited downward.
- Evaluate your resources for non-compliance with assigned policies.
- Policies can be audited or applied to resources.





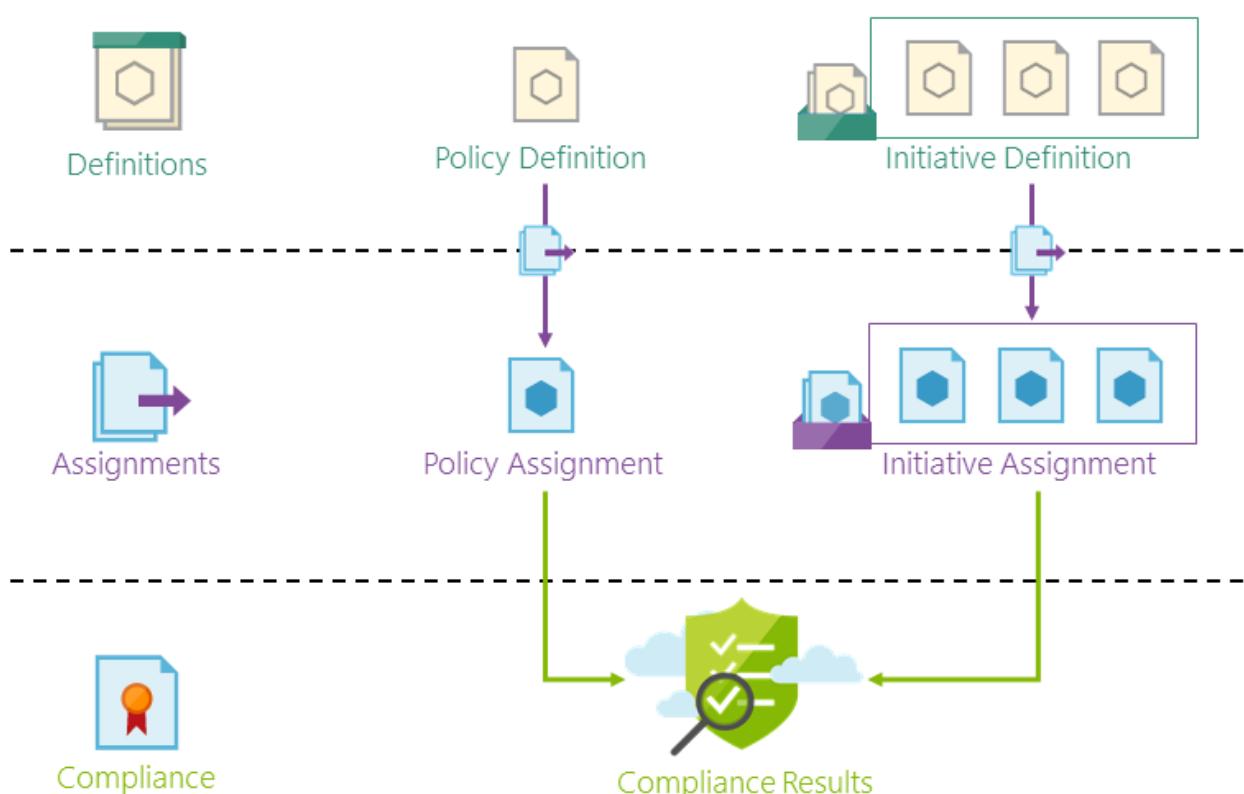
# Security, Privacy, Compliance, and Trust



- ✓ Network Security
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## Azure Initiatives

- A collection of policy definitions that are tailored toward achieving a single overarching goal.
- Simplify managing and assigning policy definitions.
- Initiatives can be assigned to Management Groups, Subscriptions, or Resource Groups and are inherited downward.





# Security, Privacy, Compliance, and Trust



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## Role-Based Access Control (RBAC)

- An authorization system built on Azure Resource Manager that provides fine-grained access management for Azure resources.
- Roles are defined and assigned to a Security Principal: User, Group, or Service Principal (i.e., application account).
- Roles can be scoped to Management Groups, Subscriptions, Resource Groups, or Resources and are inherited downward.

	Role			
	Reader	Resource-specific or custom role	Contributor	Owner
Scope	Subscription	Resource group	Resource	
Subscription	Observers	Users managing resources		Admins
Resource group			Automated processes	
Resource				



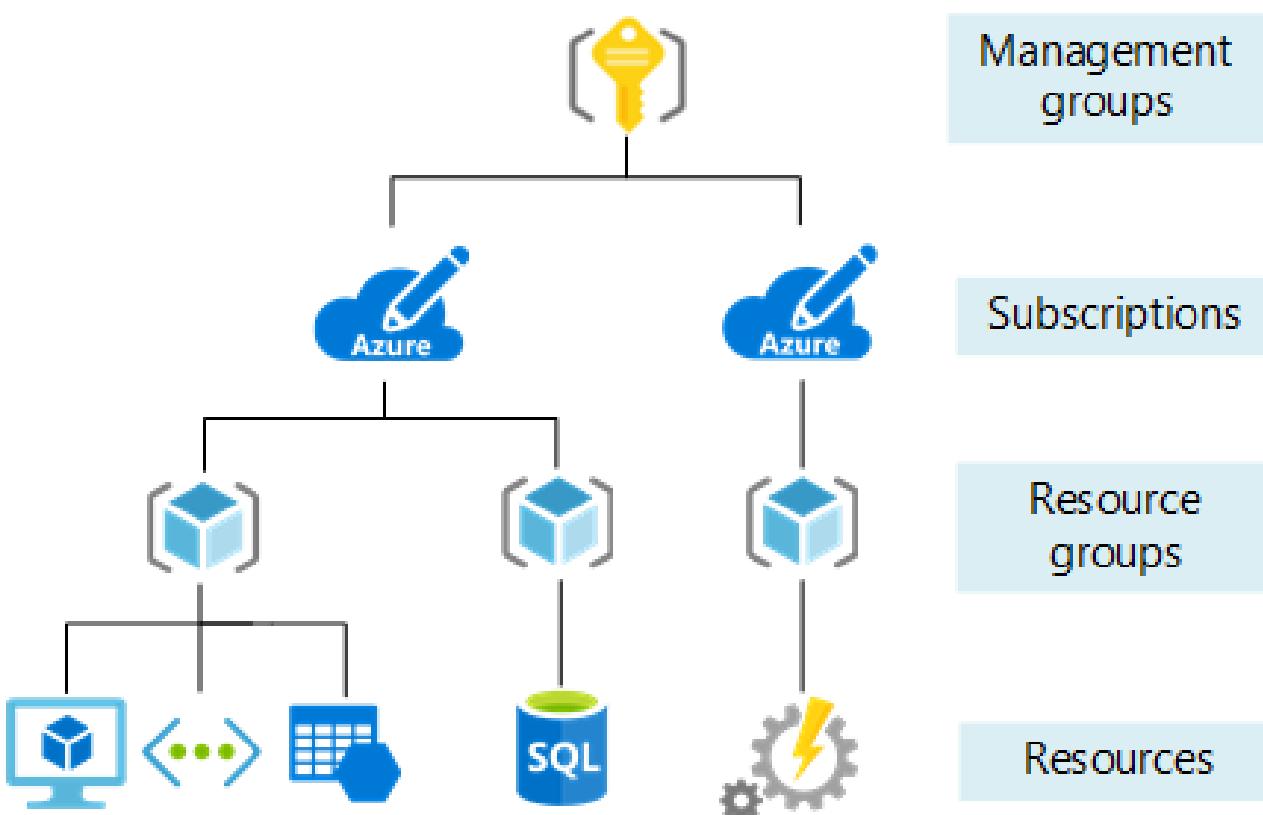
# Security, Privacy, Compliance, and Trust



- ✓ Network Security
- ✓ Azure Identity Services
- ✓ Azure Security Tools and Features
- ➡ Azure Governance
  - ▶ Monitoring and Reporting in Azure
  - ▶ Azure Privacy, Compliance, and Data Protection Standards

## Resource Locking

- Prevent other users in your organization from accidentally deleting or modifying critical resources.
- Locks can be set to prevent deletion only, or to prevent modifications and deletion.
- Locks can be assigned to Management Groups, Subscriptions, Resource Groups, or Resources and are inherited downward.





# Security, Privacy, Compliance, and Trust



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## Security Assistance in Azure Advisor

- Azure Advisor integrates with Azure Security Center to bring you security recommendations in addition to the high availability, performance, and other recommendations already included in Azure Advisor.
- Periodically analyzes the security state of your Azure resources and makes recommendations for any potential security vulnerabilities.

[Overview](#)[High Availability \(0\)](#)[Security \(3\)](#)[Performance \(0\)](#)[Cost \(1\)](#)[All \(4\)](#)

Prevent, detect and respond to threats with increased visibility, go to Security Center →



Total recommendations  
**3**

Recommendations by impact  
High 3   
Medium 0  
Low 0

Impacted resources  
**3**

**IMPACT****DESCRIPTION**

High

[Follow Security Center recommendations](#)



# Security, Privacy, Compliance, and Trust

[PREV](#)[NEXT](#)

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## Monitoring and Reporting in Azure

