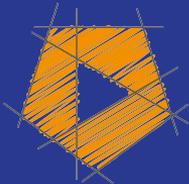


AZ-900 Microsoft Azure Fundamentals

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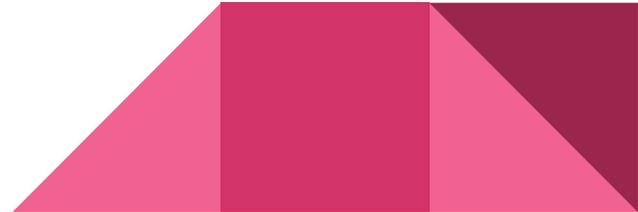
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Nov 2020 update

Microsoft Azure Fundamentals

“foundational level knowledge of cloud services and how those services are provided with Microsoft Azure”



Microsoft Azure Fundamentals

- Candidates with non-technical backgrounds
- Candidates with a technical background who have a need to validate their foundational level knowledge around cloud services



Microsoft Azure Fundamentals

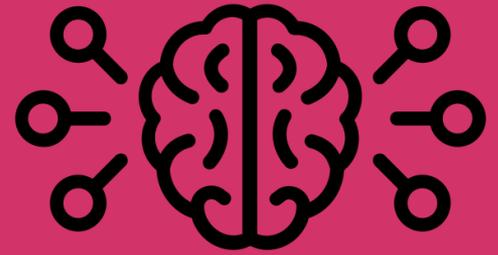
- Describe cloud concepts
 - Describe core Azure services
 - Describe core solutions and management tools
 - Describe general and network security features
 - Describe identity, governance, privacy and Compliance features
 - Describe cost management and SLA
- 

You'll be prepared
to take and pass
the AZ-900 exam



Created by Adrien Coquet
from Noun Project

But you don't have
to, if you just want
to learn cloud
concepts



Created by Adrien Coquet
from Noun Project



What is the Cloud?



There is no cloud
it's just someone else's computer

The ability to rent
computing
resources -
on demand



Created by Alvida Biersack
from Noun Project

What Computing Resources?

Windows and Linux Servers

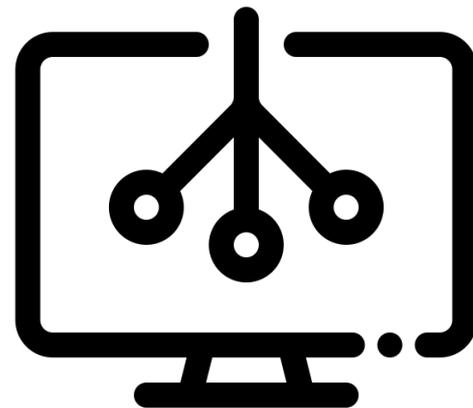
Unlimited Storage

Databases

Queues

Content Delivery Network

Batch Processing Jobs



Created by Timofei Rostilov
from Noun Project



What Computing Resources?

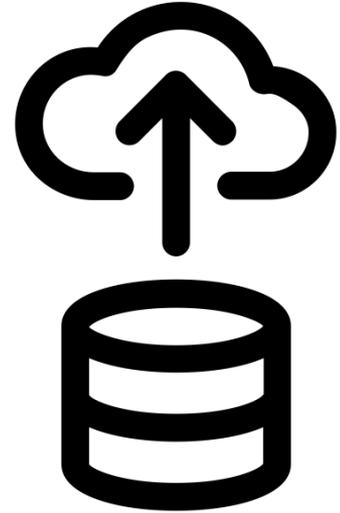
Big Data - Hadoop

Media Services

Machine Learning

Chat Bots

Cognitive Services



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1000+

Azure Service options



Exam AZ-900: Microsoft Azure Fundamentals

In response to the coronavirus (COVID-19) situation, Microsoft is implementing several temporary changes to our training and certification program. [Learn more.](#)

The content of this exam was updated on November 9, 2020. Please download the skills measured document below to see what changed.

Candidates for this exam should have foundational knowledge of cloud services and how those services are provided with Microsoft Azure. The exam is intended for candidates who are just beginning to work with cloud-based solutions and services or are new to Azure.

Azure Fundamentals exam is an opportunity to prove knowledge of cloud concepts, Azure services, Azure workloads, security and privacy in Azure, as well as Azure pricing and support. Candidates should be familiar with the general technology concepts, including concepts of networking, storage, compute, application support, and application development.

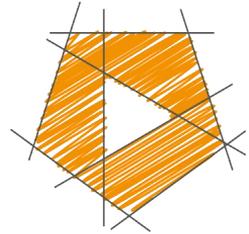
Azure Fundamentals can be used to prepare for other Azure role-based or specialty certifications, but it is not a prerequisite for any of them.

Part of the requirements for: [Microsoft Certified: Azure Fundamentals](#)

Related exams: none

Important: [See details](#)

[Go to Certification Dashboard](#) 



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Describe Cloud Concepts
(20-25%)

Describe Cloud Concepts (20-25%)

Identify the benefits and considerations of using cloud services

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

Describe the differences between categories of cloud services

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

Describe the differences between types of cloud computing

- define cloud computing
- describe Public cloud
- describe Private cloud
- describe Hybrid cloud
- compare and contrast the three types of cloud computing



Benefits of Cloud Computing

Benefits

Cost savings - both real and accounting

Agility

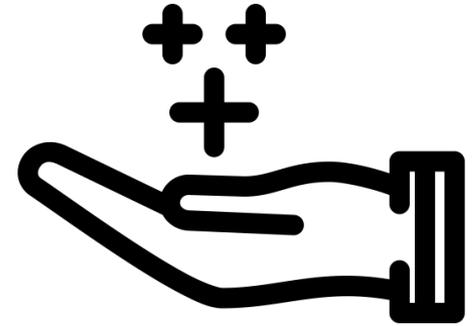
Availability

Security

Global reach

Range of ready on-demand services

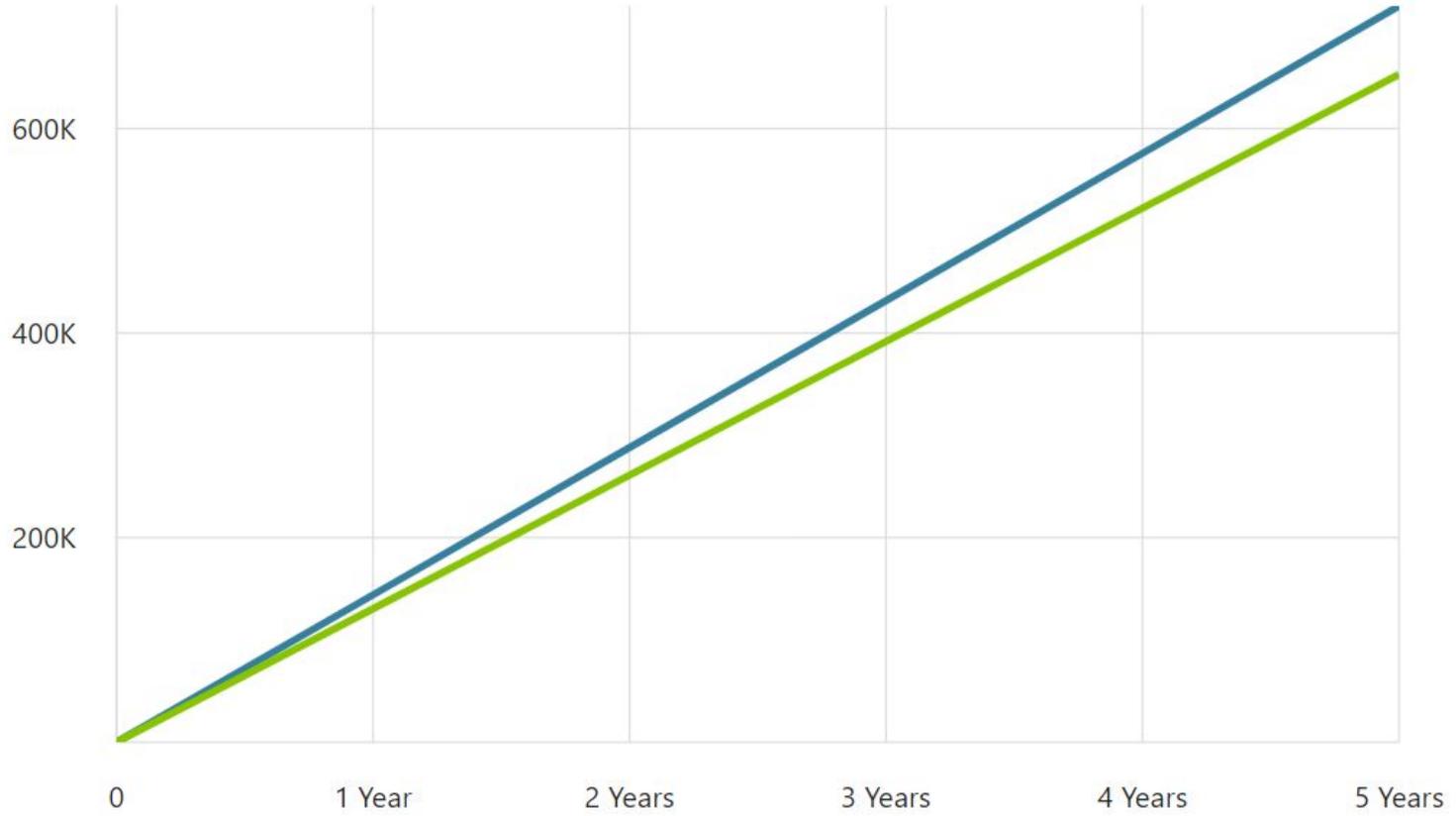
Range of tools



Created by alvianwijaya
from Noun Project

Cost Savings

■ On-premises cost ■ Microsoft Azure cost



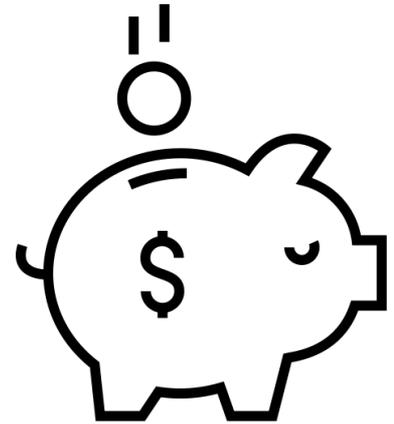
Cost Savings - Real

Economies of scale

Total cost of ownership (TCO) - electricity, Internet, cooling, employees

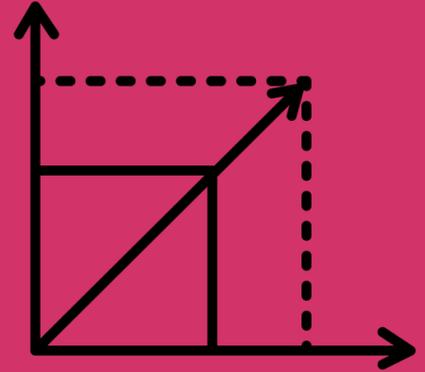
Microsoft can run a server cheaper than anyone else with few exceptions

4 vCPU server - as low as \$187/mo



Created by VectorBakery
from Noun Project

You can take
actions to reduce
your cost -
i.e. autoscaling



Created by Alla Zaleuska
from Noun Project

Global Reach

It's not possible for most businesses to run data centers in multiple countries



Created by Creative Stall
from Noun Project



High Availability

The top right corner of the slide features a decorative arrangement of overlapping geometric shapes. These include a light pink triangle pointing down and to the left, a darker pink triangle pointing up and to the left, and a dark pink square. The background of the slide is a solid, vibrant pink color.

Expressed as a percentage,
it's the ability of a system to
respond to users



99.99%

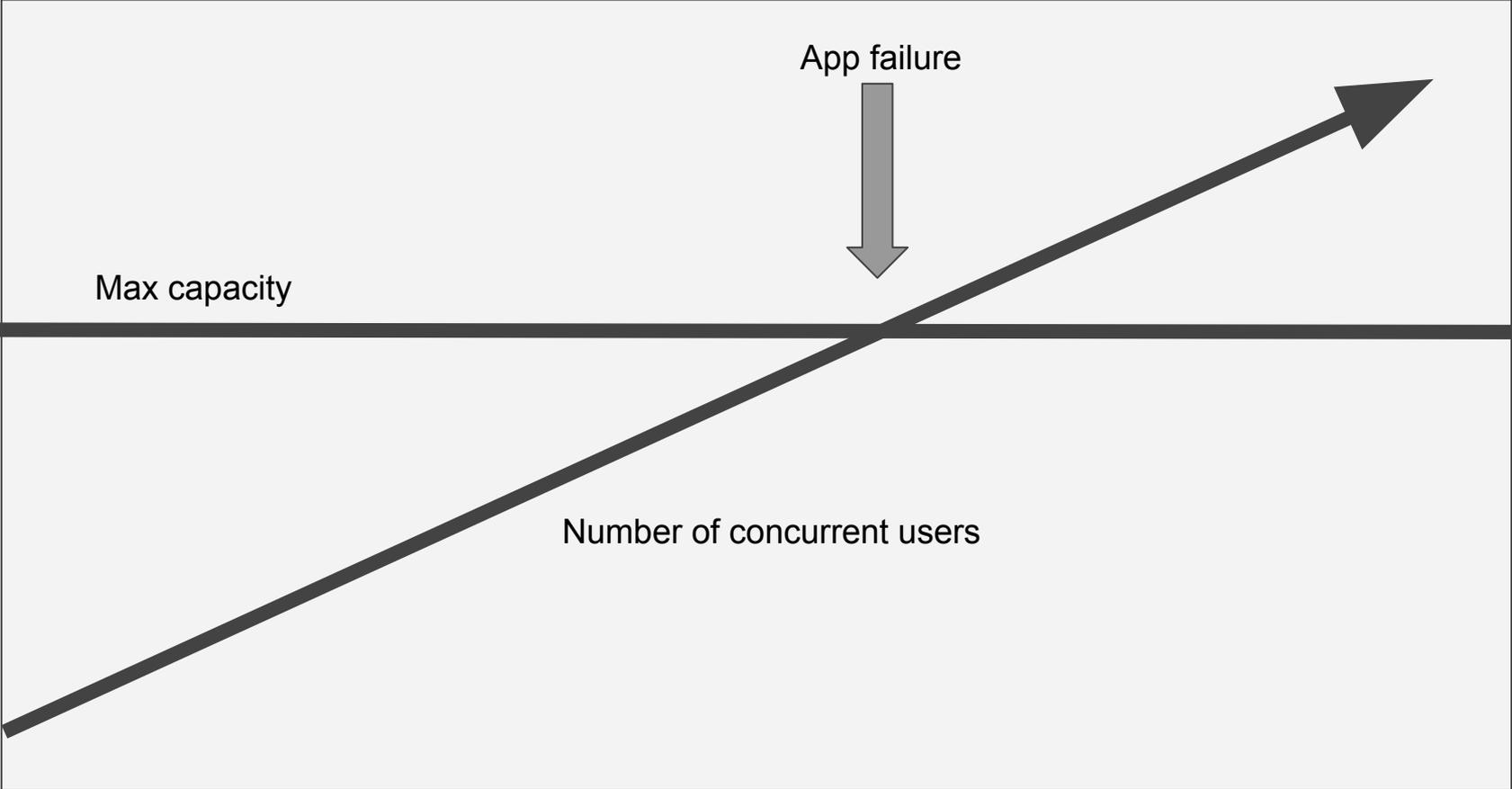
Four nines, 4 minutes per month



Scalability



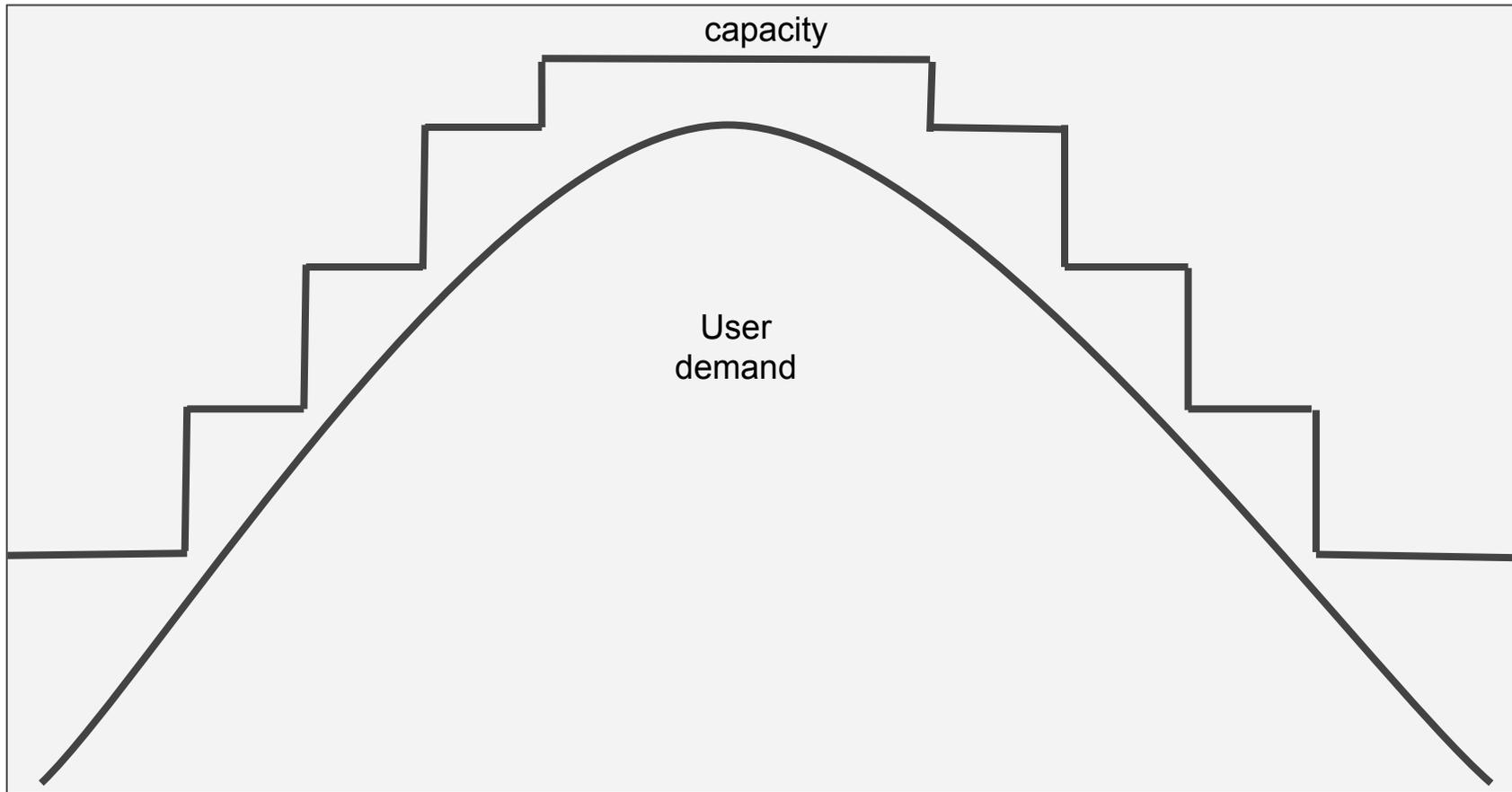
The ability of a system to
handle growth of users or
work



Elasticity

The top right corner of the slide features a decorative arrangement of overlapping geometric shapes. These include a dark pink square, a medium pink square, and a light pink square, all partially overlapping each other and the main background. The shapes are arranged in a way that creates a sense of depth and modern design.

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





Agility

The top right corner of the slide features a decorative arrangement of overlapping geometric shapes, including squares and triangles, in various shades of pink and magenta.

The ability to change rapidly
based on changes to market
or environment

Disaster Recovery

The top right corner of the slide features a decorative arrangement of overlapping triangles in various shades of pink and magenta. The text is centered on the slide in a white, sans-serif font.

The ability of a system to recover from failure within a period of time, and how much data is lost



Capital Expenditure (CapEx) and Operational Expenditure (OpEx)

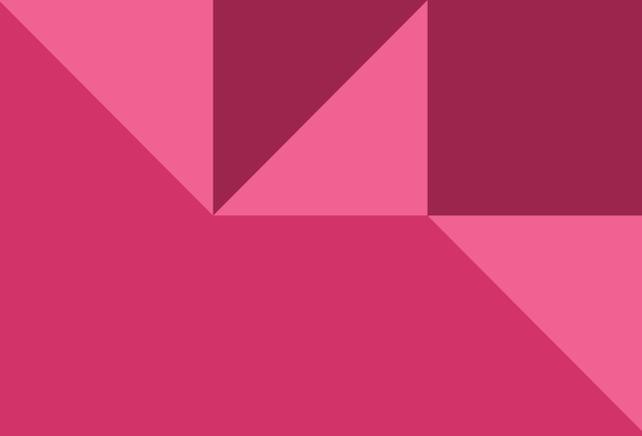
The top right corner of the slide features a decorative arrangement of overlapping triangles in various shades of pink and magenta, creating a modern, abstract design.

CapEx is money invested in assets (like computers) that return investment over time

The top right corner of the slide features a decorative arrangement of overlapping geometric shapes. These include a dark pink square, a medium pink square, and a light pink square, all partially overlapping each other and the main pink background.

OpEx is money spent every
day on operating expenses

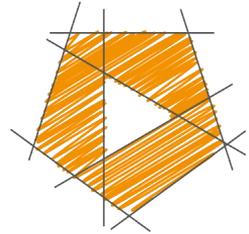
Consumption-Based Model



Pay per minute

Pay per hour

Pay per execution



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Infrastructure-as-a-Service (IaaS)



Virtual machines, networking,
load balancers, firewalls

Platform-as-a-Service (PaaS)

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Upload code packages and
have them run, without access
to the hardware

Software-as-a-Service (SaaS)



Access to configuration only



Shared Responsibility Model

Shared responsibility model

Responsibility	SaaS	PaaS	IaaS	On-prem	
Information and data	Customer	Customer	Customer	Customer	RESPONSIBILITY ALWAYS RETAINED BY CUSTOMER
Devices (Mobile and PCs)	Customer	Customer	Customer	Customer	
Accounts and identities	Customer	Customer	Customer	Customer	
Identity and directory infrastructure	Microsoft	Customer	Customer	Customer	RESPONSIBILITY VARIES BY SERVICE TYPE
Applications	Microsoft	Customer	Customer	Customer	
Network controls	Microsoft	Customer	Customer	Customer	
Operating system	Microsoft	Microsoft	Customer	Customer	RESPONSIBILITY TRANSFERS TO CLOUD PROVIDER
Physical hosts	Microsoft	Microsoft	Microsoft	Customer	
Physical network	Microsoft	Microsoft	Microsoft	Customer	
Physical datacenter	Microsoft	Microsoft	Microsoft	Customer	

Legend: Microsoft Customer



Serverless

There are still
servers... you just
don't ever have to
deal with them



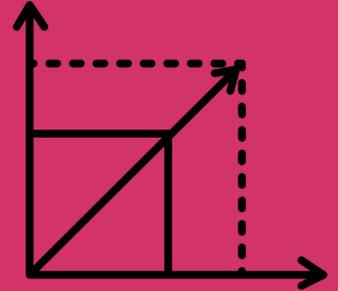
Created by Jae Deasigner
from Noun Project

Even less access to
the server than
PaaS

The top right corner of the slide features a decorative arrangement of overlapping triangles in various shades of pink and magenta, creating a modern, abstract geometric pattern.

