



Microsoft Azure Fundamentals

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Tissana Tanaklang

Software Development Trainer
Iverson Training Center Co., Ltd.
tissana@iverson.co.th

- Microsoft Certified Trainer (MCT)
- Microsoft Certified Solutions Associate (MCSA) - Web Application Development
- Microsoft Certified Azure Fundamentals
- Microsoft Certified Professional (MCP)

Description

Azure Fundamentals introduces cloud services, and how these services are provided by Microsoft Azure. Take this course as a first step towards learning about cloud computing and Azure, before taking further courses.

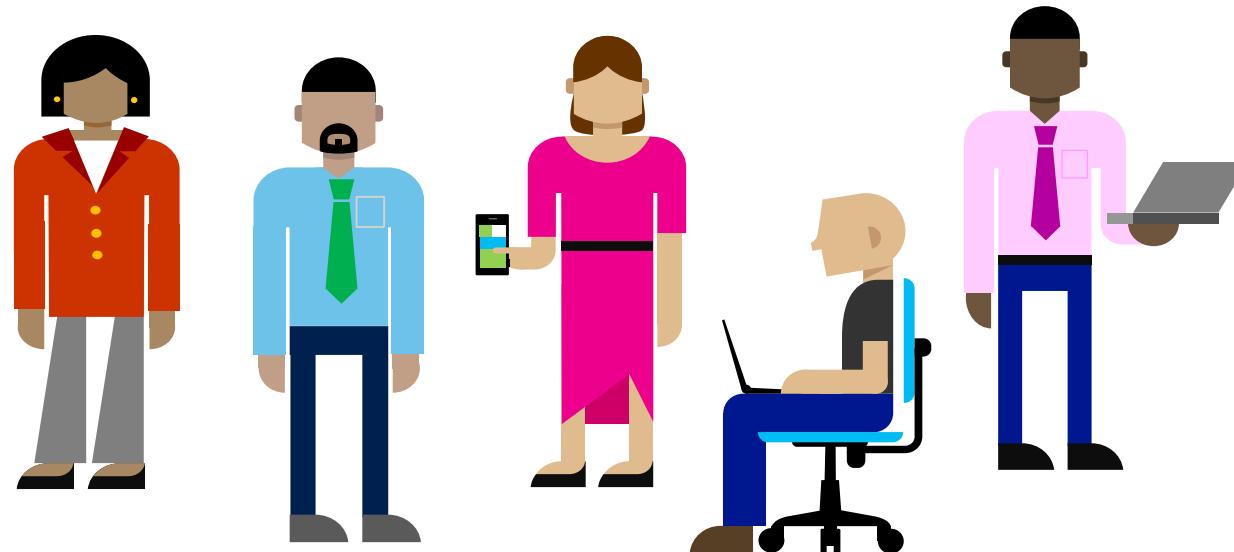
This course covers:

- General cloud computing concepts, models, and services such:
 - *Public, Private, and Hybrid* clouds
 - *Infrastructure, Platform, and Software as a Service*
- Core Azure products, services and tools for security, privacy, compliance, and trust
- Azure pricing and support options

Audience

Azure Fundamentals is suitable for candidates from technical and non-technical backgrounds, whose current or future work relates to cloud computing.

For example, those who are involved in selling or purchasing cloud-based products, solutions and services, or those taking their first look at cloud computing and Azure



Prerequisites

There are no prerequisites for taking this course. Technical IT experience is not required; however, some general IT knowledge or experience is beneficial.

Certification areas (AZ-900)

Study areas	Weights
Understanding cloud concepts	15-20%
Understanding core Azure services	30-35%
Understand security, privacy, compliance, and trust	25-30%
Understand Azure pricing and support	25-30%

- 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.

Azure Certifications

Last updated: Feb 4, 2020

*exam in beta

Role-based

Technical skills required
to perform a job

Expert

Associate

Fundamentals

Foundational understanding
of technology



Apps and Infra

Azure Solutions Architect

Azure DevOps Engineer



Data and AI

Specialty

Deep technical skills managing
industry solutions



Azure for SAP Workloads*



Azure IoT Developer*

Azure Administrator

Azure Developer

Azure Security Engineer

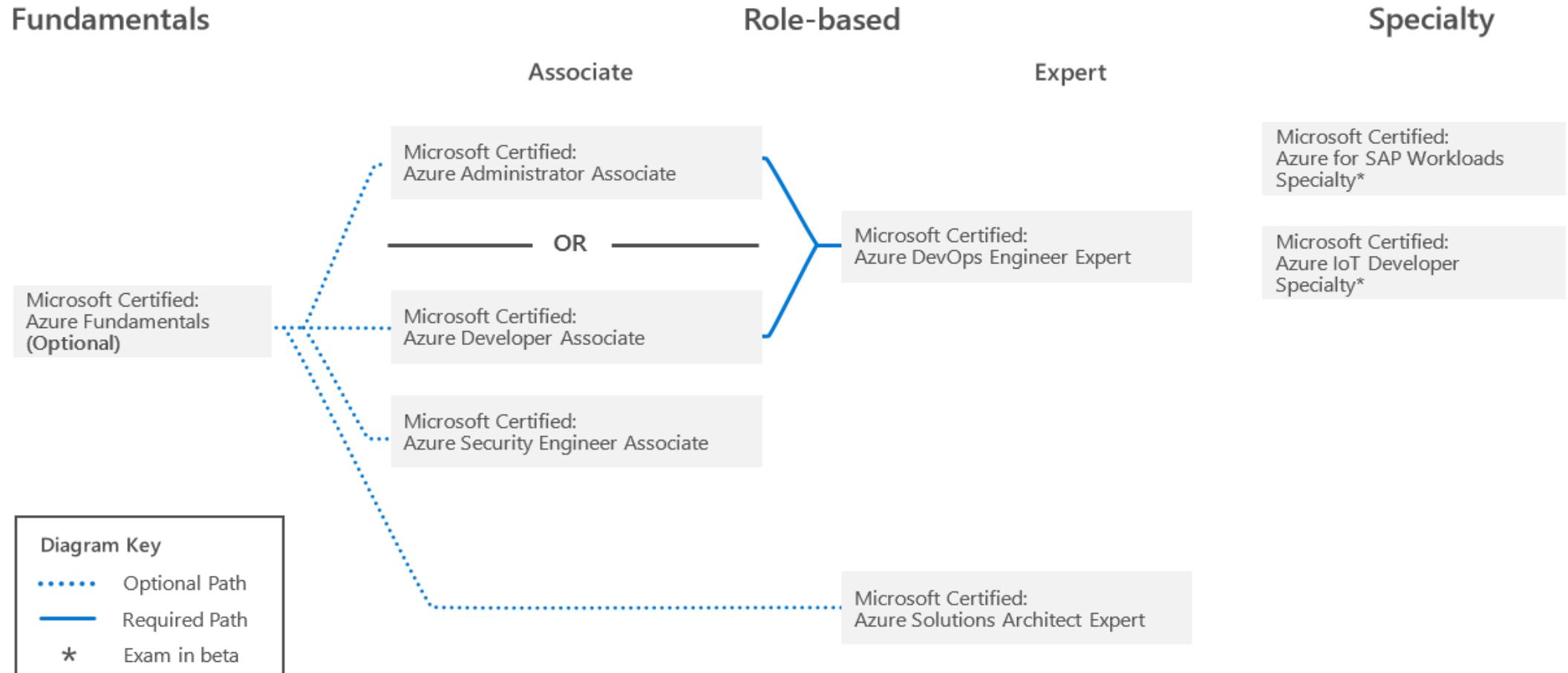
Azure Data Scientist

Azure AI Engineer

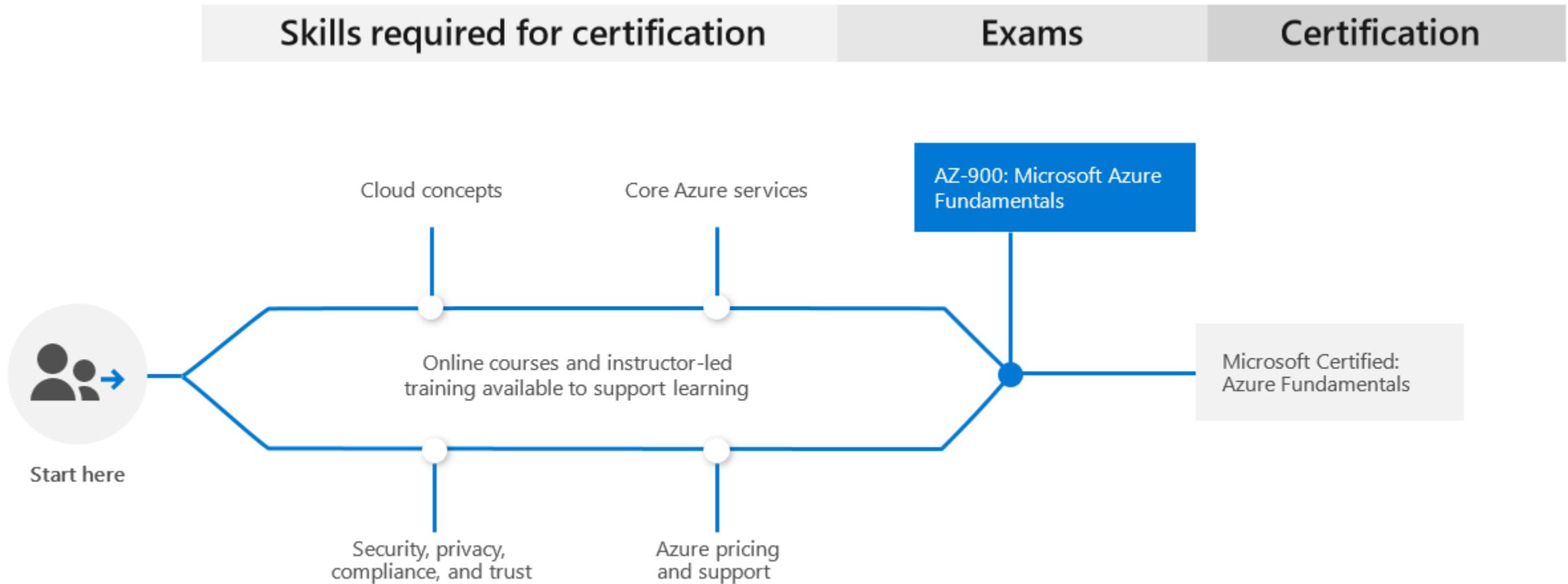
Azure Data Engineer

Azure Fundamentals

Azure Apps and Infrastructure Certifications



Learning path for Azure Fundamentals



Course details for Azure Fundamentals

2 Instructor-led training courses

Exam titles	Course title / training titles	Course ID	Course duration
Microsoft Azure Fundamentals <u>EXAM AZ-900</u>	Microsoft Azure Fundamentals	<u>AZ-900T00</u>	2 Days
	Microsoft Azure Fundamentals	<u>AZ-900T01</u>	1 Day

Module 01: Cloud concepts



Cloud computing

- Compute power - such as Linux servers or web applications.
- Storage - such as files and databases.
- Networking - such as secure connections between the cloud provider and your company.



Cloud providers include Microsoft, Amazon, and Google

Key concepts

High availability

Fault tolerance

Scalability

Elasticity

Global reach

Customer latency capabilities

Agility

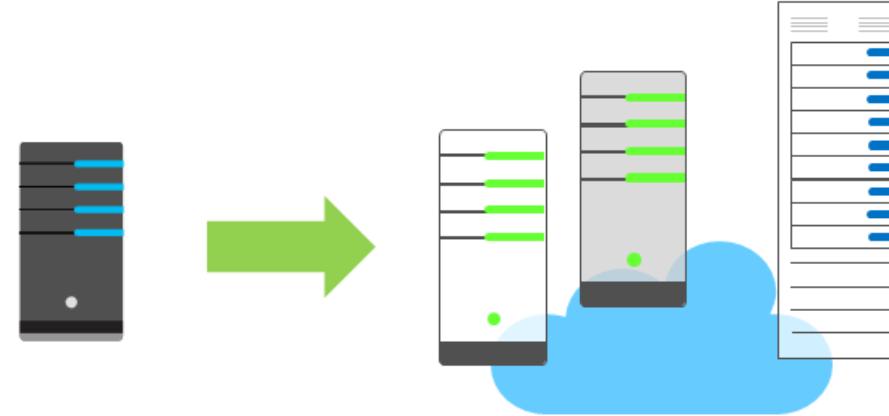
Predictive cost considerations

Disaster recovery

Security

Economies of scale

- The concept of *economies of scale* is the ability to do things less expensively and more efficiently when operating at a larger scale in comparison to operating at a smaller scale.



- Cloud providers such as Microsoft, Google, and Amazon Web Services (AWS) are very large businesses, and thus can leverage the benefits of economies of scale and then pass those benefits on to their customers.

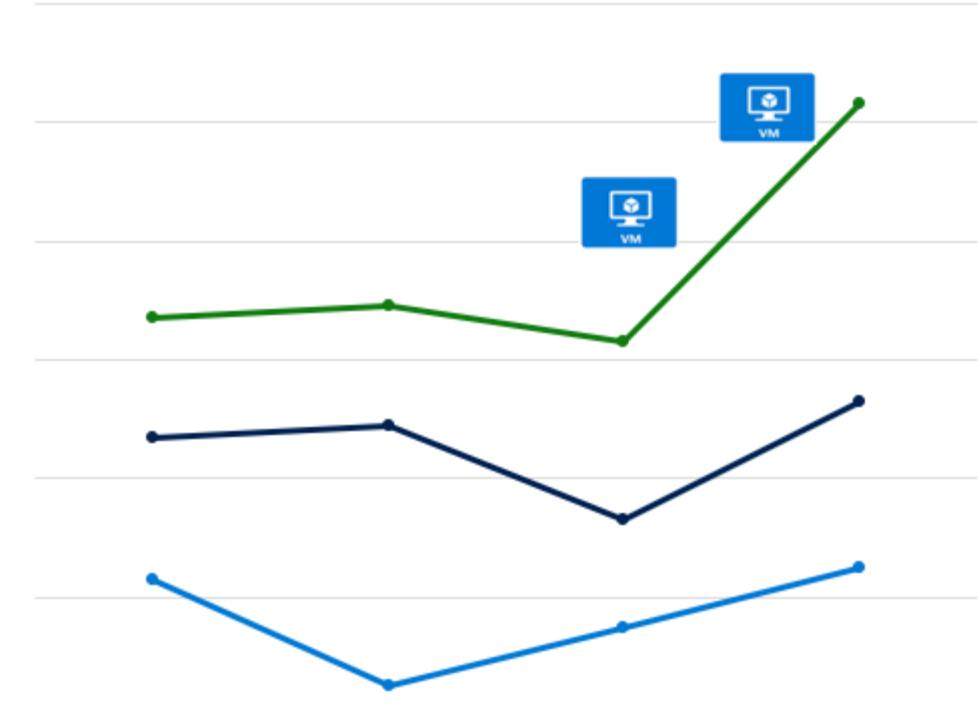
CapEx vs. OpEx

- Capital Expenditure (CapEx) : spend on physical infrastructure up front, deduct the expense from your tax bill.
 - High upfront cost, value of investment reduces over time.
- Operational Expenditure (OpEx) : spend on services or products as needed, and get billed immediately. Deduct the expense from your tax bill in the *same year*.
 - No upfront cost, pay-as-you use.



Consumption-based model

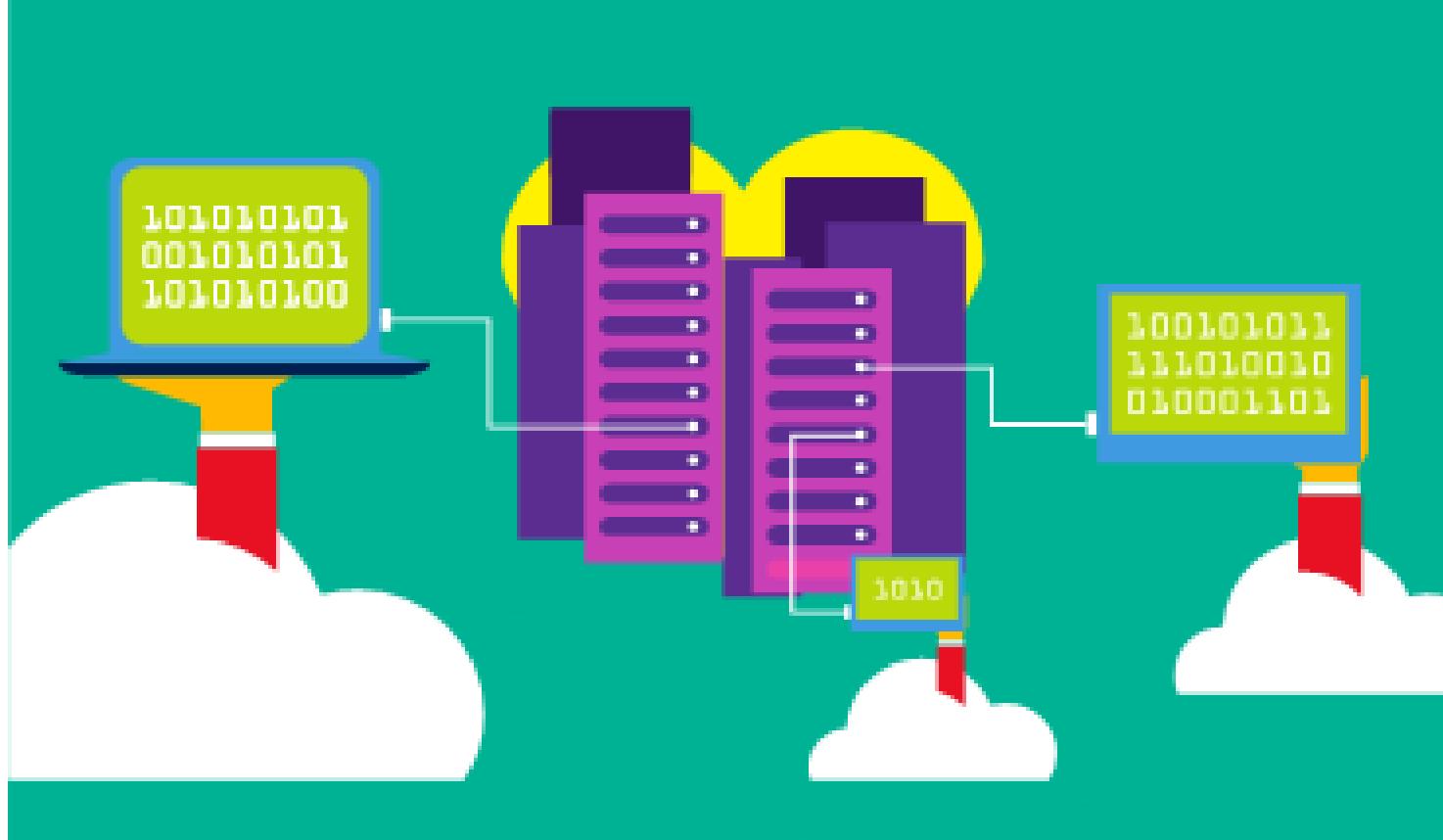
- No upfront costs.
- No need to purchase and manage costly infrastructure.
- Ability to pay for additional resources as they are needed.
- Ability to stop paying for resources that are no longer needed.



