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# Microsoft Azure Virtual Training Day: Migrating On-Premises Infrastructure and Data



# Planning and Assessment for Cloud Migrations

# Tailwind Traders Migration Requirements

## Web Apps on IIS

Migrate a number of different web applications running on IIS on physical and virtual Windows Server

## SQL Instances

Migrate a variety of SQL Server databases to Azure running on physical and virtual servers

What tools and strategies should Tailwind Traders use to accomplish these goals as efficiently as possible?

# Migration Destinations

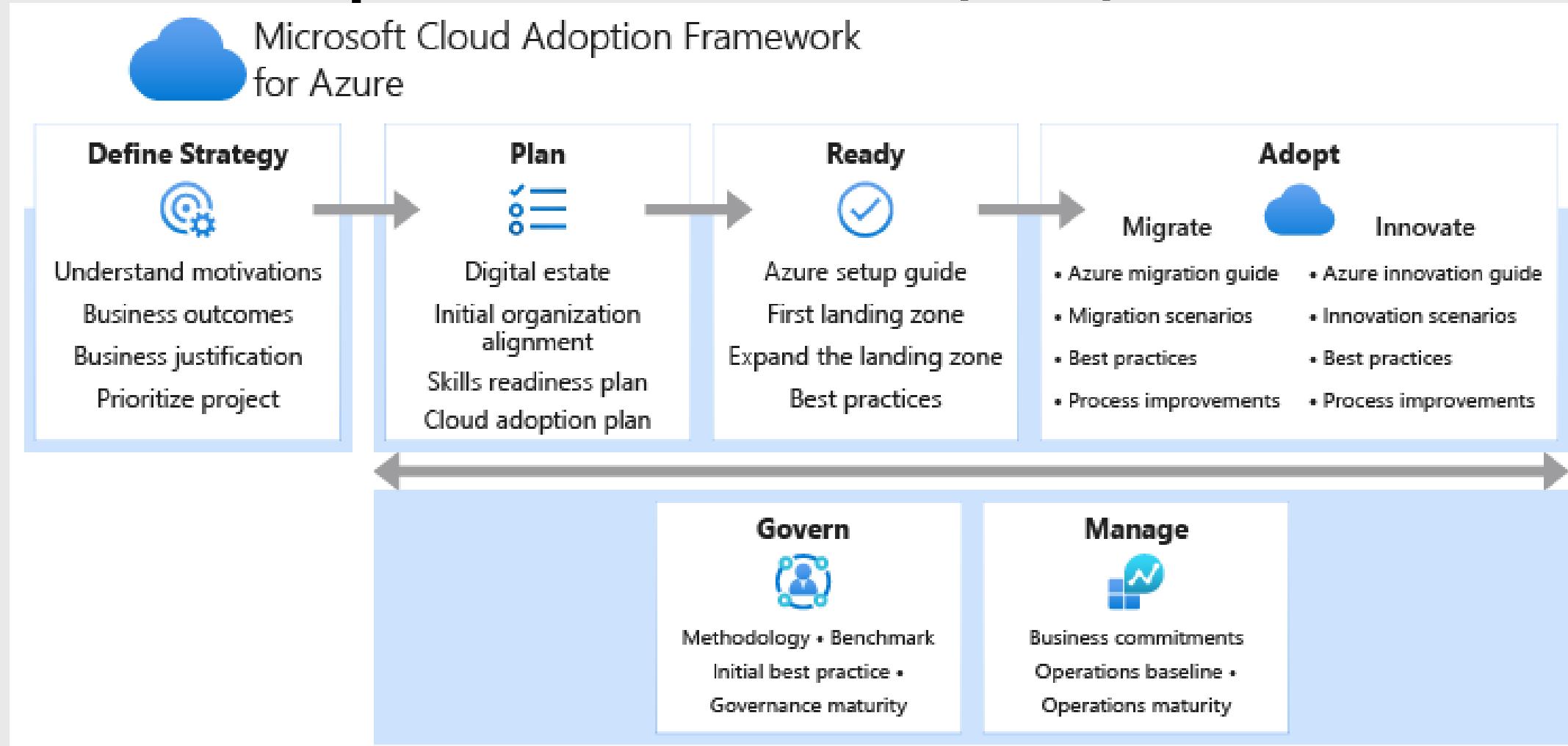
## Cloud Only

- Aim to remove all workloads from on-premises to cloud
- Migration away from on-premises Active Directory Domain Services
- Final Destination: Only client operating systems present on-premises with all server workloads running in Azure

## Hybrid

- Move some workloads to Azure
- Hybrid identity
- Move some on-premises workloads hosted on Windows Server to managed systems such as Azure Stack
- Retain some existing on-premises workloads until they can be shifted to Azure or managed systems

# Cloud Adoption Framework (CAF)



# CAF: Accelerate Migration

The Cloud Adoption Framework has the following strategy advice to accelerate migration

1. Document the business strategy
2. Align partner support
3. Gather data and analyze assets and workloads
4. Make a business case
5. Create a migration plan
6. Build a skills readiness plan
7. Deploy and align a landing zone
8. Migrate your first 10 workloads
9. Hand off production workloads to cloud governance
10. Hand off production workloads to cloud operations