Even with PaaS, you
have to choose an
App Service Plan

With PaaS, scaling is your responsibility



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from Noun Project

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Serverless means
not worrying about
choosing the right
plan



Serverless means
not worrying about
scaling

Serverless means
you might pay \$0 if
you don't use the
service

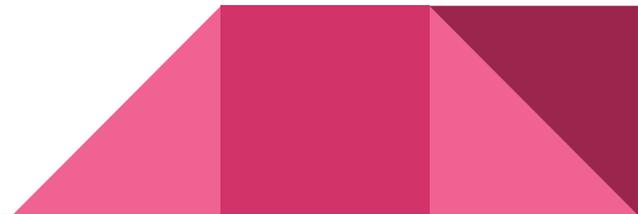
Azure Serverless Offers

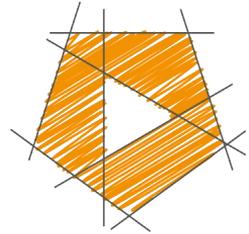
Compute - Azure Functions

Compute - Serverless Kubernetes (Virtual Nodes w/ ACI)

Database - Azure SQL Database Serverless

Database - Cosmos DB Serverless (preview)





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Public cloud

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Azure owns the hardware,
on their network and
infrastructure



Private cloud

The top right corner of the slide features a decorative arrangement of overlapping triangles in various shades of pink and magenta, creating a modern, abstract design.

Looks and acts like a cloud,
except customer owns or
leases or has exclusive
access to the hardware

Hybrid cloud

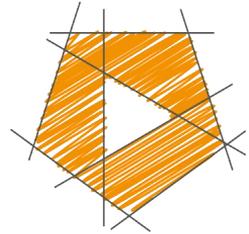


Combination of public and private clouds; scale private infrastructure to the cloud

Compare and Contrast



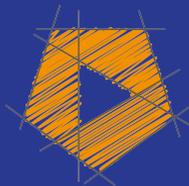
Public vs private vs hybrid



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Describe Core Azure Services (15-20%)

Describe Core Azure Services (15-20%)

Describe the core Azure architectural components

- describe the benefits and usage of Regions and Region Pairs
- describe the benefits and usage of Availability Zones
- describe the benefits and usage of Resource Groups
- describe the benefits and usage of Subscriptions
- describe the benefits and usage of Management Groups
- describe the benefits and usage of Azure Resource Manager
- explain Azure resources

Describe core resources available in Azure

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



Core Azure architectural components

Regions



60+

Regions - not all accessible by everyone



- Available region
- Announced region
- Availability Zones

West US 2
 West Central US
 West US
 US Gov Arizona
 South Central US
 US Gov Texas
 Mexico Central
 Central US
 North Central US
 Canada Central
 Canada East
 US DoD East
 East US 2
 East US
 US Gov Virginia
 US DoD Central

Norway West
 West Europe
 UK South
 North Europe
 UK West
 France Central
 France South
 Spain Central
 Norway East
 Germany West Central (Public)
 Germany North (Public)
 Germany Northeast (Sovereign)
 Poland Central
 Germany Central (Sovereign)
 Switzerland North
 Italy North
 Switzerland West

Israel Central
 Qatar Central
 UAE Central
 UAE North
 West India
 Central India
 South India

China North
 China North 2
 Korea Central
 Korea South
 Japan East
 Japan West

China East 2
 China East
 East Asia

Southeast Asia

Brazil South

South Africa North

South Africa West

Australia East
 Australia Central
 Australia Southeast
 Australia Central 2
 New Zealand North

Region Pairs

What are Paired Regions?

Each region has one other region which is treated as it's "pair"

Almost always in the same geography - data storage laws

The data connection between region pairs is the highest speed available

Software rollouts are deployed to one region of a pair and the other is not touched

If multiple regions go down, one region of each pair is treated as a priority



Example Pairs

Canada Canada Central - Canada East

Europe North Europe - West Europe

USA East US - West US

USA East US 2 - Central US

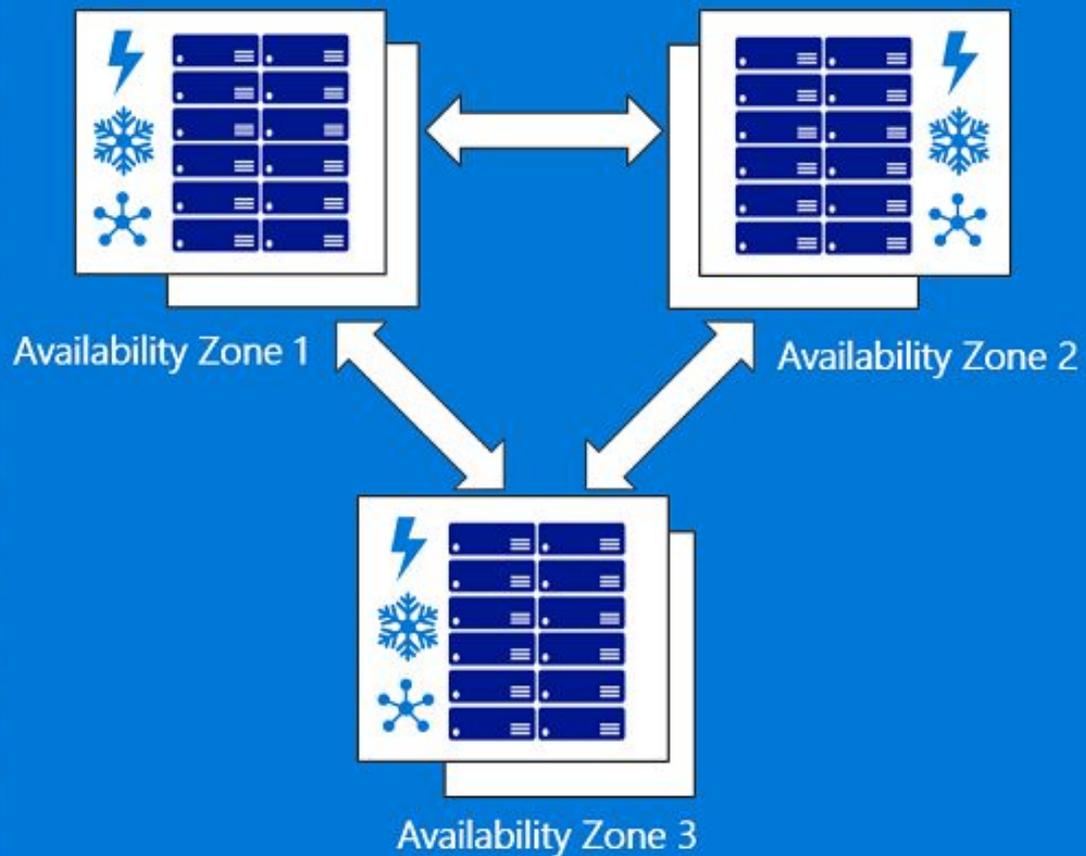
USA North Central US - South Central US

Brazil Brazil South - South Central US

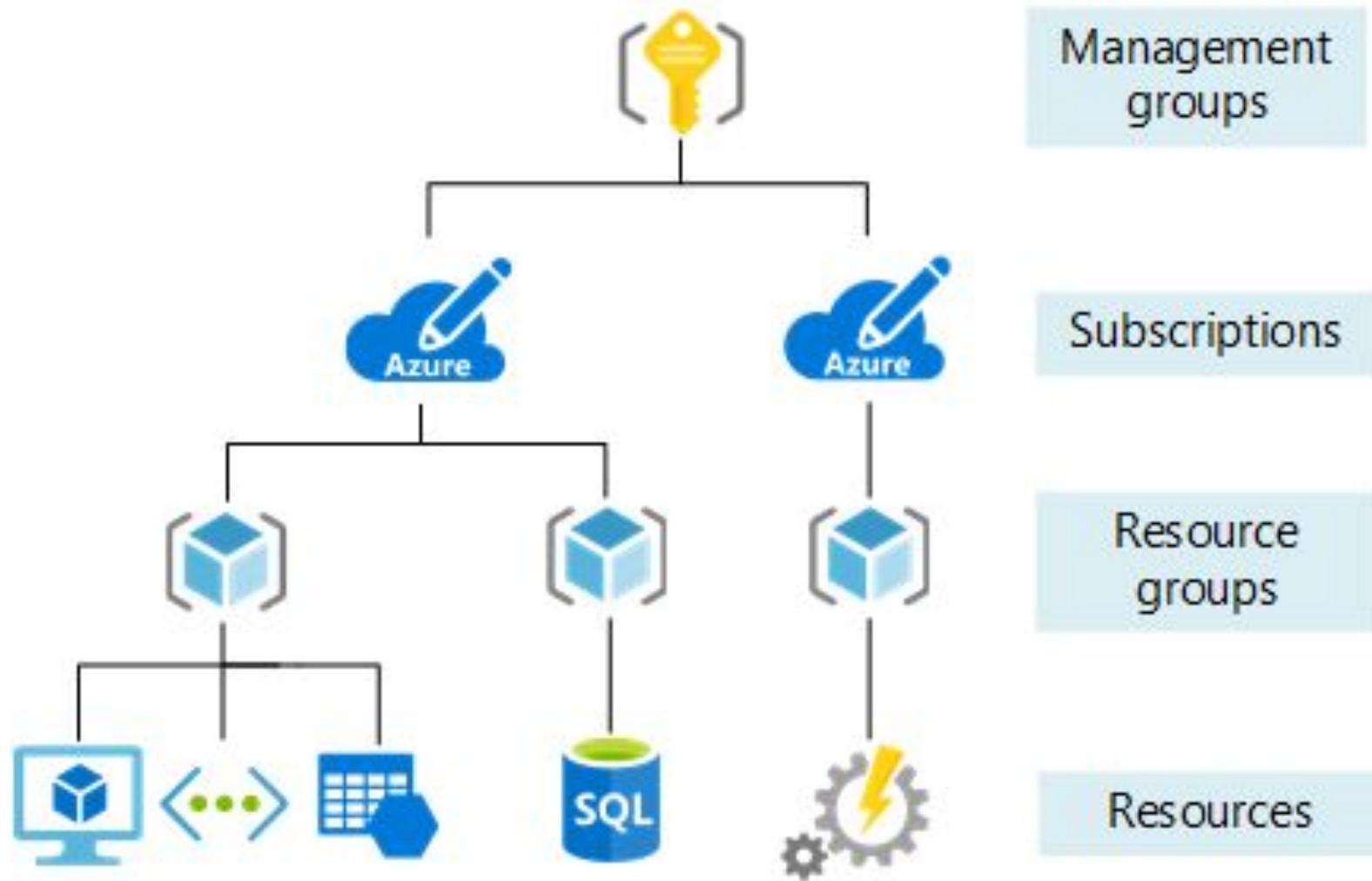


Availability Zones

Azure Region



Resource Groups



Azure Subscription



Subscription is a
billing unit

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Users have access
to one or more
subscriptions, with
different roles



All resources
consumed by a
subscription will be
billed to the owner

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Can be used to
organize resources
into completely
distinct accounts

Microsoft
Azure Account

Azure
HR Azure
subscription

Azure
Finance Azure
subscription

Azure
Marketing Azure
subscription

Services Consumed

- Azure Automation
- Cloud Service
- Virtual machine
- SQL Data Warehouse
- Traffic Manager
- Service Fabric

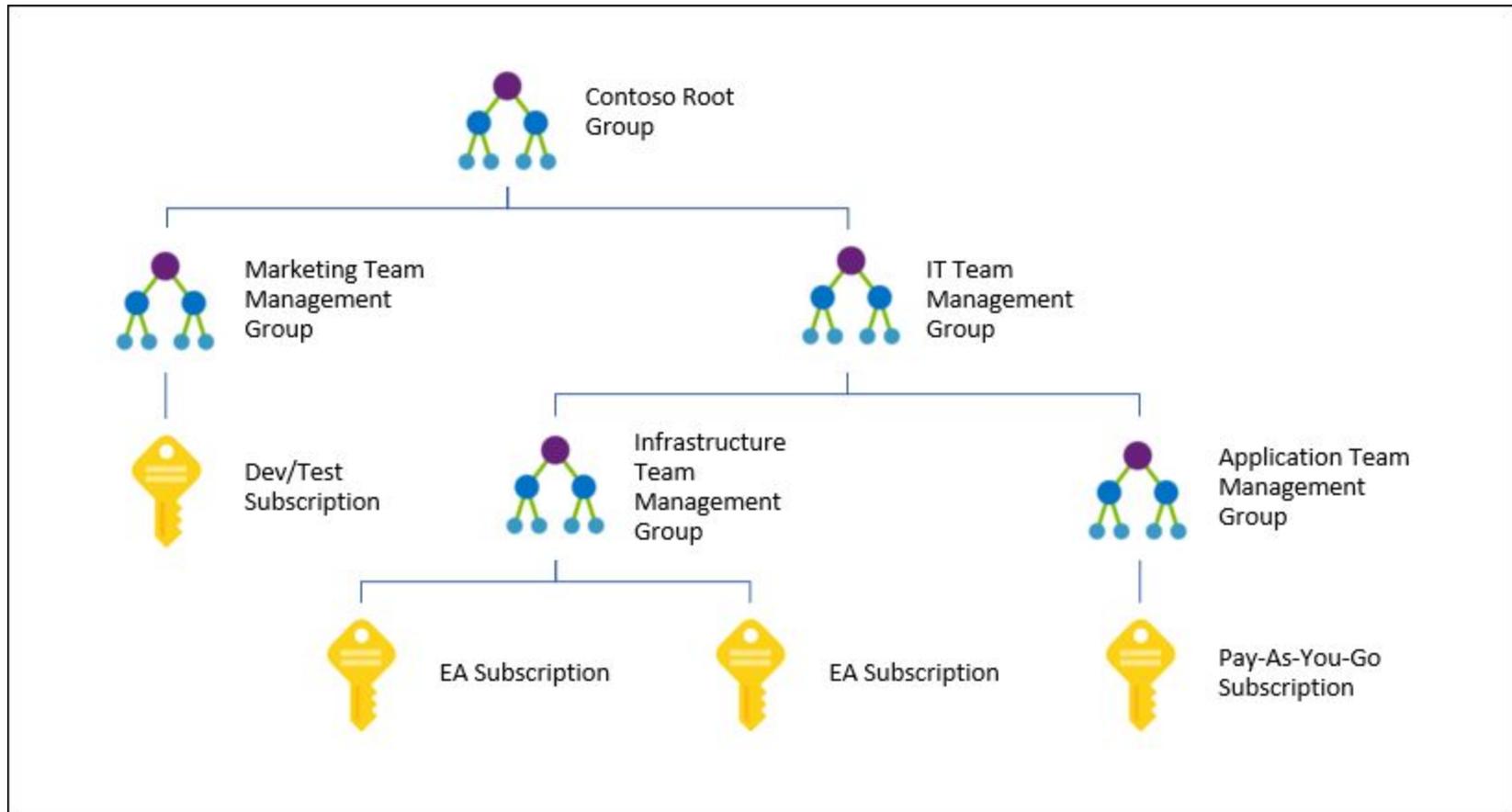
Services Consumed

- Visual Studio Online
- Cloud Service
- Virtual machine
- Web App
- Traffic Manager
- Site Recovery

Services Consumed

- Service Bus
- Cloud Service
- CodePlex
- RemoteApp
- Traffic Manager
- StorSimple

Management groups



Azure Resource Manager (ARM)

Tools



Portal

+



Command line

+



Visual Studio

AZURE RESOURCE MANAGER API

RESOURCE MANAGER



Cloud + On-Premises



ADFS

AAD

RESOURCE PROVIDER CONTRACT

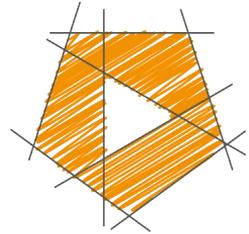
Provider
REST Points



Azure Resources

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Instance of services
that you create, that
are yours to use



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Core resources in Azure

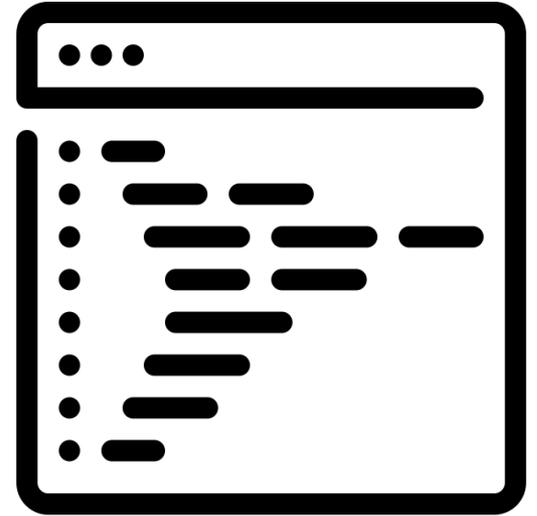
Getting Deep into the Technical

- Compute services
- Networking services
- Storage services
- Database services
- Azure Marketplace



Compute services covered

- Virtual Machines (VM)
- App services (Web apps)
- Azure Container Instances (ACI)
- Azure Kubernetes Service (AKS)
- Windows Virtual Desktop



Created by KonKapp
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Compute -
“Executing code” in
the cloud

Virtual Machines

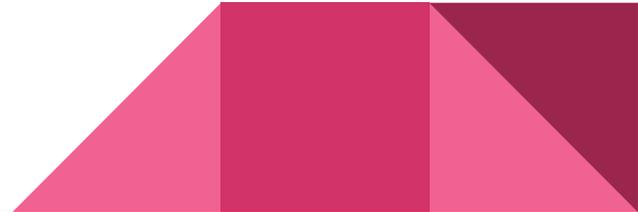
Infrastructure as a service - IaaS

Take an existing machine from your environment into the cloud - a copy

Windows or Linux operating systems - several of each

A “slice” of a physical machine shared with other customers

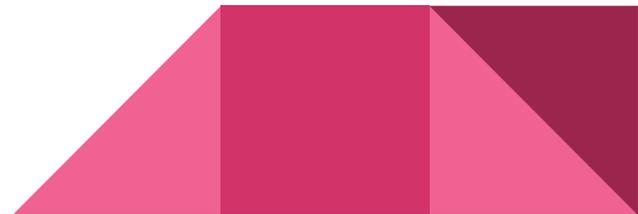
Full control over it, as if it was your machine



Virtual Machine Types

Over 200 to choose from

Number of CPU cores, CPU speed, RAM size, temporary disk size, IOPS, etc



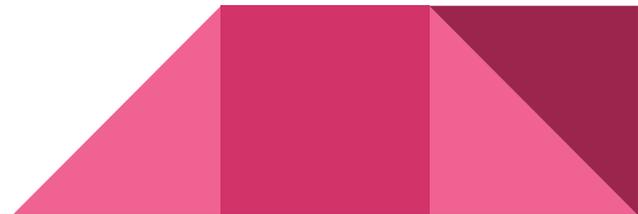
App Services

A new paradigm for running code in the cloud

Give your code and configuration to Azure, and they will run it

Promise of performance but no access to hardware

Platform as a Service (PaaS)



Containers

Another paradigm for running code in the cloud

Containers contain everything the app needs to run in a “container image”

Fastest and easiest to deploy

Azure Container Instance (ACI) - single instance, quickest way to deploy a container

Azure Kubernetes Service (AKS) - runs on a cluster of servers, enterprise-grade



Windows Virtual Desktop

Desktop version of Windows that runs in the cloud

Your software installed, your files - available from anywhere

Can even see your desktop on iOS and Android, or from any web browser

Runs on Azure



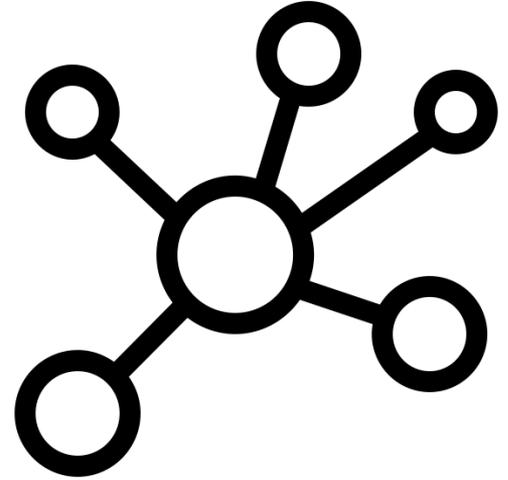
Networking Services Covered

Virtual Networks

VPN Gateway

VNet Peering

ExpressRoute

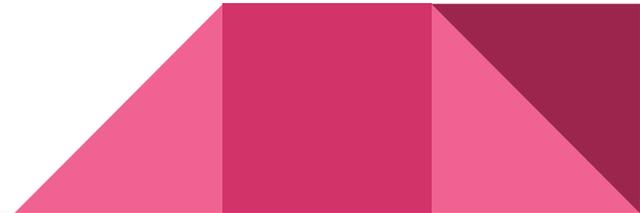


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Types of Networking Services

- Connectivity Services
- Protection Services
- Delivery Services
- Monitoring Services



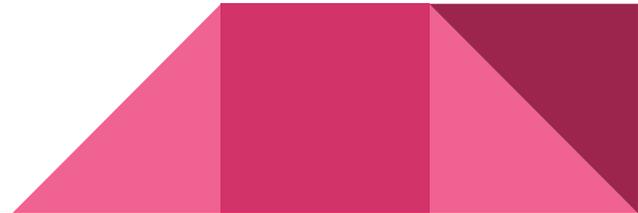
Connectivity

Virtual Network - emulating a physical network

Microsoft Global Network already exists, so a virtual network is just software configuration

Virtual Private Network (VPN) - connecting two networks as if they were on the same network, uses a Network Gateway

ExpressRoute - high-speed private connection to Azure



Protection - Security Section of the Course

DDos Protection - Distributed Denial of Service attack protection

Azure Firewall

Network Security Groups

Private Link



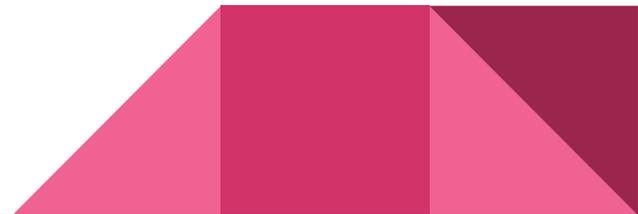
Delivery - Not on the Exam

Load Balancer - distribute traffic evenly between multiple backend servers

Application Gateway - a higher-level of load balancer with an optional firewall

Content Delivery Network (CDN) - stores common static files on the edge, closer to the users for (perceived) improved performance

Azure Front Door Service - a load balancer, CDN and firewall all-in-one



Monitoring - Management Tools Section of the Course

Network Watcher

ExpressRoute Monitor

Azure Monitor



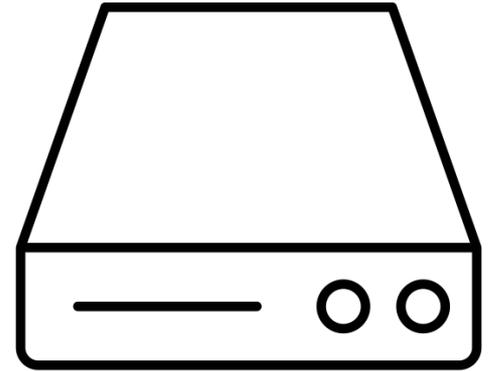
Storage Services Covered

Container (Blob) Storage

Disk Storage

File Storage

Storage Tiers



Created by DinosoftLab
from Noun Project



Storage - one of the
foundational
technologies on
which much is built

Container (Blob) and File Storage

The **Azure Storage** account

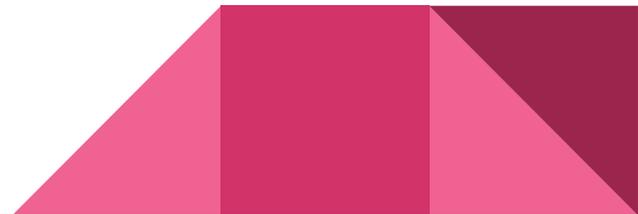
General Purpose v2 (gpv2) is the most common type