Types of cloud models



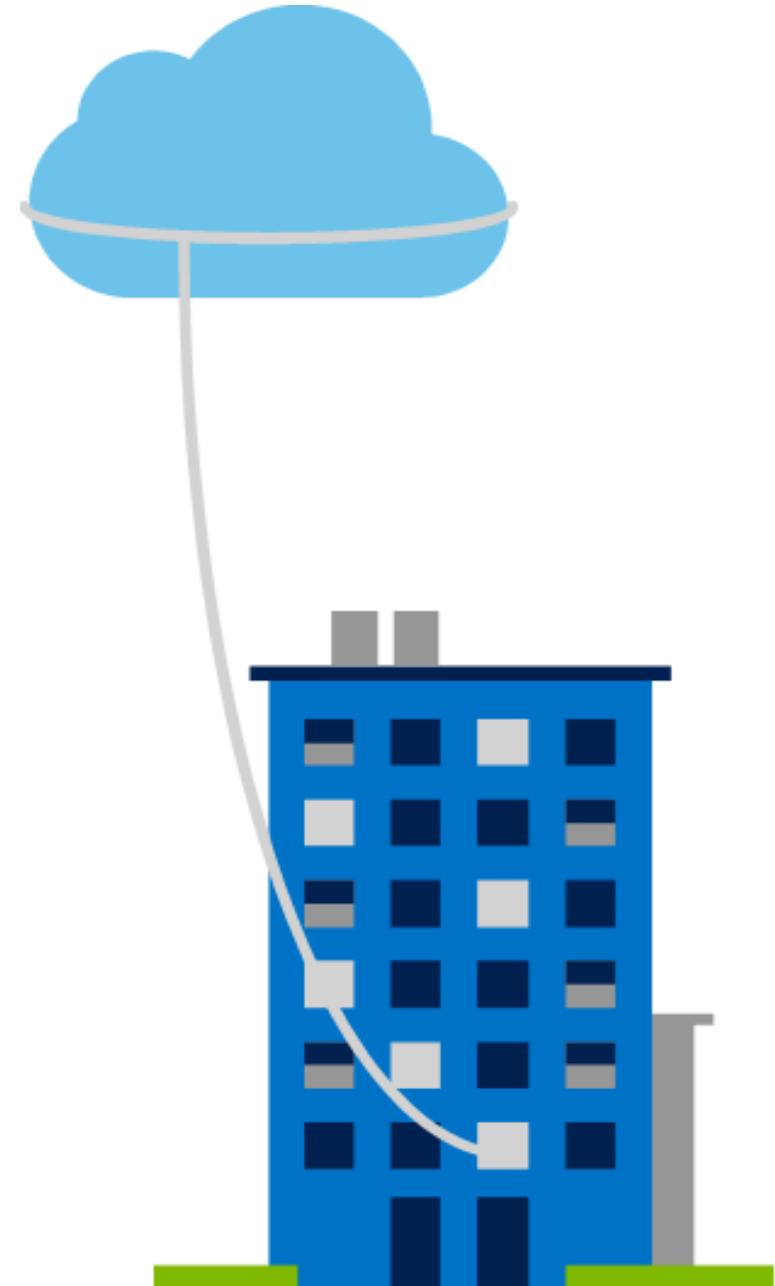
Public cloud



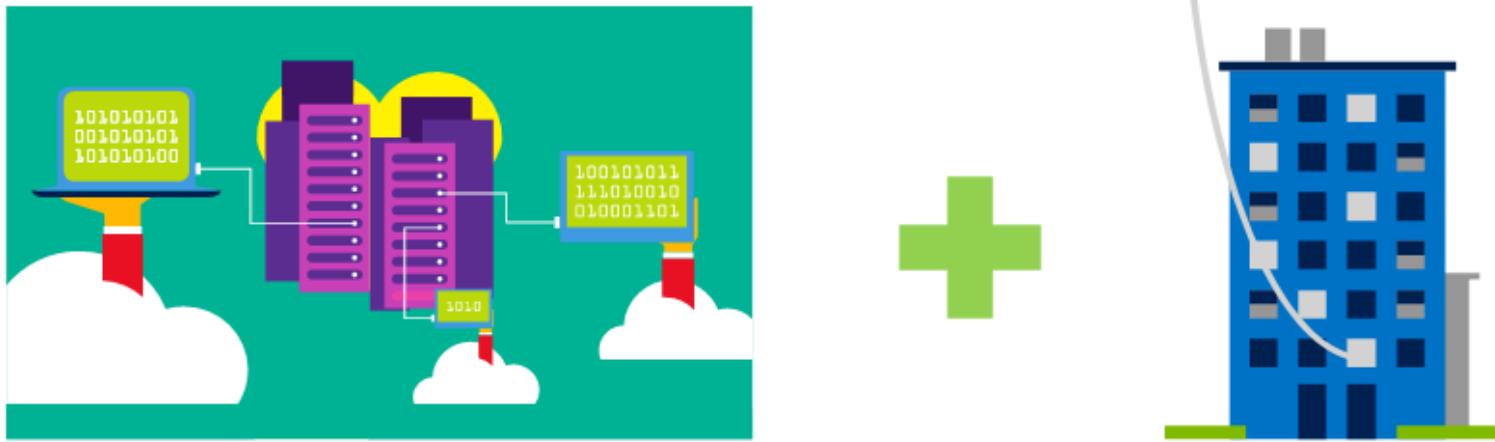
- Owned by cloud services or *hosting* provider.
- Provides resources and services to multiple organizations and users.
- Accessed via secure network connection (typically over the internet).

Private cloud

- Owned and operated by the organization that uses cloud resources.
- Organizations create a cloud environment in their data center.
- Self-service access to compute resources provided to users within the organization.
- Organizations responsible for operating the services they provide.



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:

- Organizations have complete control over resources.
- Organizations have complete control over security.

Hybrid cloud:

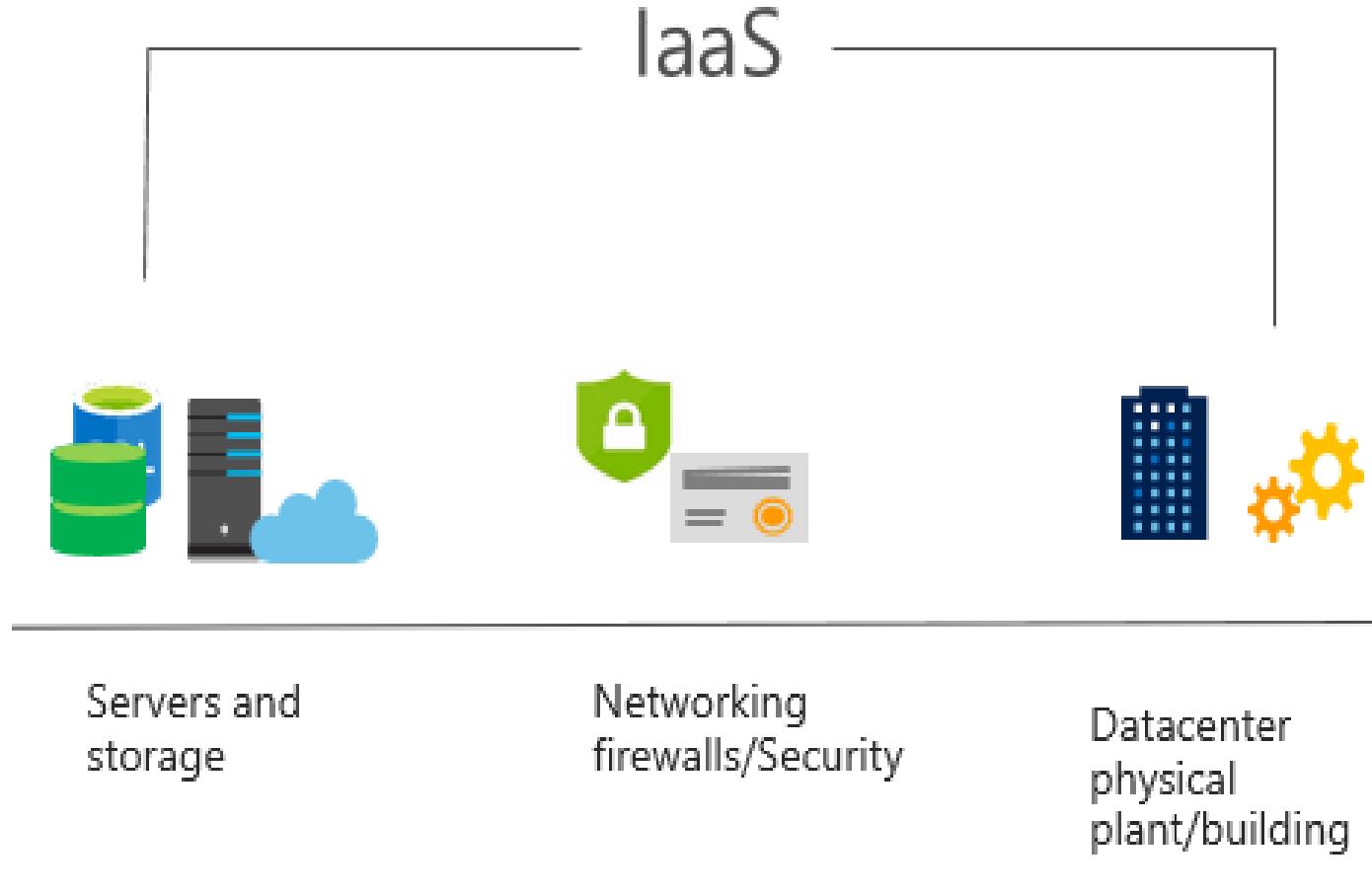
- Most flexibility.
- Organizations determine where to run their applications.
- Organizations control security, compliance, or legal requirements.

Types of cloud services

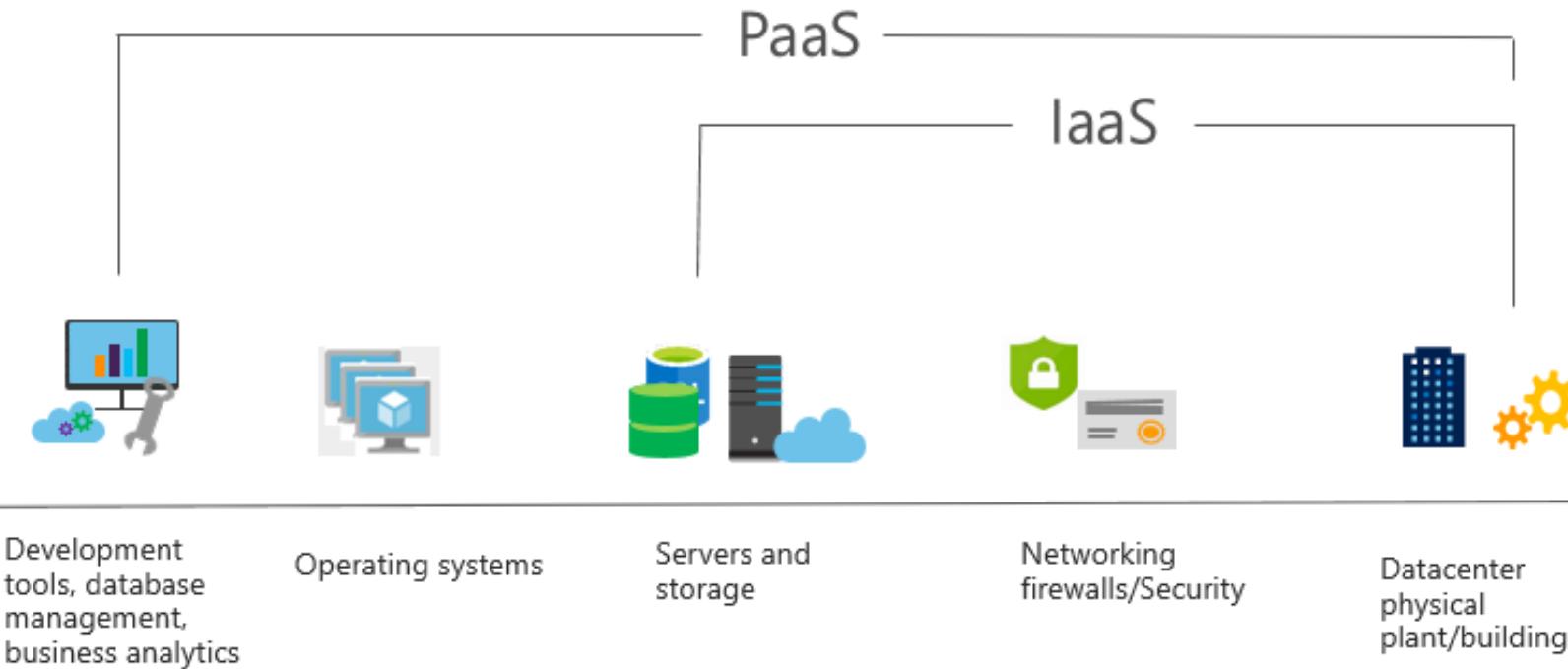


Infrastructure as a Service (IaaS)

- Most basic cloud computing services category.
- Build pay-as-you-go IT infrastructure by renting servers, virtual machines, storage, networks, and operating systems from a cloud provider.
- Instant computing infrastructure, provisioned and managed over the internet.

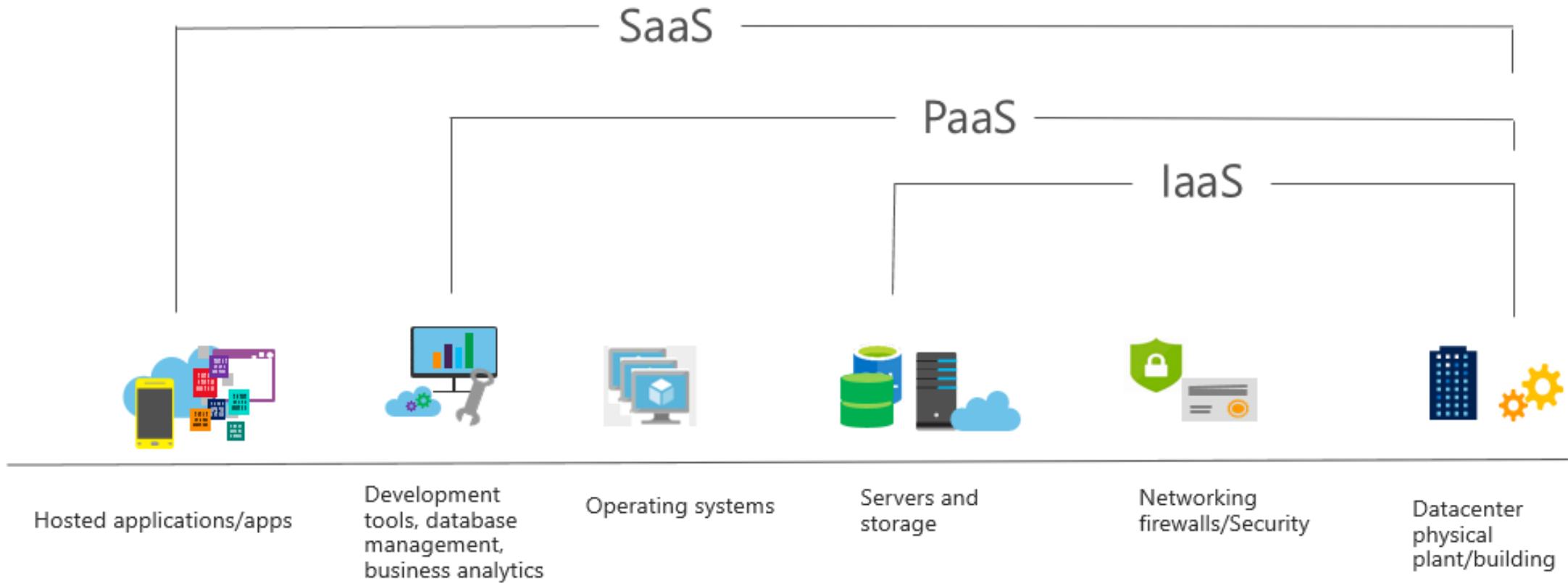


Platform as a Service (PaaS)



- Provides environment for building, testing, and deploying software applications.
- Helps create applications quickly, without focusing on managing underlying infrastructure.