Azure Monitor

Azure Service Health

Azure Monitor and Azure Service Health: Use Cases and Benefits



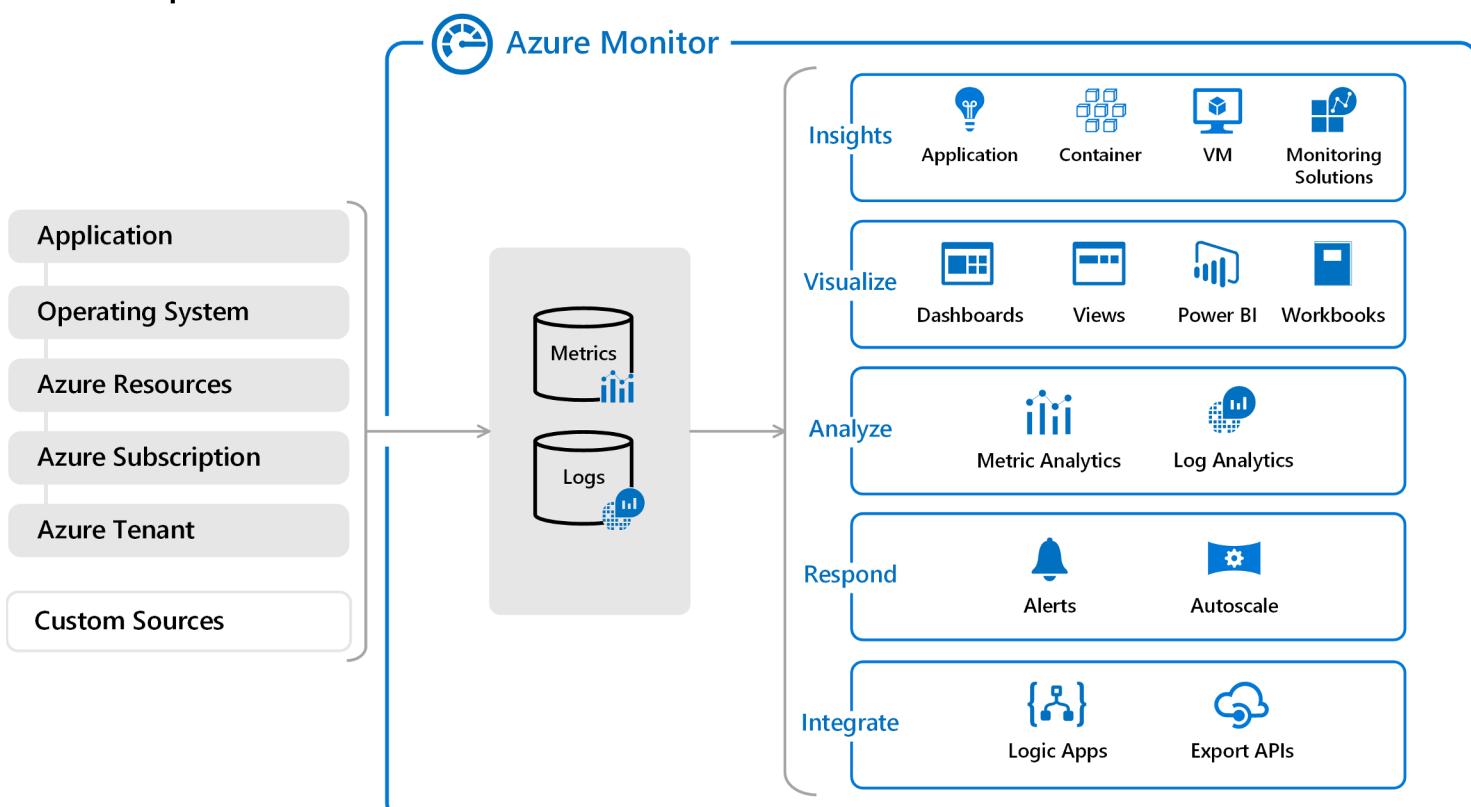
# Security, Privacy, Compliance, and Trust

PREV NEXT

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## Azure Monitor

- Monitoring platform for all Azure resources
- Allows you to collect granular performance and utilization data, activity and diagnostics logs, and notifications from your Azure resources all in one place
- Helps you understand how your applications are performing and proactively identifies issues affecting them and the resources they depend on





# Security, Privacy, Compliance, and Trust

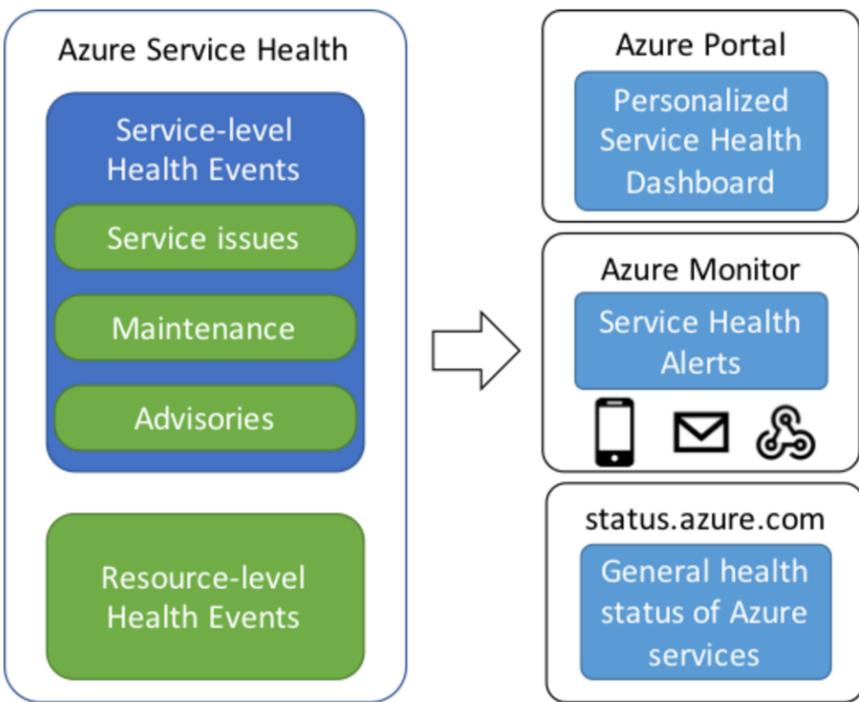
PREV

NEXT

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## Azure Service Health

- Provides a personalized view of the health of the Azure services and regions you're using
- Tracks three types of health events that may impact your resources:
  - **Service issues:** Problems in the Azure services that affect you right now
  - **Planned maintenance:** Upcoming maintenance that can affect the availability of your services in the future
  - **Health advisories:** Changes in Azure services that require your attention, such as when Azure features are deprecated or you exceed a usage quota





# Security, Privacy, Compliance, and Trust



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## Azure Monitor and Azure Service Health: Use Cases and Benefits



### Azure Monitor

- ▶ Use Azure Monitor to monitor the health and state of your resources, applications, and systems within Azure.
- ▶ Get alerts when your resources go down, experience errors, cannot handle traffic, etc.
- ▶ Create dashboards showing the performance and health of all your resources.



### Azure Service Health

- ▶ Use Azure Service Health to monitor the health and state of Azure products and services.
- ▶ Get alerts when Azure products, services, data centers, or regions go down, experience errors, cannot handle traffic, etc.
- ▶ Be notified of planned maintenance in advance.

### Best Practice — Use BOTH to:

- Monitor **all your resources + Azure as a whole** for a comprehensive health monitoring solution.
- Be alerted anytime a failure happens (in your system or in Azure).
- Be notified before planned maintenance and outages.
- Be notified when Azure products and services are deprecated.

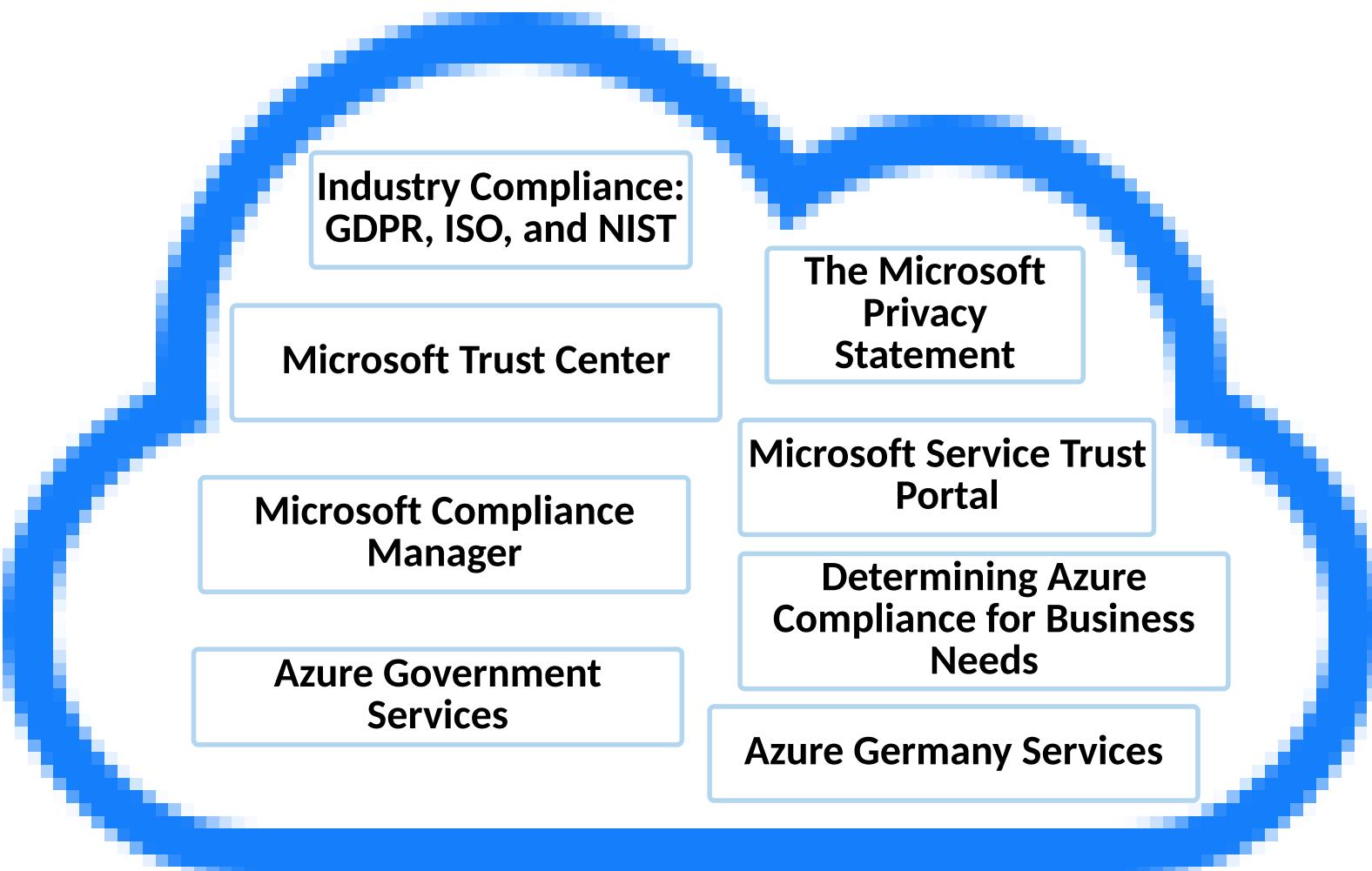


# Security, Privacy, Compliance, and Trust



- Network Security
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## Azure Privacy, Compliance, and Data Protection Standards