# CAF: Azure Landing Zone

<b>Design area</b>	<b>Objective</b>
Enterprise enrolment	Ensures that enterprise customers with multiple tenants have those tenants created correctly
Identity	A consistent identity infrastructure allowing identity and access management to be implemented
Network topology and connectivity	Network and connectivity is configured appropriately for workloads
Resource organization	Appropriate subscription and management design
Governance disciplines	Automate auditing and enforcement of security, governance, and compliance policies
Operations baseline	Inventory, monitoring, update management, and resource configuration compliance
Business Continuity/Disaster Recovery	Backup and recovery to protect data and workloads. High availability to ensure business continuity during outages
Deployment options	Ensure that the appropriate tools and templates are used to deploy landing zones

# Azure Migrate

Centralized hub to assess and migrate on-premises servers, infrastructure, applications, and data to Azure

The screenshot shows the Azure Migrate service overview page within the Microsoft Azure portal. The left sidebar includes links for creating resources, home, dashboard, and various services like Azure Database Migration, Recovery Services vaults, and SQL managed instances. The main content area features a central message: "Migrate your on-premises datacenter to Azure". It highlights three main migration paths: "Discover, assess and migrate servers", "Assess and migrate databases", and "Assess and migrate web apps to Azure". Each path has a corresponding icon (server racks, database cylinders, and rocket launching from a cloud). Below these are "Quick Starts" sections for onboarding, learning about tools, and getting help.

**Migrate your on-premises datacenter to Azure**

Discover, assess and migrate your on-premises applications using Microsoft or third-party tools, or [find an expert](#) to help with your migration. Learn more

**Discover, assess and migrate servers**

Discover, assess and migrate your on-premises VMware and Hyper-V virtual machines or Physical servers to Azure.

[Assess and migrate servers](#)

**Assess and migrate databases**

Assess and migrate your on-premises databases to Azure SQL Database Managed Instance or Azure SQL Database.

[Assess and migrate databases](#)

**Assess and migrate web apps to Azure**

Assess and migrate .NET and PHP web apps to Azure's Platform-as-a-Service, Azure App Service.

[Assess and migrate web apps](#)

**Migrate on-premises data to Azure**

Use the Data Box offline family of products to move large amount of data to Azure.

[Order a Data Box](#)

**Quick Starts**

Learn how to onboard to Azure... [TCO Calculator](#)

Learn about the available tools... [Azure Migrate: Server Assessment](#) [Azure Migrate: Server Migration](#) [Azure Migrate: Database Assessment](#) [Azure Migrate: Database Migration](#)

Need help? [FastTrack for Azure](#)

# Azure Migrate Integrated Tools

Tool	Assess and migrate	Detail
Azure Migrate: Server Assessment	Assess servers	Discover and assess on-premises VMware VMs, Hyper-V VMs and Physical Servers
Azure Migrate: Server Migration	Migrate servers	Migrate VMware VMs, physical servers, other virtualized machines, and public cloud VMs to Azure
Data Migration Assistant	Assess on-premises databases for migration to Azure	Pinpoint problems blocking database migration. Identifies unsupported features and the right path for database migration.
Azure Database Migration Service	Migrate on-premises databases to Azure	Migrate to Azure SQL Database, Azure SQL Managed Instance, or SQL in Azure VM
Movere	Assess servers	Provides performance-based rightsizing, cost planning, and dependency analysis
Web app migration assistant	Assess on-premises web apps and migrate them to Azure	Migrate .NET and PHP web apps to Azure
Azure Data Box	Migrate offline data	Move large amounts of offline data to Azure

# Cloud Migration Myths

1. The cloud is always cheaper
2. Everything should go into the cloud
3. Mirroring the on-premises environment will help save money in the cloud
4. Server costs drive business cases for cloud migration
5. An operating expense model is better than a capital expense model
6. Moving to the cloud is as simple as flipping a switch

# Myth: The cloud is always cheaper

A poorly architected cloud deployment can cost more than a well architected on-premises deployment for the following reasons:

- **Poor cloud governance.** You don't put in place controls over how cloud is used. Example: Developers able spin up endless test VMs without shutting them down or deleting them.
- **Misaligned system architectures.** Example: VMs hosting application code that could be executed using serverless functions.
- **Process duplication.** Example: Implementing redundancy when it is already provided by the cloud
- **Unusual system configuration.** Example: Custom physical hardware on physically deployed server.
- **Greater staffing costs.** Example: Hiring developers & IT Ops with cloud experience.

# Myth: Everything should go in the cloud

Not all workloads can be placed in the cloud and some must remain on-premises, necessitating a hybrid cloud posture. Reasons include but are not limited to:

- **Compliance blocker.** Example: Country/region doesn't have an Azure datacenter and the data must be kept within national borders
- **Traffic patterns.** Example: Extreme data transfer volume that requires proximity due to bandwidth and latency constraints
- **Application requires rearchitecting.** Example: Application that only runs on specific hardware or operating system that isn't supported in Azure. Needs to be rewritten to function in a way that is supported by the cloud.