Software as a Service (SaaS)



Centrally hosted and managed software for end users. 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.

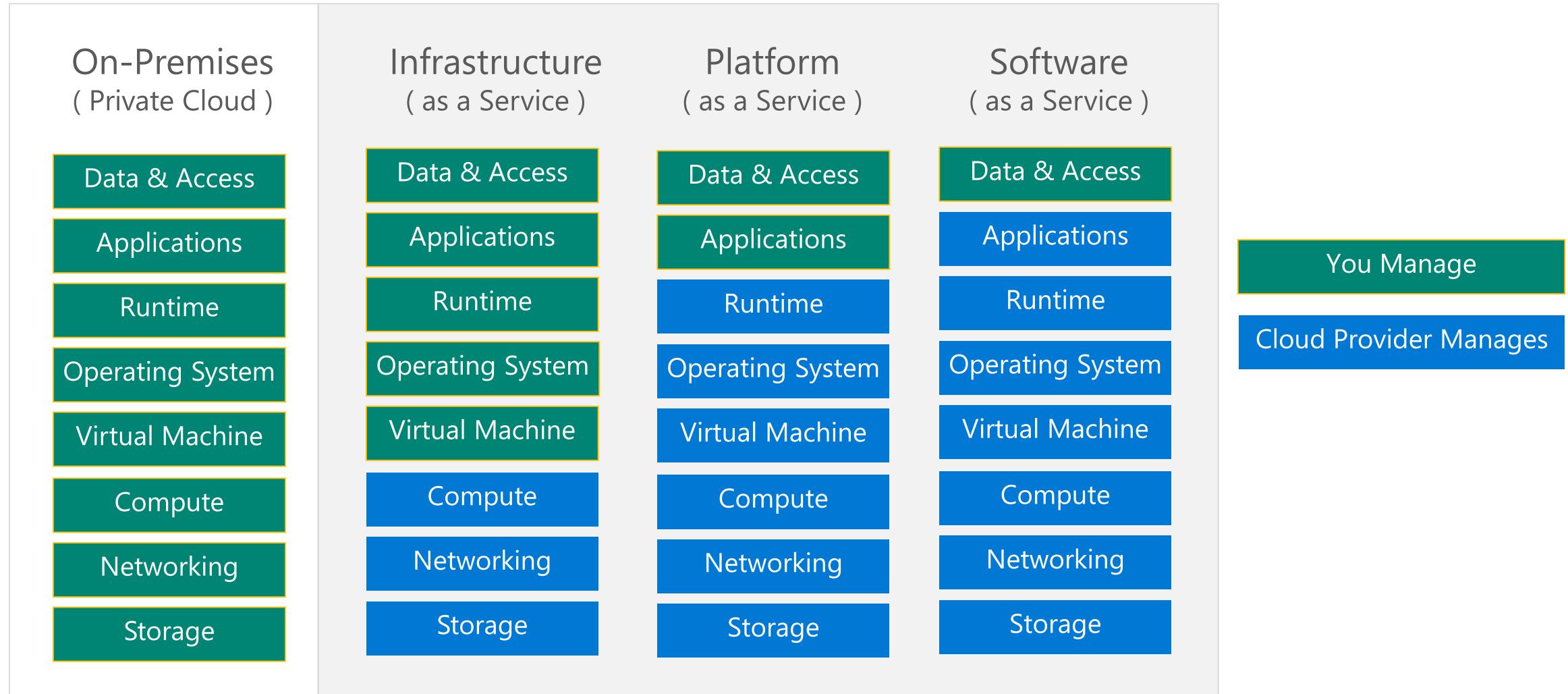
PaaS

- 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



Module 02: Core Azure services



Core Azure architectural components



Regions

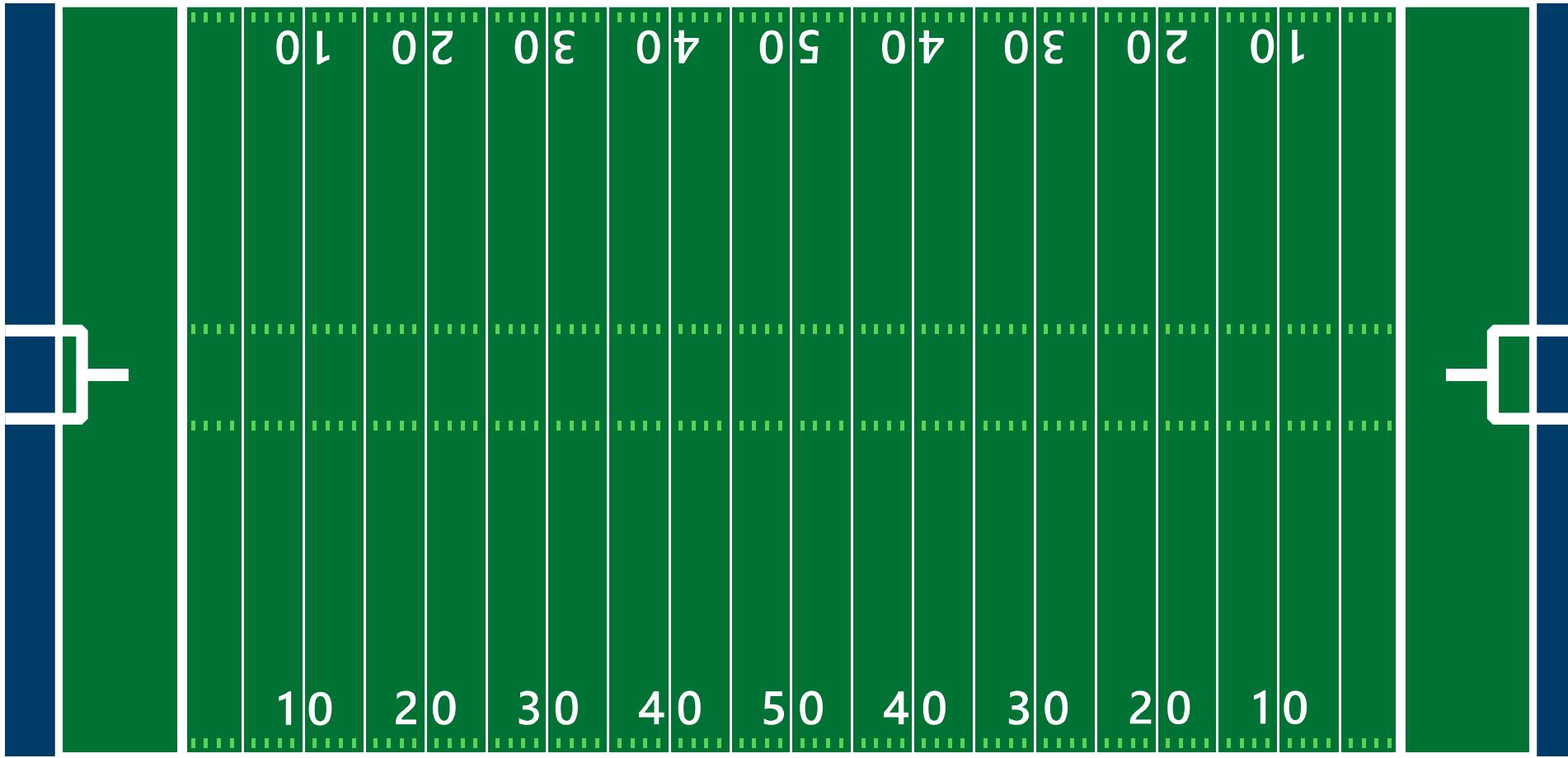
- A region represents a collection of datacenters.
- Provides flexibility and scale.
- Preserves data residency.
- Select regions close to your users.
- Be aware of region deployment availability.
- There are global services that are region independent.



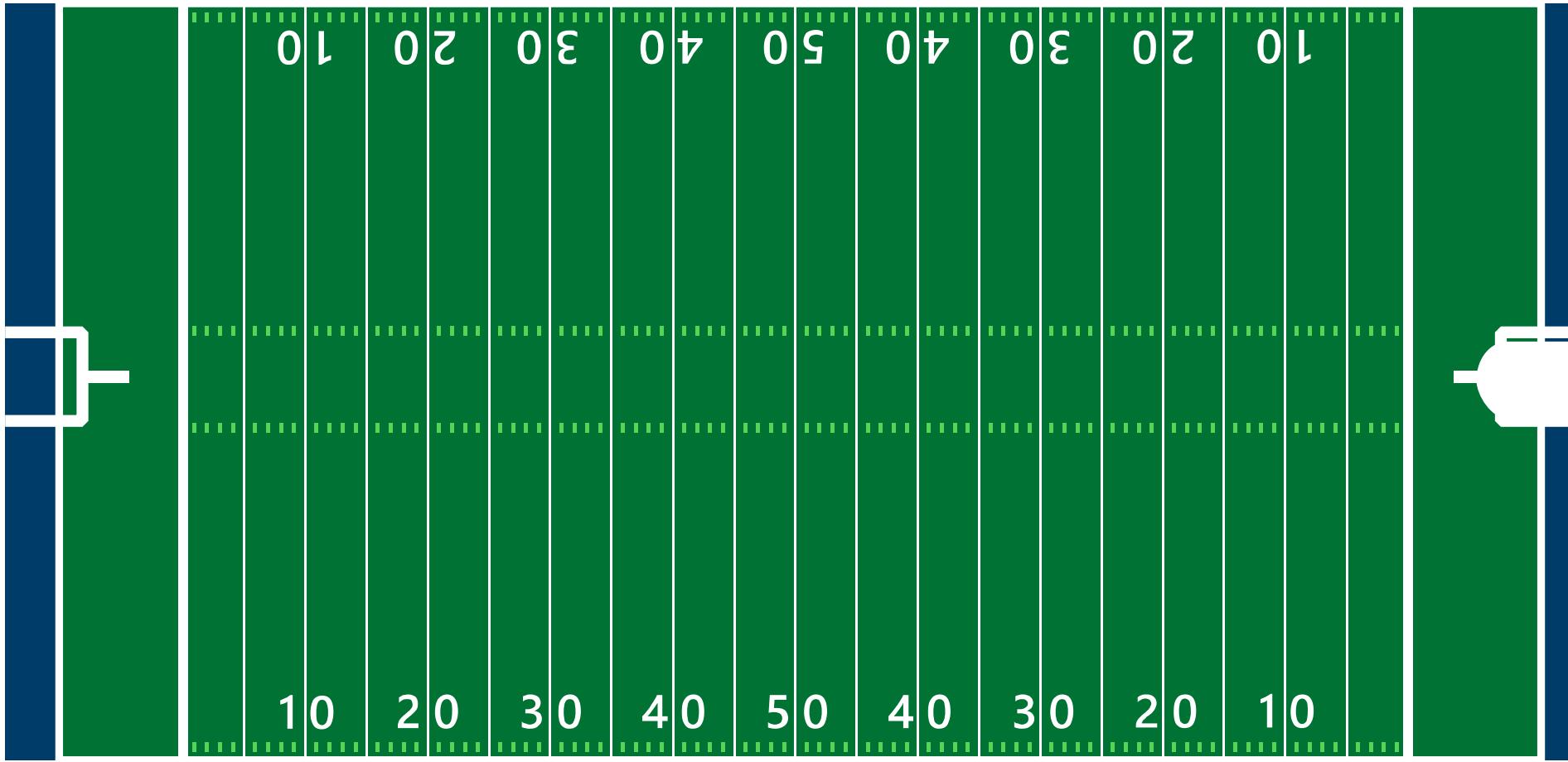
Worldwide there are 54 regions representing 140 countries

Dublin, Ireland

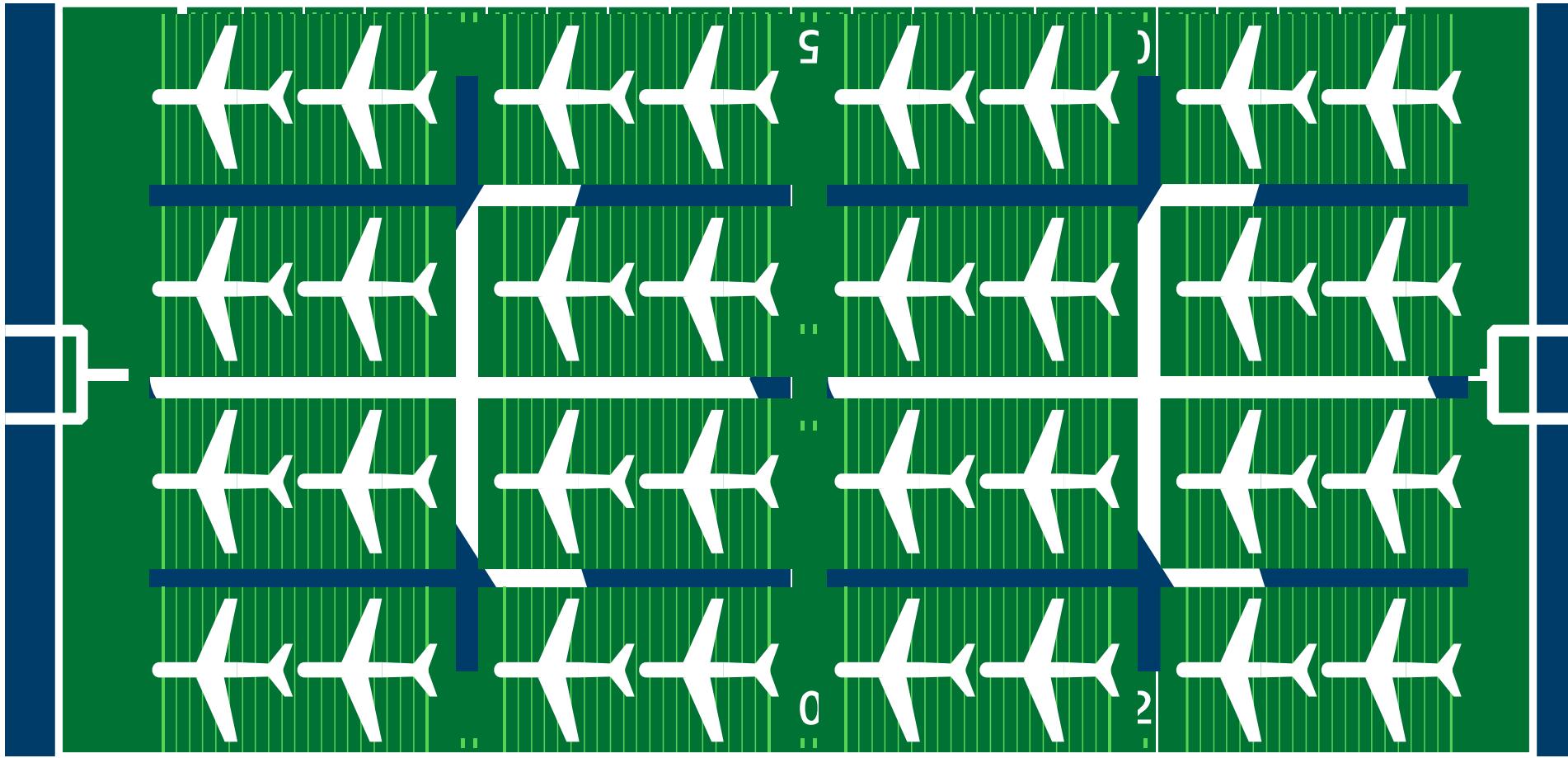




Datacenter buildings are about one football field in size



...large enough to hold
two jumbo jets



That's up to 600,000 servers in
each Azure region.

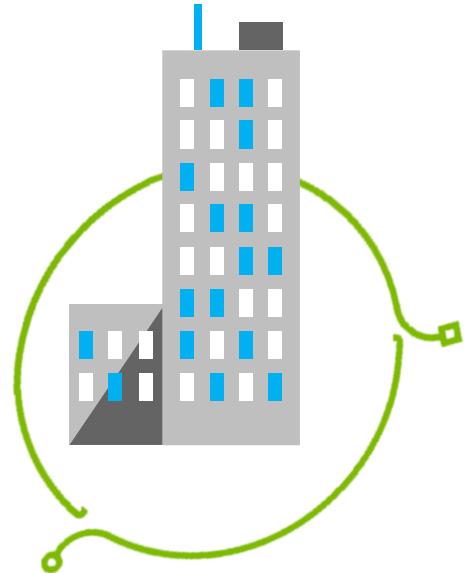
And there are 16 building per region...

Regions - *continued*

Azure special regions

For applications with specific compliance or legal requirements.

- Azure Government (North America)
[US DoD Central, US Gov Virginia, US Gov Iowa]
- Azure China 21Vianet
- Azure Germany



54 regions
worldwide

140 available in
140 countries



54

Azure regions



Region Pairs

- Each Azure region is paired with another region.
- Azure prefers at least 300 miles of separation between datacenters in a regional pair.
- **Some services provide automatic replication to the paired region.**
- In an outage, recovery of one region is prioritized out of every pair.
- Azure system updates are rolled out to paired regions sequentially (not at the same time).
- **Paired regions are members of the same geography – except Brazil.**

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

Geographies

- Discrete markets that preserve data residency and compliance boundaries.
- Typically contain two or more regions.
- Allow customers with specific data-residency and compliance needs to keep their data and applications in close proximity.
- Categorized as Americas, Europe, Asia Pacific, Middle East, and Africa.