Blobs, Tables *, Queues *, Files

Azure Data Lake Storage Gen2

Cheapest type of storage

Pay Per GB (~1.8 cents per GB)



Many, Many Options

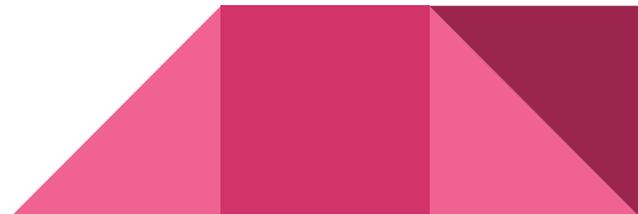
Access tiers - Hot, Cool, Archive

Performance tiers - Standard or Premium

Location

Redundancy / Replication

Failover options



Disk Storage

Azure Virtual Machine Disks

Managed Disks

Reserve capacity in advance

Optimized to virtual hard disks



Database Services Covered

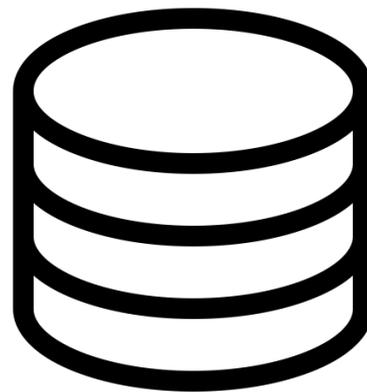
Cosmos DB

Azure SQL Database

Azure Database for MySQL

Azure Database for PostgreSQL

SQL Managed Instance



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Most sophisticated
applications have
some type of
database

Cosmos DB

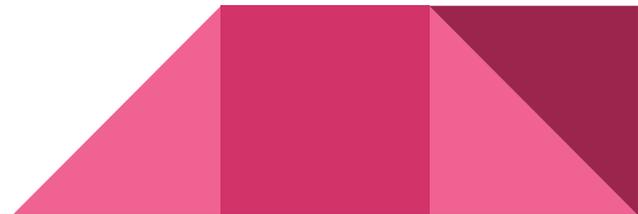
Extremely fast storage

Designed for modern applications such as mobile video games, social networks, and things requiring thousands of global replication

NoSQL Storage

Multi-modal

Supports many open-source APIs and protocols



Azure SQL Database

Runs on the SQL Server engine underneath

Relational DB

Database as a service

Easy to replicate

Easy to scale

Easy to migrate from SQL Server on-prem



Azure Database for MySQL

Managed MySQL database

Common open-source DB

Makes migration to the cloud easier if you rely on this one

Wordpress uses it



Azure Database for PostgreSQL

Managed PostgreSQL database

Open-source DB

Has better support for clusters and more complex server setups

Makes migration to the cloud easier if you rely on this one



SQL Managed Instance

Most compatible with existing SQL Server

Minimal code changes

Fully managed by Azure

Always up-to-date



Azure Marketplace

Home > New > Marketplace > Everything

Marketplace

My Saved List 0

Everything

Compute

Networking

Storage

Web

Mobile

Containers

Databases

Analytics

AI + Machine Learning

Internet of Things

Integration

Security

Identity

Everything

Search Everything

Pricing

All

Operating System

All

Publisher

All

What's new

More



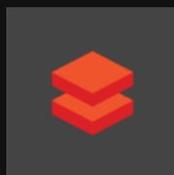
Azure Data Box

Microsoft



Red Hat Enterprise Linux 7.4

Red Hat



Azure Databricks

Microsoft



Citrix Virtual Apps Essentials

Citrix



Barracuda WAF-as-a-Service

Barracuda Networks, I



Confidential Compute VM

Microsoft Azure Com

Users interested in Function App also viewed



Web App

Microsoft



Storage account - blob, file, table,

Microsoft



Logic App

Microsoft



Azure Cosmos DB

Microsoft



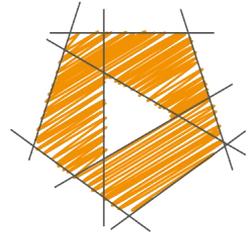
SQL Database

Microsoft



Template deployment

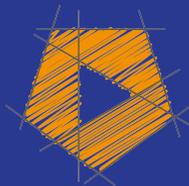
Microsoft



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AZ-900 Microsoft Azure Fundamentals

Scott Duffy, Instructor



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Describe Core Solutions and
Management Tools (10-15%)

Describe core solutions and management tools on Azure (10-15%)

Describe core solutions available in Azure

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

Describe Azure management tools

- describe the functionality and usage of the Azure Portal, Azure PowerShell, Azure CLI, Cloud Shell, and Azure Mobile App
- describe the functionality and usage of Azure Advisor
- describe the functionality and usage of Azure Resource Manager (ARM) templates
- describe the functionality and usage of Azure Monitor
- describe the functionality and usage of Azure Service Health

Internet of Things (IoT)

IoT Hub

IoT Central

Azure Sphere



Created by Flatart
from Noun Project

Azure Sphere

A platform designed to work with connected devices

Includes:

- a secure, silicon chip
- Sphere OS
- Cloud-based security services

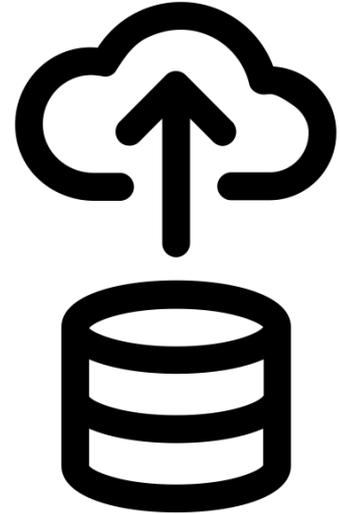


Big Data and Analytics

Azure Synapse Analytics
(formerly SQL Data Warehouse)

HDInsight

Azure Databricks



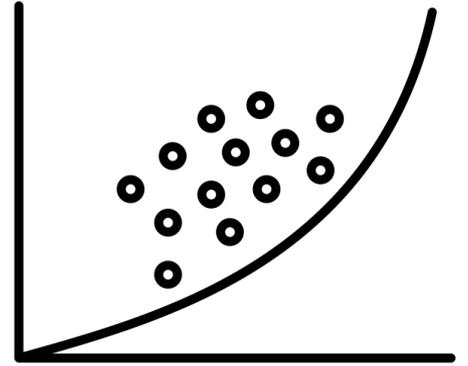
Created by Adrien Coquet
from Noun Project

Artificial Intelligence (AI)

Azure Machine Learning

Cognitive Services

Azure Bot Service



Created by Mohamed Mbarki
from Noun Project

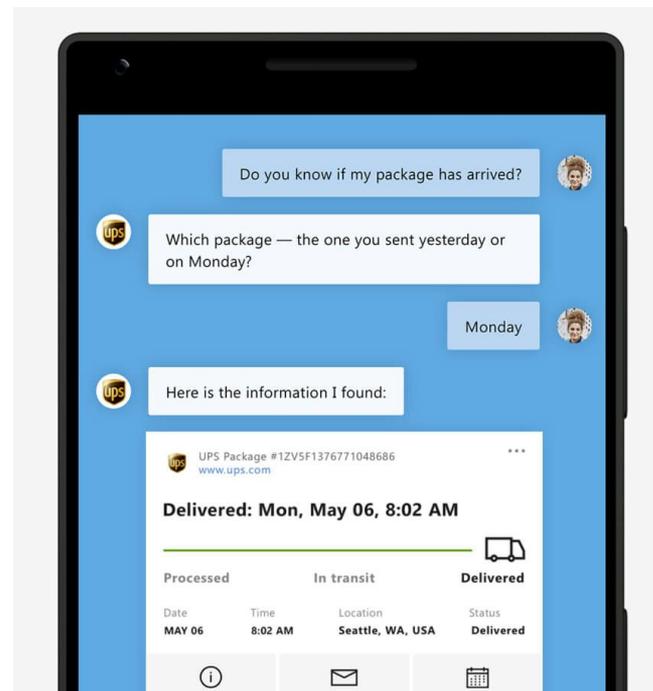
Azure Bot Service

A natural language chatbot service

A database of frequently-asked questions

A front-end that allows people to ask questions

And get answers

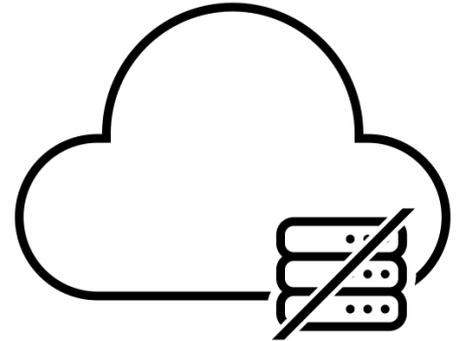


Serverless

Azure Functions

Logic Apps

Event grid



Created by Jae Deasigner
from Noun Project

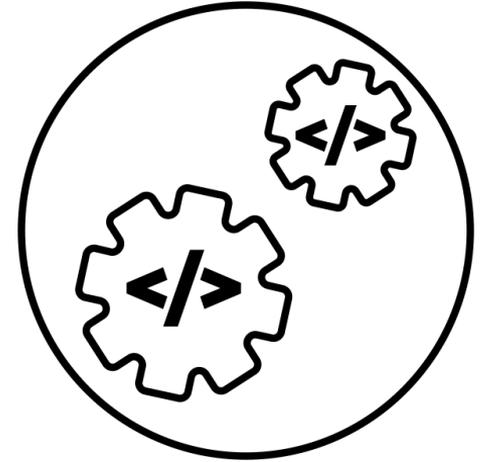
DevOps Solutions

Azure DevOps

GitHub

GitHub Actions

Azure DevTest Labs



Created by Shocho
from Noun Project

GitHub

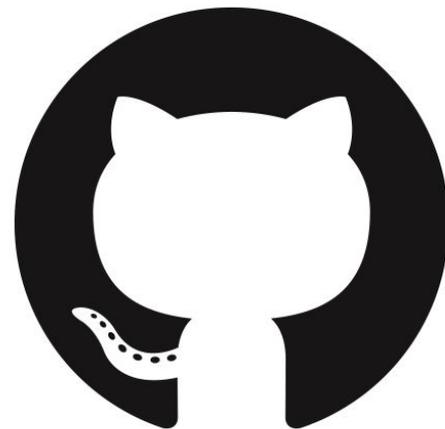
Microsoft purchased GitHub in 2018

The most popular place to store your company's source code

Has private and public options

Integrates with tools such as Visual Studio

Based on the "git" source control language invented by Linus Torvalds of Linux fame



GitHub Actions

Automate software workflows

What happens once someone “checks in” changes to code?

Possibly includes Continuous Integration (CI)

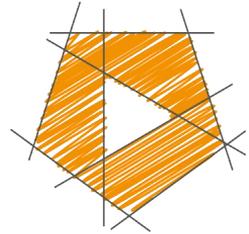
Possibly includes automatic compilation of code to check for errors

Possibly includes running a suite of tests against code



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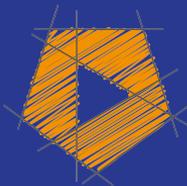
Having a Web App
automatically
update when new
code is checked in



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Azure Tools

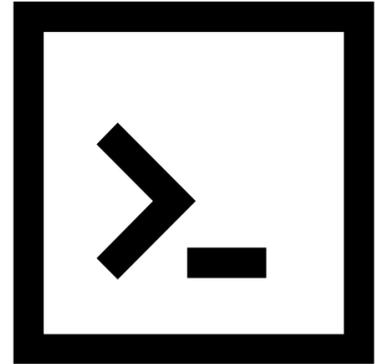
Azure CLI

PowerShell

Azure Portal

Azure Cloud Shell

Azure Mobile App



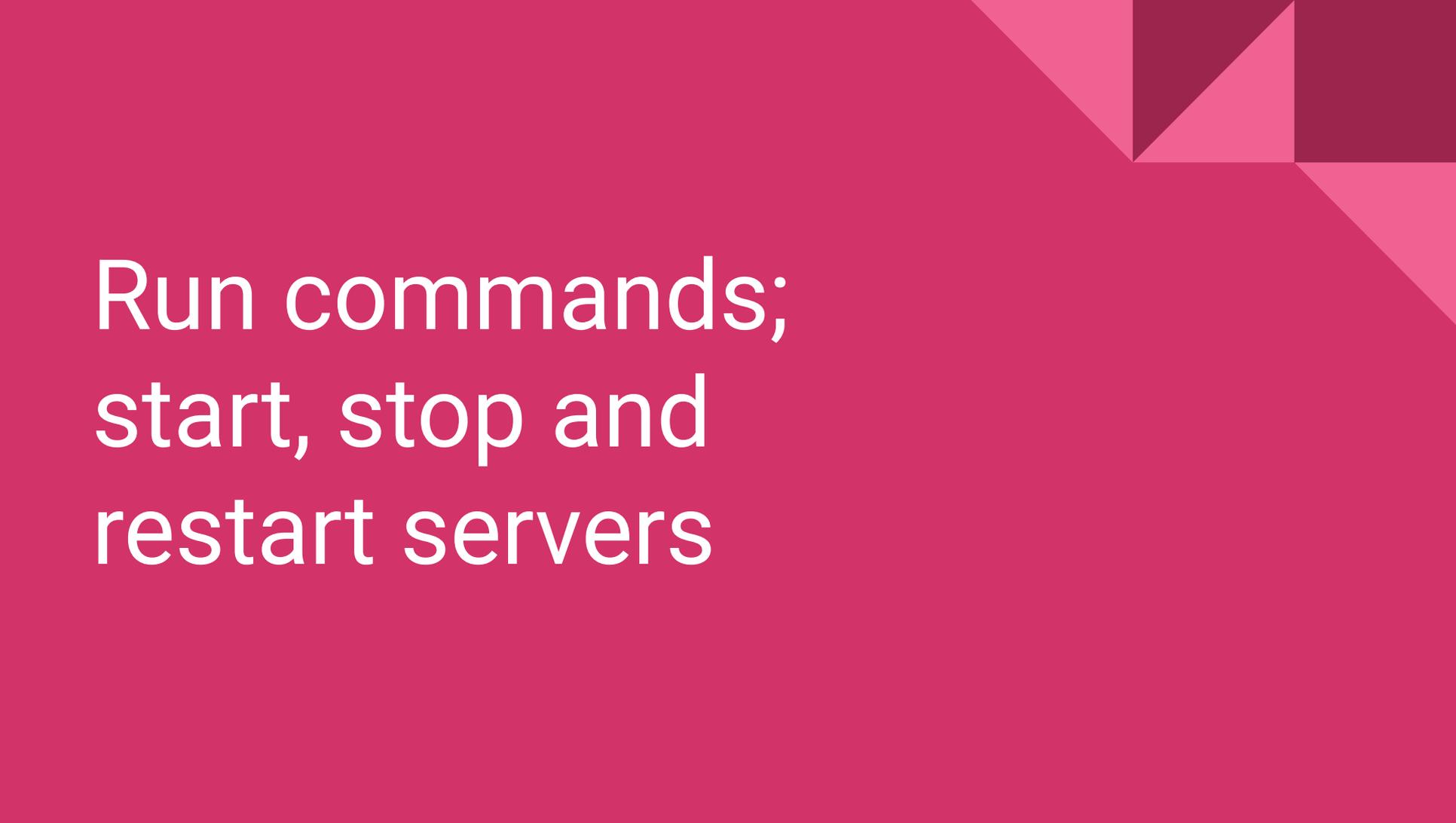
Created by Focus
from Noun Project

Azure Mobile App

Monitor the health
and status of
resources from
your phone



Created by Eucalyp
from Noun Project



Run commands;
start, stop and
restart servers

Azure Advisor

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)

High Availability

8 Recommendations

1 High impact | 7 Medium impact | 0 Low impact

25 impacted resources

Security

21 Recommendations

21 High impact | 0 Medium impact | 0 Low impact

63 impacted resources

Performance

1 Recommendation

1 High impact | 0 Medium impact | 0 Low impact

1 impacted resource

Cost

2,876 USD savings/mo *

2 Recommendations

2 High impact | 0 Medium impact | 0 Low impact

11 impacted resources

Tips & tricks

- You can customize Advisor to process recommendations for resources that matter to you the most.
- You can optimize underutilized virtual machines to reduce your monthly Azure spend.
- You can improve the performance of your SQL Azure databases.
- You can enable virtual machine backup to protect your data from corruption or accidental deletion.

Download recommendations as PDF | Download recommendations as CSV

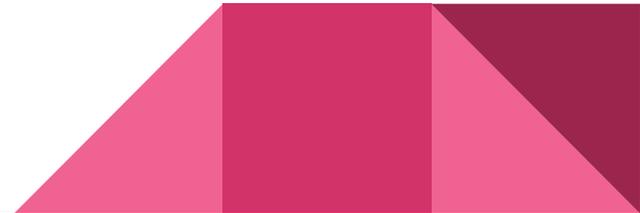
ARM Templates

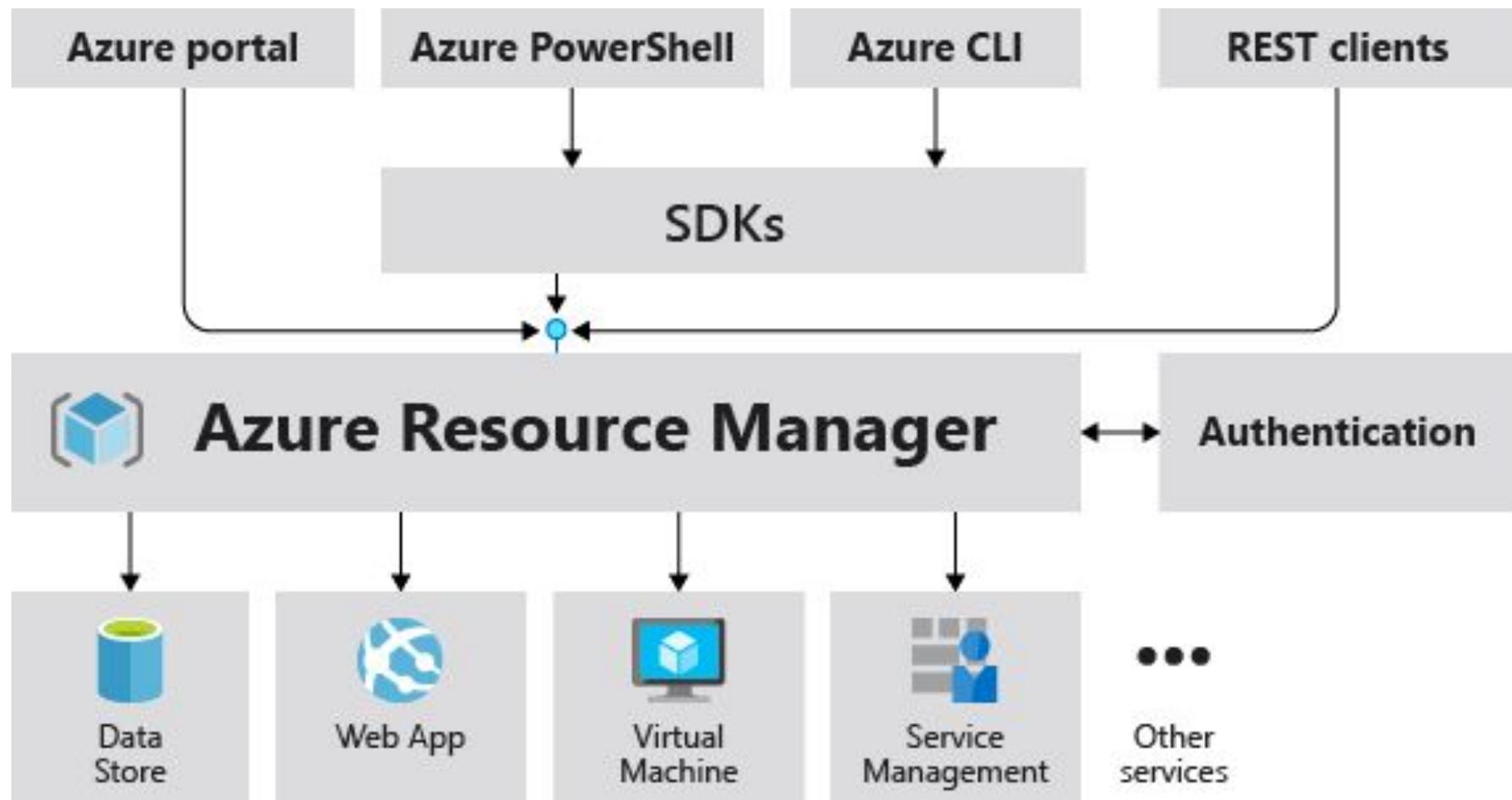
Azure Resource Manager (ARM)

The deployment and management service for Azure

Management layer that allows you to create, update, and delete resources called **“deployments”**

All actions that you take to manage your Azure resources goes through the ARM layer





```
"resources": [  
  {  
    "type": "Microsoft.Storage/storageAccounts",  
    "apiVersion": "2019-06-01",  
    "name": "[parameters('storageAccountName')]",  
    "location": "[parameters('location')]",  
    "sku": {  
      "name": "Standard_LRS",  
      "tier": "Standard"  
    },  
    "kind": "StorageV2",  
    "properties": {  
      "accessTier": "Hot"  
    },  
    "resources": [  
      {  
        "type": "blobServices/containers",  
        "apiVersion": "2019-06-01",  
        "name": "[concat('default/', parameters('containerName'))]",  
        "dependsOn": [  
          "[parameters('storageAccountName')]"  
        ]  
      }  
    ]  
  }  
]
```

```
"resources": [  
  {  
    "type": "Microsoft.Storage/storageAccounts",  
    "apiVersion": "2019-06-01",  
    "name": "[parameters('storageAccountName')]",  
    "location": "[parameters('location')]",  
    "sku": {  
      "name": "Standard_LRS",  
      "tier": "Standard"  
    },  
    "kind": "StorageV2",  
    "properties": {  
      "accessTier": "Hot"  
    },  
    "resources": [  
      {  
        "type": "blobServices/containers",  
        "apiVersion": "2019-06-01",  
        "name": "[concat('default/', parameters('containerName'))]",  
        "dependsOn": [  
          "[parameters('storageAccountName')]"  
        ]  
      }  
    ]  
  }  
]
```

Azure Monitor



Azure Monitor

Application

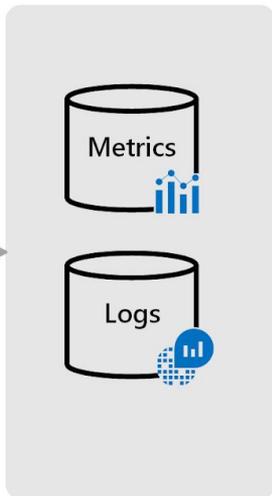
Operating System

Azure Resources

Azure Subscription

Azure Tenant

Custom Sources



Insights



Application



Container



VM



Monitoring Solutions

Visualize



Dashboards



Views



Power BI



Workbooks

Analyze



Metric Analytics



Log Analytics

Respond



Alerts



Autoscale

Integrate



Logic Apps



Export APIs

Azure Service Health

Service Health - Service issues

Search (Ctrl+/)

Select filter ...