# Security, Privacy, Compliance, and Trust



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## Industry Compliance: GDPR, ISO, and NIST



### GDPR

#### General Data Protection Regulation

An EU data protection and privacy law that applies to all individuals within the European Union and the European Economic Area (EEA)

Aims to give individuals control over their personal data

Addresses the exportation of personal data outside the EU and the security of saved personal data



### ISO

#### International Organization for Standardization

International standard-setting body composed of representatives from various national standards organizations

ISO 27001 — Framework of policies and procedures that includes all legal, physical, and technical controls involved in an organization's information risk management processes



### NIST

#### National Institute of Standards and Technology

Provides the set of standards for recommended security controls for information systems at US federal agencies

In many cases, complying with NIST guidelines and recommendations can help federal agencies ensure compliance with other US regulations, such as HIPAA, FISMA, and SOX



# Security, Privacy, Compliance, and Trust

PREV

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## The Microsoft Privacy Statement

- Explains the personal data Microsoft processes, how Microsoft processes it, and for what purposes
- Puts Microsoft's commitment in writing and details data protection policies and practices in clear, straightforward language
- Microsoft will use customer data only to provide the services agreed upon, and for purposes compatible with providing those services
- Microsoft does not use customer data or derive information from it for advertising
- Microsoft will not disclose customer data hosted in Microsoft business services to a government agency unless required by law
- If Microsoft is compelled to disclose customer data to law enforcement, Microsoft will promptly notify the customer and provide a copy of the demand
- <https://privacy.microsoft.com/en-us/privacystatement>



# Security, Privacy, Compliance, and Trust



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## Microsoft Trust Center

- Information you need to be confident that the Azure platform on which you run your services is secure
- Security — Learn how all the Microsoft Cloud services are secured
- Privacy — Understand how Microsoft ensures the privacy of your data in the Microsoft cloud
- Compliance — Discover how Microsoft helps organizations comply with national, regional, and industry-specific requirements governing the collection and use of individuals' data
- Transparency — View how Microsoft believes that you control your data in the cloud and how Microsoft helps you know as much as possible about how that data is handled
- Products and Services — See all the Microsoft Cloud products and services in one place
- Service Trust Portal — Obtain copies of independent audit reports of Microsoft cloud services, risk assessments, security best practices, and related materials
- What's New — Find out what's new in Microsoft Cloud Trust
- Resources — Check out white papers, videos, and case studies on Microsoft Trusted Cloud



## Security, Privacy, Compliance, and Trust



- Network Security
- Azure Identity Services
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### Microsoft Service Trust Portal

- Part of the Microsoft Trust Center
- Provides a variety of content, tools, and other resources about Microsoft security, privacy, and compliance practices
- Obtain copies of independent audit reports of Microsoft cloud services, risk assessments, security best practices, and related materials
- Contains details about Microsoft's implementation of controls and processes that protect cloud services and customer data



## Security, Privacy, Compliance, and Trust



- Network Security
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### Microsoft Compliance Manager

- Part of the Microsoft Service Trust Portal
- Fully managed solution that helps you manage the end-to-end regulation-to-audit compliance process
- Workflow-based risk assessment tool that enables you to track, assign, and verify your organization's regulatory compliance activities related to Microsoft Azure
- Provides recommended actions and a control management tool for your organization to improve data protection capabilities and seamlessly implement controls across teams
- Enables you to perform real-time risk assessment to help you be better prepared for auditing



## Security, Privacy, Compliance, and Trust



- Network Security
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## Determining Azure Compliance for Business Needs

Use the Microsoft Service Trust Portal to find:

- Industry-specific landing pages for information about how Microsoft Cloud services help your organization be compliant with standards and regulations for those industries.
- Legal opinions on Microsoft Cloud services compliance with the laws of various countries, including Australia, the Czech Republic, Germany, Poland, Romania, Spain, and the United Kingdom.
- A wealth of security implementation and design information that makes it easier for you to meet regulatory compliance objectives. These include white papers, how-to-articles, compliance guides, pen tests and security assessments, and auditing templates and solutions.
- Capabilities in Microsoft Cloud services that you can use to address specific requirements, such as the GDPR.



# Security, Privacy, Compliance, and Trust



- Network Security
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## Azure Government Services



Azure Government					Azure Secret (Coming soon)
Government sector	State and Local Gov	Federal Gov	US Gov Partners & Defense Industrial Base	Department of Defense	National Security System
Data classification	High Impact CUI, PII, PHI, FTI, CJI	High Impact CUI, PII, PHI, FTI, CJI	CDI, Export Controls	High Impact CUI, PII, PHI, CDI, NSSs	Secret NSSs
Compliance standard	FedRAMP High, DoD SRG IL4, ITAR, CJIS, IRS 1075, HIPAA, DFARS, NIST 800-171			+ DoD SRG IL5	+ ICD 503/705/731, DoD SRG IL6



# Security, Privacy, Compliance, and Trust



- ✓ Network Security
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## Azure Germany Services

- When it comes to data protection and security, Germany is one of the most heavily regulated countries in the world.
- GDPR and German regulations require all personal data of Germans to be stored in Germany and owned by a German company.
- Microsoft partnered with German companies to comply with all German regulations, building 2 distinct data centers for a German-only part of Azure.
- As of 2018, Azure Germany Services is being phased out by Microsoft — they are no longer accepting new users.





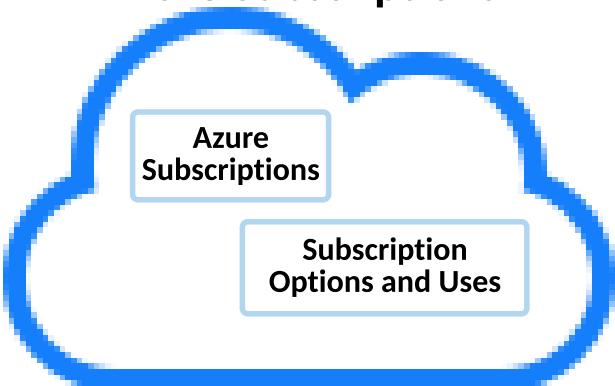
## Azure Pricing and Support

- ▶ Azure Subscriptions
- ▶ Planning and Managing Azure Costs
- ▶ Azure Support Options
- ▶ Azure Service Level Agreements (SLAs)
- ▶ The Azure Service Lifecycle