Availability Set vs Availability Zone

A group with two or more virtual machines in the same Data Center is called Availability Set

This is the next level of Azure Virtual Machines high-availability, because Virtual Machines are in different physical locations within an Azure Region

At the table below we can see the two main differences between Availability Set, Zone

Availability Set	Availability Zone
Protect from Hardware failures within data centers	Protect from entire data center failure
SLA 99.95 %	SLA 99.99%

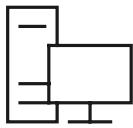
Below are the SLA's for the Azure Virtual Machines.

- 99.9%, Single VM
- 99.95%, 2 or more VMs in an Availability Set
- 99.99%, 2 or more VMs into Availability Zone

Availability Options

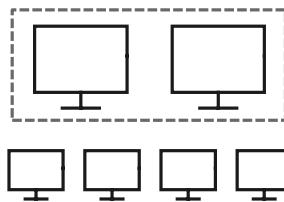
VM SLA

99.9% with Premium Storage



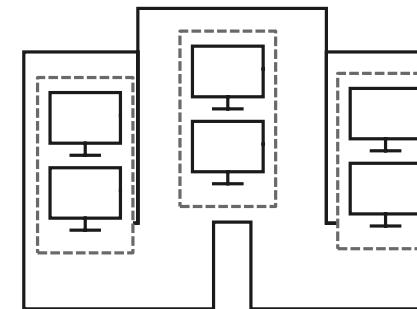
VM SLA

99.95%

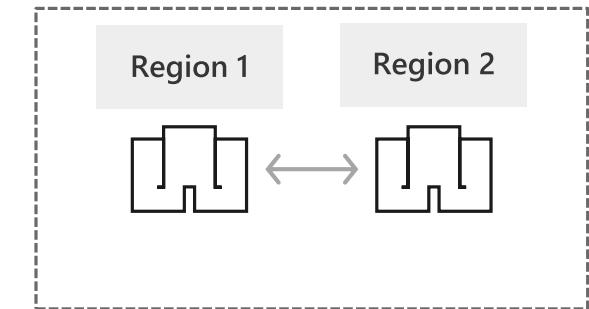


VM SLA

99.99%



MULTI-REGION DISASTER RECOVERY



SINGLE VM

Easier lift and shift

AVAILABILITY SETS

Protecting against failures within datacenters

AVAILABILITY ZONES

Protection from entire datacenter failures

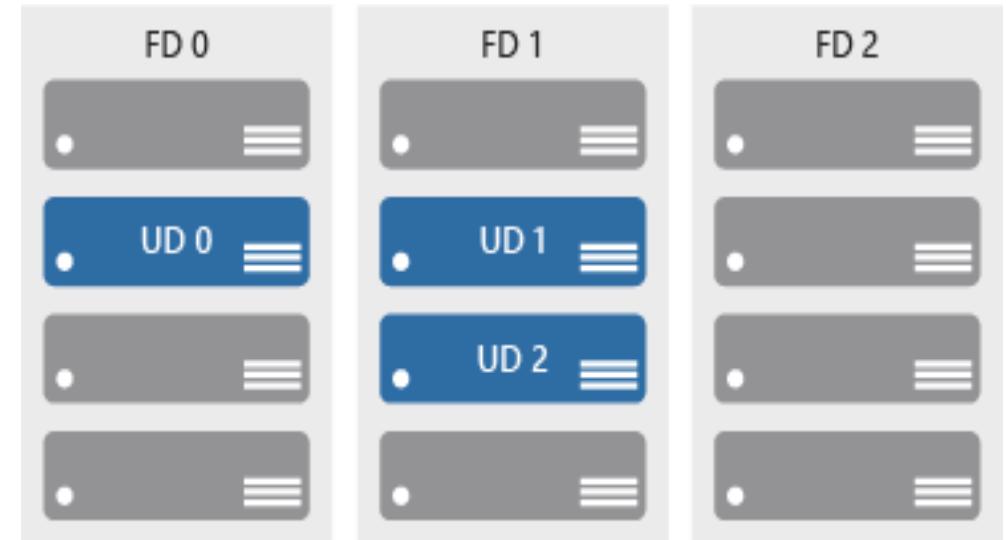
REGION PAIRS

Regional protection within Data Residency Boundaries

Availability sets

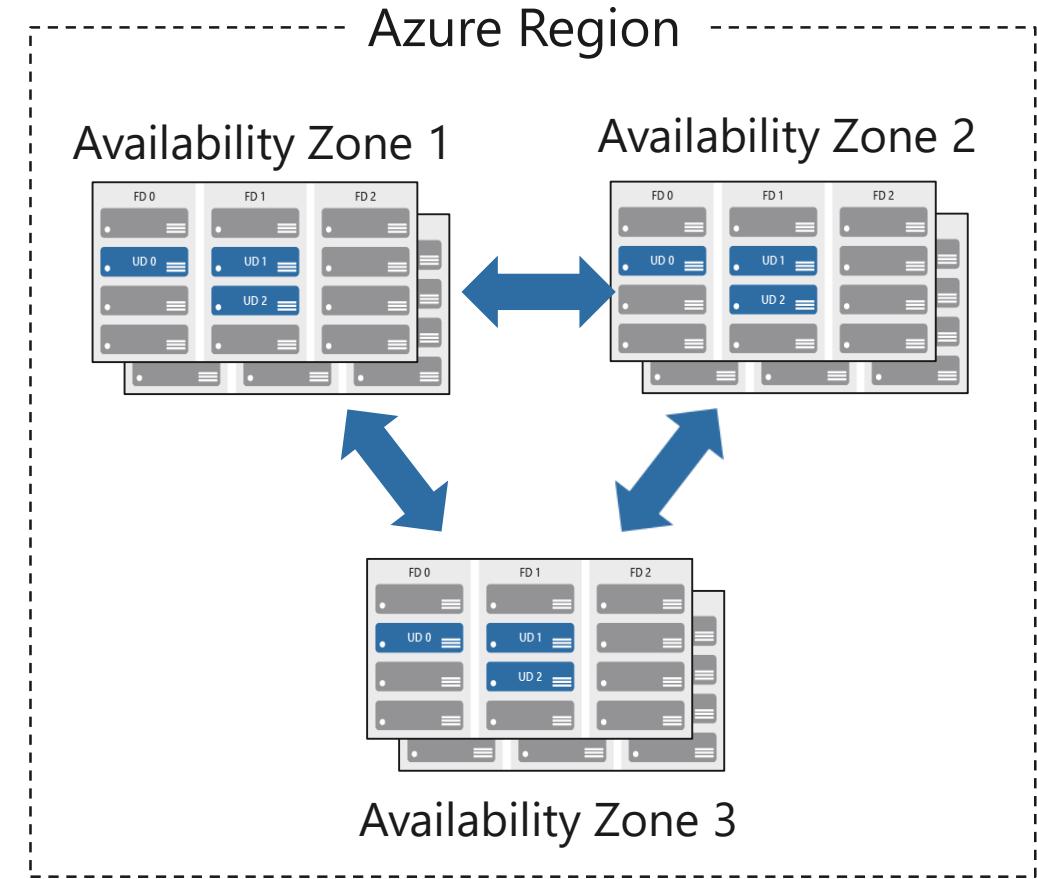
Keep applications online during maintenance or hardware failure.

- Update domains (UD): Scheduled maintenance, performance or security updates are sequenced through update domains.
- Fault domains (FD): Provide a physical separation of workloads across different hardware in a datacenter.



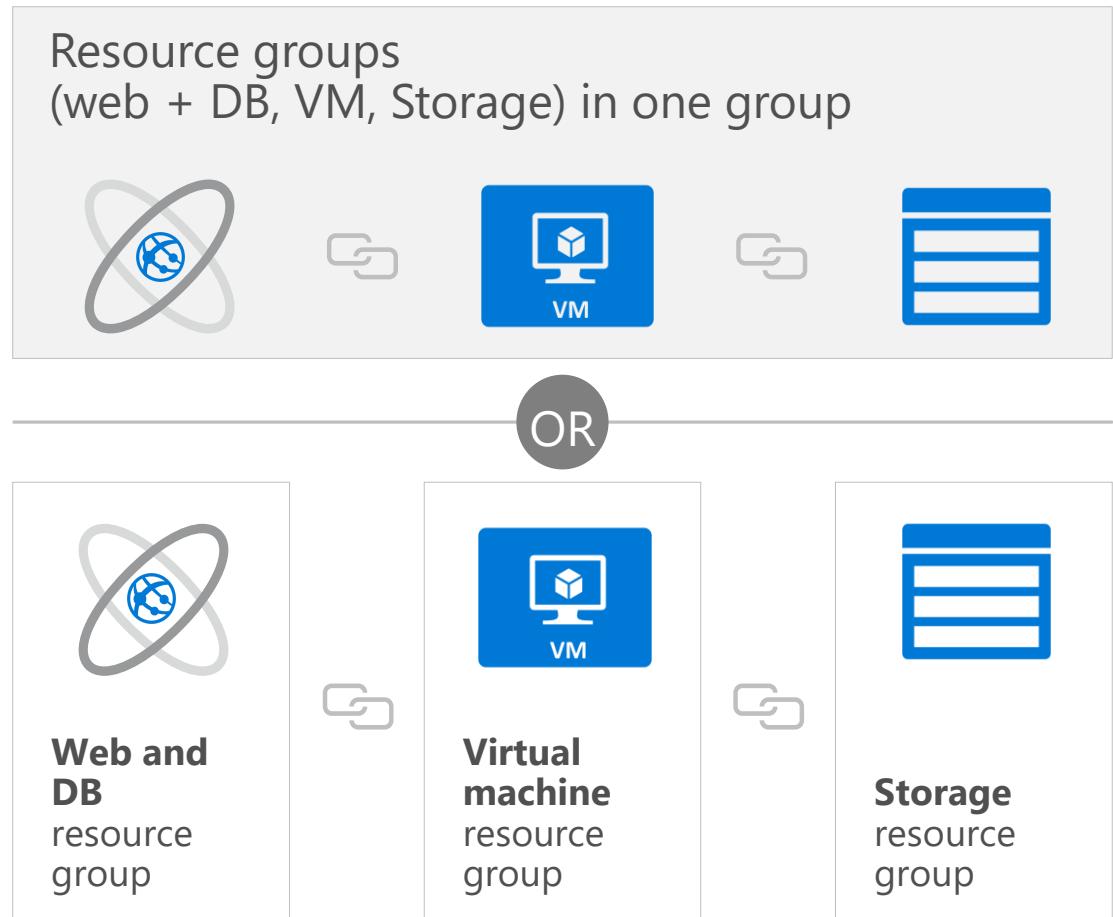
Availability zones

- Physically separate locations within an Azure region.
- Takes availability sets to the next level
- **Includes one or more datacenters, equipped with independent power, cooling, and networking.**
- Acts as an isolation boundary.
- If one availability zone goes down, the other continues working.



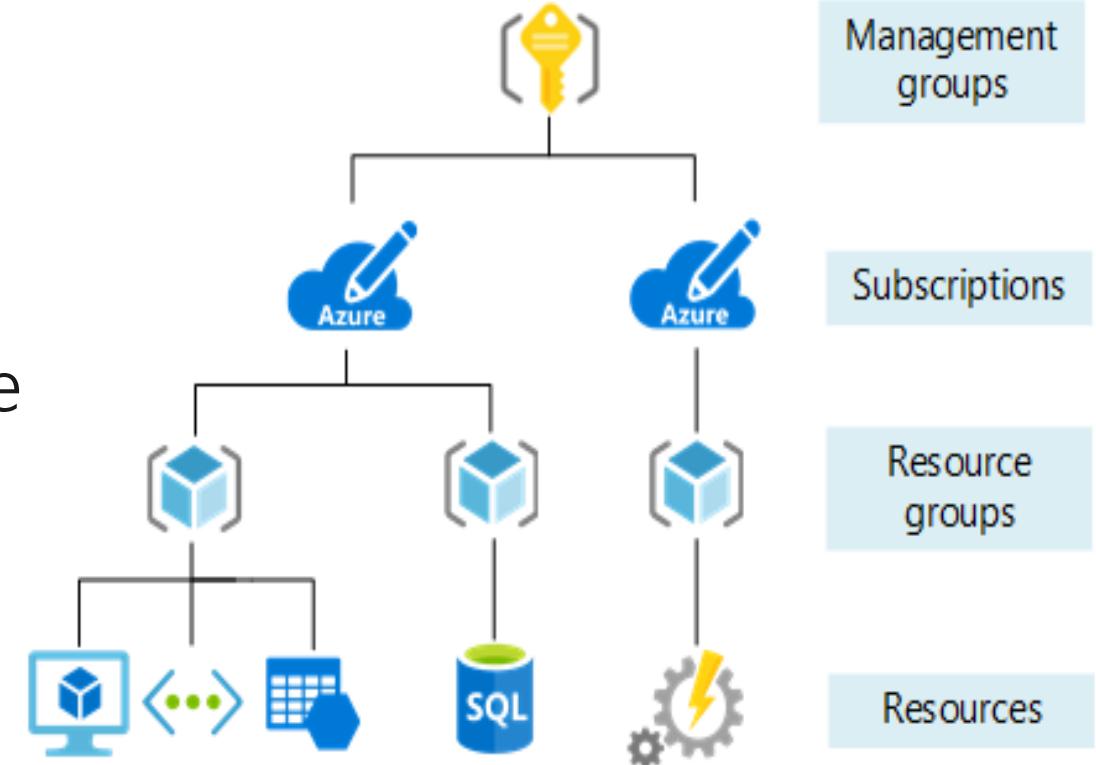
Resource groups

- Containers for multiple resources that share the same life cycle.
- Aggregates resources into a single manageable unit.
- Every Azure resource must exist in one (and only one) resource group.
- Secure at the resource group (or resource) level - using role-based access control (RBAC).



Azure Resource Manager

- Provide a management layer that enables you to create, update, and delete resources in your Azure subscription.
- Create, configure, manage and delete resources and resource groups.
- Organize resources.
- Control access and resources.
- Automate using different tools and SDKs.

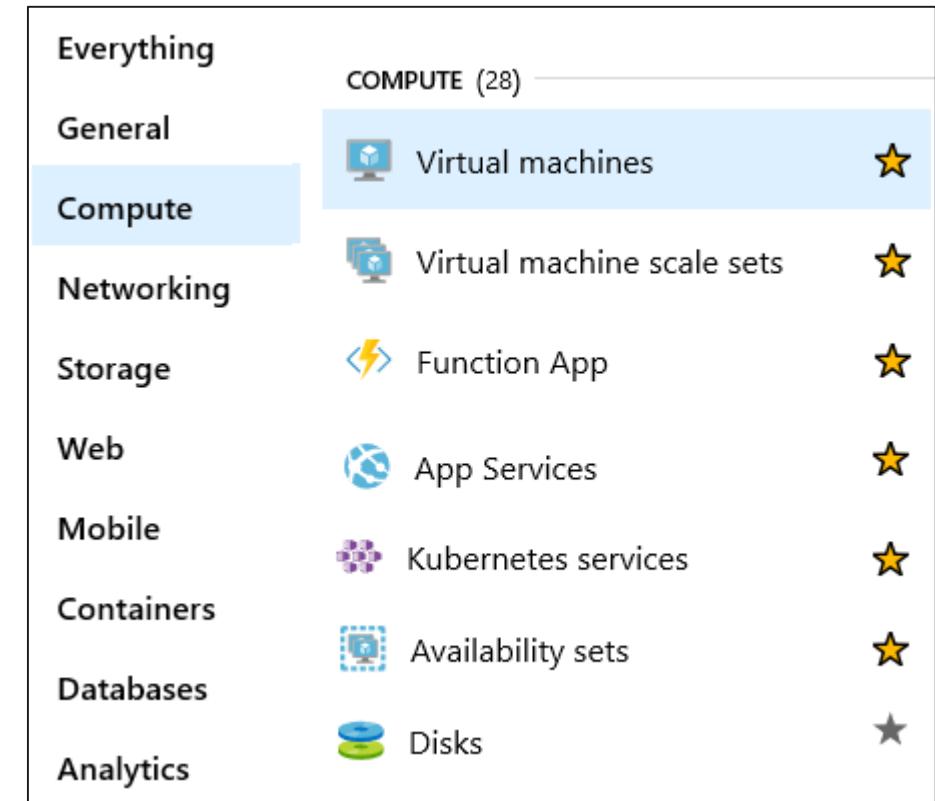


Core Azure services and products

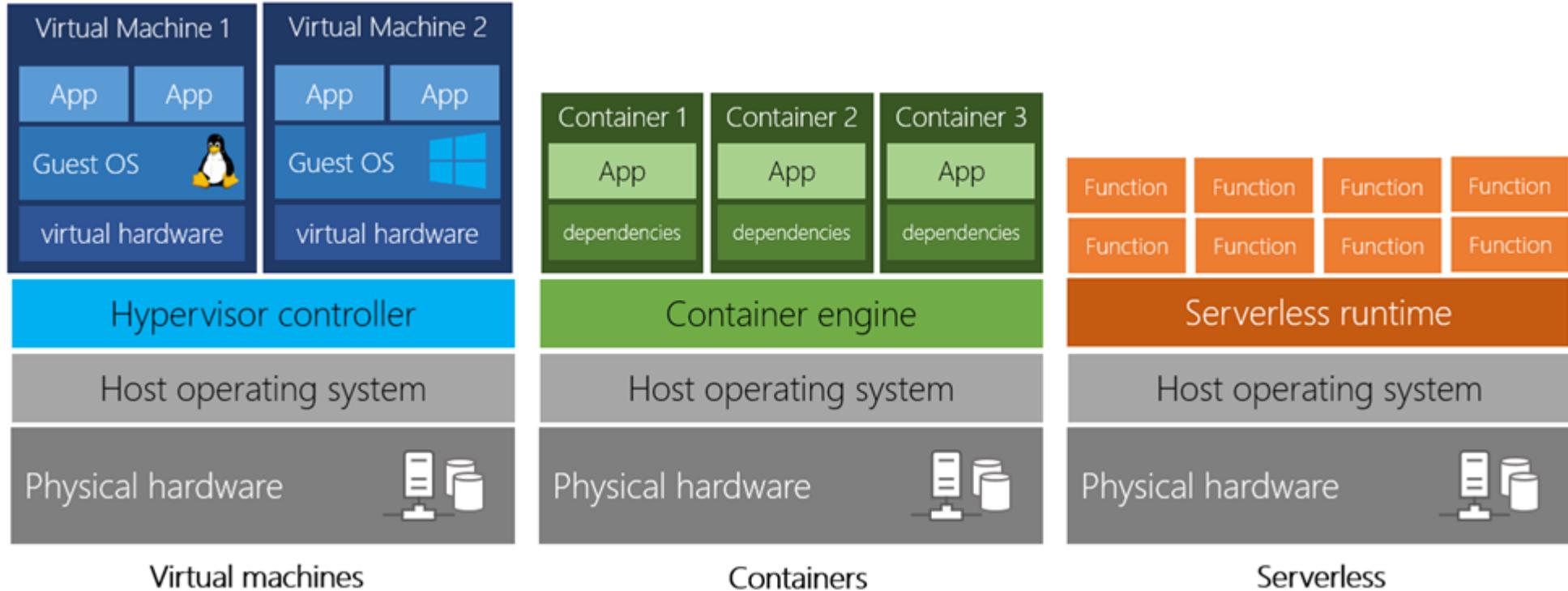


Azure compute

- On-demand computing service for running cloud-based applications.
- Provides computing resources such as disks, processors, memory, networking, and operating systems.
- Makes resources available in minutes or seconds.
- Lots of on-demand services.
- Pay-per-use.