# **Myth: Mirroring the on-premises environment will help save money in the cloud**

**Many organizations inefficiently utilize their current on-premises resources**

**Some organizations have found that 30% of their servers are “comatose”**

**If every server workload is moved automatically to the cloud without assessing actual utilization of those server workloads, the organization could be paying for Azure resources that serve no function**

# **Myth: Server costs drive business cases for cloud migration**

**There is more to calculating cost benefits than just the sticker price of server hardware:**

- Companies with long hardware refresh cycles (5-8 years) are unlikely to see quick returns on cloud migrations.
- Business losses caused by outages can exceed hardware and software costs. Such costs are difficult to calculate can be difficult to factor into calculations on savings gained by cloud migration
- Real estate, facilities, and utilities costs represent a substantial proportion of on-premises costs

# **Myth: An operating expense model is better than a capital expense model**

**Some industries view operating expenditures negatively. Consider the following scenarios:**

- If business views capital assets as a driver for business valuation, reducing capital expense reductions could reduce business valuation. This challenge is commonly encountered in retail, manufacturing, and construction industries
- Organizations that are seeking capital influx may consider increases in operating expenses as a negative outcome
- Businesses focused heavily on improved sales margins or reducing cost of good sold (COGS) can view increased operating expenses as a negative outcome

# Myth: Moving to the cloud is as simple as flipping a switch

Migrations are manually and technically intense. It is difficult to accurately assess the amount of time required to migrate workloads. Consider the following elements:

- Bandwidth limitation
- Testing timelines
- Migration timelines
- Technical and cultural impediments

Timeline risks may be mitigated with the following strategies:

- Extensively research technical adoption constraints.
- Identify key stakeholders who might be resistant to change and engage them directly

# Azure Migration and Modernization Program (AMMP)

**AMMP helps you move confidently with skilling and expert help**



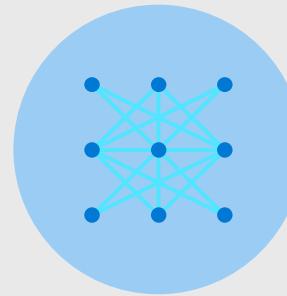
## FastTrack for Azure support

Get direct access to Azure engineers as you plan and execute the move



## Expert partners

Choose from 100s of partners who are certified migration and modernization experts



## Technical skilling

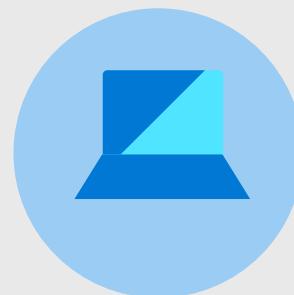
Build organizational readiness and cloud skills through Microsoft Learn and/or accredited partners

# AMMP helps with breadth of migration and modernization scenarios



## Infrastructure and database migration

Move your workloads to Azure to enhance IT resiliency, operational efficiency, and optimize costs.



## Virtual desktop infrastructure

Quickly migrate Windows desktops and apps to Azure with Azure Virtual Desktop and access your desktop and applications from virtually anywhere.



## App and data modernization

Modernize apps to optimize cost, build fully managed services, and improve performance

# Summary

A well-planned cloud migration will be more successful than an ad hoc migration

Azure Migrate provides a set of tools that allow you to assess the cloud suitability of workloads, including determining workload dependencies prior to migration, and then helps you to migrate those workloads to Azure.

Rationalize your on-premises workloads prior to migrating them.

- Containerize applications and migrate the container rather than migrating the entire VM
- Determine if any workloads that you plan to migrate are still being used

Ensure that your Azure environment is prepared for workloads using Landing Zones

Use the Azure Migration and Modernization Program to get help on challenging workloads.



# Windows Server Compute Migration

# Tailwind Traders Migration Requirements

## VMware

Migrate VMware virtual machines running Windows and Linux OS to Azure VMware Service