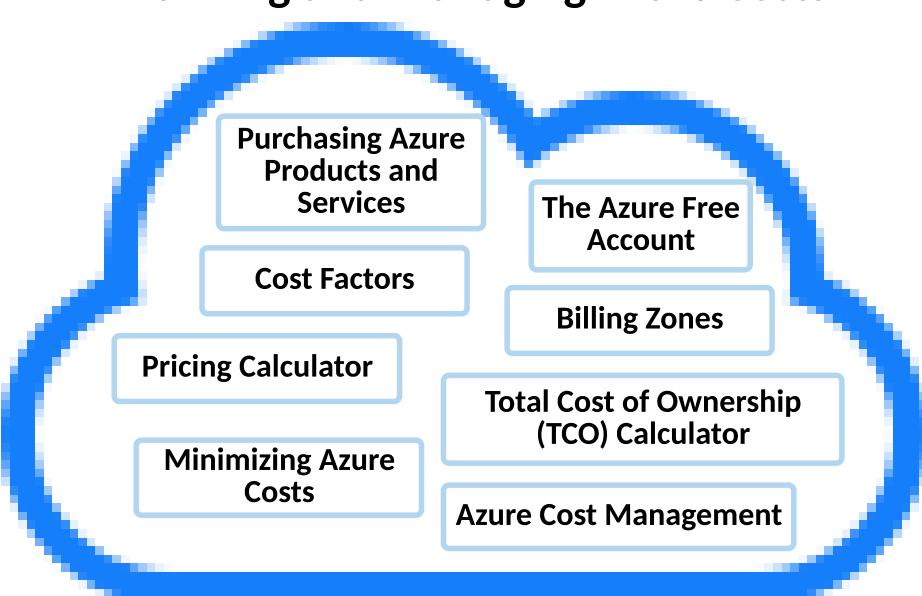
NEXT



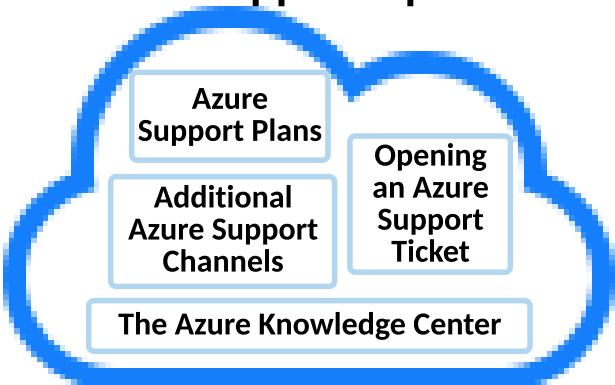
### Azure Subscriptions



### Planning and Managing Azure Costs



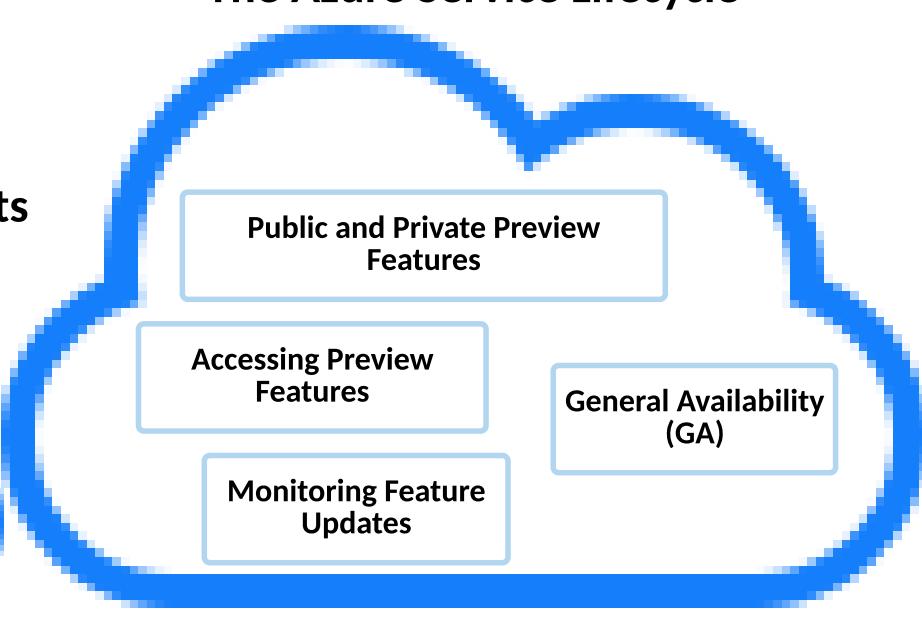
### Azure Support Options



### Azure Service Level Agreements (SLAs)



### The Azure Service Lifecycle





## Azure Pricing and Support



### Azure Subscriptions

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## Azure Subscriptions

Azure Subscriptions

Subscription Options and  
Uses



# Azure Pricing and Support

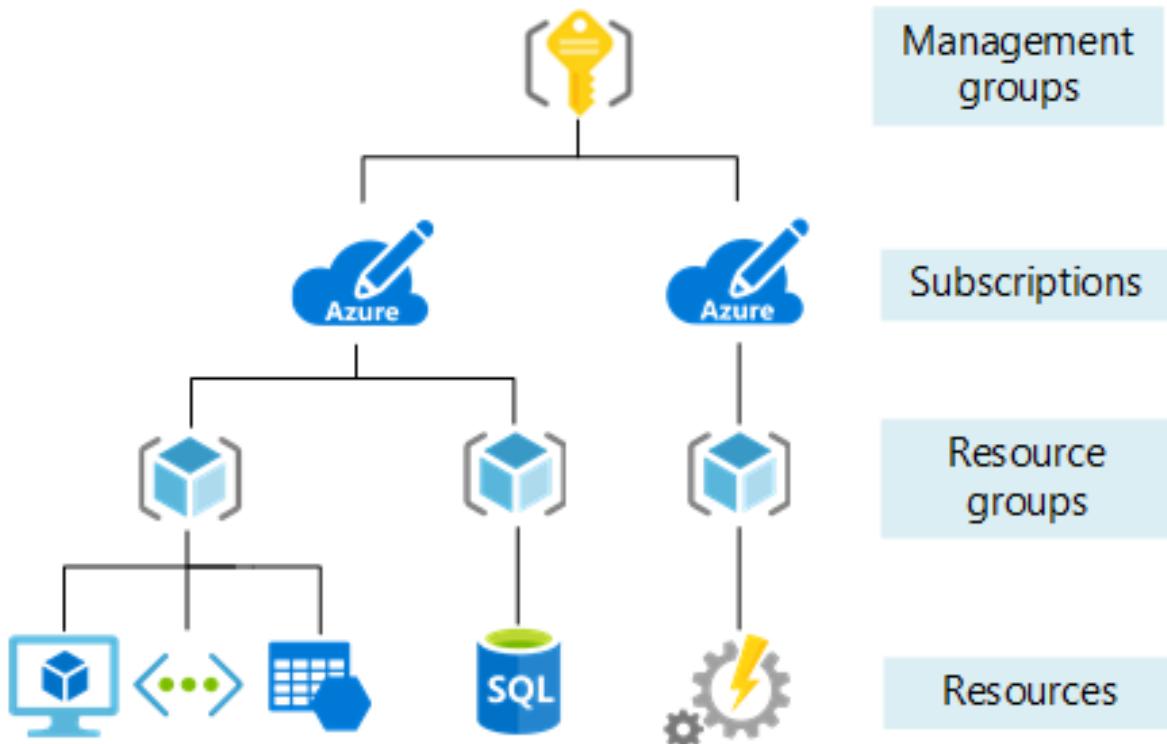
PREV NEXT

## Azure Subscriptions

- ▶ Planning and Managing Azure Costs
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## Azure Subscriptions

- An Azure account is a unique global entity that gives you access to your Azure subscriptions.
- In each of your subscriptions, you can manage resources using resource groups.
- Subscriptions have a single offer type: Enterprise Agreement, Certified Solution Partner, Pay-As-You-Go, etc.
- You can create multiple subscriptions in your Azure account to create separation for billing or management purposes.
- Azure subscriptions can have a trust relationship with an Azure Active Directory (Azure AD) instance.





# Azure Pricing and Support



## Azure Subscriptions

- ▶ Planning and Managing Azure Costs
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## Azure Subscription Options and Uses

### Azure Reservations:

Purchase Azure Reserved Instances for consistent usage



Significant cost savings  
up to 72% over pay-as-you-go  
models



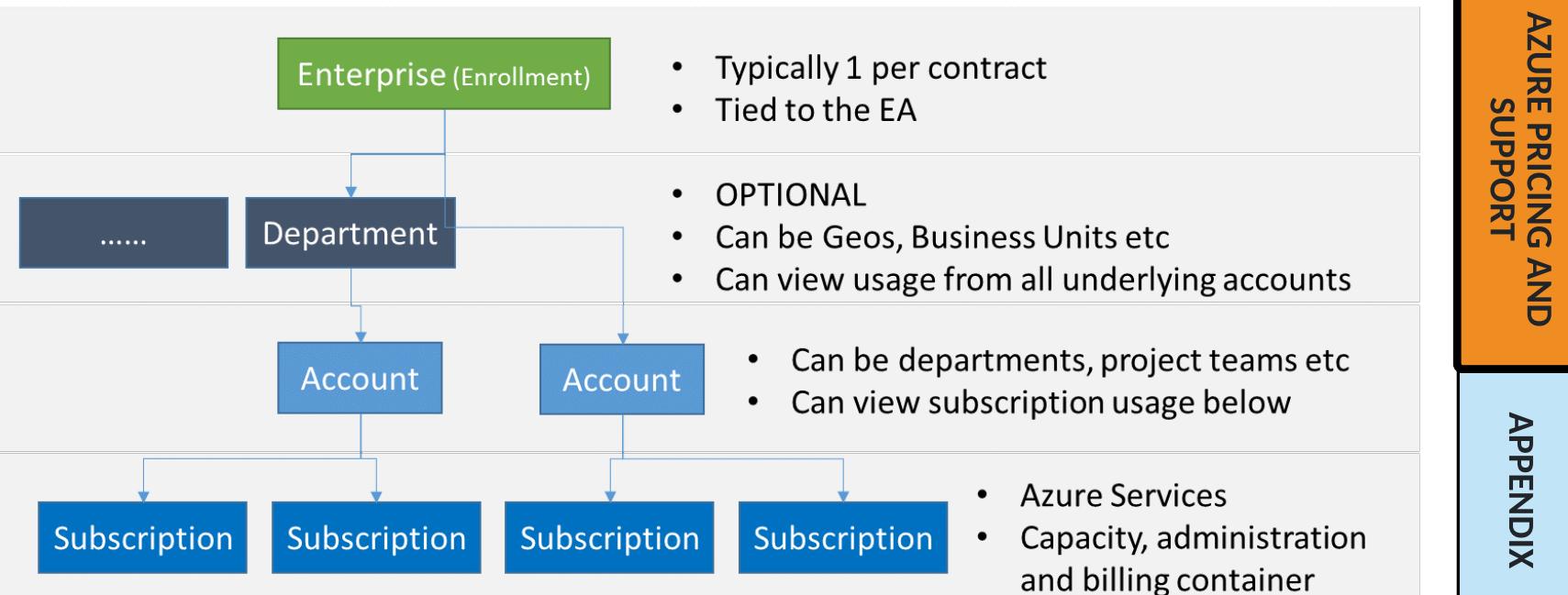
Budget predictability  
and prioritized compute  
capacity



Flexibility  
to modify reservations  
and simplicity of purchase

- ⇒ Reserve virtual machine capacity in advance
- ⇒ Select 1- or 3-year terms with significant benefits
- ⇒ Reusable across instances in the same family and region
- ⇒ Available for VMs, SQL Database, Cosmos DB, and SUSE Enterprise Linux

### Enterprise Agreement Admin Roles:



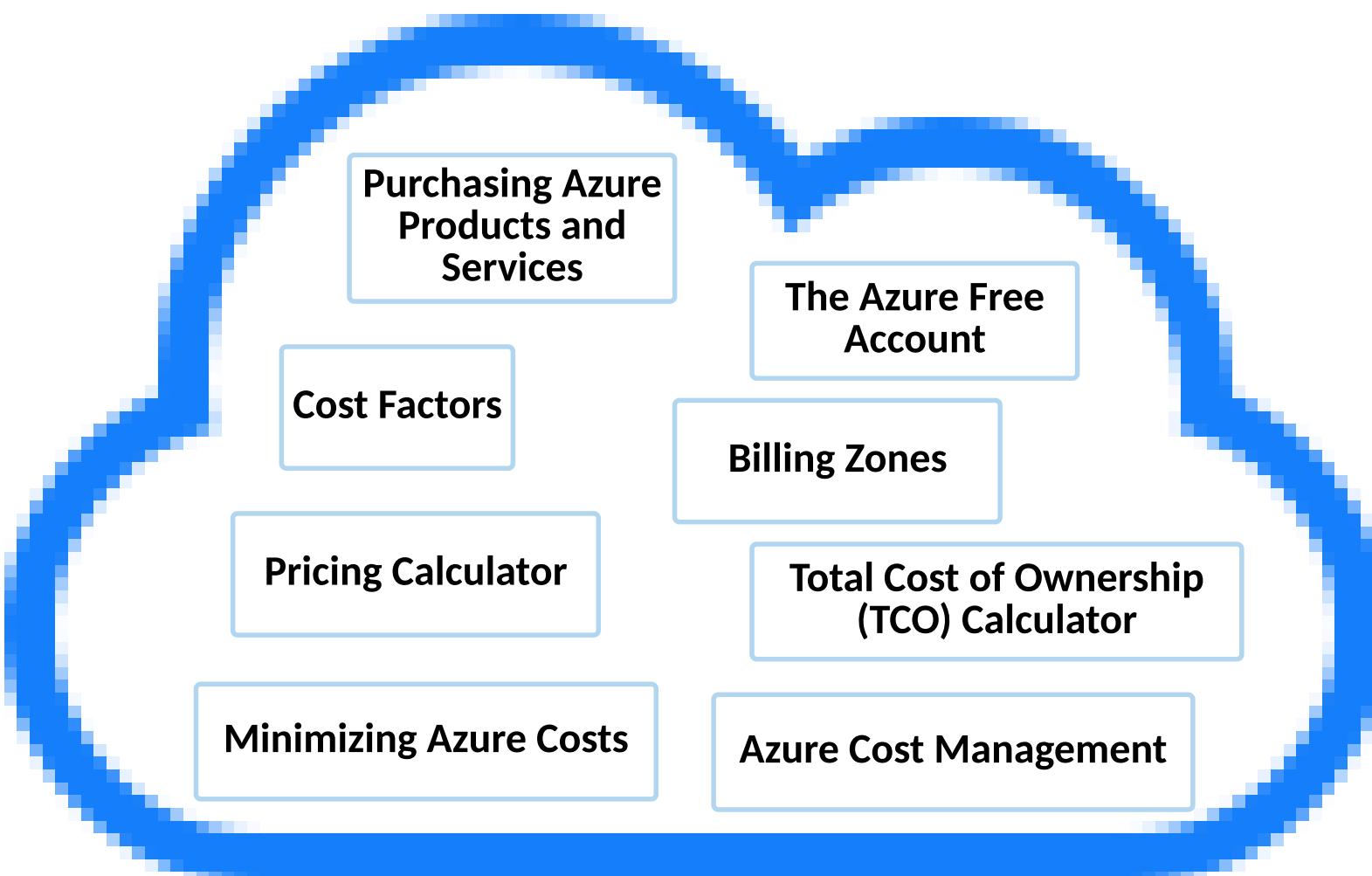


## Azure Pricing and Support



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## Planning and Managing Azure Costs