Virtual machines, Container and Serverless



Azure compute services



- Azure VMs use Infrastructure as a Service (IaaS) to provide computing power in the cloud.
- VM scale sets are designed for automatic scaling of identical VMs.
- App services is a Platform as a Service (PaaS) offering to build, deploy, and scale enterprise-grade web, mobile, and API apps.
- Functions perform compute actions based on an event.



Container services

Containers are a virtualization environment. However, unlike virtual machines, you do not manage an operating system. Containers are meant to be lightweight, and are designed to be created, scaled out, and stopped dynamically.



- Azure Container Instances: A PaaS offering that allows you to upload your containers, which it then will run for you.
- Azure Kubernetes Service: A container orchestrator service for managing large numbers of containers.



Azure network services

-  • Azure Virtual Network provides secure communication between Azure resources.
-  • Azure Load Balancer automatically scales to create highly-available access to applications or resources.
-  • VPN Gateway is a platform managed scalable and highly available application delivery controller.
-  • Azure Application Gateway provides for the management of traffic to web applications.

Azure data categories

	Schema	Data relationships	Examples
Structured data	Adheres to a schema, with the same data fields or properties.	Storable in relational database tables, with rows and columns.	Sensor data and financial data.
Semi-structured data	Has an ad hoc schema with less organized fields and properties.	Non-relational or NoSQL data, not storable in tables, rows and column.	Books, blogs, JSON, HTML documents.
Unstructured data	Has no designated schema or data structure.	Non-relational or blob data, with no restrictions on the kinds of data blobs contain.	PDFs, JPGs, videos.

Azure storage services – Azure services

Azure Storage is a service that you can use to store files, messages, tables, and other types of information.



- **Blob storage:** No restrictions on the kinds of data it can hold. Blobs are highly scalable



- **Disk storage:** Provides disks for virtual machines, applications, and other services



- **File storage:** Azure Files offers fully-managed file shares in the cloud

Azure database services



- Azure Cosmos DB is a globally-distributed database service that enables you to elastically and independently scale 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 Migration is a fully-managed service designed to enable seamless migrations from multiple database sources to Azure data platforms with minimal downtime.



Azure Marketplace

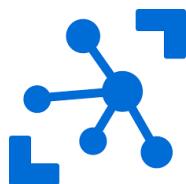
- Connects end users with Microsoft partners, Independent Software Vendors (ISVs), and start-ups that offer solutions and services for Azure.
- Azure customers, IT professionals and cloud developers can find, try, purchase, and provision Azure applications and services from certified service providers.
- Includes close to 10,000 product listings.



Internet of Things



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

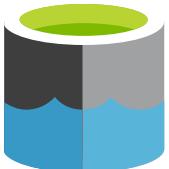
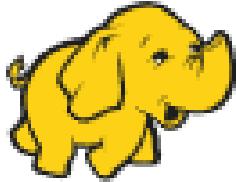


- Azure IoT Hub is a managed service hosted in the cloud that acts as a central message hub for bidirectional communication between your IoT application and the devices it manages.

Big data and analytics



- Azure SQL Data Warehouse is a cloud-based Enterprise Data Warehouse that leverages massively parallel processing to run complex queries quickly across petabytes of data.
- Azure HDInsight is a fully-managed, open-source analytics service for enterprises. It is a cloud service that makes it easier, faster, and more cost-effective to process massive amounts of data.
- Azure Data Lake Analytics is an on-demand analytics job service that simplifies big data. Instead of deploying and tuning hardware, you write queries to transform your data and extract valuable insights.



Artificial Intelligence



- Azure Machine Learning service provides a cloud-based environment used to develop, train, test, deploy, manage, and track machine learning models.
- Azure Machine Learning Studio is a collaborative, drag-and-drop visual workspace where you can build, test, and deploy machine learning solutions without needing to write code.



DevOps



- Azure DevOps services provides development collaboration tools including pipelines, Git repositories, Kanban boards, and extensive automated and cloud-based load testing.

**** formerly known as *Visual Studio Team Services (VSTS)* ****



- Azure DevTest Labs allows you to quickly create environments in Azure while minimizing waste and controlling cost.

Azure management solutions



Azure management tools

Configure and manage Azure using a broad range of tools and platforms.

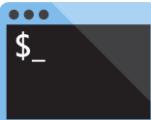
Azure management tools include:



- Azure Portal : Management website accessed via a web browser.



- Azure PowerShell : Command shell scripting language.



- Azure Command-Line Interface (CLI) : Cross-platform, command-line scripting program for Windows, Linux, or MacOS.



- Azure Cloud Shell : Browser-based scripting environment.

Azure Advisor

High Availability	Security	Performance	Cost	2,876 USD savings/mo *
8 Recommendations	21 Recommendations	1 Recommendation	2 Recommendations	



- Free Service and Get best practices recommendations
- Analyzes your deployed Azure resources and recommends ways to improve availability, security, performance, and costs.
- Get proactive, actionable, and personalized best practice recommendations.
- Improve the performance, security, and availability of your resources.
- Identify opportunities to reduce your Azure costs.

Advisor recommendations

Download as CSV Download as PDF Configure

Subscriptions: 2 of 24 selected – Don't see a subscription? Switch directories

2 subscriptions

All types

Active

No grouping

Overview

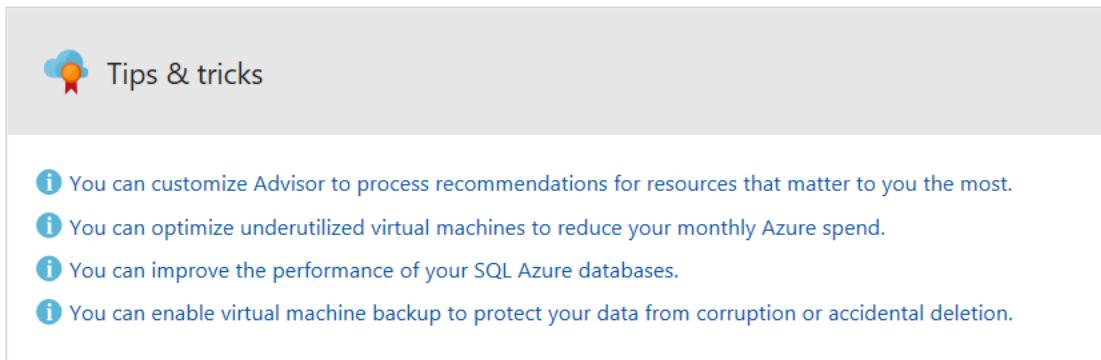
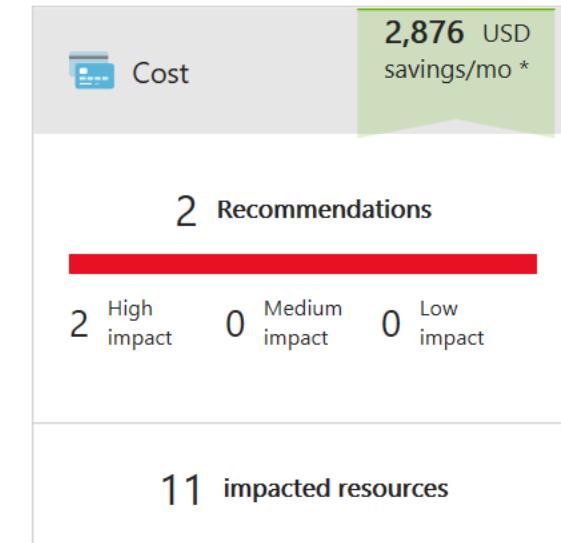
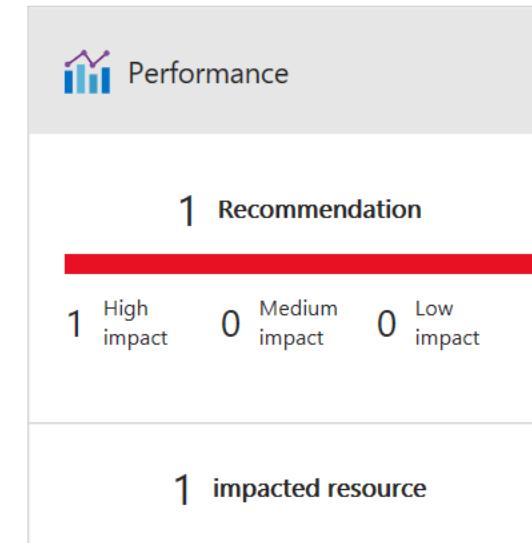
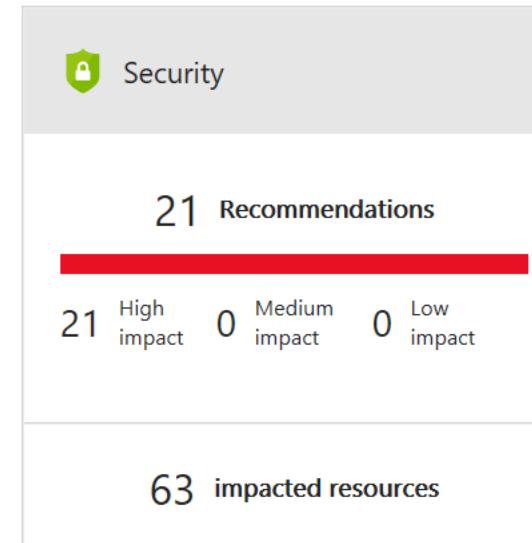
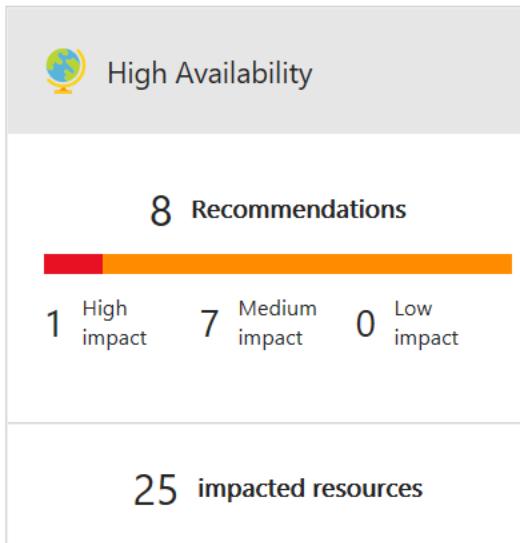
High Availability (8)

Security (21)

Performance (1)

Cost (2)

All (32)



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- Download recommendations as PDF
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- Download recommendations as CSV

Module 03:

Security, privacy, compliance, and trust

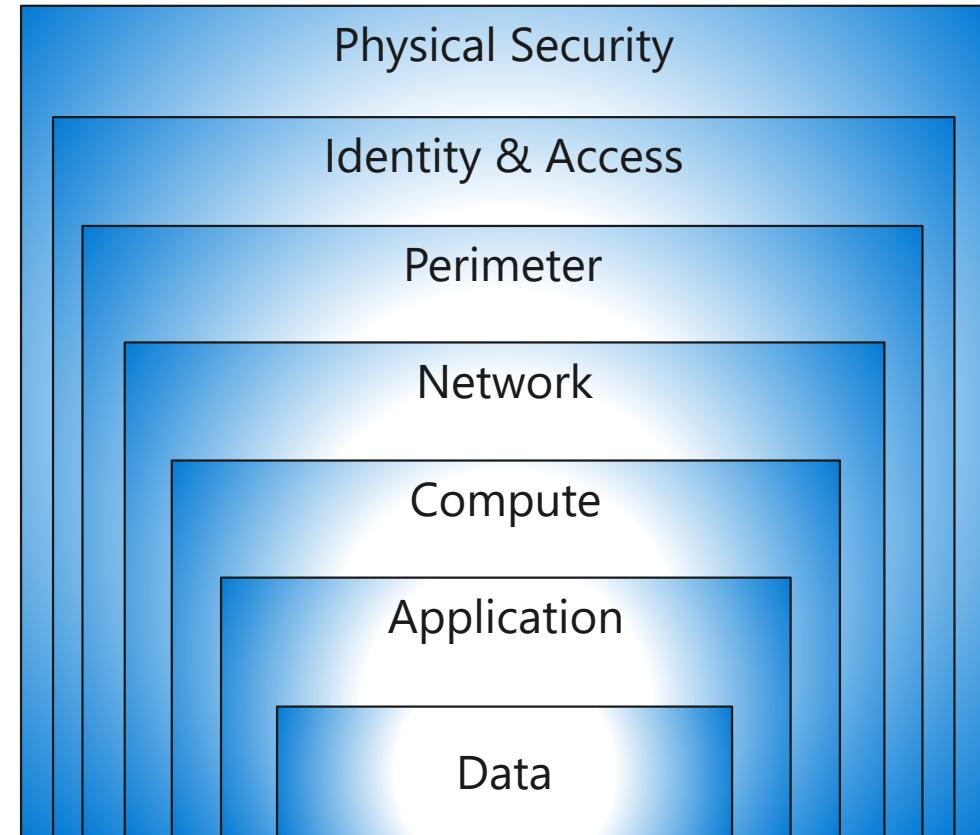


Securing network connectivity



Defense in depth

- A layered approach to securing computer systems.
- Provides multiple levels of protection.
- Attacks against one layer are isolated from subsequent layers.



Shared security

- Migrating from customer-controlled to cloud-based datacenters shifts the responsibility for security.
- Security becomes a shared concern between cloud providers and customers.

Responsibility	On-Premises	IaaS	PaaS	SaaS
Data governance and Rights Management	Customer	Customer	Customer	Customer
Client endpoints	Customer	Customer	Customer	Customer
Account and access management	Customer	Customer	Customer	Customer
Identity and directory infrastructure	Customer	Customer	Microsoft/ Customer	Microsoft/ Customer
Application	Customer	Customer	Microsoft/ Customer	Microsoft
Network controls	Customer	Customer	Microsoft/ Customer	Microsoft
Operating system	Customer	Customer	Microsoft	Microsoft
Physical hosts	Customer	Microsoft	Microsoft	Microsoft
Physical network	Customer	Microsoft	Microsoft	Microsoft
Physical datacenter	Customer	Microsoft	Microsoft	Microsoft

Azure Security Services

Azure Firewall

- Managed cloud service
- Grants or denies access to network resources
- Built-in high availability, scalability, filtering rules, and Azure Monitor logging

Azure DDoS Protection

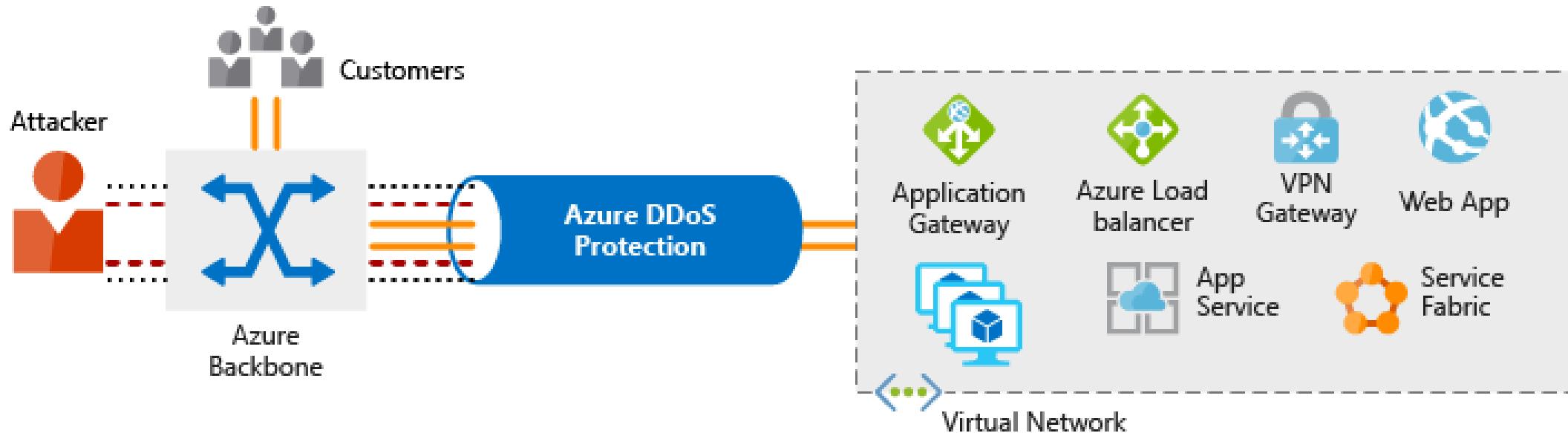
- Protects against DDoS attacks
- Monitors network traffic at Azure edge, protecting services

Network Security Groups

- Fine-grained network traffic filtering
- Packet filter



Azure DDoS Protection



<https://course.digitalskill.org>

Application Security Groups (ASGs)

Provides for the grouping of servers with similar port filtering requirements, and group together servers with similar functions, such as web servers.