ACTIVE EVENTS

Service issues

Planned maintenance

Health advisories

HISTORY

Health history

RESOURCE HEALTH

Resource health

ALERTS

Health alerts

Subscription: Pay-As-You-Go (Azure Courses) | Region: 6 selected | Service: 154 selected

Save filter | Delete filter | Pin filtered world map to dashboard | Create service health alert



No service issues found

See 1 resolved service issues in the last 24 hours, or see all past issues in the [health history](#).

Launch guided tour

Service Health - Health history

Subscription

Pay-As-You-Go (Azure Courses)

Region

North Europe

Health Event Type

Service issue

Time Range

Last 24 hours

ISSUE NAME

TRACKING ID

EVENT TYPE

SERVICE(S)

REGION(S)

START TIME

UPDATE

Connectivity Issue - North Europe - RCA

V7KX-9BG

Incident

Network Infrastr...

North Europe

07:50 UTC, 05/22/2019

16 h ago

[Summary](#)

[Issue updates](#)

[Root cause analysis](#)

Last update (16 h ago)



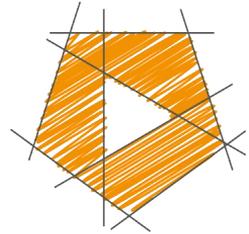
[Download the issue summary](#)

Summary of impact: Between 07:50 and 08:36 UTC on 22 May 2019, a subset of customers may have experienced connectivity issues when accessing Azure services in North Europe.

Root Cause: During this incident, approximately 12% of the network flows in or out of a single row of servers in a data center in North Europe would have failed.

Each row of servers in an Azure data center (DC) is connected to the DC network spine by eight routers. During this incident, one of the eight routers in a single row of a DC in North Europe began dropping all packets that it was expected to forward. Flows are spread over the eight routers, so flows sent to this one router would have been

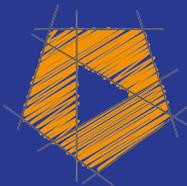
Was this helpful?



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Describe General and Network
Security Features (10-15%)

Describe general security and network security features (10-15%)

Describe Azure security features

- describe basic features of Azure Security Center, including policy compliance, security alerts, secure score, and resource hygiene
- describe the functionality and usage of Key Vault
- describe the functionality and usage of Azure Sentinel
- describe the functionality and usage of Azure Dedicated Hosts

Describe Azure network security

- describe the concept of defense in depth
- describe the functionality and usage of Network Security Groups (NSG)
- describe the functionality and usage of Azure Firewall
- describe the functionality and usage of Azure DDoS protection



Azure Security Center

Azure Security Center

Unified infrastructure security management system that monitors and protects your systems inside and outside of Azure

- Strengthen security
- Protect against threats
- Get secure faster



Dashboard >

Security Center | Overview

Showing subscription 'Pay-As-You-Go (Azure Courses)'

Subscriptions What's new

Policy & compliance

Overall Secure Score



[Review your Secure Score >](#)

Regulatory compliance

View and monitor your compliance posture relative to industry standards and regulations

[Enable Regulatory Compliance ->](#)

Subscription coverage



Regulatory compliance



View your compliance posture relative to the standards and regulations that are important to you. Remediate assessments to watch your compliance posture improve.

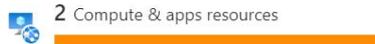
[Learn more >](#)

Resource security hygiene

Recommendations



Resource health by severity



Networking



Dashboard >



Security Center | Overview

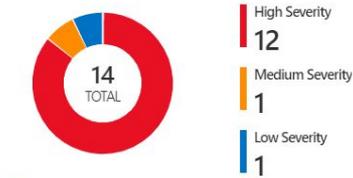
Showing subscription 'Pay-As-You-Go (Azure Courses)'



>> Subscriptions What's new

Resource security hygiene

Recommendations



8 Unhealthy resources

Review and improve your Secure Score



Review and resolve security vulnerabilities to improve your Secure Score and secure your workload

[Learn more >](#)

Resource health by severity



Networking



There are **1 high severity** recommendations to resolve.

[Secure your network resources](#)

Threat protection

Security alerts by severity

Security alerts over time

Most attacked resources

Key Vault



Central, secure repository for
your secrets, certificates and
keys



azsjdkeyvault - Secrets

Key vault

Search (Ctrl+/)

- Overview
- Activity log
- Access control (IAM)
- Tags
- Diagnose and solve problems

Settings

- Keys
- Secrets**
- Certificates
- Access policies

Generate/Import Refresh Restore Backup

NAME	TYPE	STATUS
A37CA50C-C519-4605-8A73-5F67...	Wrapped BEK	✓ En
weather-service-api		✓ En

Create a key

Options

Generate



* Name 

Key Type 

RSA

EC

RSA Key Size

2048

3072

4096

Set activation date? 

Set expiration date? 

Enabled?

Yes

No

NAME	THUMBPRINT	STATUS	EXPIRATION DATE
------	------------	--------	-----------------

COMPLETED

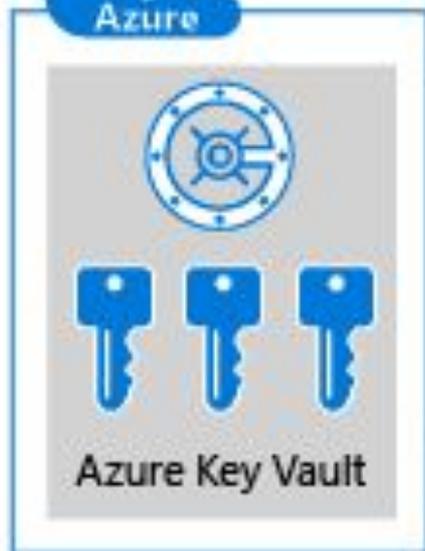
azsjdsfc-cert	61D304B7D8692F0CDF120C2C940...	✓ Enabled	2/25/2020
---------------	--------------------------------	-----------	-----------

newsfckey	395F068B7972B75D5F09C7C82D6...	✓ Enabled	2/25/2020
-----------	--------------------------------	-----------	-----------

IN PROGRESS, FAILED OR CANCELLED

There are no certificates available.

Administrator with
Azure subscription
creates and manages
vault and keys



URIs for keys



Azure developer

Usage logging for keys



Security administrator

Azure Sentinel

What is Sentinel?

Centralizes all the log files from various resources

Analyzes them to detect threats

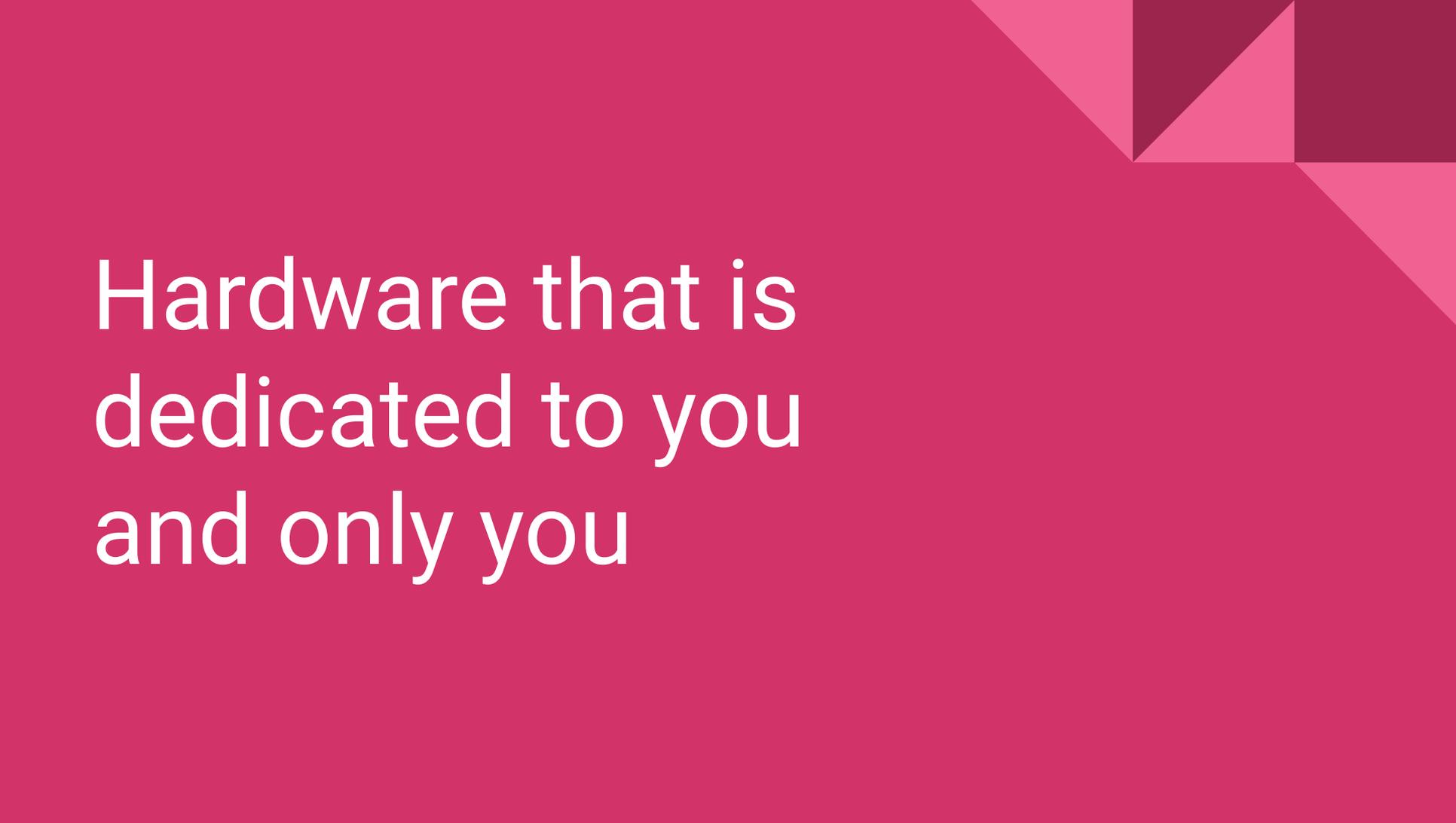
Allows you to run queries on those logs yourself

Investigate an incident

Orchestration and automation to fix the issues

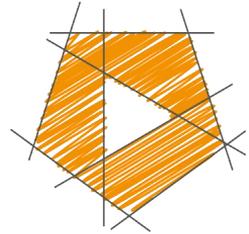


Azure Dedicated Hosts

The background is a solid pink color. In the top right corner, there are several overlapping geometric shapes: a dark pink square, a medium pink square, and a light pink square, all partially cut off by the edge of the frame.

Hardware that is
dedicated to you
and only you

You can reserve a machine and run multiple virtual machines on it (to the machine limit)



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Defense in Depth

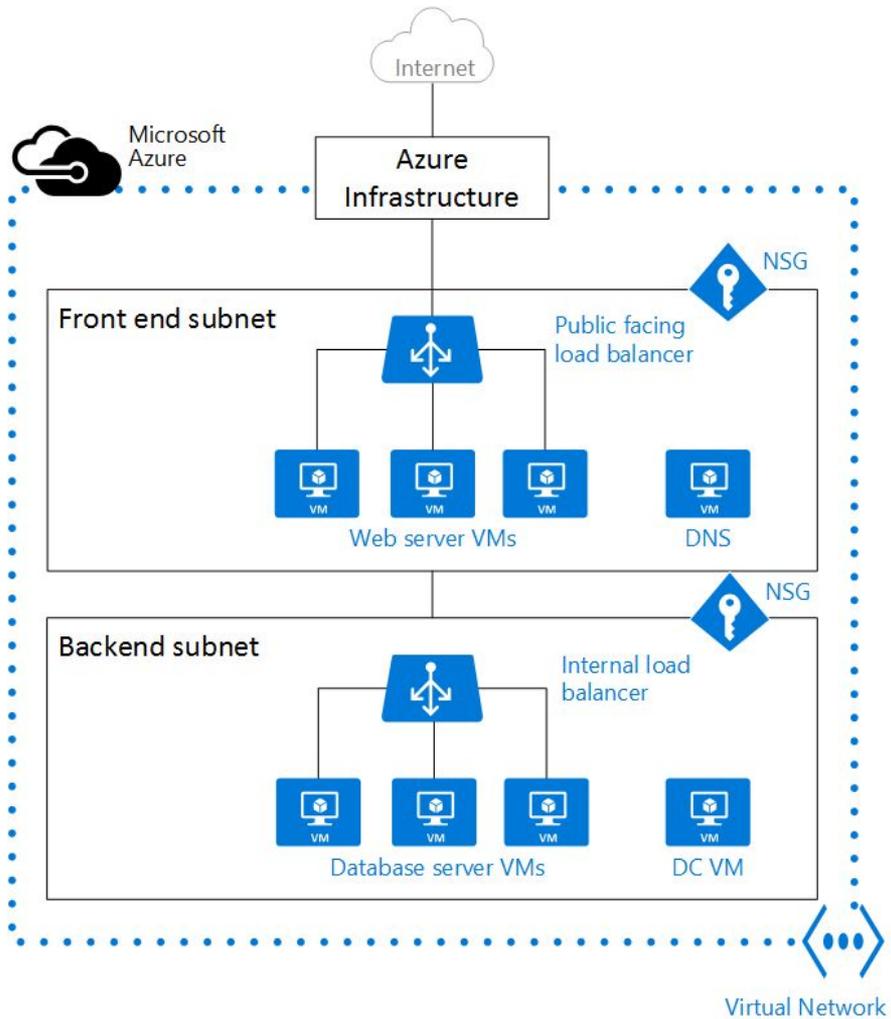
Security Layers

- Data - i.e. virtual network endpoint
 - Application - i.e. API Management
 - Compute - i.e. Limit Remote Desktop access, Windows Update
 - Network - i.e. NSG, use of subnets, deny by default
 - Perimeter - i.e. DDoS, firewalls
 - Identity & access - i.e. Azure AD
 - Physical - i.e. Door locks and key cards
- 

Defense in Depth

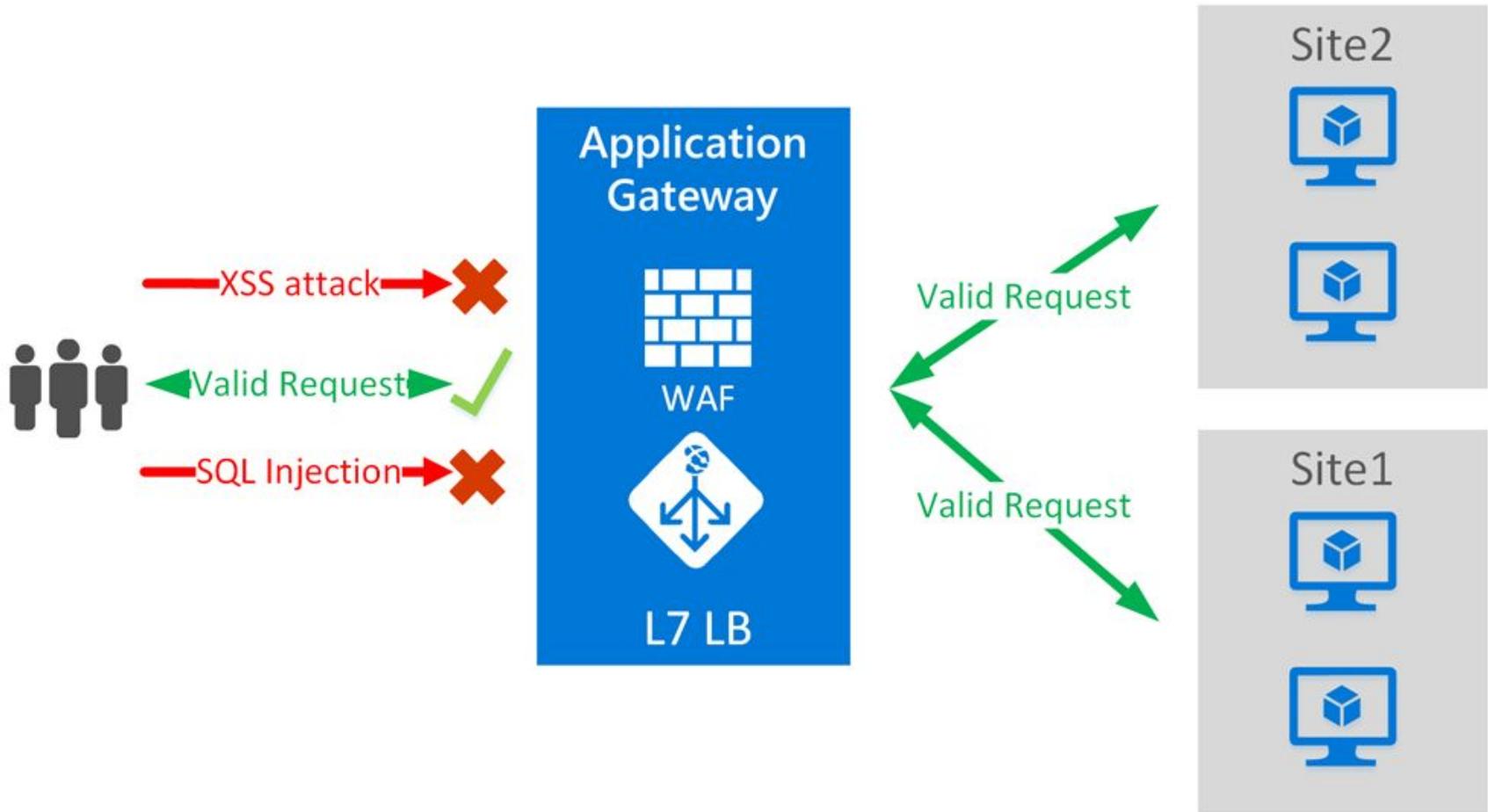
Identity & Access	Apps & Data Security	Network Security	Threat Protection	Security Management
Role-based access	Encryption	DDOS Protection	Antimalware	Log Management
Multifactor Authentication	Confidential Computing	NG Firewall	AI-Based Detection and Response	Security Posture Assessment
Central Identity Management	Key Management	Web App Firewall	Cloud Workload Protection	Policy and Governance
Identity Protection	Certificate Management	Private Connections	SQL Threat Protection	Regulatory Compliance
Privileged Identity Management	Information Protection	Network Segmentation	IoT Security	SIEM

Network Security Group (NSG)



Virtual Network

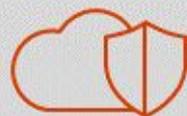
Azure Firewall



Azure DDoS Protection



Basic



Standard

Feature



Always on monitoring



Automatic mitigation for L3/L4 attacks



L7 Protection with Application Gateway Web application firewall



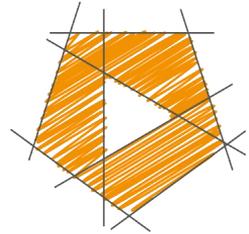
Globally deployed

Protection policies tuned to your VNet

Logging, alerting, and telemetry

Resource cost scale protection

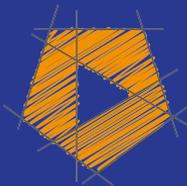




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Describe Identity, Governance,
Privacy, and Compliance Features
(20-25%)

Describe identity, governance, privacy, and compliance features (20-25%)

Describe core Azure identity services

- explain the difference between authentication and authorization
- define Azure Active Directory
- describe the functionality and usage of Azure Active Directory
- describe the functionality and usage of Conditional Access, Multi-Factor Authentication (MFA), and Single Sign-On (SSO)

Describe Azure governance features

- describe the functionality and usage of Role-Based Access Control (RBAC)
- describe the functionality and usage of resource locks
- describe the functionality and usage of tags
- describe the functionality and usage of Azure Policy
- describe the functionality and usage of Azure Blueprints
- describe the Cloud Adoption Framework for Azure

Describe privacy and compliance resources

- describe the Microsoft core tenets of Security, Privacy, and Compliance
- describe the purpose of the Microsoft Privacy Statement, Online Services Terms (OST) and Data Protection Amendment (DPA)
- describe the purpose of the Trust Center
- describe the purpose of the Azure compliance documentation
- describe the purpose of Azure Sovereign Regions (Azure Government cloud services and Azure China cloud services)



What is “Identity”?

In computing,
“identity” is a
representation of a
person, application
or device



Created by Humble_Bee
from Noun Project

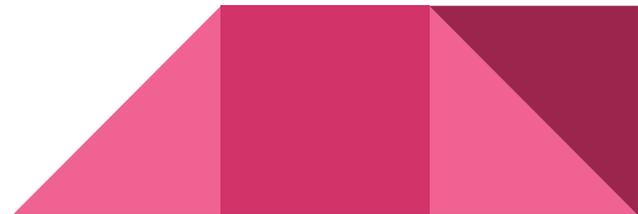
Examples of Identity

John Henry Doe

johndoe@example.com

Monthly Payroll Application

The laser printer at 6th Floor West



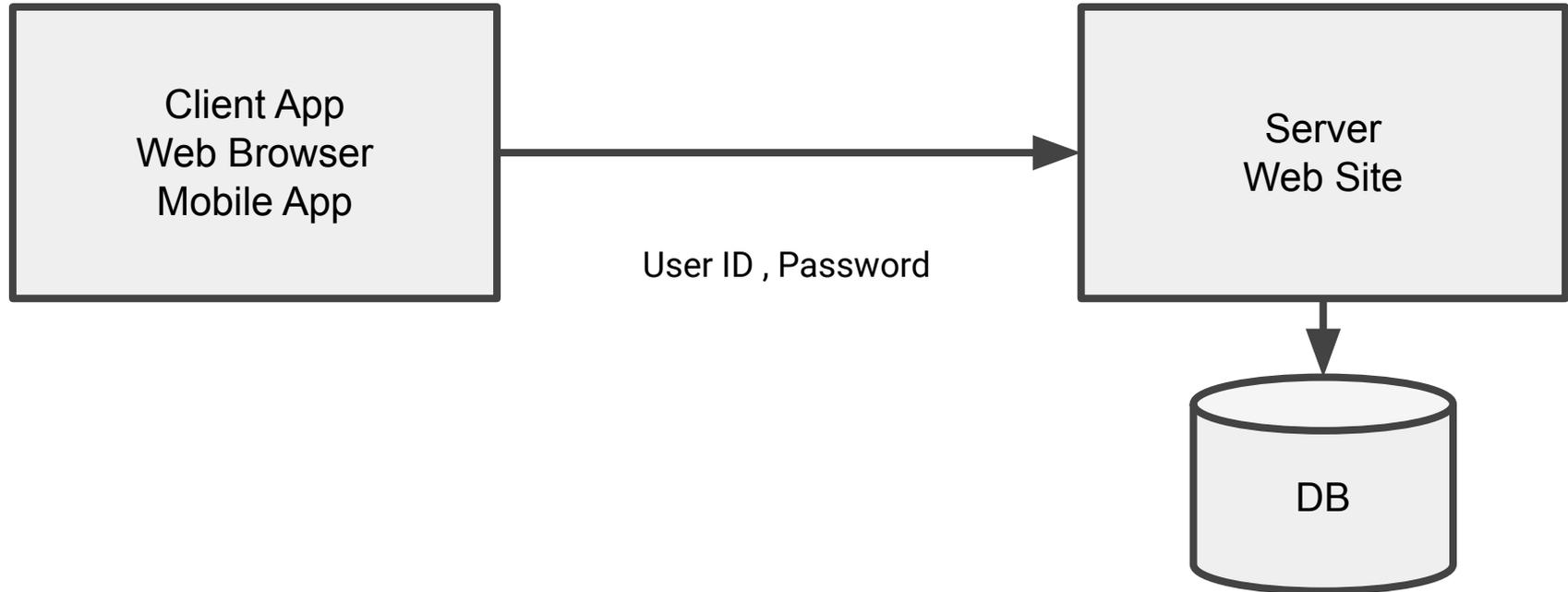
Usually requires a
password, a secret
key or a certificate
to prove

Many applications
require you to log in
to use some of its
functionality



How It's Traditionally Handled

Client-Server Model





Traditionally,
companies have
written their own
code to handle this

Some of the more famous “hacks” have been on custom created identity systems



Created by Peter van Driel
from Noun Project

Hacks

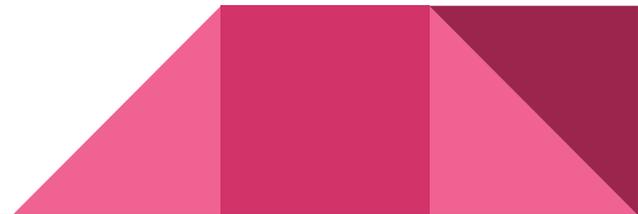
Some companies were storing the password in “plain text”

Some companies were using a simple, reversible hash algorithm (MD5)

Some companies were storing the “salt” along with the data

Not enforcing password change policies

Not enforcing password complexity policies



The top right corner of the slide features a decorative arrangement of overlapping triangles in various shades of pink and magenta, creating a modern, abstract design.