## Hyper-V

Migrate Hyper-V VMs running Windows and Linux OS to Azure IaaS VMs

## Physical

Migrate physical machines running Windows and Linux OS to Azure IaaS VMs

# Tailwind Traders Migration Requirements

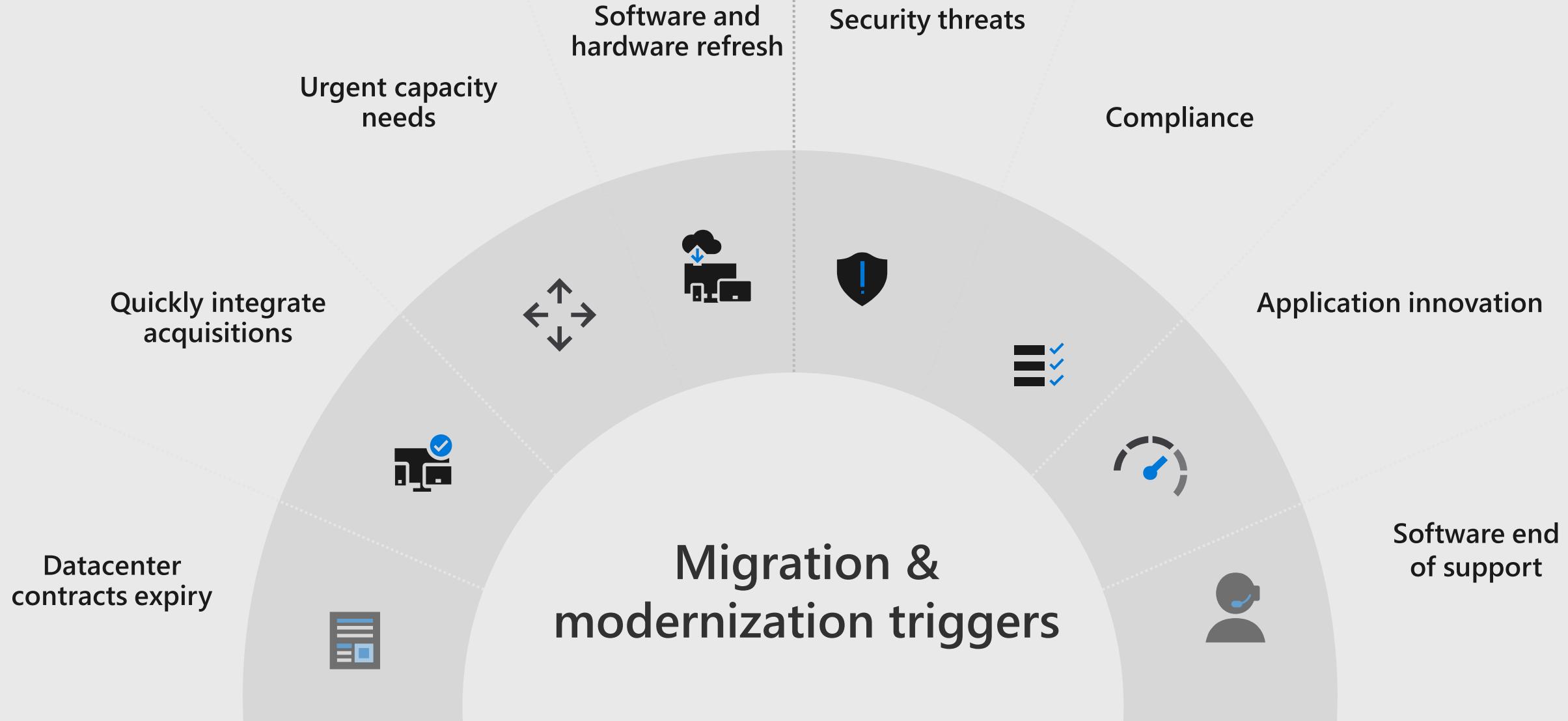
How does Tailwind Traders determine the application dependencies related to an application running on on-premises virtual machines?

How does TWT migrate VMware VMs to Azure?

How can TWT migrate Hyper-V virtual machines to Azure?

How can TWT migrate on-premises physical servers to virtual machines in Azure?

How can TWT migrate file servers and file shares to virtual machines in Azure?



# EOS presents opportunity to modernize your infrastructure & avoid business risk



No security updates



Compliance & regulatory concerns



Additional cost for support + patches



Missed innovation opportunities



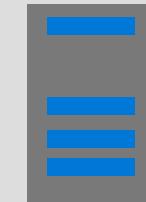
## 2012 | R2



Windows Server



Ends October, 2023



SQL Server



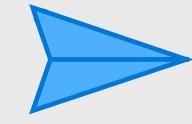
Ends July, 2022

Find lifecycle support deadlines at: [support.microsoft.com/lifecycle](https://support.microsoft.com/lifecycle)

# Unified and extensible Azure migration experience



Assess



Migrate



Optimize



Secure and manage

[Migration tools](#) | [Azure migration center](#) | [Scenario guidance](#) | [FastTrack for Azure](#) | [Azure Expert MSPs](#)

## Azure Fundamentals

[Target architecture](#) | [Governance](#) | [Connectivity](#) | [Security](#) | [Training & Readiness](#)