## Azure Pricing and Support

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  - ▶ The Azure Service Lifecycle

## Purchasing Azure Products and Services

- Purchase Azure directly from Microsoft:
  - Get a monthly bill from Microsoft for the Azure services you consume
  - Option to choose a Microsoft support plan for Azure
- Purchase Azure as part of a managed service from a Microsoft partner:
  - Get your bill from and pay for Azure usage through your CSP
  - Get support for Azure through your CSP
- Azure partners have experience helping businesses save time and money.
- Pricing depends on subscription type and, in some cases, region.
- Prepay and save even more with 1-3 year commitments (Azure Reservations).



## Azure Pricing and Support



### Azure Subscriptions

### Planning and Managing Azure Costs

- ▶ Azure Support Options
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- ▶ The Azure Service Lifecycle

## The Azure Free Account

- One-time offer per account for free access to many Azure products.
- Your subscription starts with the "Free Trial" offer.
- Get a \$200 credit to spend in the first 30 days.
- Get 12 months of free Azure compute time and other resources.
- After 30 days, you must upgrade your subscription to "Pay-As-You-Go" and remove the spending limit, or your free account will be disabled.
- As long as you stay within the quotas for the 12 months of free Azure resources, you won't be charged.

### What do I get?

With your Azure free account, you get all of this—and you won't be charged until you choose to upgrade.

**12 months**

+

**\$200 credit**

+

**Always free**

of popular free services

to explore any Azure service for 30 days

25+ services



# Azure Pricing and Support



## Azure Subscriptions

## Planning and Managing Azure Costs

- ▶ Azure Support Options
- ▶ Azure Service Level Agreements (SLAs)
- ▶ The Azure Service Lifecycle

## Cost Factors

### Things that are free:

- ▶ Management Groups, Subscriptions, Resource Groups
- ▶ VM Network Interface Cards (NICs)
- ▶ Azure AD Groups
- ▶ Network Security Groups
- ▶ Inbound data transfer to Azure
- ▶ Certain quotas of usage for more than 25 Azure products and services, like virtual networks, app service plans, etc.

### Things that cost money:

- ▶ Most resources (products and services)
- ▶ Virtual Machines
- ▶ Azure AD Users
- ▶ Public IP Addresses
- ▶ VPN Gateways
- ▶ Outbound data transfer from Azure
- ▶ Usage beyond the quota for more than 25 Azure products and services, like virtual networks, app service plans, etc.





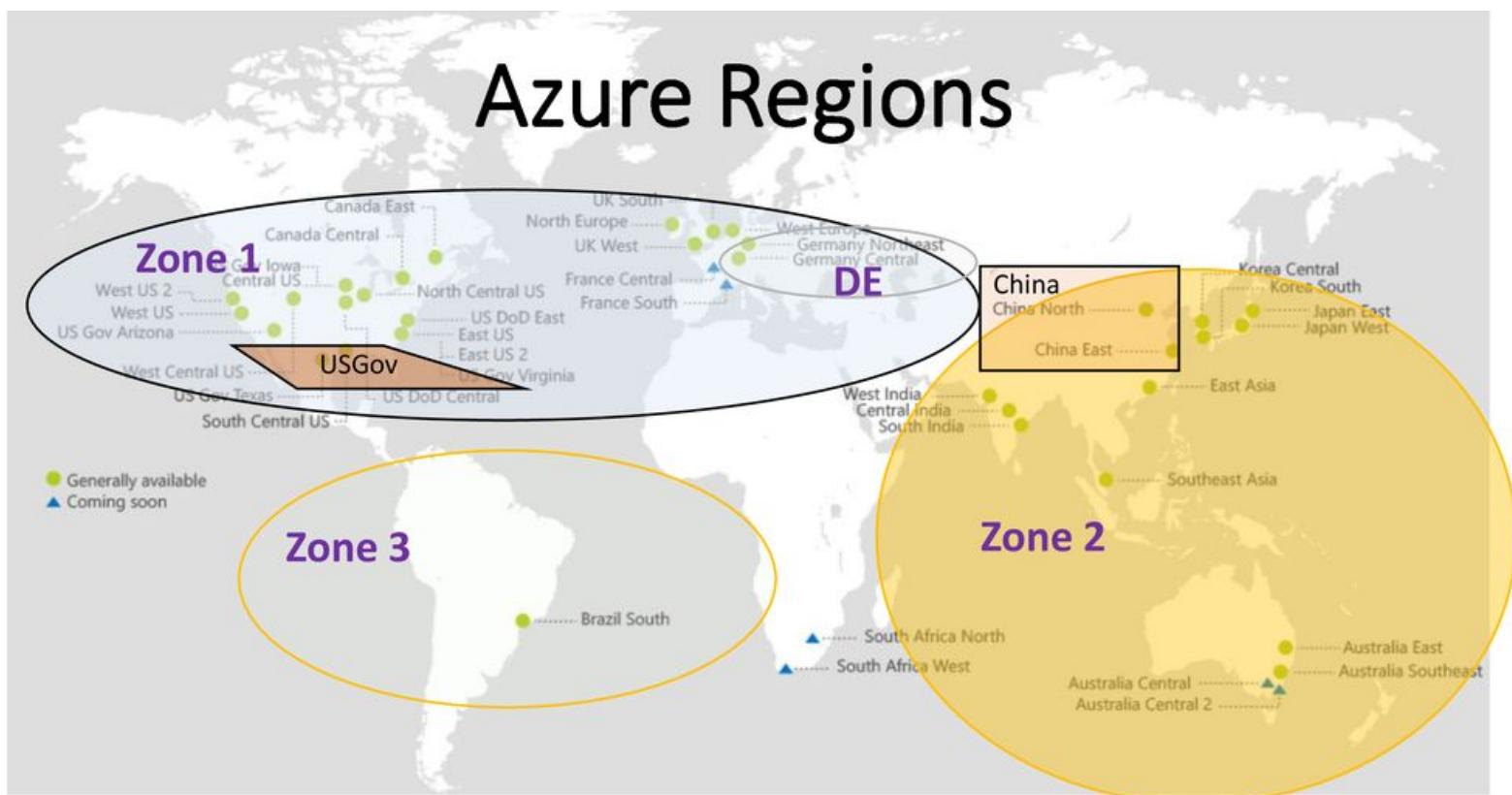
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## Billing Zones

- For data transfer in/out of Azure, the following regions correspond to different Azure Billing Zones and charge different prices:
  - Zone 1 — Canada, Europe, UK, US, US Government, US DoD
  - Zone 2 — Asia, Australia, India, Japan, Korea
  - Zone 3 — Brazil
  - DE Zone — Germany
  - China Zone — China





## Azure Pricing and Support



- ✓ Azure Subscriptions
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## Pricing Calculator

- Estimate your Azure consumption using the free Azure pricing calculator.
- Estimate the pricing for each product or service in your solution.
- Example: A running virtual machine consumes virtual machine capacity, disk storage, table storage (performance metrics), a public IP address, and some other micro-charges.
- See a full estimate of all your total costs and export to Excel.

The screenshot shows the Azure Pricing Calculator interface. On the left, there's a form for configuring a virtual machine. It includes dropdowns for REGION (South Central US), TYPE (Windows), PRICING TIER (Standard), and INSTANCE SIZE (A2). Below these are fields for quantity (2) and duration (744 hours). On the right, a summary table titled "Your estimate" shows the breakdown of costs:

Virtual Machines	\$267.84
Support Options	\$0.00

The total estimated monthly cost is \$267.84. A green button at the bottom right says "Purchase options".





## Azure Pricing and Support



- ✓ Azure Subscriptions
- ➡ Planning and Managing Azure Costs
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### Minimizing Azure Costs

- Minimizing costs is a continuous process.
- Set up your resources with costs in mind — add tags to your resources to group your billing data.
- Regularly check the portal for cost breakdown and burn rate.
- Consider enabling cost-cutting features like auto-shutdown for VMs.
- Turn on and check out Azure Advisor recommendations.