Azure provides an identity management system based on their popular “Active Directory”



Azure Active Directory (Azure AD or AAD)



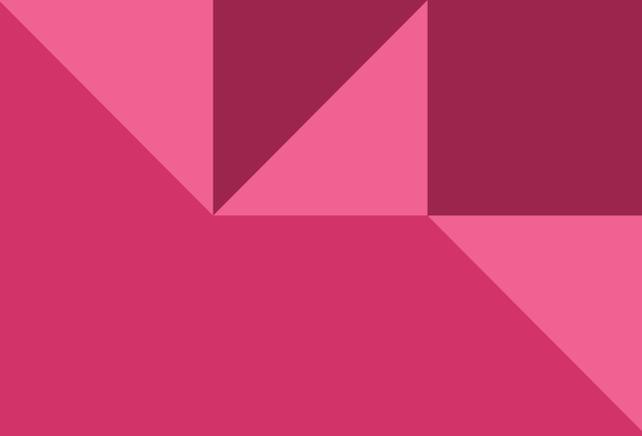
Azure Active Directory

is not the same as

Active Directory

The top right corner of the slide features a decorative arrangement of overlapping geometric shapes. These include a light pink triangle pointing down and to the right, a darker pink triangle pointing up and to the right, and a dark pink square. The background of the slide is a solid, vibrant pink color.

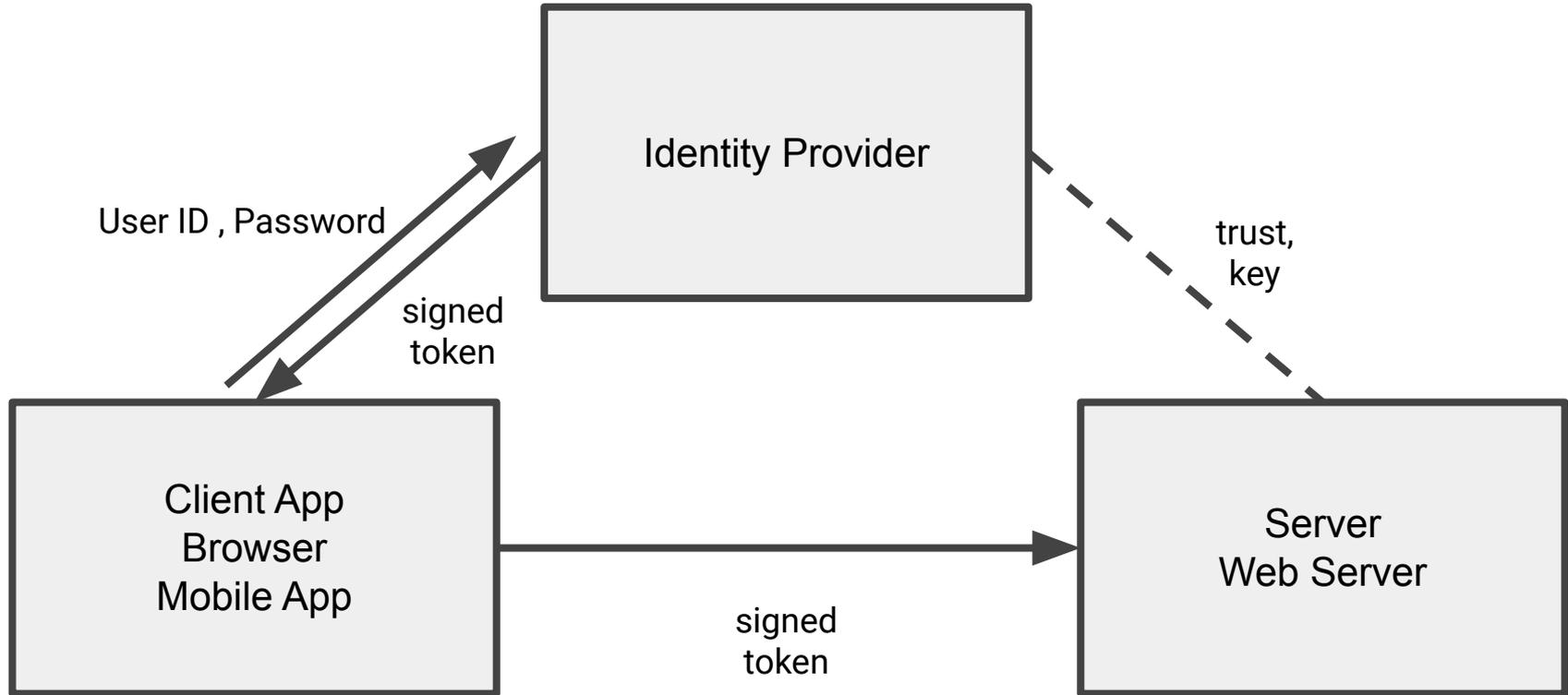
Traditional AD does
not work with
Internet protocols

The top right corner of the slide features a decorative graphic consisting of several overlapping triangles in various shades of pink and magenta, creating a modern, abstract design.

Azure AD provides
“identity as a
service”

Instead of having to
write code to
handle users,
passwords,
password reset

The AAD Model





SAML

OpenID

WS Federation

Benefits of Azure AD

Security



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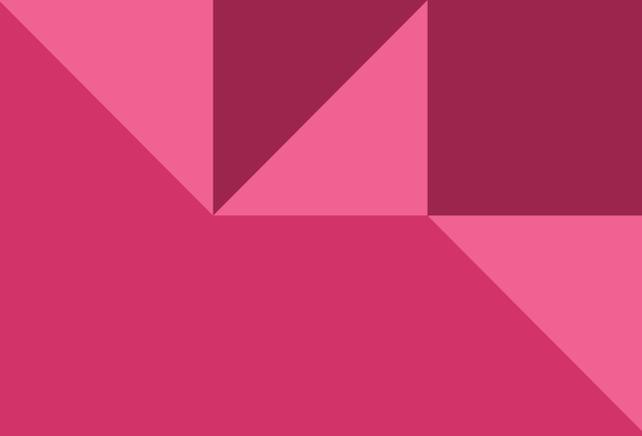
The top right corner of the slide features a decorative arrangement of overlapping geometric shapes. These include a light pink triangle pointing down and to the left, a dark pink square, and another light pink triangle pointing down and to the right, all set against the main pink background.

Reduced
development time,
easier support

The background is a solid pink color. In the top right corner, there is a decorative pattern of overlapping geometric shapes: a light pink triangle pointing down-left, a dark pink square, and a light pink triangle pointing up-right.

More features

Centralized administration

The top right corner of the slide features a decorative arrangement of overlapping triangles in various shades of pink and magenta, creating a modern, abstract design.

Only one user ID
and password
- Single Sign-On

Integration with other Azure services



The difference between Authentication and Authorization

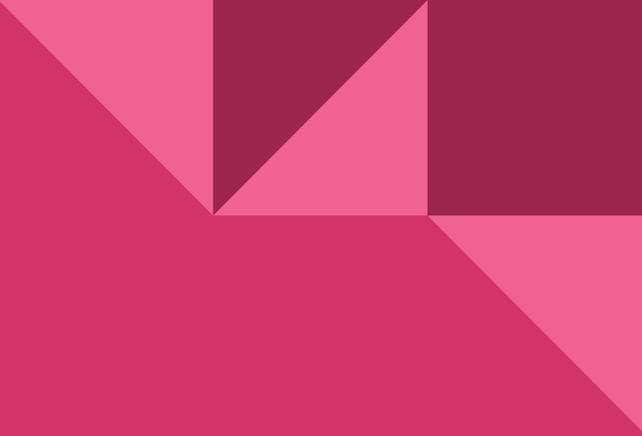
Authentication is a user
proving who they are -
user id and password



Authorization is ensuring
that a user is permitted to
perform an action

Move away from all
authenticated users
having admin
access

Azure Active Directory

The top right corner of the slide features a decorative arrangement of overlapping geometric shapes. These include a light pink triangle pointing down and to the right, a darker pink triangle pointing up and to the right, and a dark pink square. The background of the entire slide is a solid, vibrant pink color.

Microsoft's
preferred solution for
identity management

Azure AD Powers Other Microsoft Services

Azure

Skype

Outlook

OneDrive

Xbox

Office 365 - Teams, SharePoint, PowerBI, etc





Complete solution
for managing users,
groups, roles



Single-sign on



Synchronize with
your corporate AD

Conditional Access

User A attempts to
log in to the app
from within the
company office, as
she does every day

User B attempts to
log in to the app for
the first time in 4
months

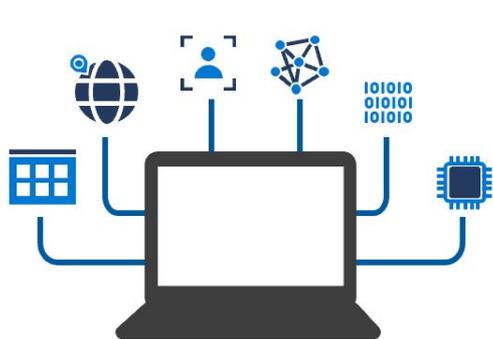
Administrator C
attempts to log in
to the app from
their phone

Administrator D

attempts to log in
to the app from a
location 1200 miles
from the office

The top right corner of the slide features a decorative arrangement of overlapping triangles in various shades of pink and magenta. The text is centered on the left side of the slide.

You can treat some
access attempts as
“routine”, and some
as “not normal”



Signal



Decision



Enforcement



Azure Multi-Factor Authentication

Require 2 or more
pieces of evidence
(factors) in order to
log in

Three Factors

Something you **know** - i.e password

Something you **have** - i.e mobile phone, access to email account

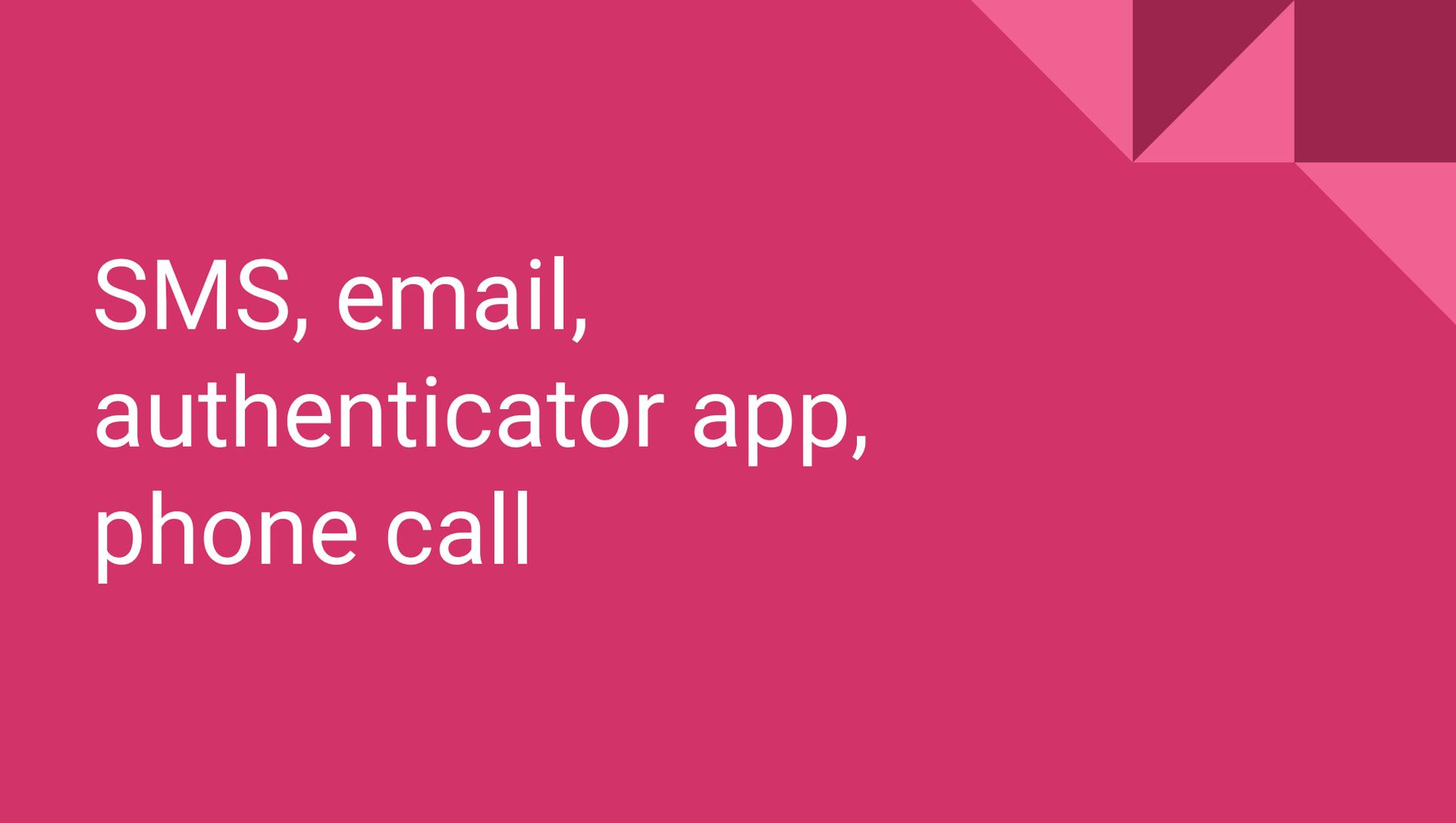
Something you **are** - i.e fingerprint



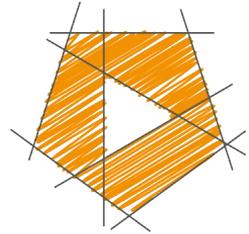
The top right corner of the slide features a decorative arrangement of overlapping triangles in various shades of pink and magenta. The text is centered on the left side of the slide.

Your unique
password could be
1 piece of evidence

But a second piece
of evidence is
required - a unique,
time-limited code
sent to you



SMS, email,
authenticator app,
phone call



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AZ-900 Microsoft Azure Fundamentals

Scott Duffy, Instructor



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<http://sjd.ca/az900>

Role-Based Access Control (RBAC)



Microsoft's
preferred solution
for access control

The top right corner of the slide features a decorative arrangement of overlapping triangles in various shades of pink and magenta, creating a modern, abstract geometric pattern.

Create roles that
represent the
common tasks of
the job



Accountant
Developer
Business Lead

The top right corner of the slide features a decorative arrangement of overlapping triangles in various shades of pink and magenta, creating a modern, abstract design.

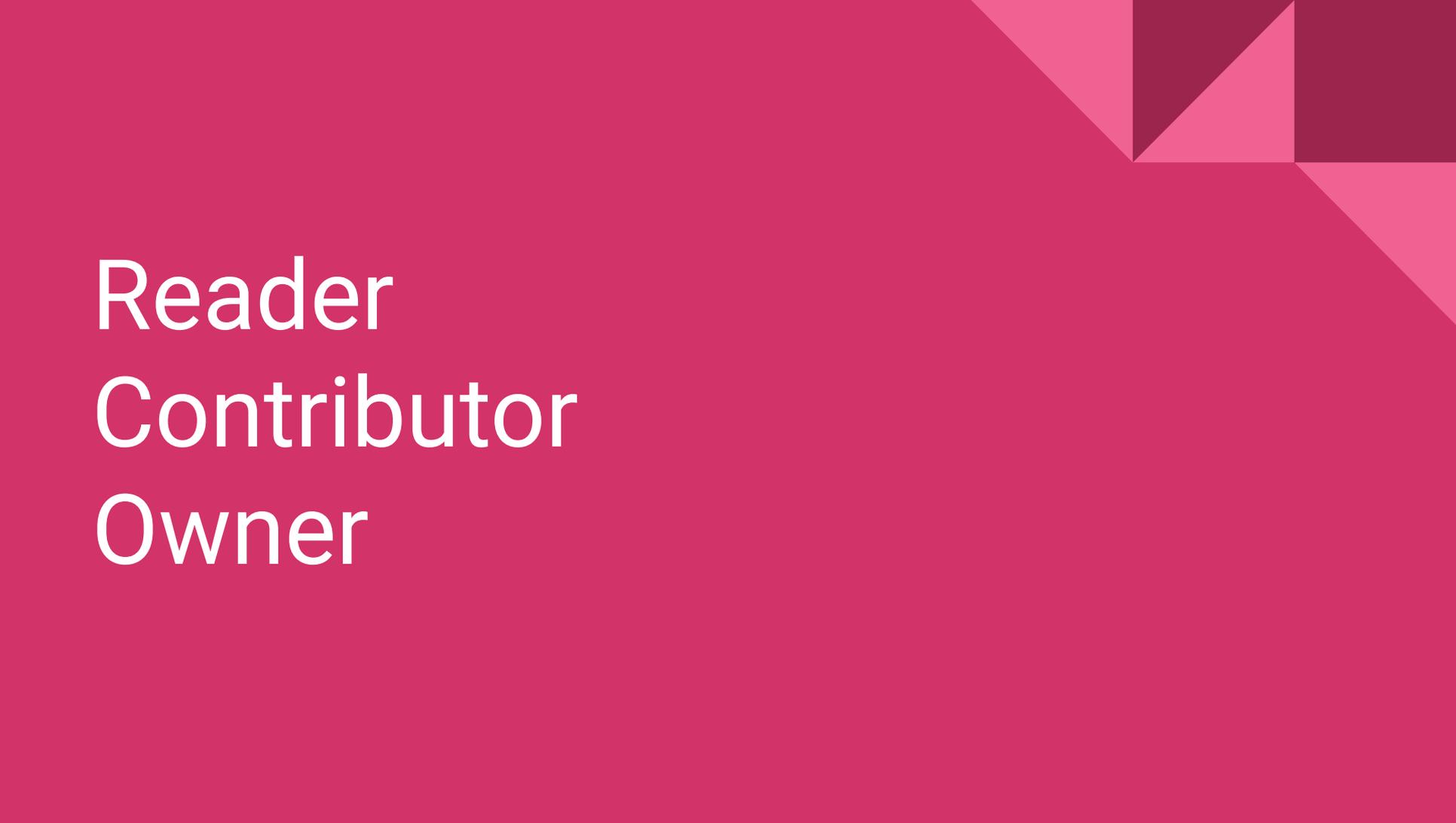
Assign granular
permissions to that
role



Assign users to
that role



Do not assign
granular permissions
to an individual

The background is a solid pink color. In the top right corner, there are several overlapping geometric shapes: a dark pink square, a medium pink square, and a light pink square, all partially cut off by the edge of the image.

Reader

Contributor

Owner

Locks

Read Only
Can Not Delete



Created by An Chi
from Noun Project



openvpnVM - Locks

Virtual machine

Search (Ctrl+/)

Extensions

Continuous delivery (Preview)

Availability set

Configuration

Identity

Properties

Locks

Export template

Operations



+ Add

 Resource group

 Subscription

 Refresh

Add lock

Lock name

dontdeleteme

Lock type

Delete

Notes

This is needed for production processes

OK

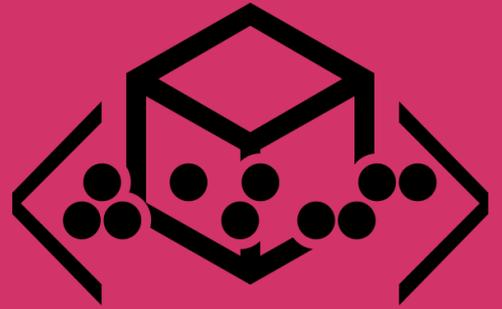
Cancel

The top right corner of the slide features a decorative arrangement of overlapping geometric shapes. These include a light pink triangle pointing downwards, a darker pink triangle pointing upwards, and a dark pink square. The shapes are layered, creating a complex, abstract pattern.

Using RBAC, you
can restrict who
has access to locks

Resource Tags

Can add metadata to Azure resources



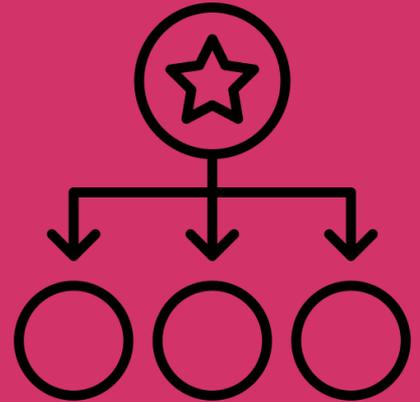
Created by Pascal Conil-lacoste
from Noun Project



Helps with billing
and support issues

Azure Policy

Governance



Created by Made x Made
from Noun Project

The top right corner of the slide features a decorative arrangement of overlapping geometric shapes. These include a light pink triangle pointing down and to the right, a darker pink triangle pointing up and to the right, and a dark pink square. The background of the slide is a solid, vibrant pink color.

Create rules across
all of your Azure
resources

Evaluate
compliance to
those rules



Created by Shems Eddine Boukhatem
from Noun Project

Examples of Built-In Policies

- Require SQL Server 12.0
 - Allowed Storage Account SKUs
 - Allowed Locations
 - Allowed Virtual Machine SKUs
 - Apply tag and its default value
 - Not allowed resource types
- 

Can create custom
policies using JSON
definition

Azure Blueprints

Azure Subscription templates with Roles and Policies already defined



Cloud Adoption Framework for Azure



Microsoft Cloud Adoption Framework for Azure

The Cloud Adoption Framework is a collection of documentation, implementation guidance, best practices, and tools that are proven guidance from Microsoft designed to accelerate your cloud adoption journey.