# Azure Migrate

Agentless migration: Windows Server & Linux

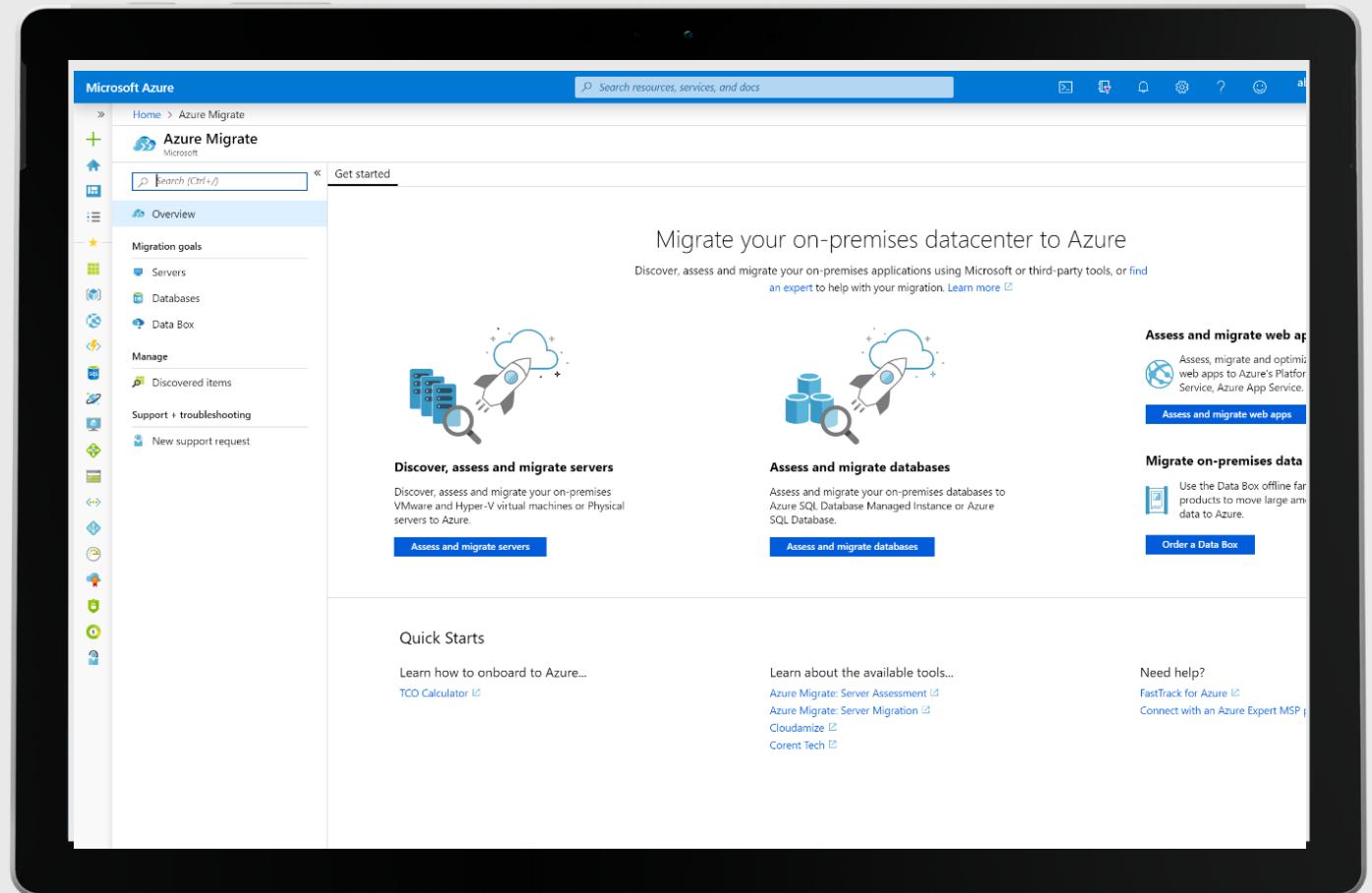
VMware, Hyper-V, Physical server migration

SQL / Non-SQL data migration

Web app migration to Azure App Service

Migration from **on-premises, AWS, & GCP**

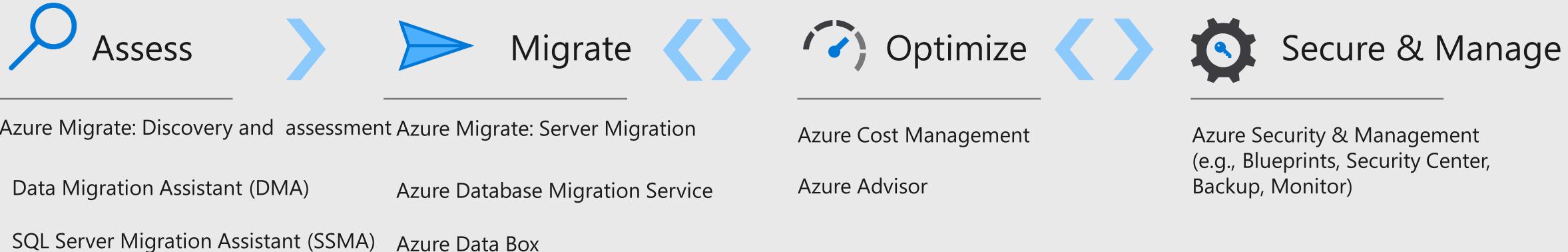
Integrated with **third-party solutions**



<https://www.aka.ms/MIG-Azure>

# Choice of tools for every stage and every requirement

Goal is successful Azure migration: Pick the right tool for the job



## We embrace ISV solutions



# Migrate your on-premise Datacenter to Azure

Discover, assess and migrate servers

Assess and migrate databases

Assess and migrate web apps to Azure

Migrate on-premises data to Azure

# Azure Migrate: Discover Compute Instances

The first step in a migration is to discover the compute workloads that can be migrated.