#### Continuous cost optimization process





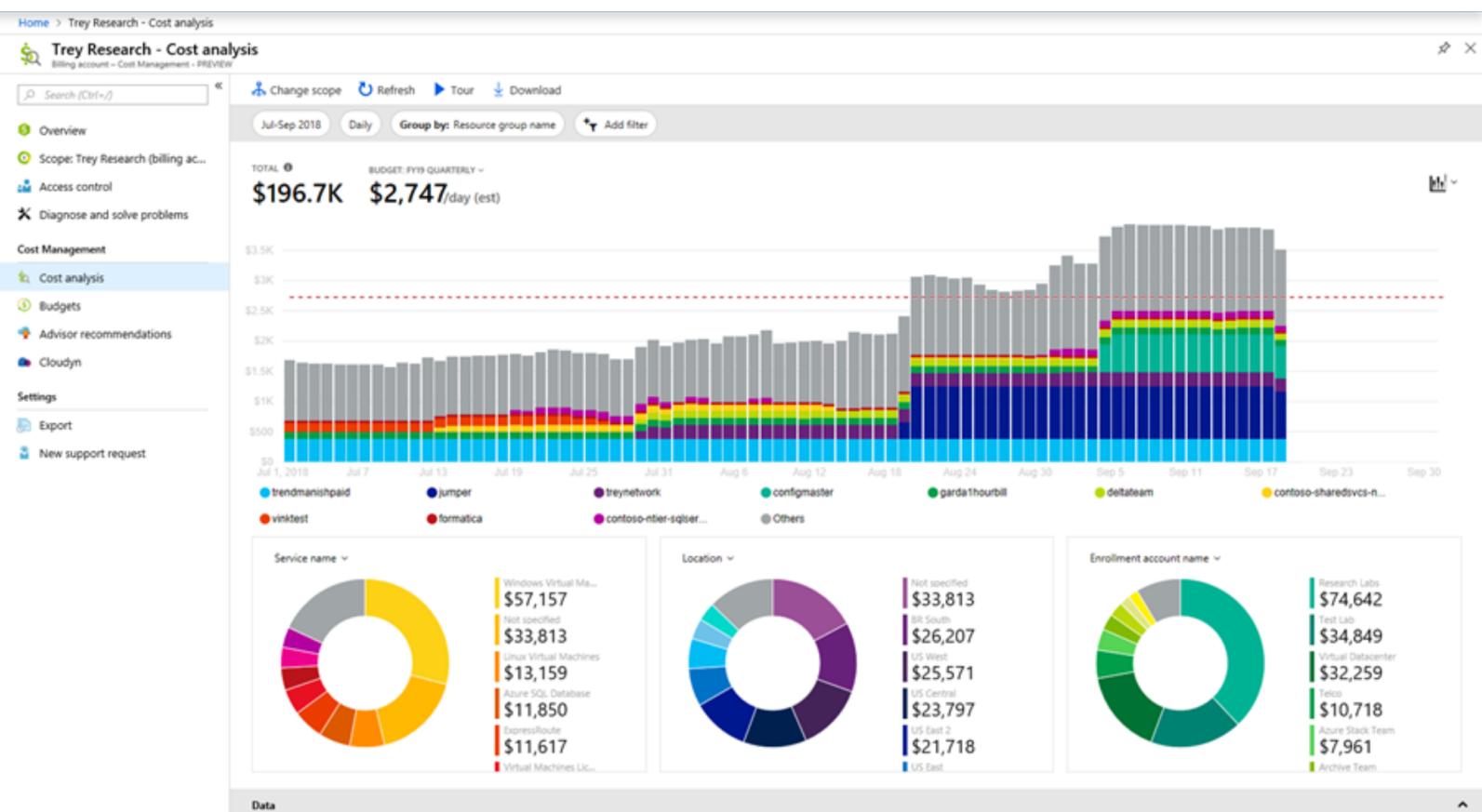
## Azure Pricing and Support



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## Azure Cost Management

- Helps you analyze costs, create and manage budgets, export data, and review and act on optimization recommendations to save money.
- Recommendations come from Azure Advisor and show how you can optimize and improve efficiency by identifying idle and under-utilized resources.



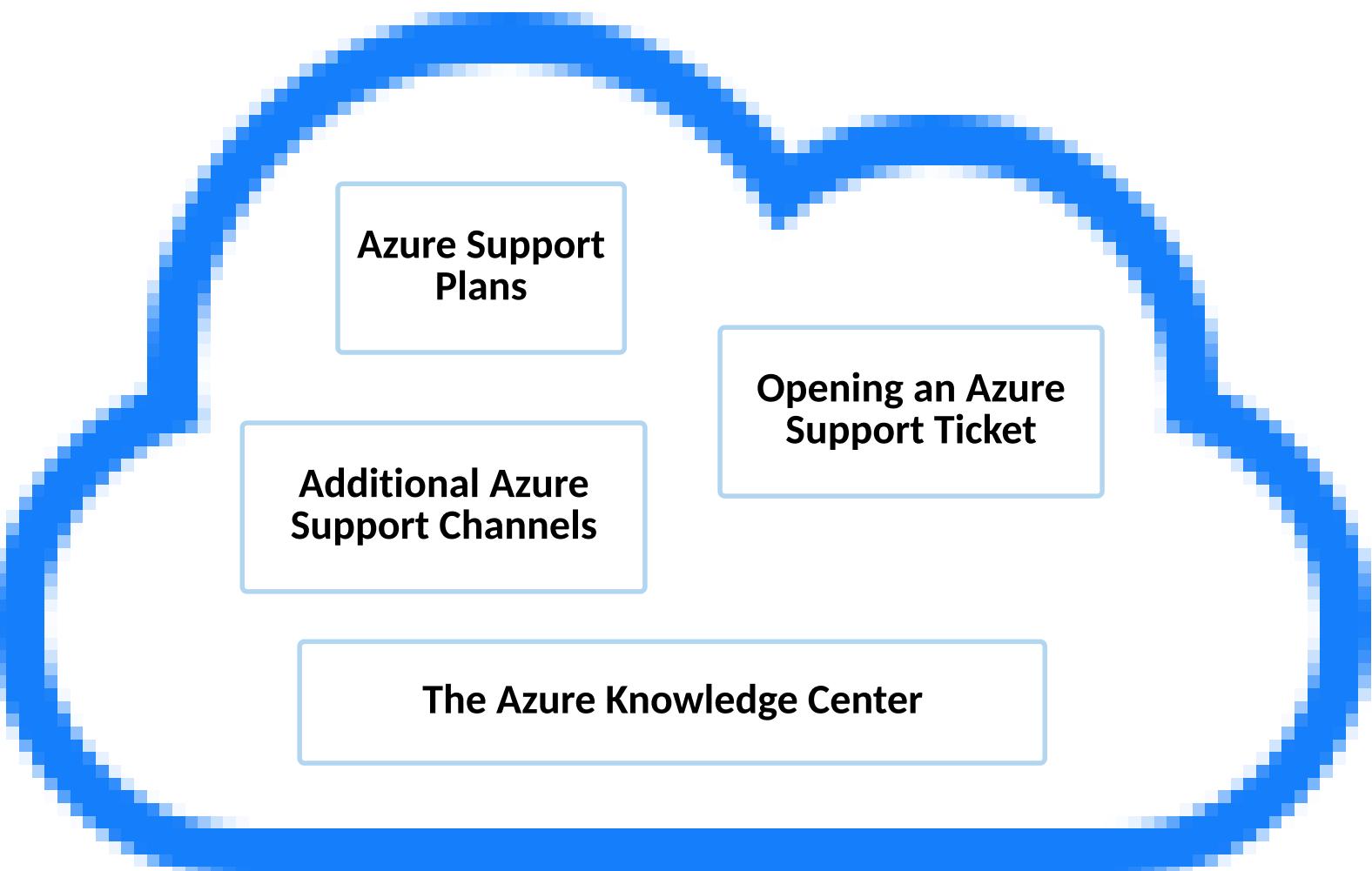


## Azure Pricing and Support



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## Azure Support Options





## Azure Pricing and Support



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## Azure Support Plans

### Windows Azure Support Features:

	Included	Developer	Standard	Professional Direct	Premier
Billing & Subscription Management	✓	✓	✓	✓	✓
Community Forums	✓	✓	✓	✓	✓
Service Dashboard	✓	✓	✓	✓	✓
Web Incident Submission	-	✓	✓	✓	✓
Unlimited Break/Fix (24x7)	-	✓	✓	✓	✓
Fastest Response Time	-	<8 hours	<2 hours	<1 hour	<15 min
Phone Support (Call Backs)	-	-	3/Month	Unlimited	Unlimited
Service Delivery Management	-	-	-	Pooled	Assigned
Priority Handling	-	-	-	✓	✓
Escalation Phone Line	-	-	-	✓	✓
Advisory Support	-	-	-	Limited	Full
Onsite Services	-	-	-	-	✓
Developer Mentoring	-	-	-	-	✓



## Azure Pricing and Support



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## Opening an Azure Support Ticket

- Azure customers with a support plan can create and manage support requests in the Azure portal (<https://portal.azure.com>).
- The Azure support request experience is:
  - Streamlined: Reduce clicks and blades to make the process of submitting a support request simple.
  - Integrated: When you're troubleshooting an issue with an Azure resource, it should be easy to open a support request for that resource without switching context.
  - Efficient: Gather the key information your support engineer needs to efficiently resolve your issue.

Contact Microsoft Support

Create Support Ticket

SUBSCRIPTION  
@microsoft.com

SUPPORT TYPE  
Choose an option

COUNTRY/REGION  
United States

LANGUAGE  
English

Your Support Plan: Developer

Other support options

Community Forum support

Microsoft Premier support

Microsoft Professional Contract Support (for MSDN, TechNet, MPN subscribers)

View Existing Tickets

manage tickets

CREATE TICKET



## Azure Pricing and Support

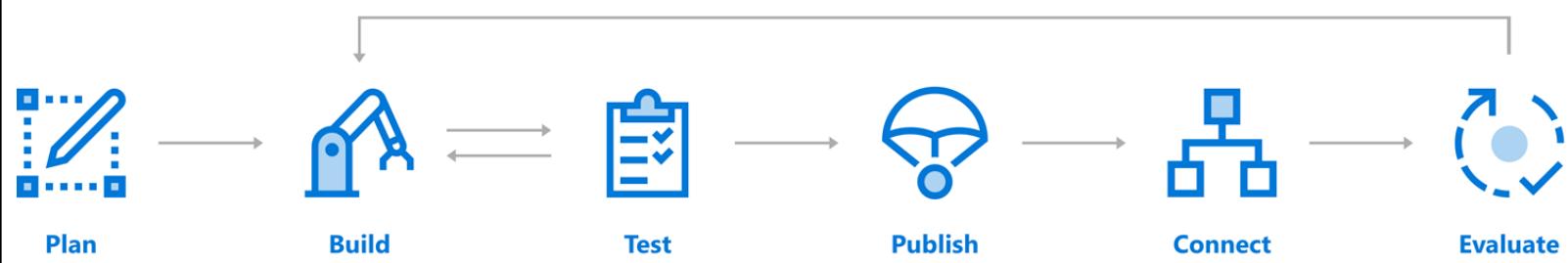


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## Additional Azure Support Channels

- Azure Knowledge Center — Get answers to common support questions.
- You can raise questions in two different Azure forum options (MSDN and Stack Overflow) to connect with other Azure customers and experts to ask questions, share experiences, or find solutions.
- If you are a member of certain programs like MPN, MSDN, or BizSpark, you may be eligible for limited Azure Support benefits from those programs even if you don't have a support plan.
- Your Azure subscription includes access to subscription management support (e.g., billing, quota adjustment, account transfer) at no additional cost.