GET STARTED

[Start your cloud journey](#)



DOWNLOAD

[Find cloud adoption tools and templates](#)



OVERVIEW

[What is the Cloud Adoption Framework](#)



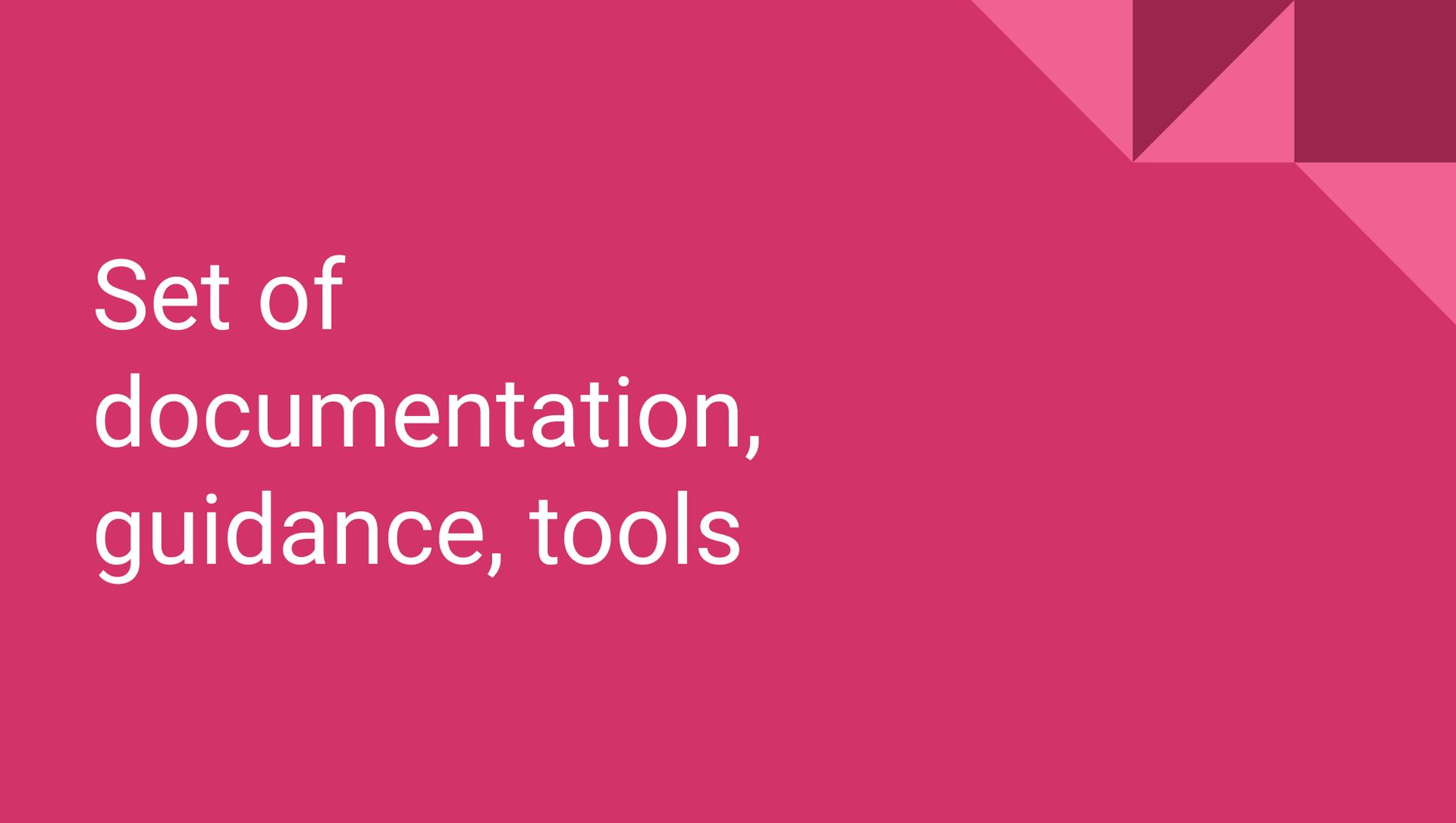
WHAT'S NEW

[What's new in the Cloud Adoption Framework](#)

Cloud Adoption Framework guidance

This guidance aligns to the phases of the cloud adoption lifecycle, ensuring easy access to the right guidance at the right time.





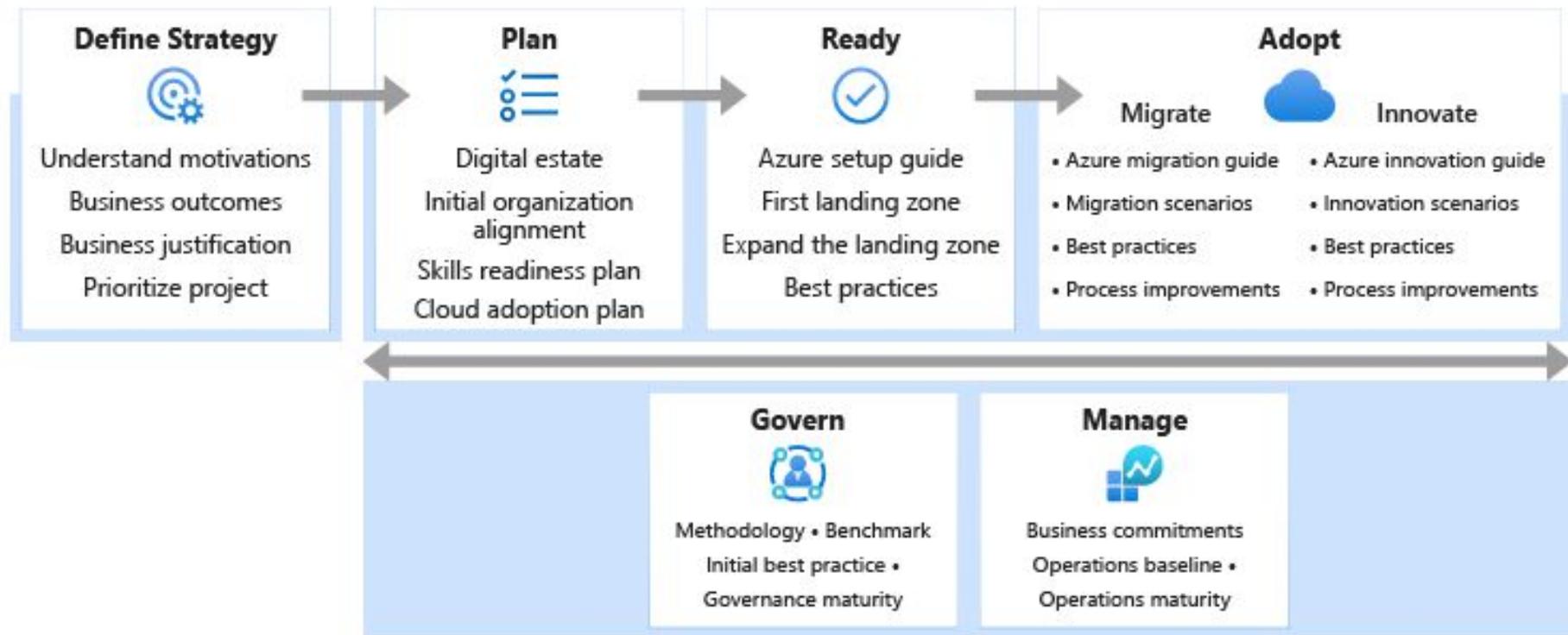
Set of
documentation,
guidance, tools



Best practices for succeeding in the cloud



Microsoft Cloud Adoption Framework for Azure



Filter by title

Cloud Adoption Framework for Azure

About the Framework

What's new

Get started

Overview

> Foundational alignment

Accelerate migration

Build new products and services

Unblock environment design and configuration

Enable customer success

Deliver operational excellence

Manage cloud costs

Secure the enterprise environment

Improve reliability

Ensure consistent performance

Align your organization

Build a cloud strategy team

Download PDF

Get started with the Cloud Adoption Framework

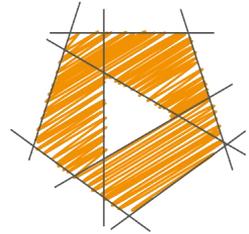
05/04/2020 • 2 minutes to read • 

These common scenarios provide a roadmap through the Microsoft Cloud Adoption Framework for Azure. They can help you balance speed, innovation, and control by using an agile approach to start with a minimally viable solution. You can iterate on and improve that solution over time.

Scenario	Description
We need to understand the fundamental concepts around cloud adoption	If your journey involves the cloud, there are a few initial concepts to understand and decisions to make.
We want to migrate existing workloads to the cloud	This guide is a great starting point if your primary focus is migrating on-premises workloads to the cloud.
We want to build new products and services in the cloud	This guide can help you prepare to deploy innovative solutions to the cloud.
We're blocked by environment design and configuration	This guide provides a quick approach to designing and configuring your environment.
We need to ensure operational excellence during cloud transformation	The steps in this guide help the strategy team lead the organizational change management that's required to consistently

Is this page helpful?

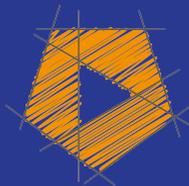
 Yes  No



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Scott Duffy, Instructor



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<http://sjd.ca/az900>



Core Tenets of Security, Privacy and Compliance

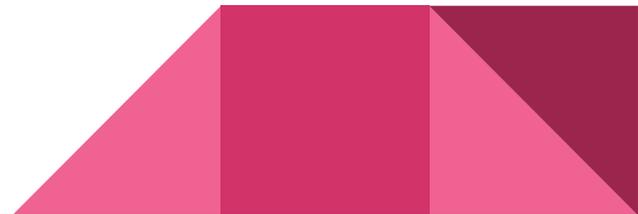
Azure: Trusted Cloud

- Security
- Privacy
- Compliance
- Resiliency
- Intellectual Property (IP) protection



Security

- Azure is built with security in mind
- Azure delivers tools and technologies to help organizations protect applications and data
- Azure uses encryption
- Azure offers advanced tools to detect and defend against security threats



Privacy

- You own all your data in Azure
 - Microsoft will not mine your data or use it for marketing
 - You control where the data is located and who has access
 - You can access your own data at any time for any reason
 - Microsoft follows a specific policy for government and law enforcement requests
 - Microsoft follows a specific policy to remove data if you discontinue using their service
- 

Compliance

Microsoft follows international standards and helps customers to follow those standards too if they wish

Azure has more than 90 compliance certifications

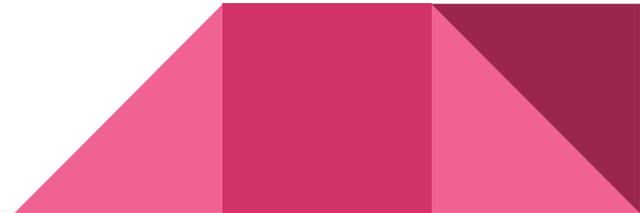
Azure follows more than 50 regional standards

Azure can help with standards in more than 35 industries like health care, government, finance, etc.



Reliability and Resiliency

- High availability
- Disaster recovery
- Backup

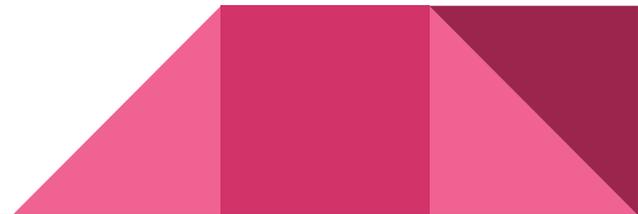


Protecting IP

You can build your solutions on top of Azure's products and services

Azure offers specific protections against frivolous infringement claims

See: Azure IP Advantage and Shared Innovation Initiative





Microsoft Privacy Statement

privacy.microsoft.com

Microsoft Privacy Statement

Last Updated: May 2019 [What's new?](#)

[Expand All](#)

[Print](#)

Your privacy is important to us. This privacy statement explains the personal data Microsoft processes, how Microsoft processes it and for what purposes.

Microsoft offers a wide range of products, including server products used to help operate enterprises worldwide, devices you use in your home, software that students use at school, and services developers use to create and host what's next. References to Microsoft products in this statement include Microsoft services, websites, apps, software, servers and devices.

Please read the product-specific details in this privacy statement, which provide additional relevant information. This statement applies to the interactions Microsoft has with you and the Microsoft products listed below, as well as other Microsoft products that display this statement.

Personal data we collect

How we use personal data

Reasons we share personal data

How to access and control your personal data

Cookies and similar technologies

Products provided by your organisation – notice to end users

Microsoft account

Other important privacy information [▼](#)

Product-specific details:

Enterprise and developer products [▼](#)

Productivity and communications products [▼](#)

Search and artificial intelligence [▼](#)

Windows [▼](#)

Personal data we collect

Microsoft collects data from you, through our interactions with you and through our products. You provide some of this data directly, and we get some of it by collecting data about your interactions, use and experiences with our products. The data we collect depends on the context of your interactions with Microsoft and the choices that you make, including your privacy settings and the products and features that you use. We also obtain data about you from third parties.

If you represent an organisation, such as a business or educational institution, that utilises Enterprise and Developer Products from Microsoft, please see the [Enterprise and developer products](#) section of this privacy statement to learn how we process your data. If you are an end user of a Microsoft product or a Microsoft account provided by your organisation, please see the [Products provided by your organisation](#) and the [Microsoft account](#) sections for more information.

You have choices when it comes to the technology you use and the data you share. When we ask you to provide personal data, you can decline. Many of our products require some personal data to provide you with a service. If you choose not to provide data necessary to provide you with a product or feature, you cannot use that product or feature. Likewise, where we need to collect personal data by law or to enter into or carry out a contract with you, and you do not provide the data, we will not be able to enter into the contract, or if this

Online Service Terms (OST)



Licensing

Learn

Purchase

Manage

Get Support

Licensing News

All Microsoft



Please provide feedback on the new Product Terms site using the feedback button below. You may continue to access prior and current versions of the Product Terms and Online Services Terms documents [here](#).

Product Terms Site

Feedback

Program: None selected

Effective Date: Present Day Terms

en-US



Product Terms

Welcome

Summary of Changes

Universal License Terms

For all Online Services

For all Software

Online Services Privacy & Security Terms

Product Offerings

Software

Online Services

Licensing Information

Glossary

CAL and ML Equivalency Licenses

Subscription License Suites

Notices

Professional Services

[Product Terms](#) > [Universal License Terms](#) > For all Online Services

For all Online Services

Introduction

The parties agree that these Online Services Terms govern Customer's use of the Online Services and that the DPA (defined in the [Glossary](#)) sets forth their obligations with respect to the processing and security of Customer Data and Personal Data by the Online Services. The parties also agree that, unless a separate Professional Services agreement exists, these Online Services Terms govern the provision of Professional Services, including but not limited to the terms in the [Professional Services](#) section and terms in the DPA for the processing and security of Professional Services Data and Personal Data in connection with that provision. Separate terms, including different privacy and security terms, govern Customer's use of Non-Microsoft Products (as defined below). In the event of any conflict or inconsistency between the DPA and any other terms in Customer's volume licensing agreement (including these terms), the DPA shall prevail.

Service Level Agreements

Most Online Services offer a Service Level Agreement (SLA). For more information regarding the Online Services SLAs, please refer to <http://microsoft.com/licensing/contracts>.

Applicable Online Services Terms and Updates

When Customer renews or purchases a new subscription to an Online Service, the then-current Online Services Terms will apply and will not change during Customer's subscription for that Online Service. When Microsoft introduces features, supplements or related software that are new (i.e., that were not previously included with the subscription), Microsoft may provide terms or make updates to the Online Services Terms that apply to Customer's use of those new features, supplements or related software.

Data Protection Addendum (DPA)

File Home Insert Design Layout References Mailings Review View Help Acrobat

Clipboard Font Paragraph Styles Editing Adobe Acrobat Voice Sensitivity Editor

Volume Licensing

Microsoft Online Services Data Protection Addendum

Last updated July 21, 2020

Published in English on July 21, 2020. Translations will be published by Microsoft when available. These commitments are binding on Microsoft as of July 16, 2020.

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Trust center

<https://www.microsoft.com/en-us/trustcenter/cloudservices/azure>



Microsoft Azure

Now you can take advantage of the latest security, privacy, and compliance features of Microsoft Azure. In this site, you'll learn about the trusted cloud, how your data is stored and accessed, and our comprehensive approach to securing your IT environment.

[Overview](#)[Security](#)[GDPR](#)

About Microsoft Azure

Microsoft Azure is a cloud computing platform that features a growing collection of integrated cloud services—analytics, computing, database, mobile, networking, storage, and web. Azure includes integrated tools, pre-built templates, and managed services that make it easier to build and manage enterprise, mobile, web, and Internet of Things (IoT) apps faster, using skills you have and technologies you already know.

We understand that some organizations are still wary about cloud computing; keeping data confidential is essential for any organization. That's why Microsoft has made an industry-leading commitment to the protection and privacy of your data. We were the first cloud provider recognized by the European Union's data protection authorities for our commitment to rigorous EU privacy laws. Microsoft was also the first major cloud provider to adopt the new international cloud privacy standard, [ISO 27018](#).

Azure safeguards customer data in the cloud and provides support for companies that are bound by extensive regulations regarding the use, transmission, and storage of customer data.

[Azure Security Documentation](#) >

[Azure compliance](#)



[Privacy](#)



[Transparency](#)



[Azure Government](#)



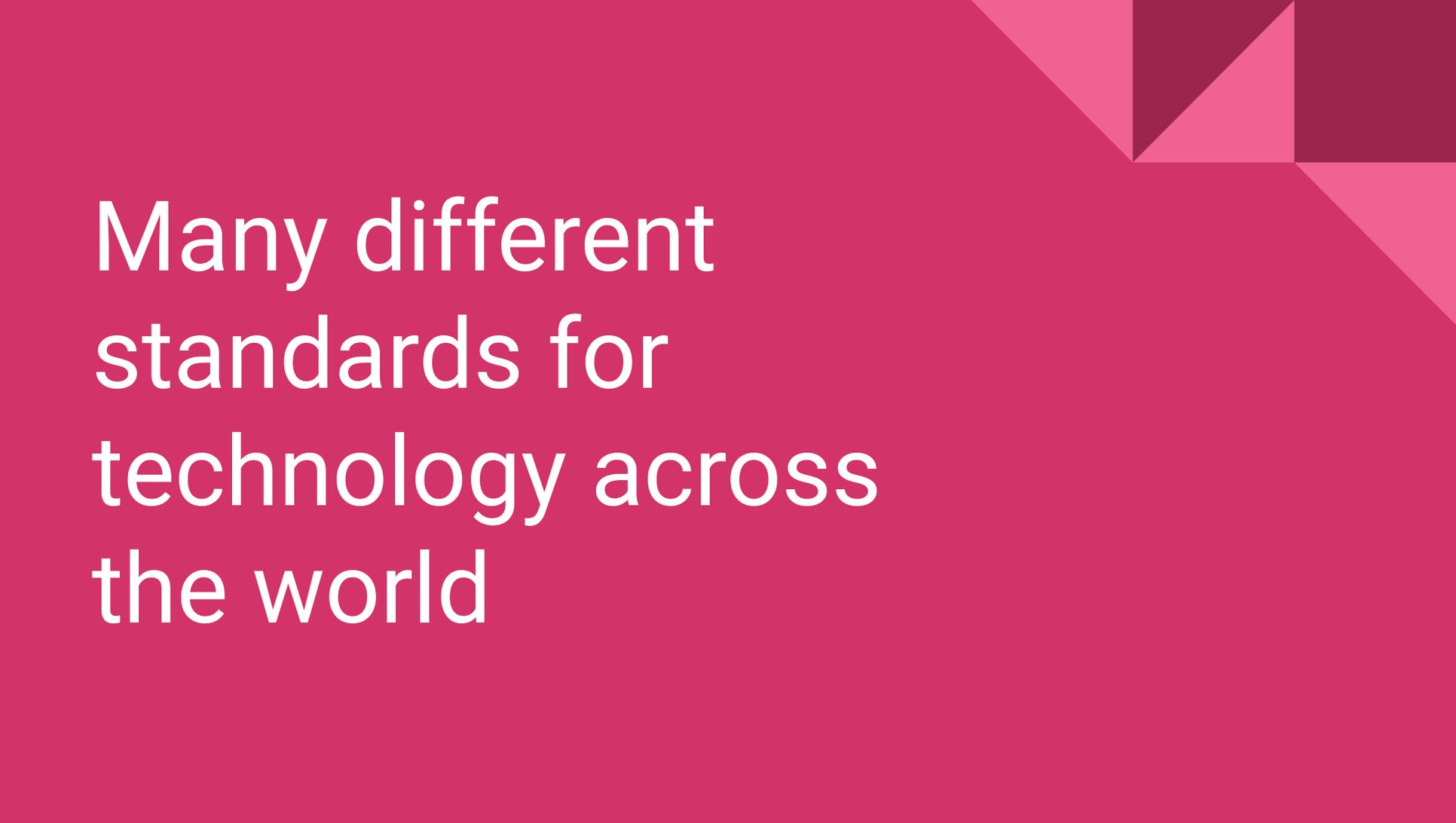
[Azure industries](#)



Get the information you need



Compliance terms such as GDPR,
ISO and NIST



Many different
standards for
technology across
the world



Microsoft claims to
be in compliance
with many of them

The top right corner of the slide features a decorative arrangement of overlapping geometric shapes. These include a light pink triangle pointing down and to the left, a dark pink triangle pointing up and to the left, and a dark pink square. The background of the slide is a solid, vibrant pink color.