Azure Migrate: Server Assessment tool allow you to:

- Discover VMware VMs
- Discover Hyper-V VMs
- Discover physical servers
- Discover AWS instances
- Discover GCP instances

# Assess your servers

- First and third-party tools
- VMware, Hyper-V, physical and workloads on other public clouds supported
- Free and paid options



Azure Migrate



Cloudamize



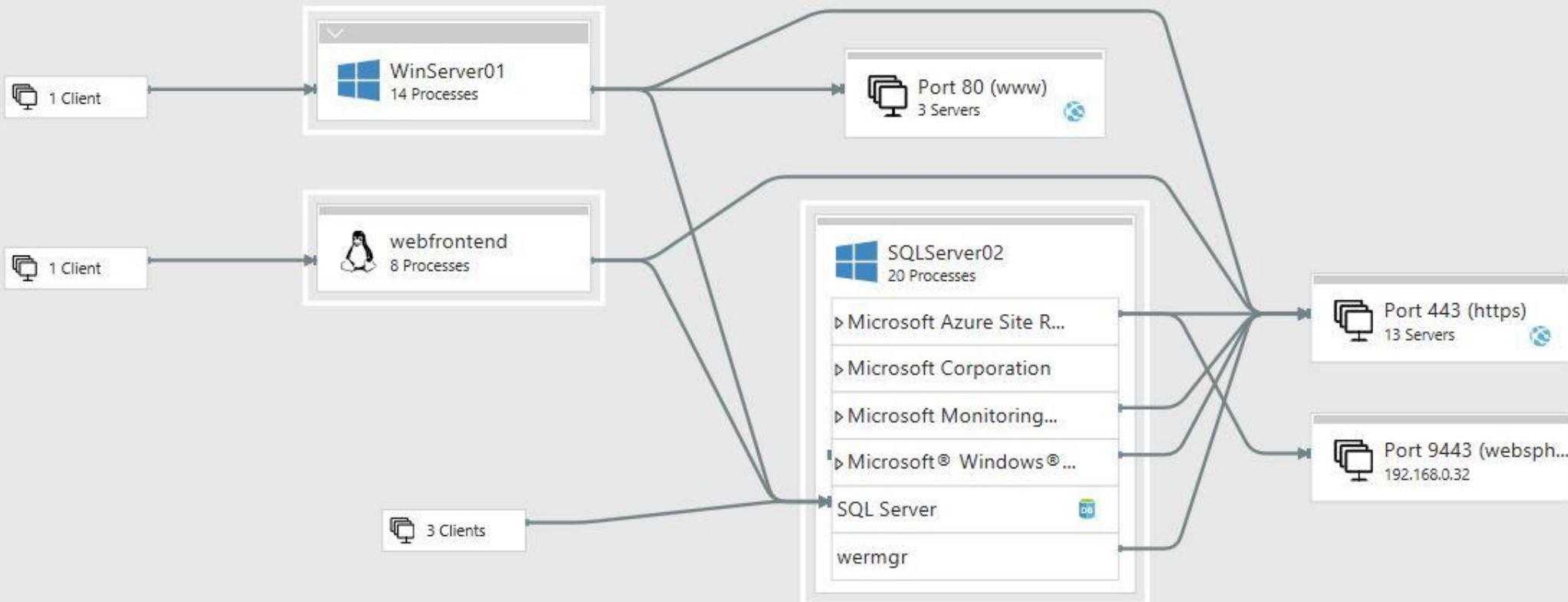
Corent



# Azure Migrate: Assess

Azure readiness assessment	<ul style="list-style-type: none"><li>• Determines whether a compute instance is ready for migration to Azure</li></ul>
Azure sizing	<ul style="list-style-type: none"><li>• Will calculate the size of Azure VMs or number of Azure VMware nodes required after migration</li></ul>
Azure cost estimation	<ul style="list-style-type: none"><li>• Estimates the costs of running the migrated VM in Azure</li></ul>
Dependency analysis	<ul style="list-style-type: none"><li>• Determines cross-server dependencies</li><li>• Suggests optimization strategies for moving interdependent servers to Azure</li><li>• Group compute instances for assessment</li><li>• Identify compute instances that must be migrated together</li><li>• Determine if any machines in an assessment can be decommissioned instead of migrated</li></ul>

# Deep Discovery Example



# Azure Migrate: Assess

**Azure Migrate: Server Assessment supports the following:**

- Assess VMware VMs for migration to Azure VMware service
- Assess VMware VMs for migration to Azure IaaS VMs
- Assess Hyper-V VMs for migration to Azure IaaS VMs
- Assess physical servers for migration to Azure
- Assess AWS instances for migration to Azure
- Assess GCP instances for migration to Azure

# Demo

Discover and Assess Hyper-V VMs

# Migrate your servers

First and third-party tools

VMware, Hyper-V, physical and workloads on other public clouds supported

Windows, Linux and Unix supported

Agentless and agent-based options

Free and paid options



Azure Migrate



# Migrate Hyper-V VMs

1. Deploy the Azure Migrate: Server Migration tool in the Hyper-V environment that hosts the VMs to be migrated
2. Discover the VMs to be migrated and assess dependencies
3. Begin replicating the VMs to Azure
4. Perform a test migration to ensure that all elements are functioning correctly
5. Perform the full VM migration

# Demo

Migrate Hyper-V VMs

# Migrate VMware Workloads

Migrate to Azure VMware solution or Azure IaaS VM

To migrate to Azure VMware solution, deploy and configure VMware HCX

- Deploy on-premises VMware HCX OVA (Connector)
- Activate VMware HCX
- Pair on-premises environment with Azure VMware Solution environment
- Configure the interconnect (compute profile, network profile(s) and service mesh)
- Verify appliance status
- Migrate on-premises VMware VMs using VMware HCX