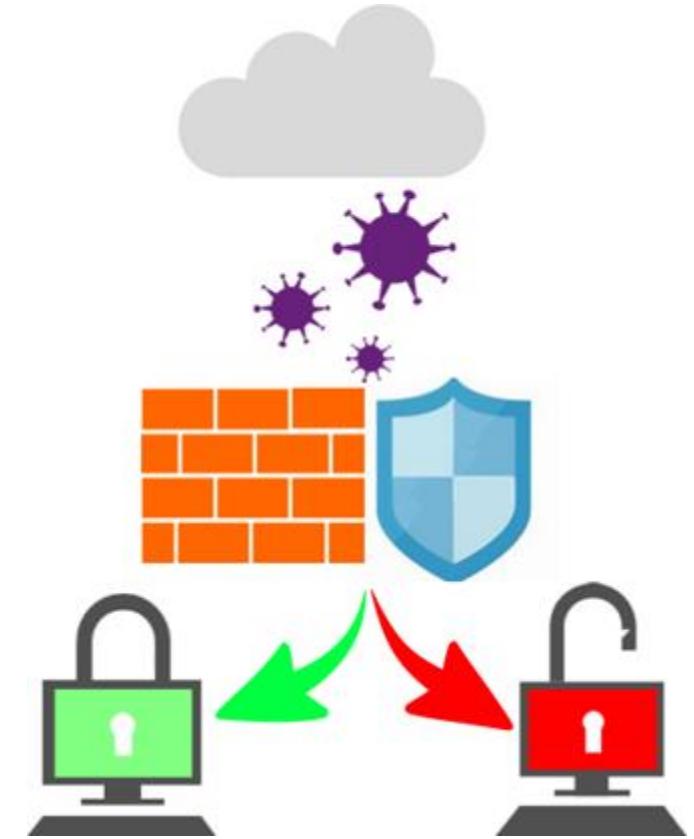
- Allows you to reuse your security policy at scale without manual maintenance of explicit IP addresses.
- Handles the complexity of explicit IP addresses and multiple rule sets, allowing you to focus on your business logic.



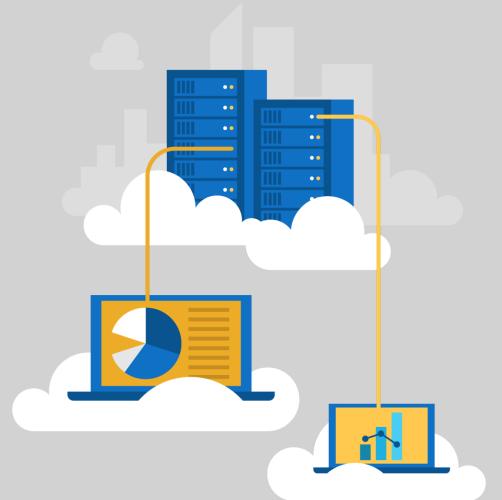
Choosing Azure network security solutions

Azure supports combined network security solutions.

- Perimeter layer protects your networks' boundaries with Azure DDoS Protection and Azure Firewall.
- Networking layer only permits traffic to pass between networked resources with Network Security Group (NSG) inbound and outbound rules.



Core Azure identity services



Authentication and authorization

Two concepts are fundamental to understanding identity and access.

Authentication

- Identifies the person or service seeking access to a resource.
- Requests legitimate access credentials.
- Basis for creating secure identity and access control principles.

Authorization

- Determines an authenticated person's or service's level of access.
- Defines which data they can access, and what they can do with it.

Azure Active Directory (AD)

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

- Authentication (employees sign-in to access resources).
- Single sign-on (SSO).
- Application management.
- Business to Business (B2B).
- Business to Customer (B2C) identity services.
- Device management.



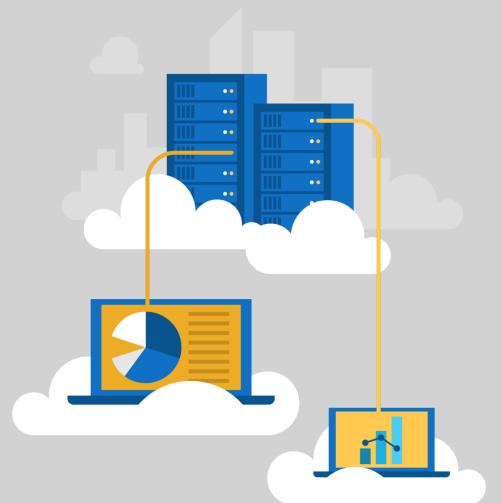
Azure Multi-Factor Authentication

Provides additional security for your identities by requiring two or more elements for full authentication.

- Something you know.
- Something you possess.
- Something you are.



Security tools and features



Azure Security Center

A monitoring service that provides threat protection across all your Azure, and on-premises, services.

- Provides security recommendations based on your configurations, resources, and networks.
- Monitors security settings across your on-premises and cloud workloads.
- Automatically applies your security policies to any new services you provision.



Azure Security Center

techgenix.com

Security Center - Overview

Showing 2 subscriptions

Search (Ctrl+)

GENERAL

- Overview
- Getting started
- Events
- Search

POLICY & COMPLIANCE

- Coverage
- Secure score
- Security policy
- Regulatory Compliance (Prev...)

RESOURCE SECURITY HYGIENE

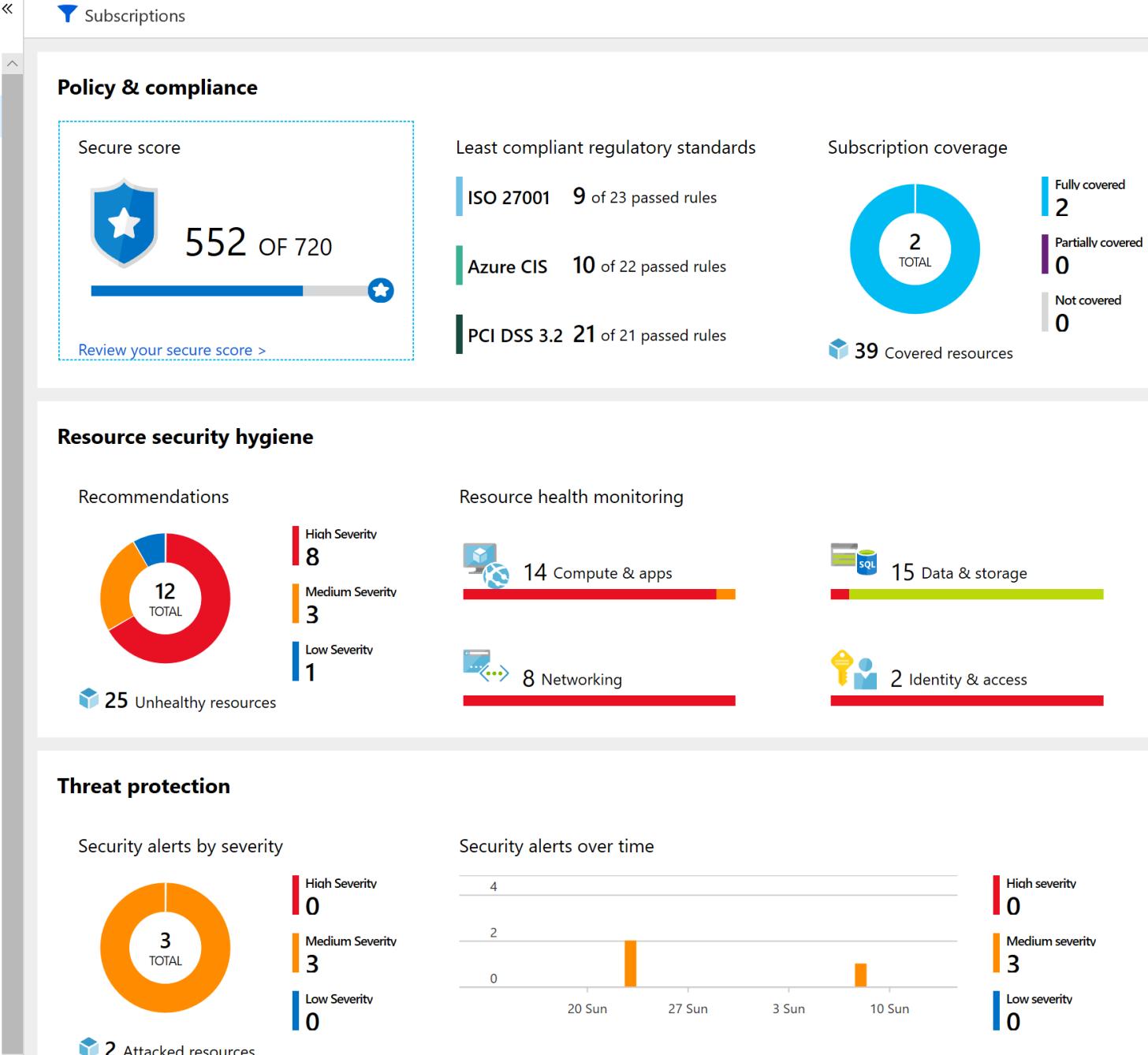
- Recommendations
- Compute & apps
- Networking
- Data & storage
- Identity & access (Preview)
- Security solutions

ADVANCED CLOUD DEFENSE

- Adaptive application controls
- Just in time VM access
- File Integrity Monitoring

THREAT PROTECTION

- Security alerts



Azure Security Center usage scenarios

- You can use Security Center in the *Detect, Assess, and Diagnose* stages of an incident response.



- Use Security Center recommendations to enhance security.

Azure Key Vault

- Stores application secrets in a centralized cloud location, to securely control access permissions, and access logging.
 - Secrets management.
 - Key management.
 - Certificate management.
 - Storing secrets backed by hardware security modules (HSMs).



Azure Information Protection (AIP)

Classifies and protects documents, and emails, by applying labels.

- Automatically using rules and conditions defined by administrators.
- Manually, by users.
- By combining automatic and manual methods, guided by recommendations.



Azure Advanced Threat Protection (Azure ATP)

Cloud-based security solution for identifying, detecting, and investigating advanced threats, compromised identities, and malicious insider actions.

- Dedicated portal for monitoring and responding to suspicious activity.
- Sensors installed directly onto your domain controllers.
- Cloud service runs on Azure infrastructure.





mydemoserver - Advanced Threat Protection (Preview)

Azure Database for MySQL server

 Search (Ctrl+ /)

Overview

Activity log

Tags

Settings

Connection security

Connection strings

Server parameters

Pricing tier

Properties

Locks

Automation script

Security

Advanced Threat Protection (Pr...)

Monitoring

Alerts

Metrics

Server logs

Save

Feedback



Advanced Threat Protection costs 15 USD/Server/month with 50% discount during preview. It will be free for the first 60 days.

Advanced Threat Protection

ON

OFF

Send alerts to

 Email addresses Email service and co-administrators

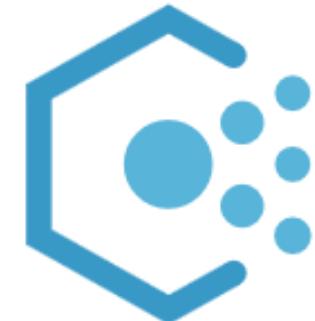
Azure Governance methodologies



Azure Policy

Stay compliant with your corporate standards and service level agreements (SLAs) by using policy definitions to enforce rules and effects for your Azure resources.

- Evaluates and identifies Azure resources that do not comply with your policies.
- Provides built-in policy and initiative definitions, under categories such as Storage, Networking, Compute, Security Center, and Monitoring.



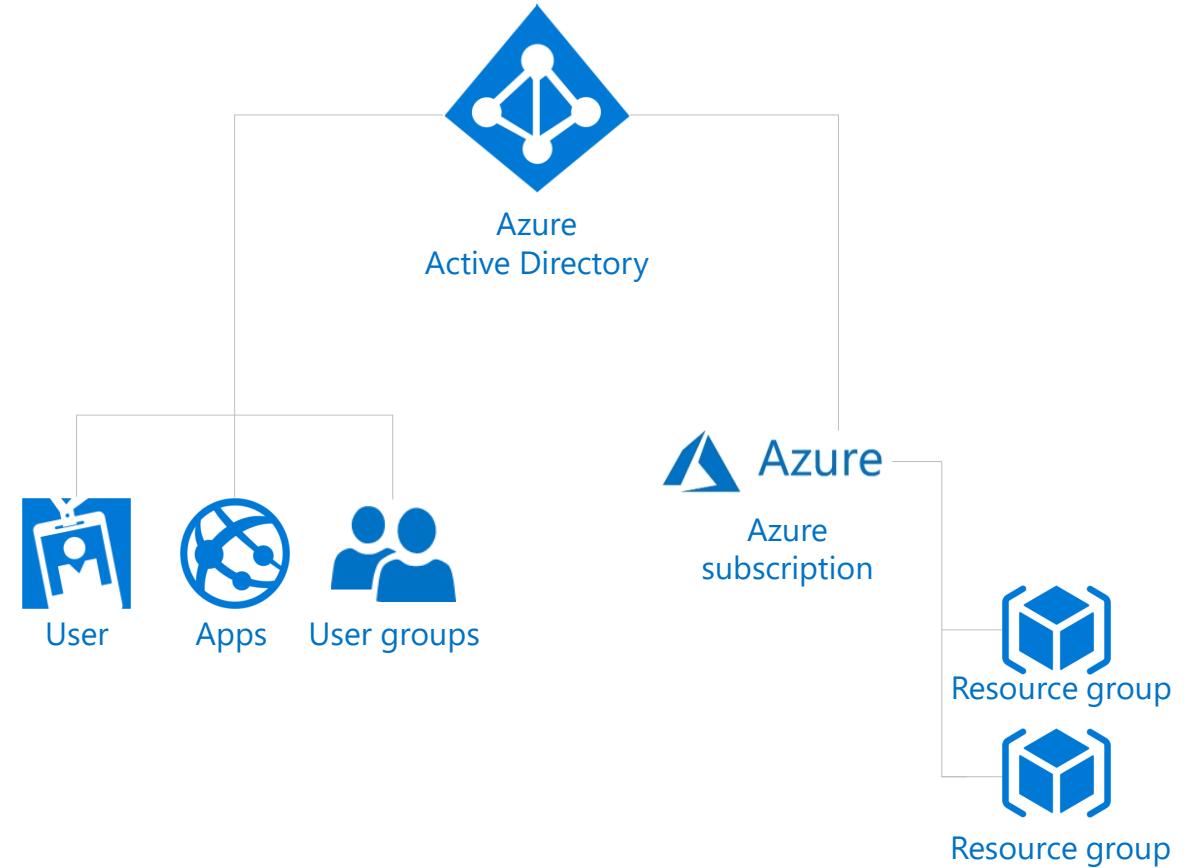
Implementing Azure Policy

Create a policy definition → Assign the definition to resources → Review the evaluation results

- A policy definition expresses what to evaluate and what action to take.
- Implement your policy definition by assigning it to a group of resources.
- Review the results. Results are either compliant or non-compliant.

Role-based access control (RBAC)

- Fine-grained access management
- Segregate duties within your team and grant only the amount of access to users that they need to perform their jobs.
- Enables allowing or disallowing access to the Azure portal, and controlling access to resources.



Role-based access control (RBAC)

Home > Resource groups > vnet-rg1 | Access control (IAM)

Resource groups iverson

+ Add Manage view ...

Filter by name...

Name ↑

vnet-rg1 ...

Access control (IAM)

Tags

Events

Settings

Quickstart

Deployments

Policies

Properties

Locks

Export template

Cost Management

... Cost analysis

vnet-rg1 | Access control (IAM)

Resource group

Search (Ctrl+ /)

+ Add Edit columns Refresh Remove Got feedback?

Check access Role assignments Deny assignments Classic administrators Roles

Check access
Review the level of access a user, group, service principal, or managed identity has to this resource. [Learn more](#)

Find ⓘ

Azure AD user, group, or service principal

Search by name or email address

Add a role assignment
Grant access to resources at this scope by assigning a role to a user, group, service principal, or managed identity.

Add Learn more

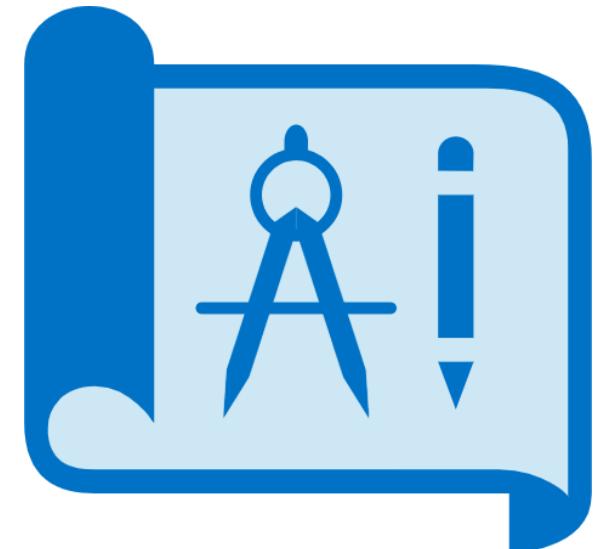
View role assignments
View the users, groups, service principals and managed identities that have role assignments granting them access at this scope.