And has tools to
help you be in
compliance with
others

General Data Protection Regulation (GDPR)

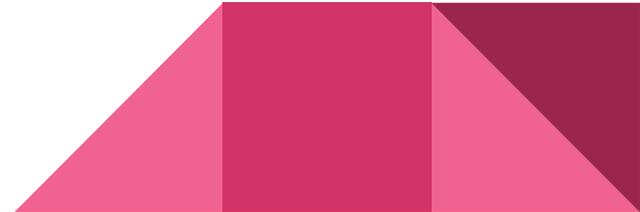
GDPR is a new set of rules designed to give EU citizens more control over their personal data

Affects companies outside of the EU that handle EU citizen's data

Data has to be collected legally under strict conditions

Data has to be protected from misuse

Reporting obligations if data is mishandled

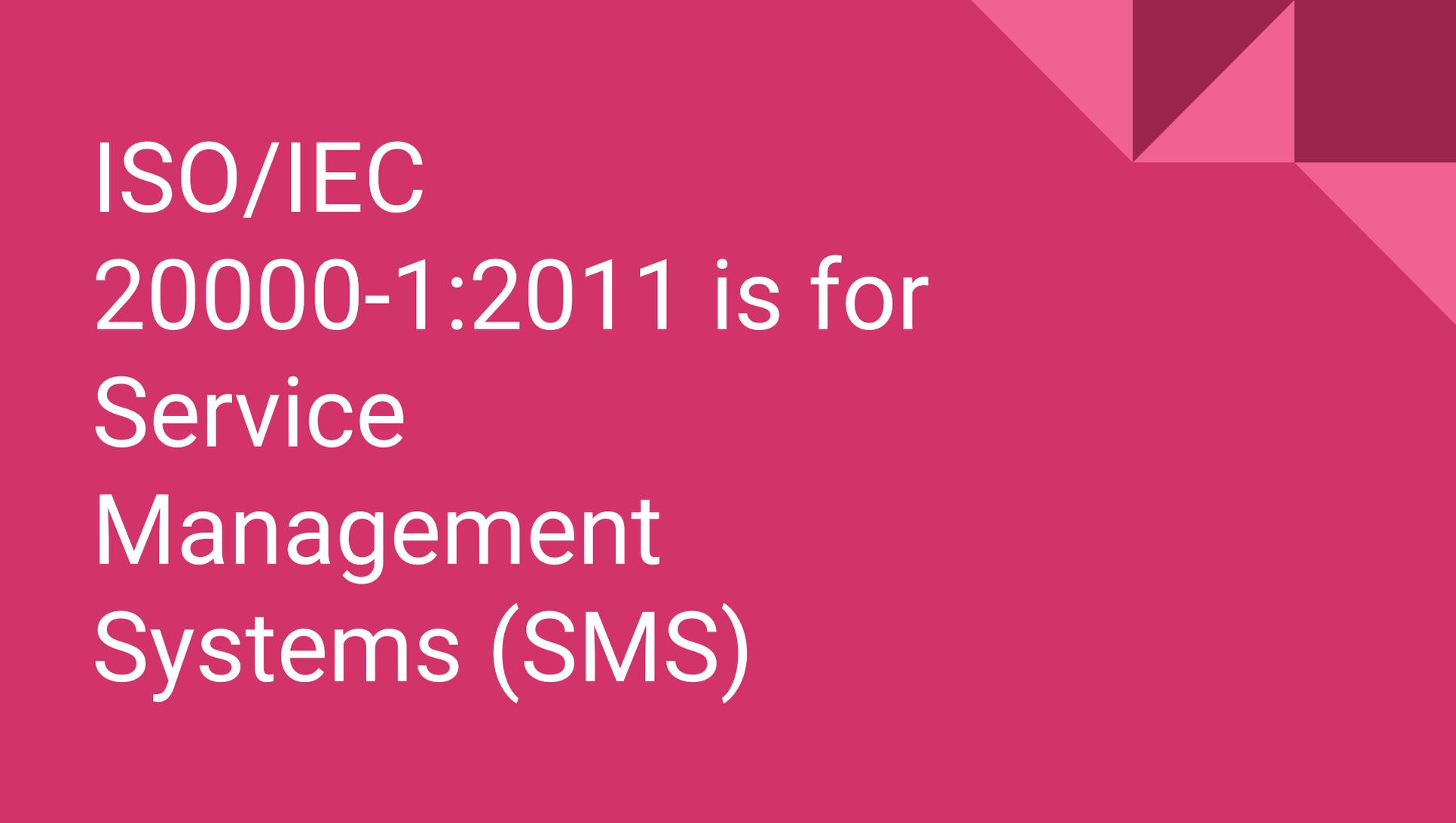


ISO - International Organization for Standardization

Certification	Azure	Azure Government
CSA STAR Certification	✓	✓ (new)
ISO 27001:2013	✓	✓ (new)
ISO 27017:2015	✓	✓ (new)
ISO 27018:2014	✓	✓ (new)
ISO 20000-1:2011	✓ (new)	✓ (new)
ISO 22301:2012	✓	✓
ISO 9001:2015	✓	



ISO 9001:2015 is
for Quality
Management
Systems (QMS)



ISO/IEC

20000-1:2011 is for

Service

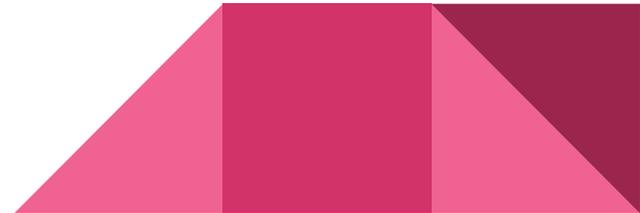
Management

Systems (SMS)

NIST Cybersecurity Framework (CSF)

National Institute of Standards and Technology (NIST)

Audited for compliance to security and privacy processes





NIST Cybersecurity Framework (CSF)

Microsoft Cloud Services meet the National Institute of Standards and Technology (NIST) Cybersecurity Framework (CSF).

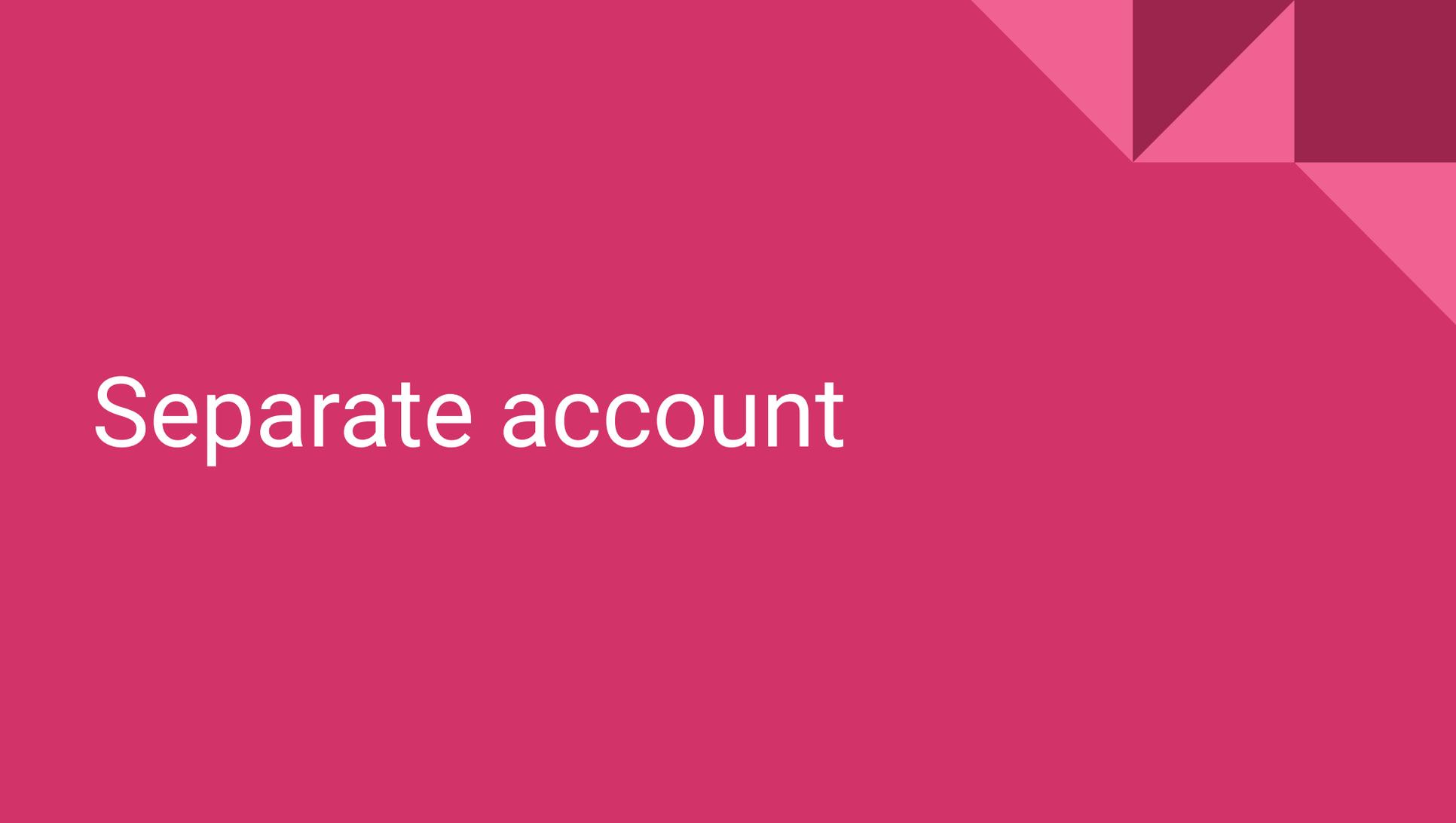
Microsoft and the NIST CSF

NIST Cybersecurity Framework (CSF) is a voluntary Framework that consists of standards, guidelines, and best practices to manage cybersecurity-related risks. Microsoft Cloud services have undergone independent, third-party FedRAMP Moderate and High Baseline audits and are certified according to the FedRAMP standards. Additionally, through a validated assessment performed by HITRUST, security and privacy standards development and accreditation organization, Office 365 is certified to the objectives specified in the NIST CSF.

Learn how to accelerate your NIST Cybersecurity Framework deployment with Compliance Manager and our Azure Security and Compliance Blueprint:

[Download the Azure Security and Compliance Blueprint - NIST CSF Risk Assessment Checklist](#) > [Learn more about the NIST CSF assessment for Office 365 in Compliance Manager](#) >

Azure Sovereign Regions

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Separate account

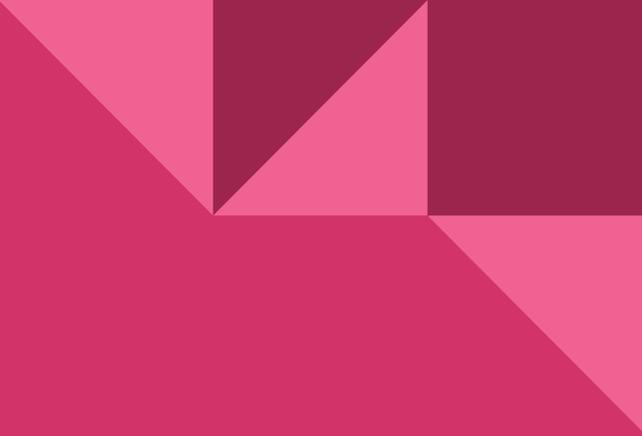


For US government
agencies - federal,
state and local

Department of
Defense (DoD) has
its own too

The top right corner of the slide features a decorative arrangement of overlapping geometric shapes. These include a light pink triangle pointing down and to the right, a darker pink triangle pointing up and to the right, and a dark pink square. The background of the slide is a solid, vibrant pink color.

Isolated data
centers separate
from the Azure
public cloud



Meets standards
specific to
government

FedRAMP, NIST
800.171 (DIB), ITAR,
IRS 1075, DoD L4,
and CJIS

portal.azure.us

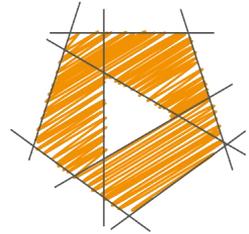
The top right corner of the slide features a decorative arrangement of overlapping geometric shapes. These include a light pink triangle pointing down and to the right, a darker pink triangle pointing up and to the right, and a dark pink square. The background of the slide is a solid, medium pink color.

Different URLs for
connecting to
storage, functions,
etc.

Azure China

Separate account

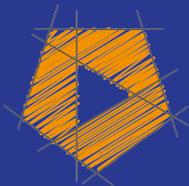
Data remains in China



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Scott Duffy, Instructor



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<http://sjd.ca/az900>

Describe Azure cost management and Service Level Agreements (10-15%)

Describe Azure cost management and Service Level Agreements (10-15%)

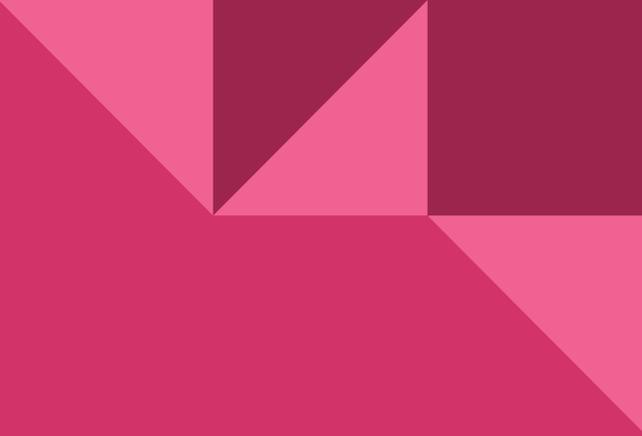
Describe methods for planning and managing costs

- identify factors that can affect costs (resource types, services, locations, ingress and egress traffic)
- identify factors that can reduce costs (reserved instances, reserved capacity, hybrid use benefit, spot pricing) Describe the functionality and usage of the Pricing calculator and the Total Cost of Ownership (TCO) calculator
- describe the functionality and usage of Azure Cost Management

Describe Azure Service Level Agreements (SLAs) and service lifecycles

- describe the purpose of an Azure Service Level Agreement (SLA)
- identify actions that can impact an SLA (i.e. Availability Zones)
- describe the service lifecycle in Azure (Public Preview and General Availability)

Factors affecting costs

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Different services
are billed based on
different factors

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Free services

Free services

Resource groups

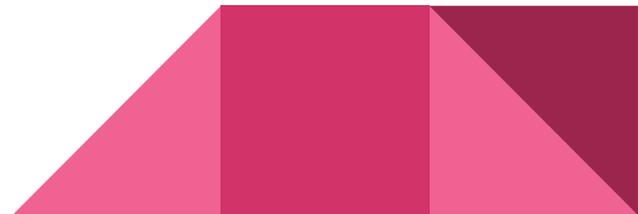
Virtual network (up to 50)

Load balancer (basic)

Azure Active Directory (basic)

Network security groups

Free-tier web apps (up to 10)



kWh



KWHR

Rr 27 7/9

KILOWATT HOURS

68775-3

FM 2S CL 200 240 V Type **MX**
 TA 30 Kh 7.2 3W 60Hz



76 548 902 0906



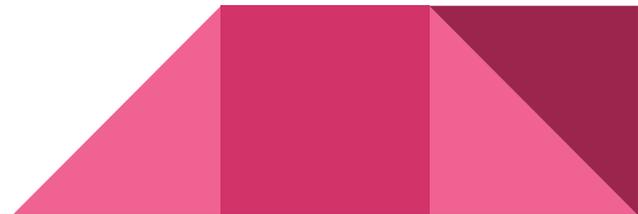
-546

Pay per usage
(consumption
model)

Opportunity for cost savings

Azure Functions:

- 1 million executions free per month
- \$0.20 per million executions
- Cheapest virtual machine is \$20 per month



Pay per usage services

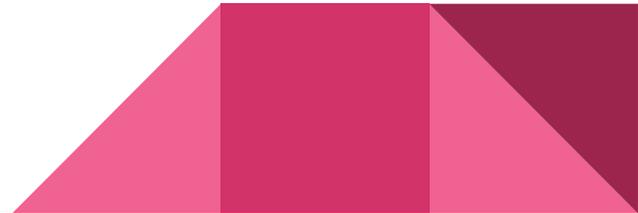
Functions

Logic Apps

Storage (pay per GB)

Outbound bandwidth

Cognitive Services API



Pay for time (per second)



Created by Alvida Biersack
from Noun Project

Per second billing
means billing stops
when the VM is
stopped *

Stability in pricing

Pay a fixed price per month for computing power or storage capacity

Whether you use it or not

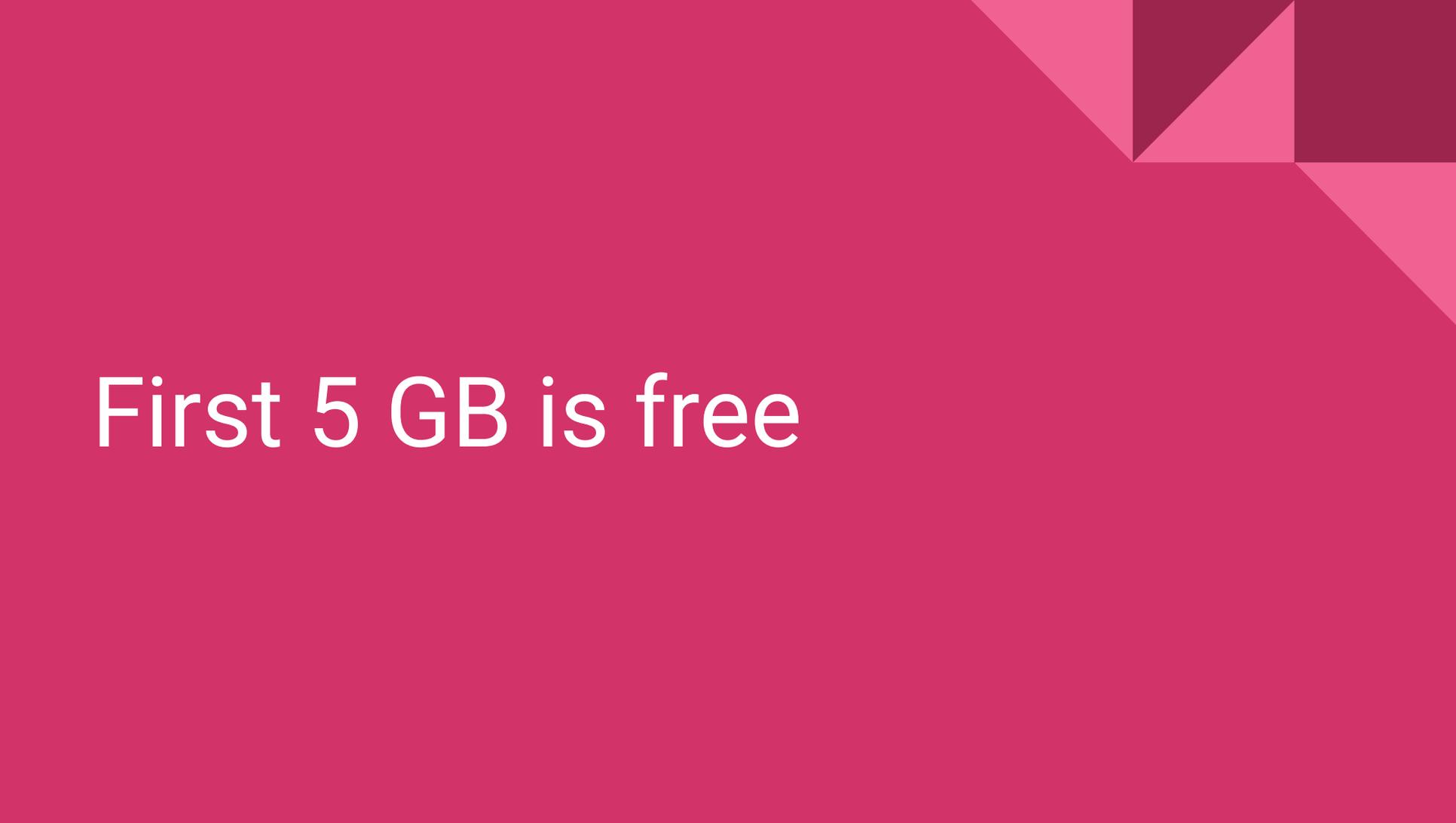
Discounts for 1-year or 3-year commitment in VM (Reserved Instances)

Multi-tenant or isolated environment



The background is a solid pink color. In the top right corner, there are several overlapping geometric shapes: a dark pink square, a medium pink square, and a light pink square, all partially cut off by the edge of the image.

Pay for bandwidth

The background is a solid pink color. In the top right corner, there are several overlapping geometric shapes in various shades of pink and dark pink, creating a modern, abstract design.

First 5 GB is free

The background is a solid pink color. In the top right corner, there is a decorative graphic consisting of several overlapping geometric shapes: a dark pink square, a medium pink square, and a light pink square, all partially cut off by the edge of the frame.

Inbound data is free

Bandwidth costs

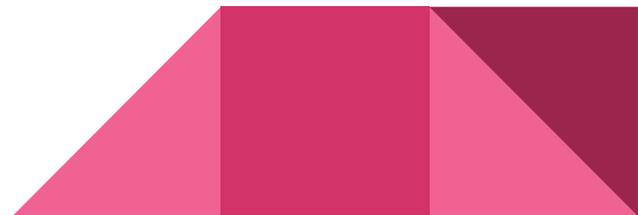
Outbound data, \$0.05 to \$0.087 / GB for Zone 1 (NA and EU w/o Germany)

Outbound data, \$0.057 to \$0.10 / GB for DE Zone 1 (Germany)

Outbound data, \$0.08 to \$0.12 / GB for Zone 2 (Asia, Africa and Oceania)

Outbound data, \$0.16 to \$0.181 / GB for Zone 3 (Brazil)

(Availability zone pricing is different)



1 PB of data
transfer = \$52,000



Best practices for minimizing Azure costs

Azure Advisor cost tab

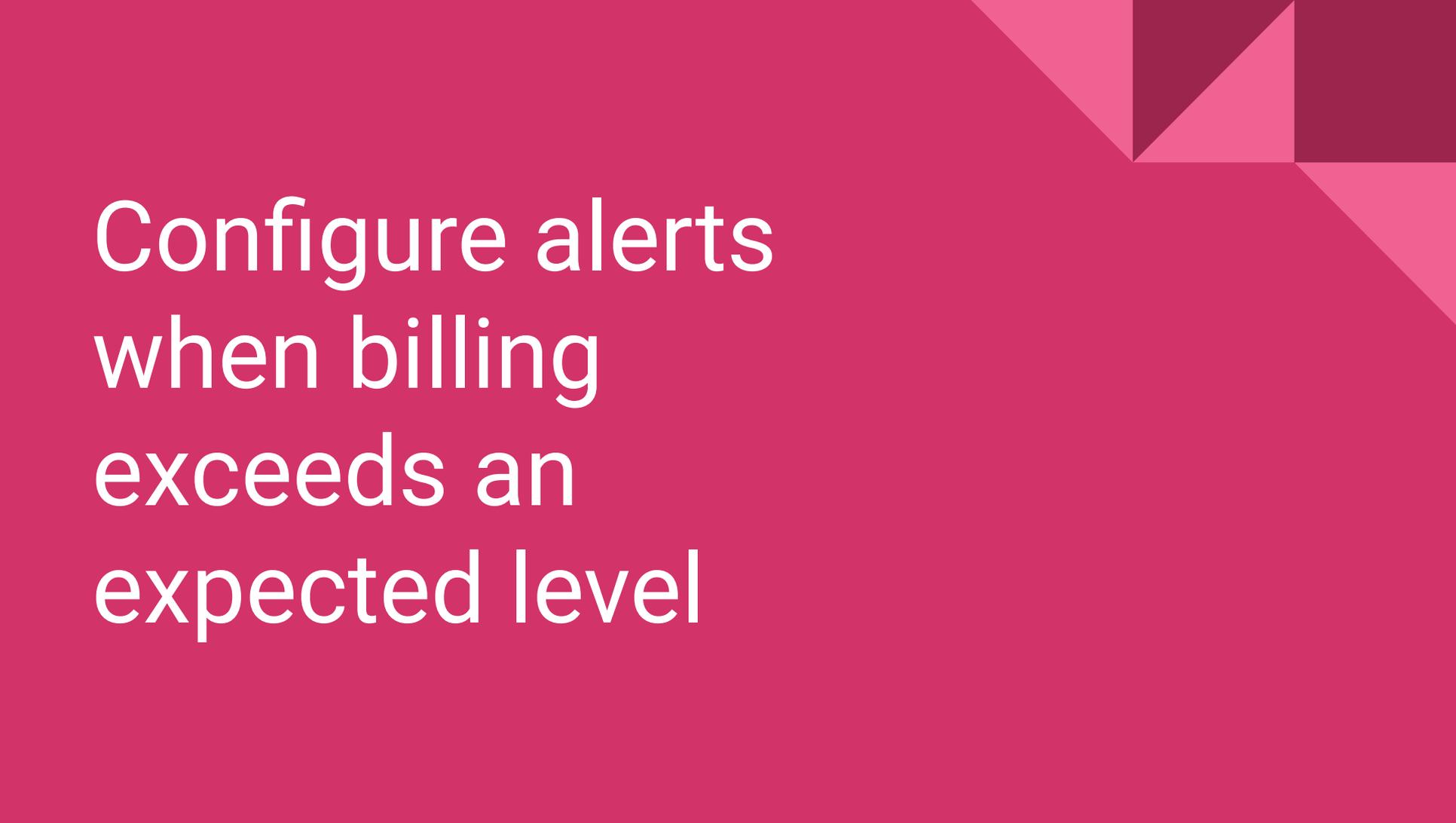


Auto shutdown on
dev/qa resources



Utilize cool/archive
storage where
possible

Reserved instances

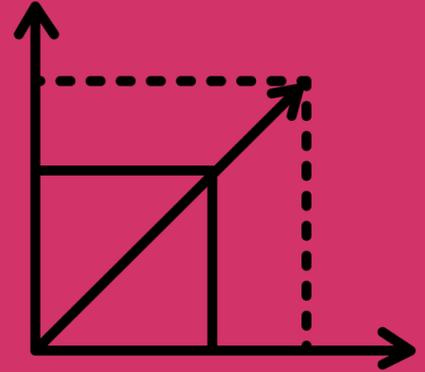


Configure alerts
when billing
exceeds an
expected level

The top right corner of the slide features a decorative arrangement of overlapping triangles in various shades of pink and magenta, creating a modern, abstract design.