To migrate to Azure IaaS VMs, use Azure Migrate

# Migrate Physical Servers

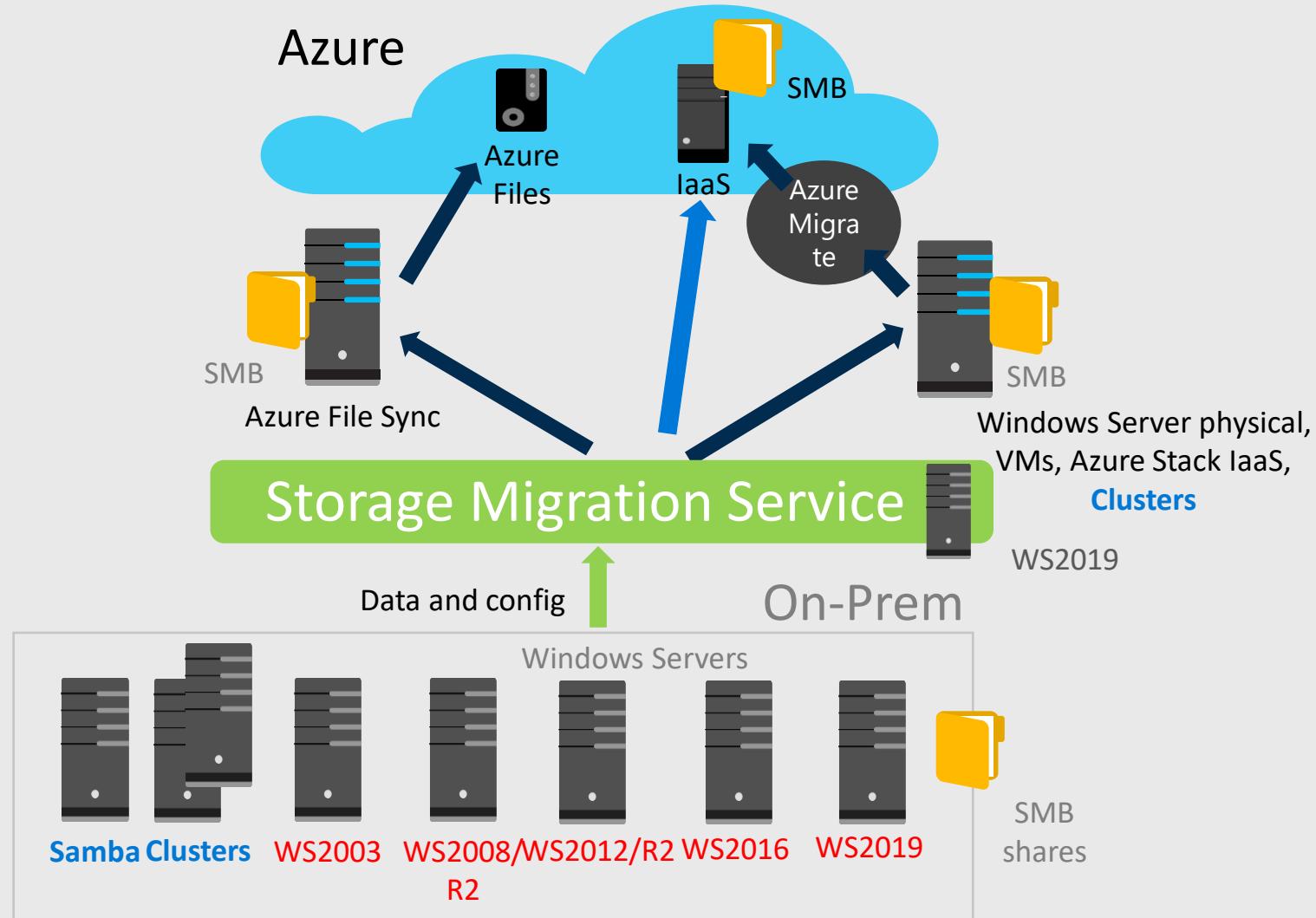
Migrating a physical server requires a replication appliance. The replication appliance has the following components:

- Configuration server. This server coordinates communication between the on-premises environment and Azure. It also manages replication of data to Azure.
- Process server. Functions as the replication gateway.