View Learn more

Azure Blueprints

Create reusable environment definitions that can recreate your Azure resources and apply your policies instantly.

- Help audit and trace your deployments, and maintain compliance using built-in tools and artifacts.
- Associate blueprints with specific Azure DevOps build artifacts, and release pipelines, for rigorous tracking.



Subscription Governance

There are mainly three aspects to consider in relation to creating and managing subscriptions.

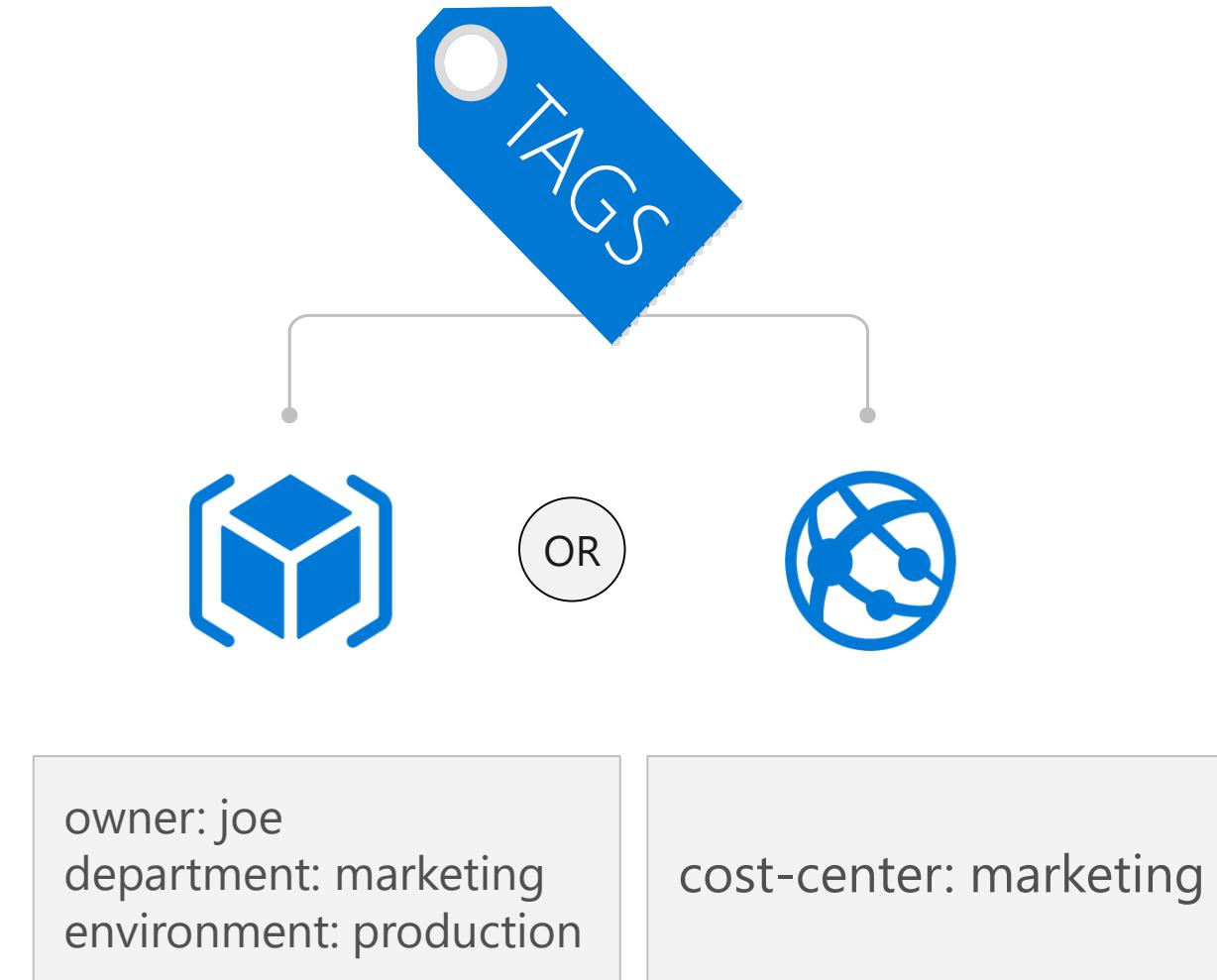
- **Billing.** Reports and chargeback can be generated per subscriptions
- **Access Control.** A subscription is a deployment boundary for Azure resources and can set up role-based access control.
- **Subscription Limits.** Subscriptions are also bound to some hard limitations. If there is a need to go over those limits, then additional subscriptions may be needed. If you hit a hard limit, there is no flexibility.

Monitoring and reporting in Azure



Tags

- Provides metadata for your Azure resources.
- Logically organizes resources into a taxonomy.
- Consists of a name-value pair.
- Very useful for rolling up billing information.



Tags

Tags
Tags for msftlearn-vnet1

Save Delete all Revert changes

Tags are name/value pairs that enable you to categorize resources and view consolidated billing by applying the same tag to multiple resources and resource groups. [Learn more](#)

NAME	VALUE
Department	Finance

msftlearn-vnet1 (Virtual network)
1 to be added

Close

Tags

<input type="text"/> Filter by name...	<input type="button"/> All types	<input type="button"/> All locations	<input type="button"/> No grouping
2 items <input type="checkbox"/> Show hidden types <small>ⓘ</small>			
<input type="checkbox"/> NAME ↑↓	<input type="checkbox"/> TYPE ↑↓	<input type="checkbox"/> LOCATION ↑↓	<input type="checkbox"/> TAGS ↑↓
<input type="checkbox"/>  msftlearn-vnet1	Virtual network	East US	<input type="button"/> Department : Finance  
<input type="checkbox"/>  msftlearn-vnet2	Virtual network	East US	<input type="button"/> Department : Marketing  

<https://course.digitalskill.org>

Azure Monitor

Collect, analyze, and act on telemetry from cloud and on-premises environments, to maximize your applications' availability and performance.

- Starts collecting data as soon as you create an Azure subscription and add resources.
- **Activity Logs** record all resource creation and modification events.
- **Metrics** measure resource performance and consumption.
- Add an Azure monitor agent to collect operational data for a resource.



Azure Service Health

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

Components of Azure service health :

- Azure Status provides a global overview Azure services' state of health.
- Service Health has a customizable dashboard for tracking the state of services in the regions you use.
- Azure Resource Health can diagnose and obtain support for Azure service issues affecting your resources.



Privacy, compliance, and data protection standards



Compliance Terms and Requirements

Microsoft provides the most comprehensive set of compliance offerings (including certifications and attestations) of any cloud service provider. Some compliance offerings include.

CJIS (Criminal Justice Information Services)

HIPAA (Health Insurance Portability and Accountability Act)

CSA STAR Certification

ISO/IEC 27018

General Data Protection Regulation (GDPR)

National Institute of Standards and Technology (NIST)

Microsoft privacy statement

Provides openness and honesty about how Microsoft handles the user data collected from its products and services.

The Microsoft privacy statement explains:

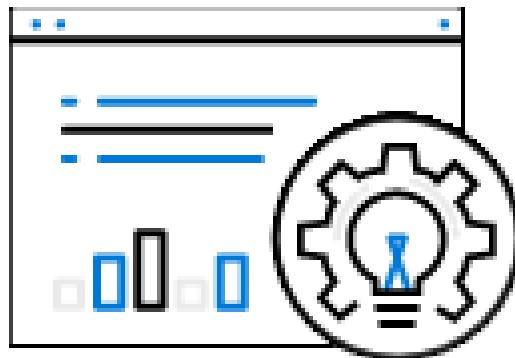
- What data Microsoft processes.
- How Microsoft processes it.
- What purposes the data is used for.

Microsoft's Privacy Statement at -
microsoft.com/privacystatement



Trust Center

Learn about security, privacy, compliance, policies, features, and practices across Microsoft's cloud products.

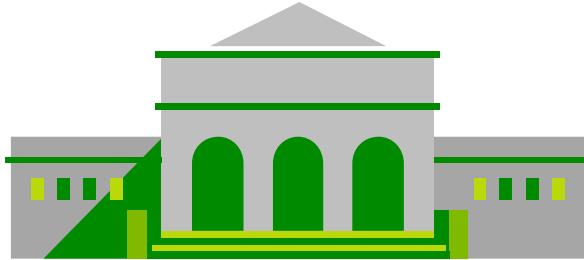


<https://www.microsoft.com/trustcenter>

Azure Government services

Meets the security and compliance needs of US federal agencies, state and local governments, and their solution providers.

Azure Government :



- Separate instance of Azure.
- Physically isolated from non-US government deployments.
- Accessible only to screened, authorized personnel.

Examples of compliant standards : FedRAMP, NIST 800.171 (DIB), ITAR, IRS 1075, DoD L2, L4 & L5, and CJIS.

Azure China 21Vianet

China's first foreign public cloud service provider, in compliance with government regulations.

10101
01010
00100

Azure China 21Vianet features:

10101
01010
00100

- Physically separated instance of Azure cloud services, located in China.
- Operated by 21Vianet (Azure China 21Vianet).

10101
01010
00100

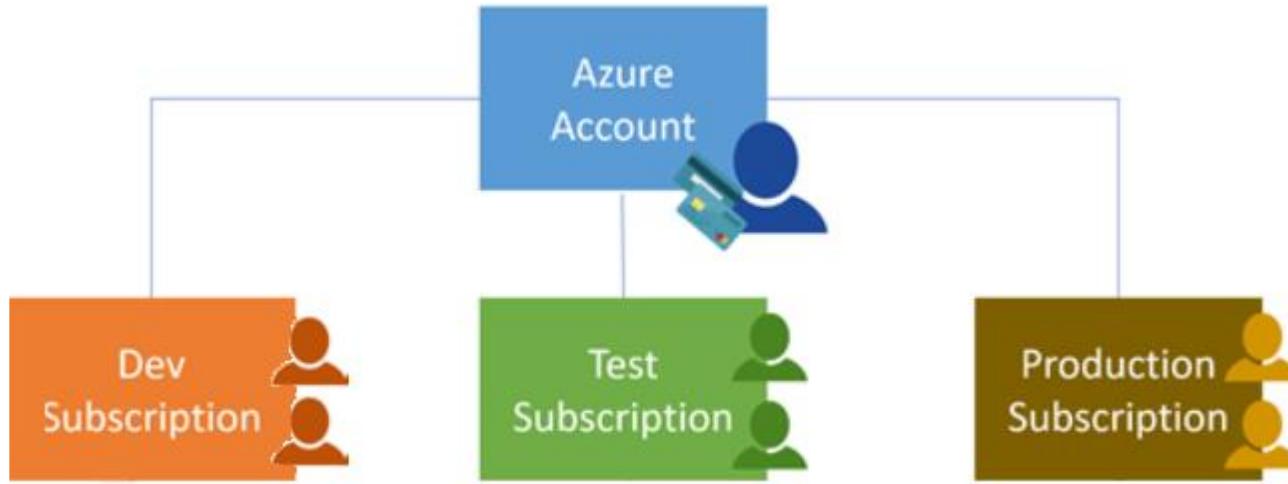
Module 04: Azure pricing and support



Azure subscriptions



Azure subscriptions



- An Azure subscription provides you with authenticated and authorized access to Azure accounts.
- Subscriptions can provide billing and access control boundaries.
- An account can have one subscription or multiple subscriptions.

Subscription offers

- Free (next slide)
- Pay-as-you-go
- Enterprise Agreement
- Student
- An account can have one subscription or multiple subscriptions.

SELECT AN OFFER

 Pay-As-You-Go Dev/Test
This offer is for teams of active Visual Studio subscribers to run dev/test workloads on Microsoft Azure, providing discounted rates on Windows virtual machines and access to exclusive images in the Azure Gallery.
[Learn more](#)

 Visual Studio Enterprise: BizSpark
Enjoy monthly credits and lower rates.
Use MSDN software at no additional charge.
[Learn more](#)

 Visual Studio Professional
Enjoy monthly credits and lower rates.
Use MSDN software for development and test at no additional charge.
[Learn more](#)

Azure free account

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

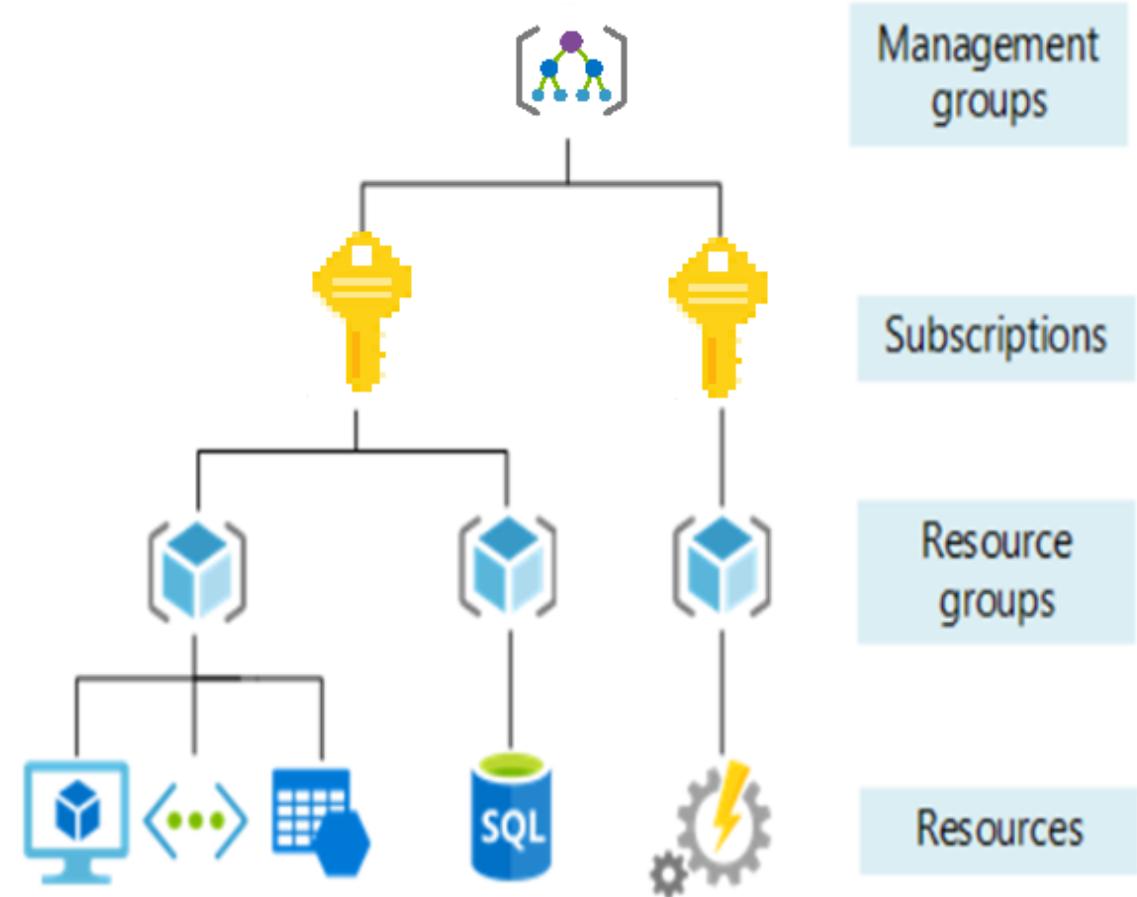
to explore any Azure
service for 30 days

25+ services

- Provides 12 months of our most popular services, a \$200 credit to explore any Azure service for 30 days, and over 25 services are free.
- At the end of the trial you can upgrade to pay-as-you-go pricing.

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.



Planning and managing costs



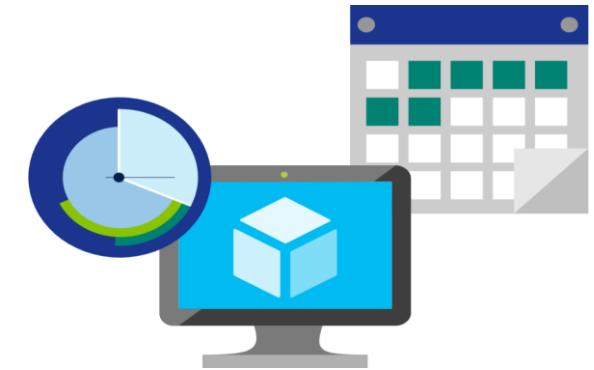
Purchasing Azure products and services

- Three main customer types on which the available purchasing options for Azure products and services are contingent are:
 - Enterprise: Enterprise customers sign an Enterprise Agreement with Azure that commits them to spending a negotiated amount on Azure services, which they typically pay annually.
 - Web direct: Web direct customers sign up for Azure through the Azure website.
 - Cloud solution providers (CSPs): Typically are Microsoft partner companies that a customer hires to build solutions on top of Azure. Payment and billing for Azure usage occurs through the customer's CSP.