Use Policy to
restrict access to
certain expensive
resources

Auto scaling resources

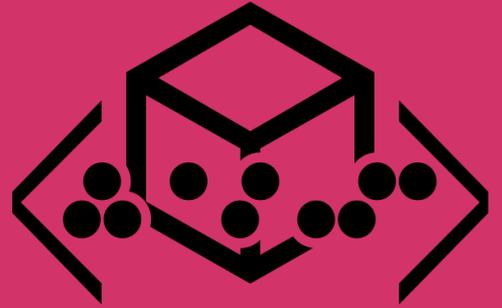


Created by Alla Zaleuska
from Noun Project

The top right corner of the slide features a decorative arrangement of overlapping geometric shapes. These include a light pink triangle pointing down and to the right, a darker pink triangle pointing up and to the right, and a dark pink square. The background of the slide is a solid, vibrant pink color.

Downsize when
resources
over-provisioned

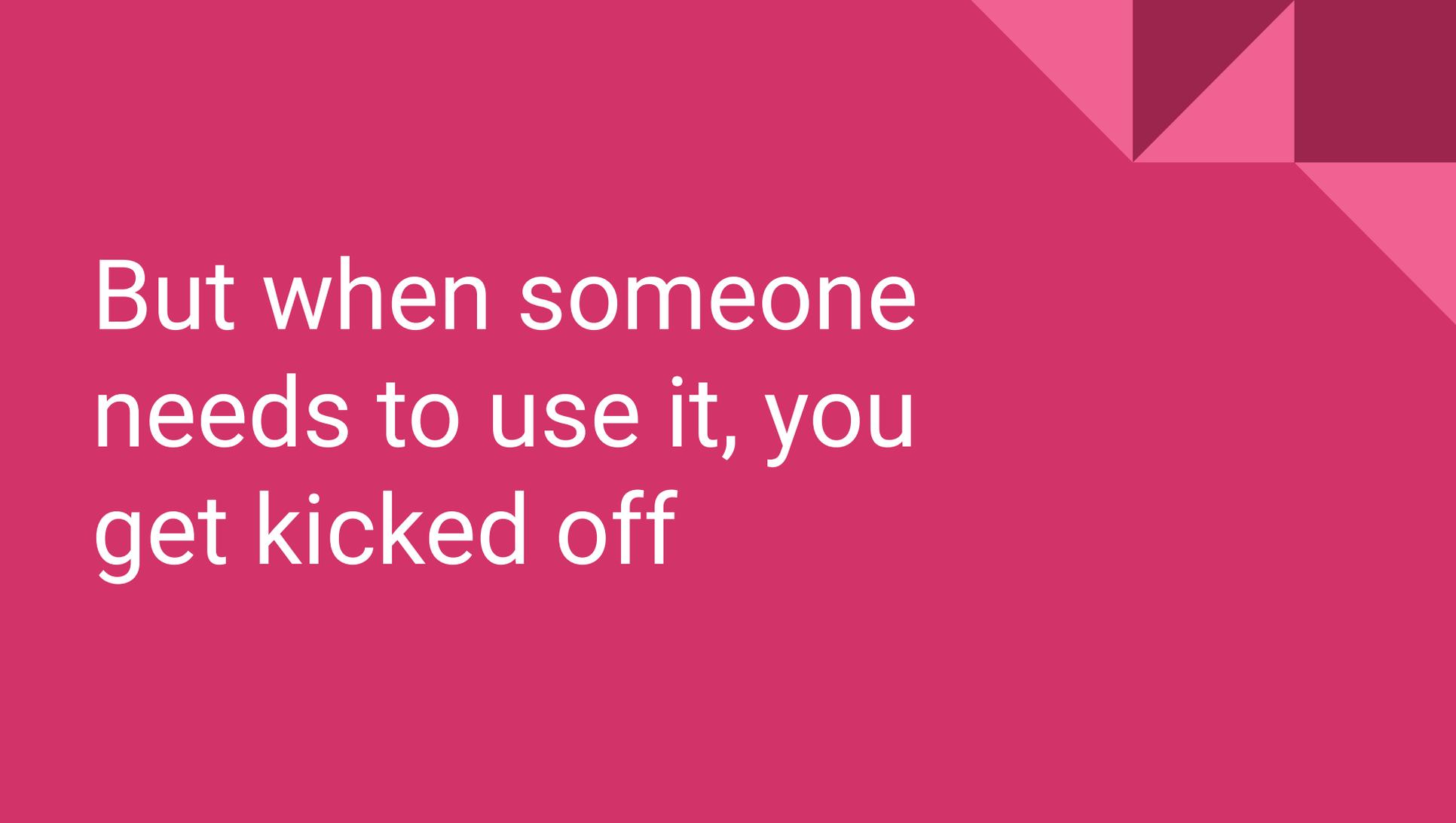
Ensure every
resource has an
owner (tags)



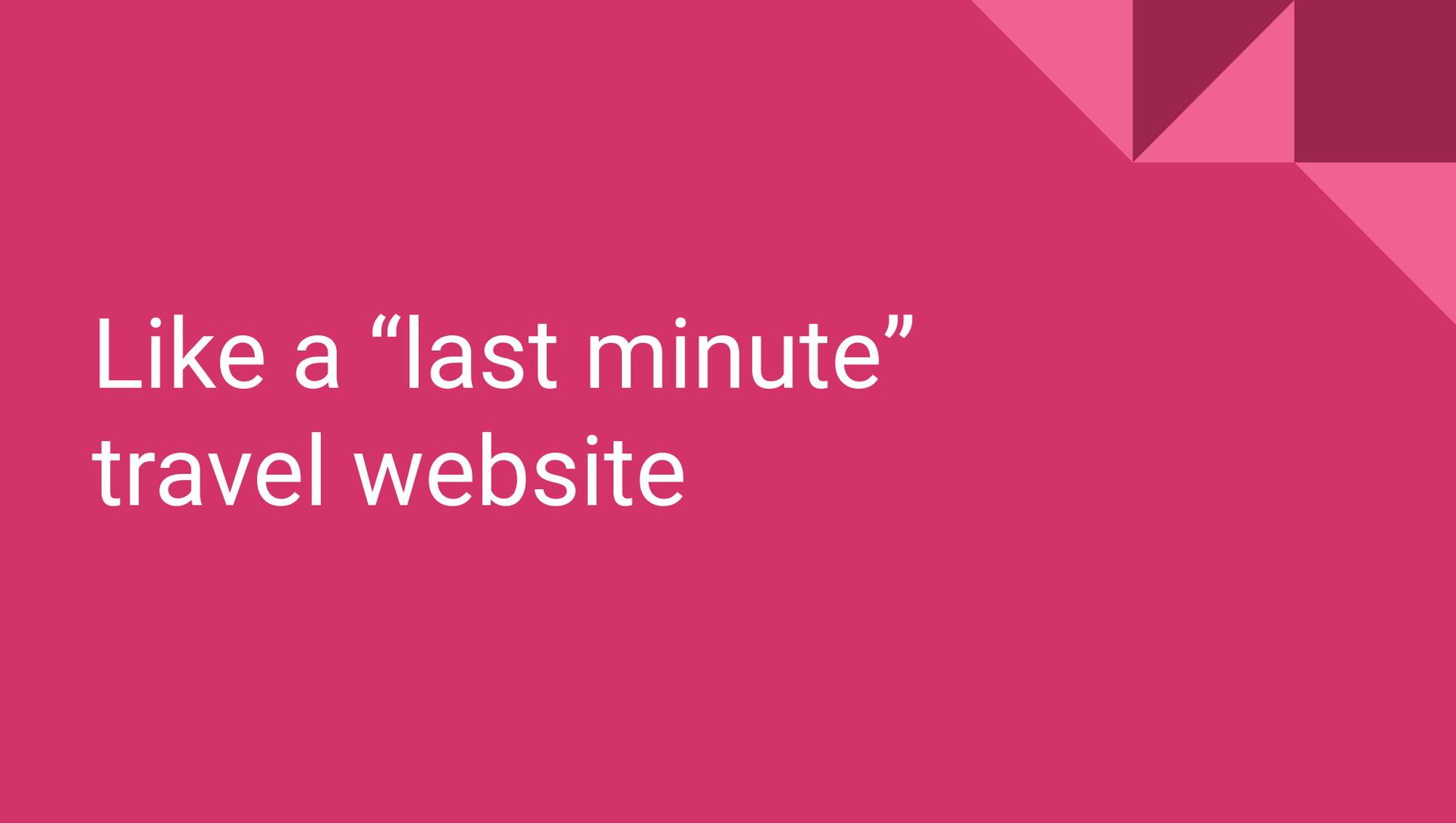
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Spot Pricing

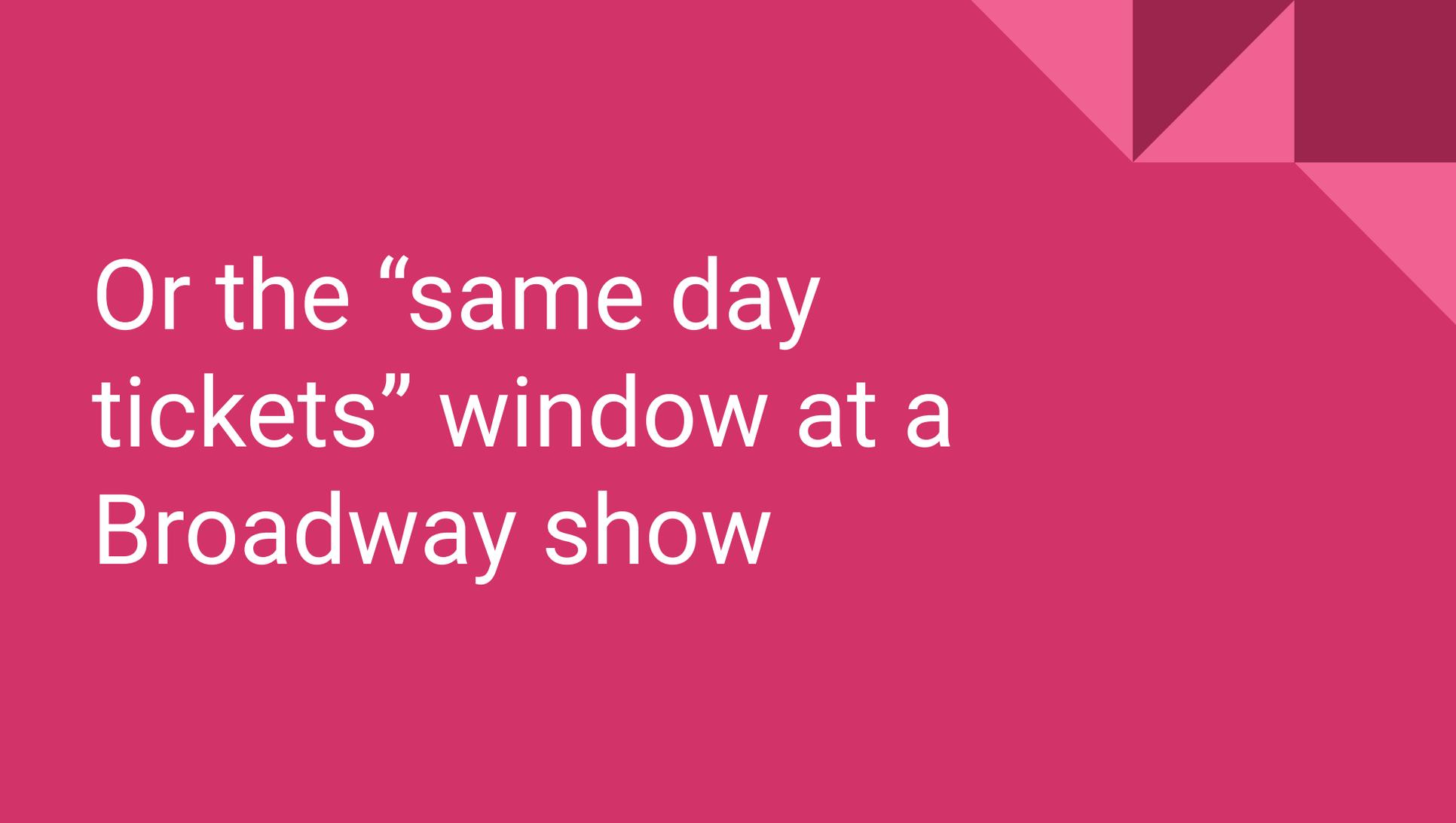
Ability to use virtual
machine when
nobody is using it
for a discounted
price

The background is a solid pink color. In the top right corner, there are several overlapping geometric shapes: a dark pink triangle pointing down and to the left, a medium pink triangle pointing down and to the left, and a dark pink square. The text is centered on the left side of the slide.

But when someone
needs to use it, you
get kicked off

The background is a solid pink color. In the top right corner, there are several overlapping geometric shapes: a dark pink square, a medium pink square, and a light pink square, all partially cut off by the edge of the image.

Like a “last minute”
travel website

The background is a solid pink color. In the top right corner, there are several overlapping geometric shapes: a dark pink triangle pointing down and to the left, a medium pink triangle pointing up and to the left, and a dark pink square partially visible on the right edge.

Or the “same day
tickets” window at a
Broadway show

Pricing calculator

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

The top right corner of the slide features a decorative arrangement of overlapping geometric shapes. These include a light pink triangle pointing down and to the right, a dark pink triangle pointing up and to the right, and a dark pink square. The background of the slide is a solid, vibrant pink color.

Estimates are hard
to make 100%
accurate

Configurable Options

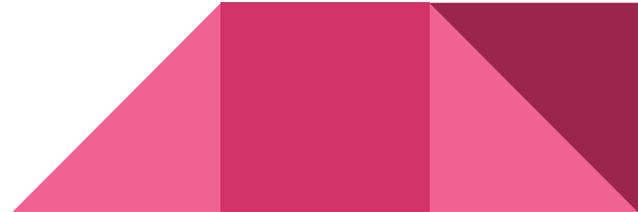
Region

Tier

Subscription Type

Support Options

Dev/Test Pricing





Export and share
the estimate



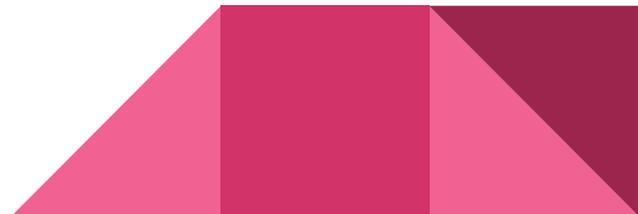
Total Cost of Ownership (TCO) calculator

The top right corner of the slide features a decorative arrangement of overlapping geometric shapes. These include a light pink triangle pointing down and to the left, a dark pink triangle pointing up and to the left, and a dark pink square. The background of the slide is a solid, vibrant pink color.

The cost of a server
is more than just
the cost of the
hardware

Other costs

- Electricity
- Cooling
- Internet connectivity
- Rack space
- Setup labor
- Maintenance labor
- Backup



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

Azure Cost Management

The top right corner of the slide features a decorative arrangement of overlapping geometric shapes. These include a light pink triangle pointing down and to the right, a darker pink triangle pointing up and to the right, and a dark pink square. The background of the slide is a solid, vibrant pink color.

Another free tool
inside Azure to
analyze spending

Pay-As-You-Go (Azure Courses) | Cost analysis

Subscription

Search (Ctrl+)

Save Save as Delete view Share Refresh Download Settings Try preview Help

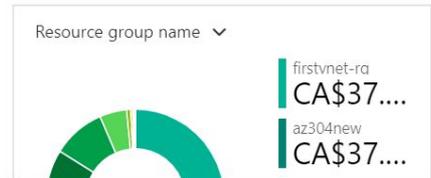
Scope: **Scott's Course Management Group** VIEW: *** Accumulated costs** Invoice (Azure): **Jul 7-Aug 6** Add filter

ACTUAL COST (CAD ONLY) **CA\$115.37** FORECAST UNAVAILABLE **--** BUDGET: AZBUDGET **CA\$100**

Group by: None Granularity: Accumulated Area



Accumulated cost



- Home
- Overview
- Activity log
- Access control (IAM)
- Tags
- Diagnose and solve problems
- Security
- Events
- Cost Management
 - Cost analysis
 - Budgets
 - Advisor recommendations
- Billing
 - Invoices
 - External services
 - Payment methods
 - Partner information

Analyze spending over time



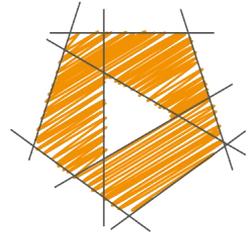
Created by VectorBakery
from Noun Project

Tracking against budgets



Created by Eucalyp
from Noun Project

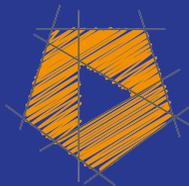
Schedule reports



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AZ-900 Microsoft Azure Fundamentals

Scott Duffy, Instructor



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<http://sjd.ca/az900>

Service Level Agreement (SLA)

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



Service Level Agreements

Read the SLAs to learn about our uptime guarantees and downtime credit policies

The Service Level Agreement (SLA) describes Microsoft's commitments for uptime and connectivity. The SLA for individual Azure services are listed below.

AI + Machine Learning	Internet of Things	AI + Machine Learning Create the next generation of applications using artificial intelligence capabilities for any developer and any scenario	
Analytics	Management	Azure Bot Service Intelligent, serverless bot service that scales on demand	Microsoft Genomics Power genome sequencing & research insights
Blockchain	Media	Machine Learning Studio Easily build, deploy, and manage predictive analytics solutions	Azure Machine Learning service Bring AI to everyone with an end-to-end, scalable, trusted platform with experimentation and model management
Compute	Migration	Cognitive Services Add smart API capabilities to enable contextual interactions	
Containers	Mobile		
Databases	Networking		
Developer Tools	Storage		

SLA for Virtual Machines

Last updated: March 2018

- For all Virtual Machines that have two or more instances deployed across two or more Availability Zones in the same Azure region, we guarantee you will have Virtual Machine Connectivity to at least one instance at least 99.99% of the time.
- For all Virtual Machines that have two or more instances deployed in the same Availability Set, we guarantee you will have Virtual Machine Connectivity to at least one instance at least 99.95% of the time.
- For any Single Instance Virtual Machine using premium storage for all Operating System Disks and Data Disks, we guarantee you will have Virtual Machine Connectivity of at least 99.9%.

Introduction

General Terms

SLA details

Additional Definitions

"**Availability Set**" refers to two or more Virtual Machines deployed across different Fault Domains to avoid a single point of failure.

"**Availability Zone**" is a fault-isolated area within an Azure region, providing redundant power, cooling, and networking.

Preview features

The top right corner of the slide features a decorative arrangement of overlapping triangles in various shades of pink and magenta, creating a modern, abstract geometric pattern.

Preview features
are for “testing” and
not production use

Could change
significantly before
it goes live

May not go live



Public and Private Preview

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Public preview
available to
everyone



Private Preview
requires registration

Announcing private preview of Azure VM Image Builder

Posted on 26 September, 2018



Daniel Sol, Program Manager, Azure Compute

Today I am excited to announce the private preview of Azure VM Image Builder, a service which allows users to have an image building pipeline in Azure. Creating standardized virtual machine (VM) images allow organizations to migrate to the cloud and ensure consistency in the deployments. Users commonly want VMs to include predefined security and configuration settings as well as application software they own. However, setting up your own image build pipeline would require infrastructure and setup. With Azure VM Image Builder, you can take an ISO or Azure Marketplace image and start creating your own golden images in a few steps.

How it works

Azure VM Image Builder lets you start with either a Linux-based Azure Marketplace VM or Red Hat Enterprise Linux (RHEL) ISO and begin to add your own customizations. Your customizations can be added in the form of a shell script, and because the VM Image Builder is built on [HashiCorp Packer](#), you can also import your existing [Packer shell provisioner scripts](#). As the last step, you specify where you would like your images hosted, either in the [Azure Shared Image Gallery](#) or as an Azure Managed Image. See below for a quick video on how to create a custom image using the VM Image Builder.

Azure VM Image Builder – Private Preview Signup

Thank you for your interest in the Azure VM Image Builder. Please sign up for the private preview and we will get back to you.

* Required

1. Name *

General Availability (GA)

Web Application Firewall (WAF) for Azure Front Door service is now generally available

Posted on May 31, 2019

Web Application Firewall (WAF) for Azure Front Door service is now generally available. Customers can use WAF to define security policies that allow, block, forward or rate limit access to their web applications delivered through Azure Front Door.

- A WAF security policy may consist of an ordered list of custom rules and Azure managed pre-configured rulesets.
- Custom rules are based on a combination of client IP addresses, geolocation, http parameters, request methods and size constraints.
- The pre-configured default rule set can be enabled to protect your applications from OWASP top 10 threats.
- New or updated WAF configurations are deployed globally within minutes, letting you respond quickly to changing attack patterns.
- WAF for Azure Front Door is integrated with Azure Monitor and the logs can be accessed through an Azure storage account, Azure Event Hub or Azure Log Analytics.

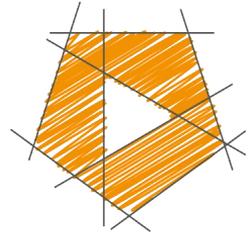
Along with the general availability of the service, we are also adding in preview a new Azure managed pre-configured ruleset, Bot Protection Ruleset, that can be enabled to block requests coming from malicious IPs based on Microsoft's threats intelligence data feeds.

For more details, see [WAF overview](#). To get started, follow [WAF configuration guide](#).

Related products



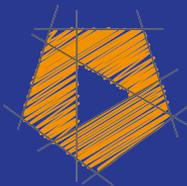
[Azure Front Door Service](#)



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Scott Duffy, Instructor



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<http://sjd.ca/az900>

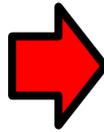


Thank you and best of luck!

Grab Your Free Resources

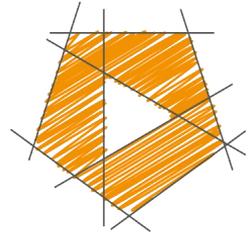
Located at the end of the course:

- Free PDF Study Guide
- Download the slides and MP3 audio if you like to study offline
- 50 question practice test

A screenshot of a course interface. At the top, it says "Section 6: Thank You!" with a progress indicator "2 / 5 | 1min" and an upward arrow. Below this is a list of items:

- 23. Thank you! (1min)
- Practice Test 1: 50 Question Practice Test
- 24. Other Exam Resources (1min)
- 25. Course Resources - Study Guide, Slides, Audio (1min)
- 26. BONUS Lecture - Discounts (1min)

In the bottom right corner of the screenshot, there is a button labeled "Resources" with a downward arrow.



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