Support throughout the entire software development lifecycle:





## Azure Pricing and Support



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  - ▶ The Azure Service Lifecycle

## The Azure Knowledge Center

- Get answers to common support questions.
- Available 24/7/365.
- Search across different products and services, or search by tags to find information for related products and services.
- One of many free resources for Azure information and support.

Microsoft Azure

Contact Sales: 1-800-867-1389 | Search | My account | Portal | jason | Free account >

Overview Solutions Products Documentation Pricing Training Marketplace Partners Support Blog More >

## Knowledge Center

Get answers to common support questions.

Search

What can we help you with?

Products

All

Tags

All

Is there a quick tutorial on how back up your Windows Server (or Windows computer) files and folders to Azure using a Classic deployment?

Storage backup

Is there a quick tutorial on how back up your Windows Server (or Windows computer) files and folders to Azure using a Resource Manager deployment?

Storage backup

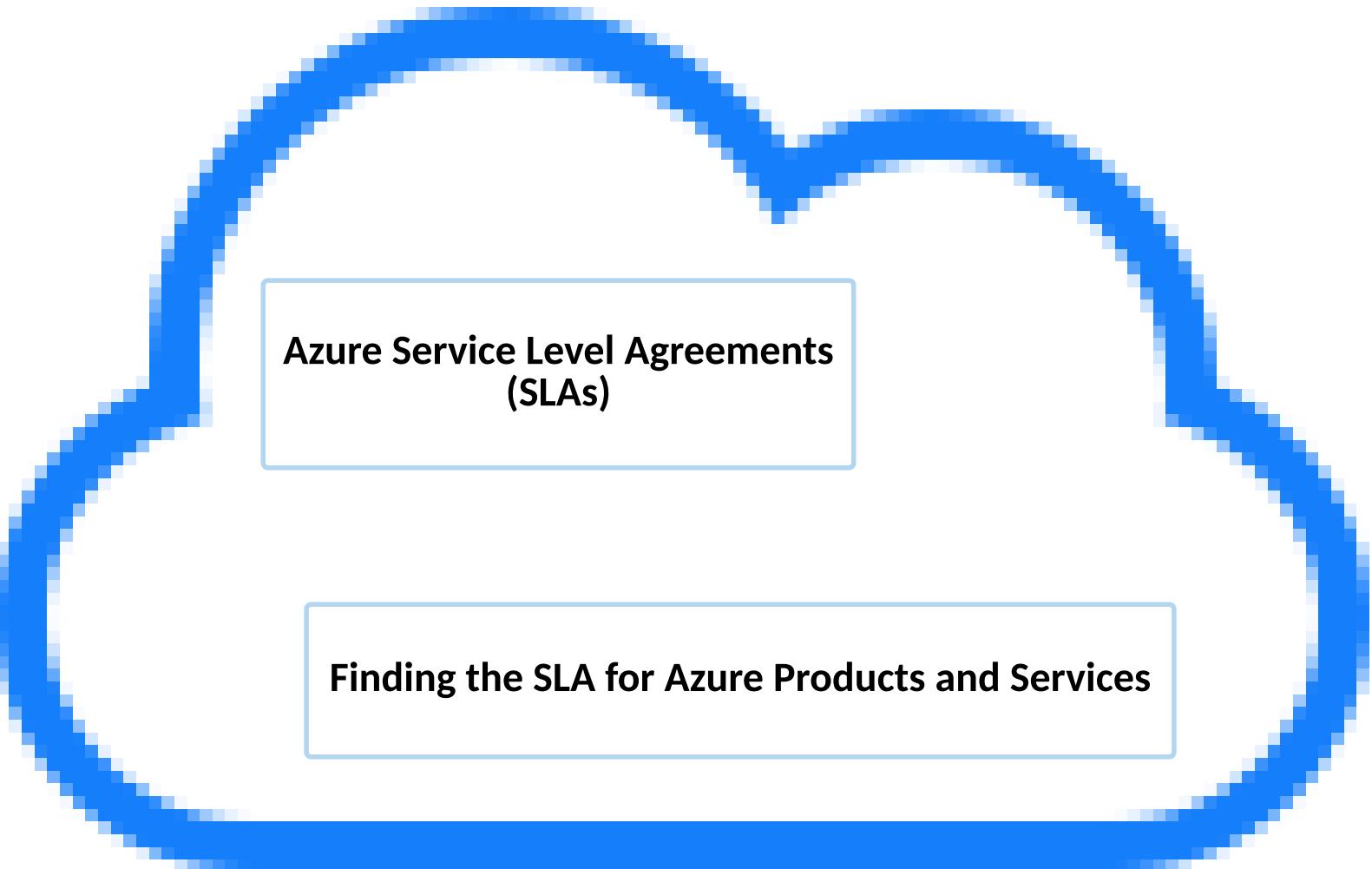


## Azure Pricing and Support



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### Azure Service Level Agreements (SLAs)



Azure Service Level Agreements (SLAs)

Finding the SLA for Azure Products and Services



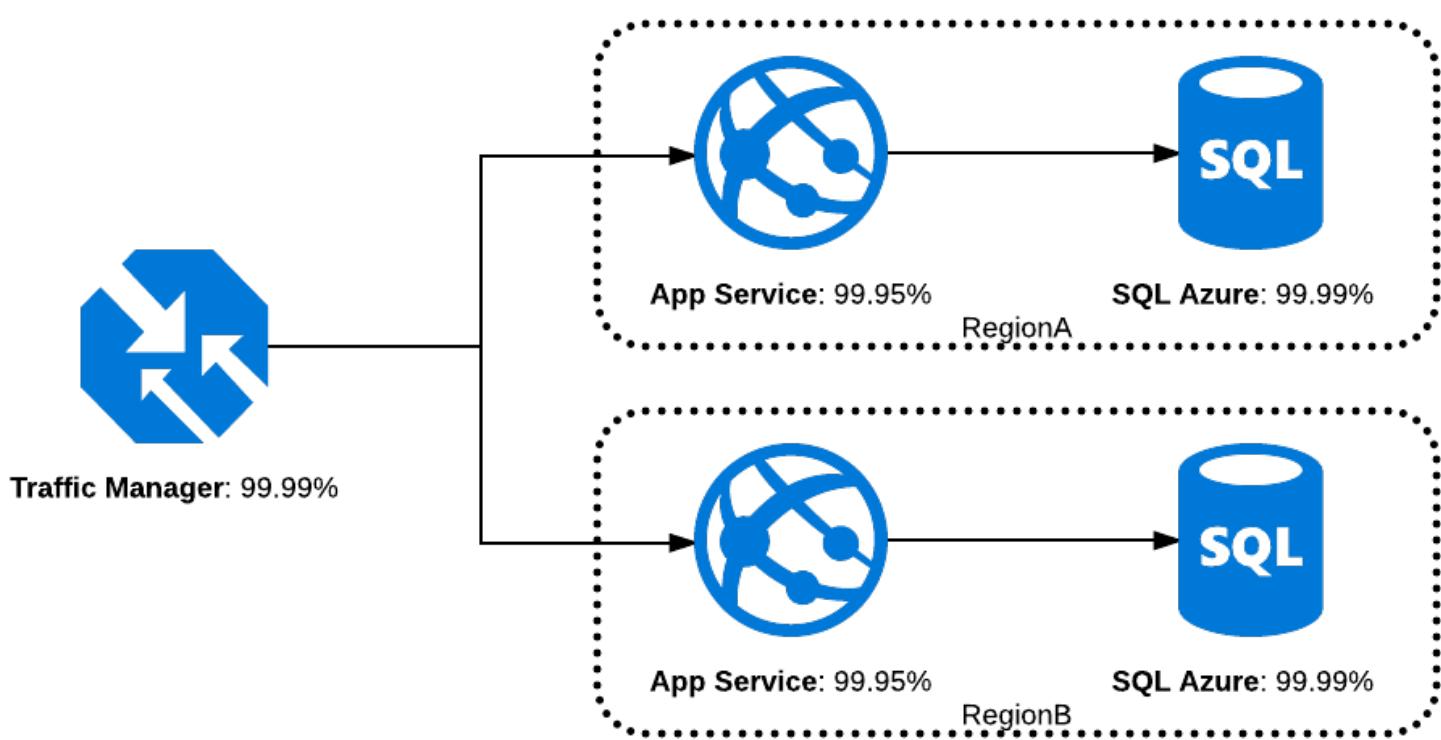
## Azure Pricing and Support



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### Azure Service Level Agreements (SLAs)

- Uptime is guaranteed (not performance, bandwidth, or feature availability).
- Expressed as a percentage of the total time per month that the service is guaranteed to be up.
- If an incident causes the uptime to fall below the SLA guarantee, you are entitled to a credit towards your monthly service fees.
- Monthly Uptime % =  $(\text{Maximum Available Minutes} - \text{Downtime}) / \text{Maximum Available Minutes} * 100$





## Azure Pricing and Support



- ✓ Azure Subscriptions
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### Finding the SLA for Azure Products and Services

- Each Azure product and service has a separate SLA.
- Certain Azure products and services can be configured in different ways for different SLAs. For example, CosmosDB has a 99.99% SLA, but if configured to use multiple regions, the SLA is 99.999%.
- You can find the SLA for *all* Azure products and services on the Azure SLA landing page:

<https://azure.microsoft.com/en-us/support/legal/sla/>

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Q Portal [Free account >](#)

### SLA summary for Azure services

Last updated: February 2019

#### Azure Active Directory

We guarantee at least 99.9% availability of the Azure Active Directory Basic and Premium services. The services are considered available in the following scenarios:

- Users are able to login to the service, login to the Access Panel, access applications on the Access Panel and reset passwords.
- IT administrators are able to create, read, write and delete entries in the directory or provision or de-provision users to applications in the directory.

No SLA is provided for the Free tier of Azure Active Directory.