Factors affecting costs

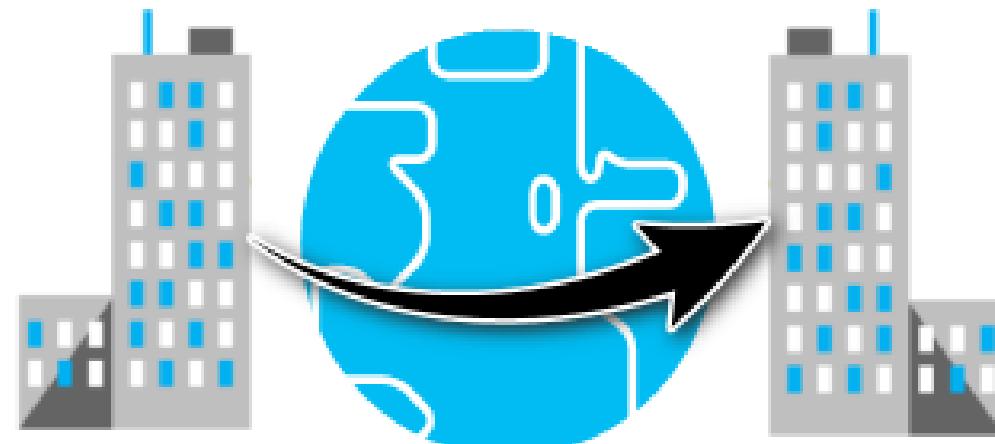
There are three primary factors affecting costs:

- **Resource Type:** Costs are resource-specific, so the usage that a meter tracks and the number of meters associated with a resource depend on the resource type.
- **Services:** Azure usage rates and billing periods can differ between Enterprise, Web Direct, and CSP customers.
- **Location:** The Azure infrastructure is globally distributed, and usage costs might vary between locations that offer Azure products, services, and resources.



Zones for Billing Purposes

- *Bandwidth* refers to data moving in and out of Azure datacenters. Some inbound data transfers are free, such as data going into Azure datacenters. For outbound data transfers—such as data going out of Azure datacenters—pricing is based on Zones.
- Zone 1 - West US, East US, West Europe, and others.
- Zone 2 - Australia Central, Japan West, Central India, and others.
- Zone 3. - Brazil South only.
- DE Zone 1- Includes Germany Central and Germany Northeast.



Pricing calculator

- Provides a detailed *estimate* of the costs associated with your infrastructure configuration.

Your Estimate

Virtual Machines			1 D2 v3 (2 vCPU(s), 8 GB RAM) x 730 Hours;	\$188.57
----------------------------------	--	--	--	----------

Virtual Machines

REGION: West US OPERATING SYSTEM: Windows TYPE: (OS Only)

TIER: Standard

INSTANCE: D2 v3: 2 vCPU(s), 8 GB RAM, 50 GB Temporary storage, \$0.209/hour

[Clone](#)

[Delete](#)

More info

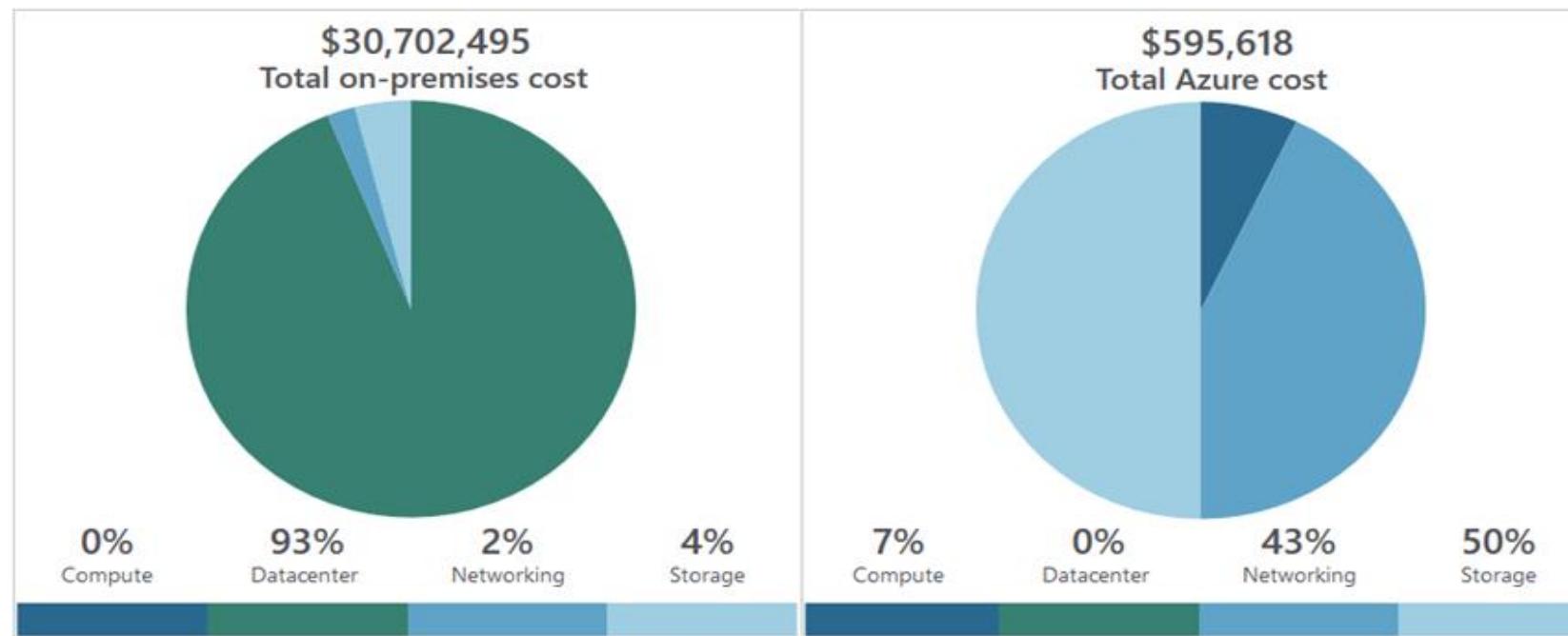
[Pricing details](#)

[Product details](#)

[Documentation](#)

Total cost of ownership calculator

- A tool to estimate cost savings you can realize by migrating to Azure.
- A report compares the costs of on-premises infrastructures with the costs of using Azure products and services in the cloud.



<https://azure.microsoft.com/en-us/pricing/tco/calculator/>



Total Cost of Ownership (TCO) Calculator

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

1

Define your workloads

2

Adjust assumptions

3

View report

Define your workloads

Enter the details of your on-premises workloads. This information will be used to understand your current TCO and recommended services in Azure.

Servers

Enter the details of your on-premises server infrastructure. After adding a workload, select the workload type and enter the remaining details.



Workload 1

**Workload**

Windows/Linux Server

Environment

Physical Servers

Operating system

Windows

Servers

1

Procs per server

1

Core(s) per proc

1

RAM (GB)

1

(1 - 448)

Optimize by

CPU

GPU

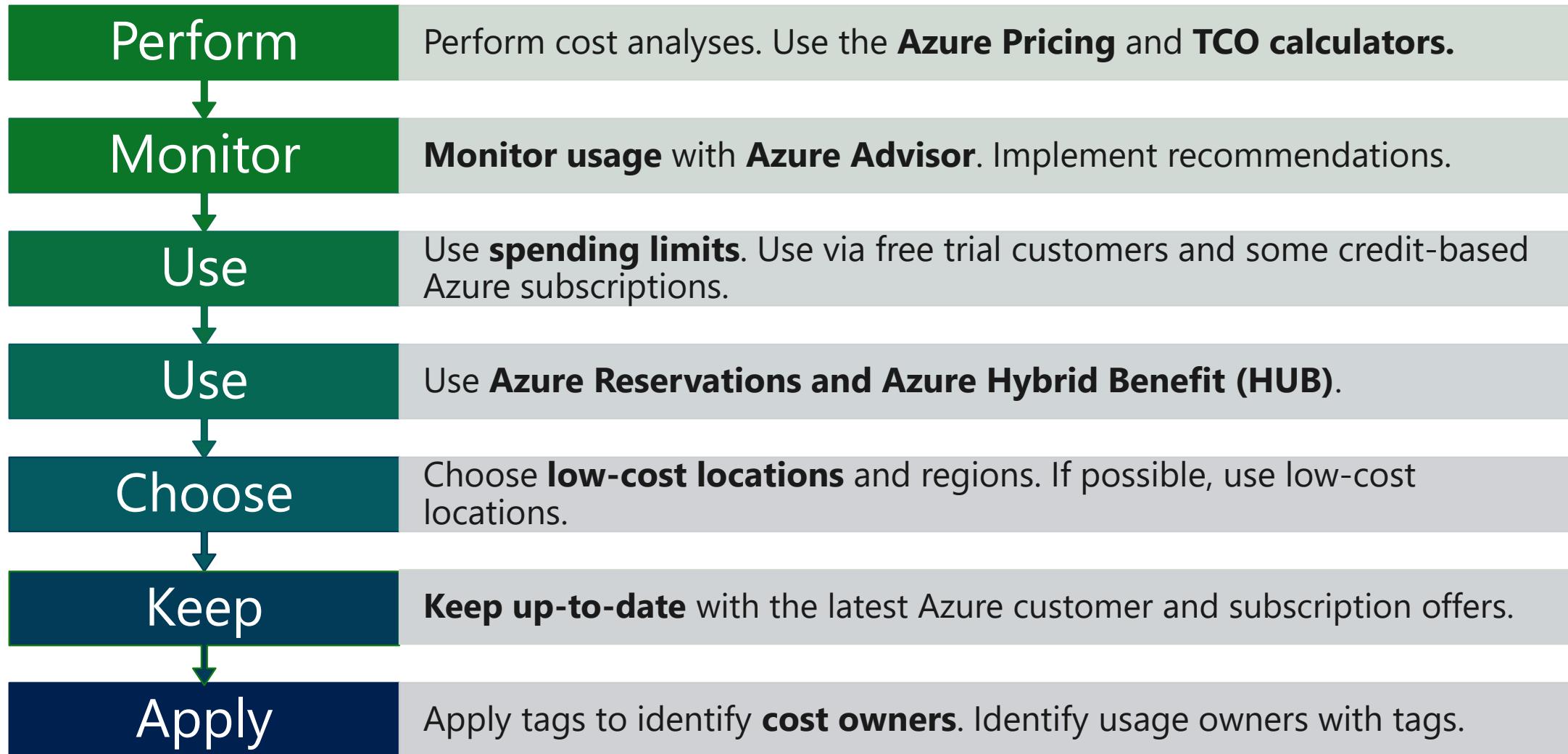
None

Windows Server 2008/2008 R2 **+ Add server workload**

Databases

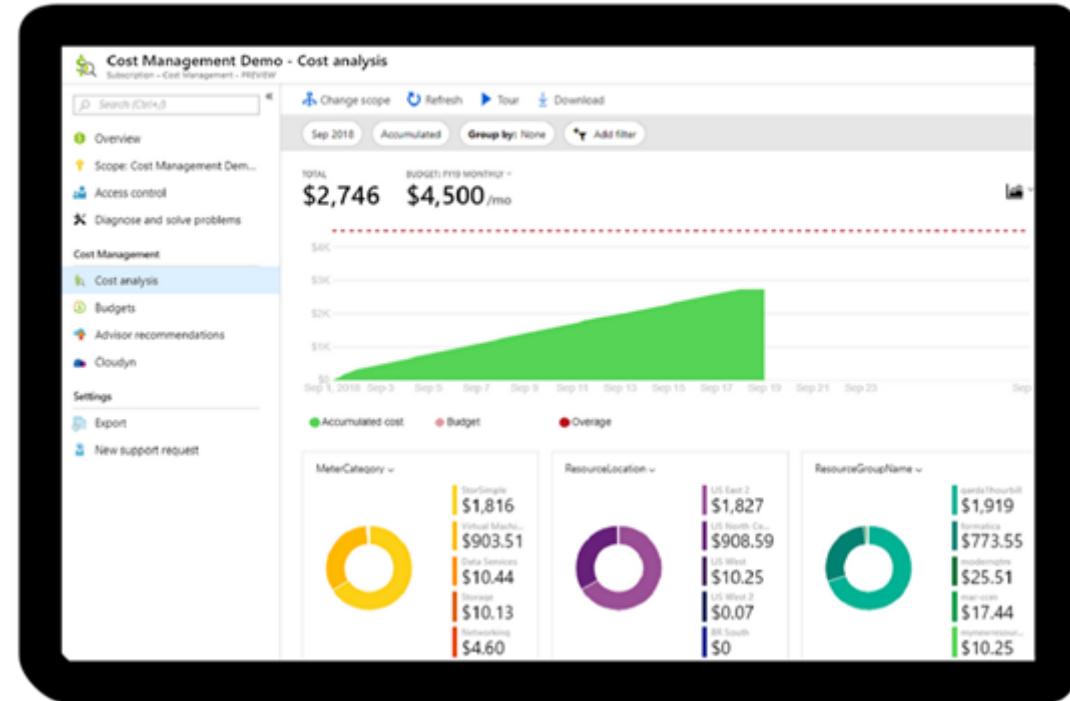
Enter the details of your on-premises database infrastructure. After adding a database, enter the details of your on-premises database infrastructure in the Source section. In the Destination section, select the Azure service you would like to use.

Minimizing costs



Azure Cost Management

- Reporting
- Data enrichment
- Budgets
- Alerting
- Recommendations



Azure support options



Support plan options

Every Azure subscription includes free access to billing and subscription support, Azure products and services documentation, online self-help documentation, white papers, and community support forums.

	Basic	Developer	Standard	Professional Direct
Scope	Available to all Microsoft Azure accounts	Trial and non-production environments	Production workload environments	Business-critical dependence
Technical Support		Business hours access to Support Engineers via email	24x7 access to Support Engineers via email and phone	24x7 access to Support Engineers via email and phone

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

Alternative support channels

-  • Microsoft Developer Network (MSDN) Azure Forums
-  • Stack Overflow
-  • Server Fault
-  • Microsoft Azure general feedback
-  • @AzureSupport

Knowledge Center

A searchable database that contains support questions and answers from a community of Azure experts, developers, customers, and users.

The screenshot shows the Azure Knowledge Center homepage. At the top, there's a dark header with the title "Knowledge Center" and a sub-header "Get answers to common questions.". Below the header is a search bar containing the text "virtual machines". To the right of the search bar is a "Filter by product" section with a "Browse" dropdown and a search input field. The main content area displays search results under the heading "Questions matching \"virtual machines\"". There are three visible results cards:

- About the features in Azure Backup**
Learn More | [Learn more >](#)
- Am I billed separately for local disk storage?**
No. All new virtual machines have an operating system disk and a local disk (or "resource disk"). We don't charge for local disk storage. The operating system disk is charged at the regular rate for disks.
See all virtual machines config...
[Learn more >](#)
- Are data transfers over the VPN connection charged separately?**
Data transfers over the VPN connections to your on-premises sites or the internet in general are charged separately at the regular data transfer rate.
[Learn more >](#)
- Are there additional diagnostics for Azure VM reboot issues?**
Learn More | [Learn more >](#)

<https://azure.microsoft.com/en-us/resources/knowledge-center/>

Azure Service Level Agreements (SLAs)



Service Level Agreements (SLAs)

- SLAs document the specific terms that define Azure performance standards.
- SLAs define Microsoft's commitment to an Azure service or product.
- Individual SLAs are available for each Azure product and service.
- SLAs also define what happens if a service or product fails to meet the designated availability commitments.



Improving application SLAs

The following table lists the potential cumulative downtime for various SLA levels over different durations

SLA	Downtime per week	Downtime per month	Downtime per year
99%	1.68 hours	7.2 hours	3.65 days
99.9%	10.1 minutes	43.2 minutes	8.76 hours
99.95%	5 minutes	21.6 minutes	4.38 hours
99.99%	1.01 minutes	4.32 minutes	52.56 minutes
99.999%	6 seconds	25.9 seconds	5.26 minutes

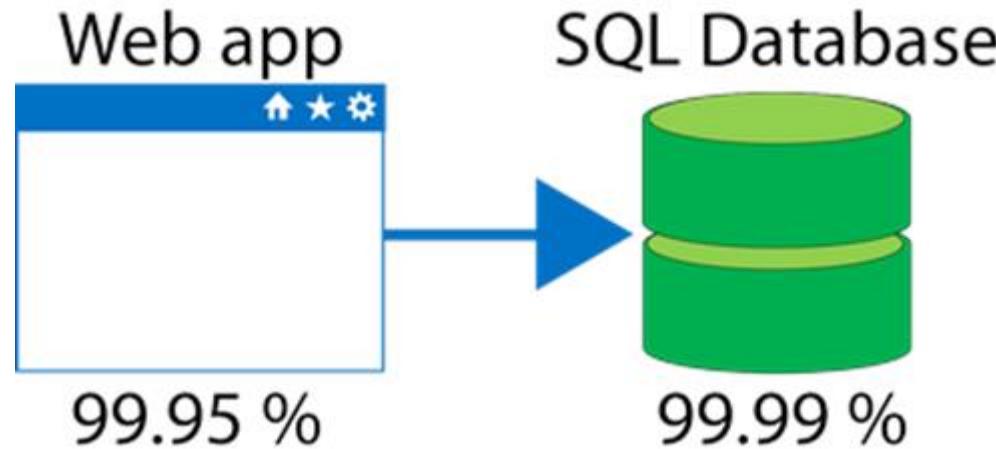
SLAs for Azure products and services

- Performance targets are expressed as uptime and connectivity guarantees.
- Performance-targets range from 99.9% (three nines) to 99.99% (four nines).
- If a service fails to meet the guarantees, a percentage of the monthly service fees can be credited to you.

SLA	Downtime per month	Downtime per year
99.9%	43.2 minutes	8.76 hours
99.95	21.6 minutes	4.38 hours
99.99	4.32 minutes	52.56 minutes

Composite SLAs

- If the App Service has a 99.95% SLA, and the Azure SQL Database has a 99.99% SLA, what is the composite SLA for your application?



Composite SLA

$$\begin{aligned} & .9995 * .9999 \\ & = 99.94\% \end{aligned}$$

- Notice the composite SLA is lower than the individual SLAs.
- Improve the SLA by creating independent fallback paths.

The End