[Download Active Directory SLA](#)

[View full details](#)

#### Azure Active Directory B2C

We guarantee at least 99.9% availability of the Azure Active Directory B2C service. The service is considered available for a directory in the following scenarios:

- The service is able to process user sign-up, sign-in, profile editing, password reset and multi-factor authentication requests.
- Developers are able to create, read, write and delete entries in the directory.

No SLA is provided for the Free tier of Azure Active Directory B2C.

[View full details](#)

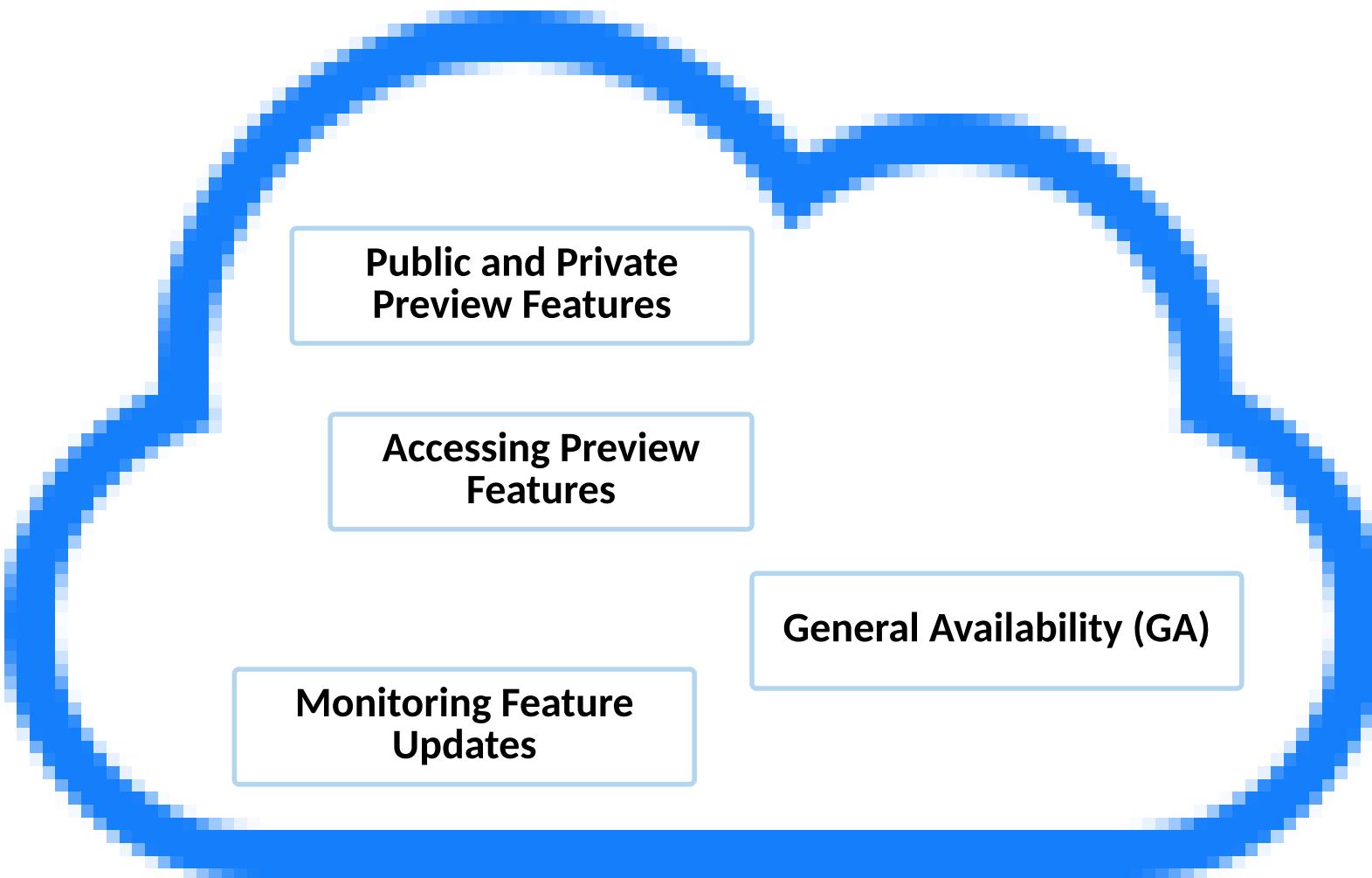


## Azure Pricing and Support



- Azure Subscriptions
- Planning and Managing Azure Costs
- Azure Support Options
- Azure Service Level Agreements (SLAs)
- The Azure Service Lifecycle

## The Azure Service Lifecycle





## Azure Pricing and Support



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## Public and Private Preview Features

- Azure features (new products and services) can be initially released as public or private preview features:
  - All previews are excluded from Microsoft SLAs and warranties.
  - Previews might not include customer support from Microsoft.
  - Previews might not be brought into General Availability status.
  - Preview features may change from Preview to General Availability.
- Previews are released in order for Microsoft to obtain feedback and for evaluation purposes:
  - Public Preview: Made available to all Microsoft Azure subscribers through the Azure Portal, these services are intended to be used as an early-look into what is coming and as a chance to test upcoming services and features.
  - Private Preview: Provided only to small subset of customers, in direct contact with the Azure Engineering teams, focused on direct and constant feedback during the development phase of a service
  - Limited Preview: A fixed and limited number of customers can have access to this Preview program, and once a maximum threshold is met, no more users are allowed into the program.
- You can find *all* Azure products and services currently in preview through the Azure Updates landing page:  
<https://azure.microsoft.com/en-us/updates/?status=inpreview>



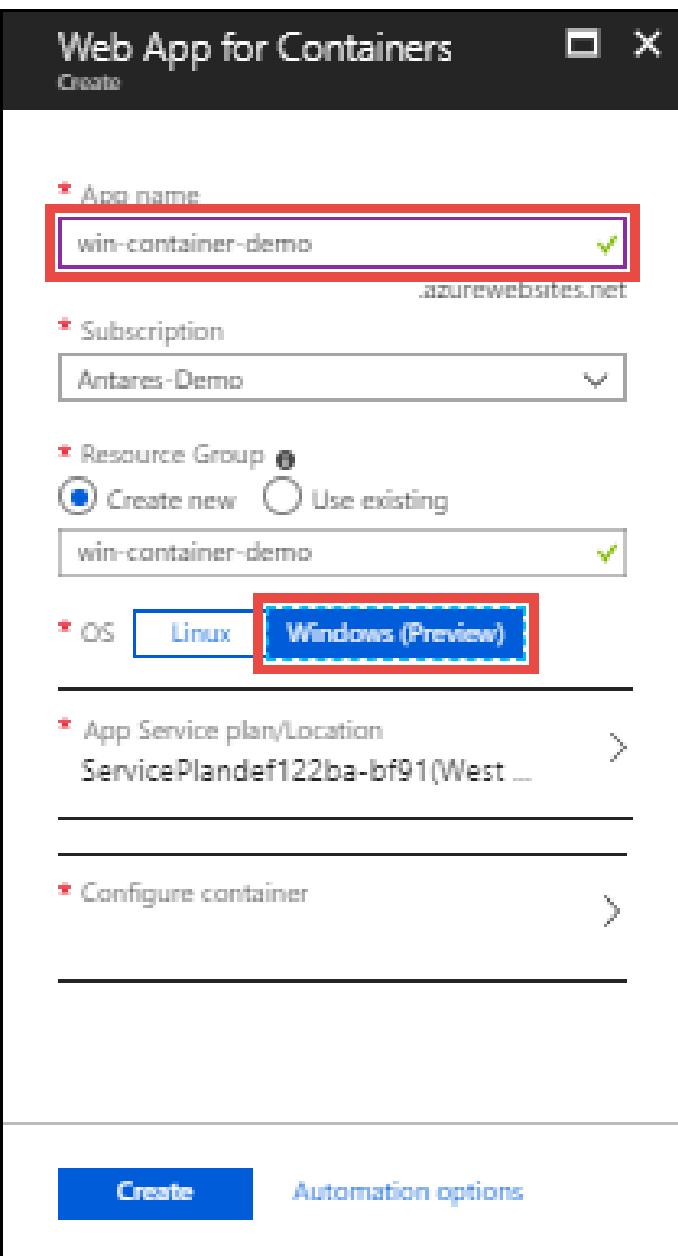
## Azure Pricing and Support



- ✓ Azure Subscriptions
- ✓ Planning and Managing Azure Costs
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- ➡ The Azure Service Lifecycle

## Accessing Preview Features

- You can find all Azure products and services currently in preview through the Azure Updates landing page.
- Try any preview features using the Azure Portal:  
<https://portal.azure.com>
- Preview features are labeled as "(Preview)" throughout the Azure Portal.





## Azure Pricing and Support



- ✓ Azure Subscriptions
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### General Availability (GA)

- Once a feature has been evaluated and successfully tested, it might be released to customers as part of Azure's default product set — this release is referred to as "General Availability" (GA).
- Azure GA products and services may not always be available in every region — check product availability by region:

<https://azure.microsoft.com/en-us/global-infrastructure/services/?products=all>





## Azure Pricing and Support



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## Monitoring Feature Updates

- You can track updates to products and services through the Azure Updates landing page, which provides additional information and features:
  - Find out which updates are in general availability, preview, or development.
  - Browse updates by product category or update type using the provided dropdown lists.
  - Search for updates by keyword by entering search terms into a text-entry field.
  - Subscribe to get Azure update notifications by RSS.
  - Access the Microsoft Connect page to read Azure product news and announcements.
  - <https://azure.microsoft.com/en-us/updates/>
- The "What's New" link in the Azure portal provides a list of recent updates you can periodically check to see what's changed in Azure.
- Provide feedback on preview features through the Azure portal or the Azure portal feedback forum.



# Appendix

[Helpful Links](#)[About the Exam](#)[Hands-On Labs](#)[Exit](#)

## Helpful Links

Here are some useful links that will help you out on your journey to becoming Azure certified.

### Linux Academy Resources:

- [Linux Academy Home Page](#)
- [AZ-900 Microsoft Azure Fundamentals Course Page](#)
- [Linux Academy Community](#)
  - Share your success with the community when you pass the exam
  - Share any feedback, thoughts, and tips and tricks
- [Linux Academy Blog](#)

### Azure Resources:

- [Azure Home Page](#)
- [Azure Documentation](#)
- [Azure Certification Exams \(General Information Page\)](#)
- [AZ-900 Microsoft Azure Fundamentals Exam Page](#)