Replication appliance uses MySQL and needs to be able to communicate with specific Azure URLs  
Once migration appliance is deployed, possible to discover, assess and migrate physical servers to Azure

Need to install Mobility service agent on each physical machine you wish to migrate

# Storage Migration Service



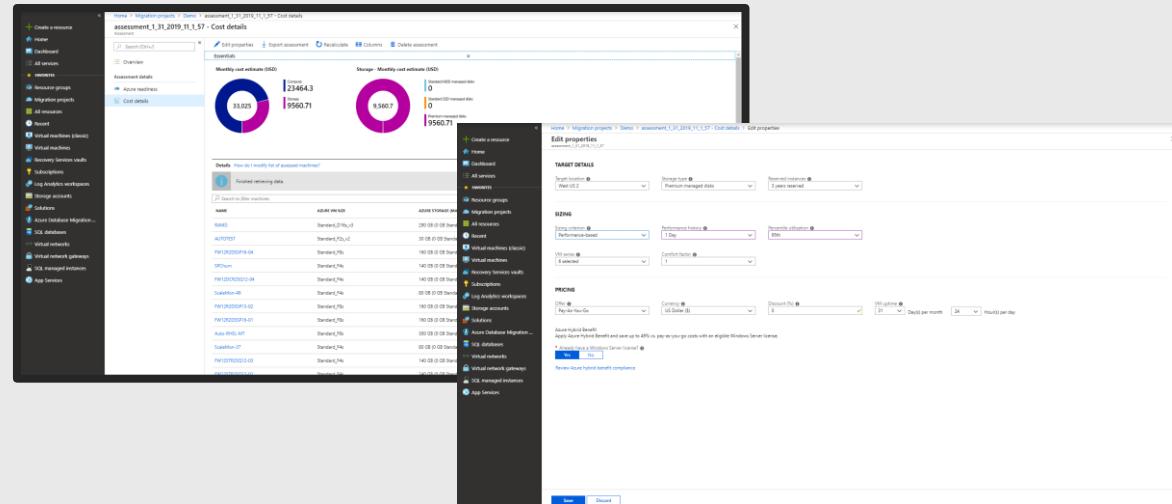
# Storage Migration Service

Inventory of existing file server and file shares	<ul style="list-style-type: none"><li>• Determine file server name, IP address, DNS address</li><li>• Determine file share name, path, file share permission</li><li>• Determine file and folder structure and permissions</li><li>• Determine any local user and groups</li><li>• Can inventory Windows Server file servers, Linux file servers that use Samba and NetApp appliances.</li></ul>
Create Windows Server 2019 IaaS VM file server in Azure	<ul style="list-style-type: none"><li>• Create a server in Azure that will become the replacement for the migrated file server</li></ul>
Transfer file share content	<ul style="list-style-type: none"><li>• Replica file shares are created on Azure IaaS VM file server</li><li>• Files and folders are transferred to Azure IaaS VM file server</li></ul>
Identity cutover	<ul style="list-style-type: none"><li>• The original file server is renamed with a randomly generated identity<ul style="list-style-type: none"><li>• You can keep the original around until it is safe to be decommissioned</li></ul></li><li>• New Azure IaaS VM file server is renamed so that it has original file server's name</li><li>• DNS records are updated to point to new file server</li></ul>

# Continuously optimize resources during and after migration

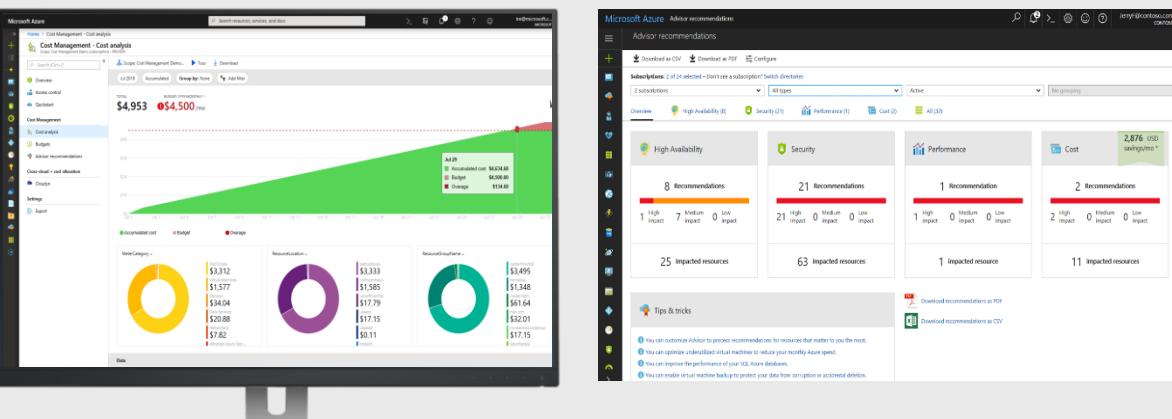
## As you move

- Right-size Azure resources based on assessment guidance
- Use Azure Hybrid Benefit and Azure Reserved Instances to save money



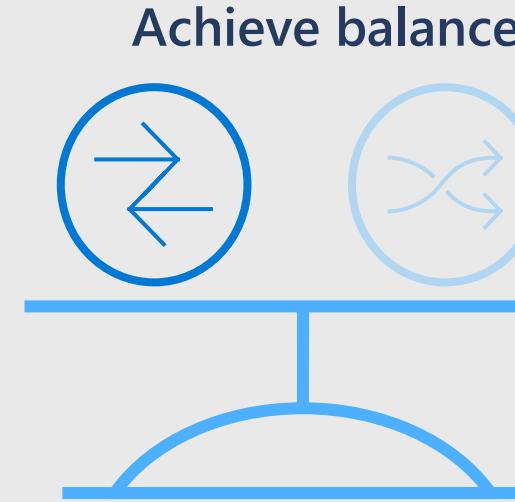
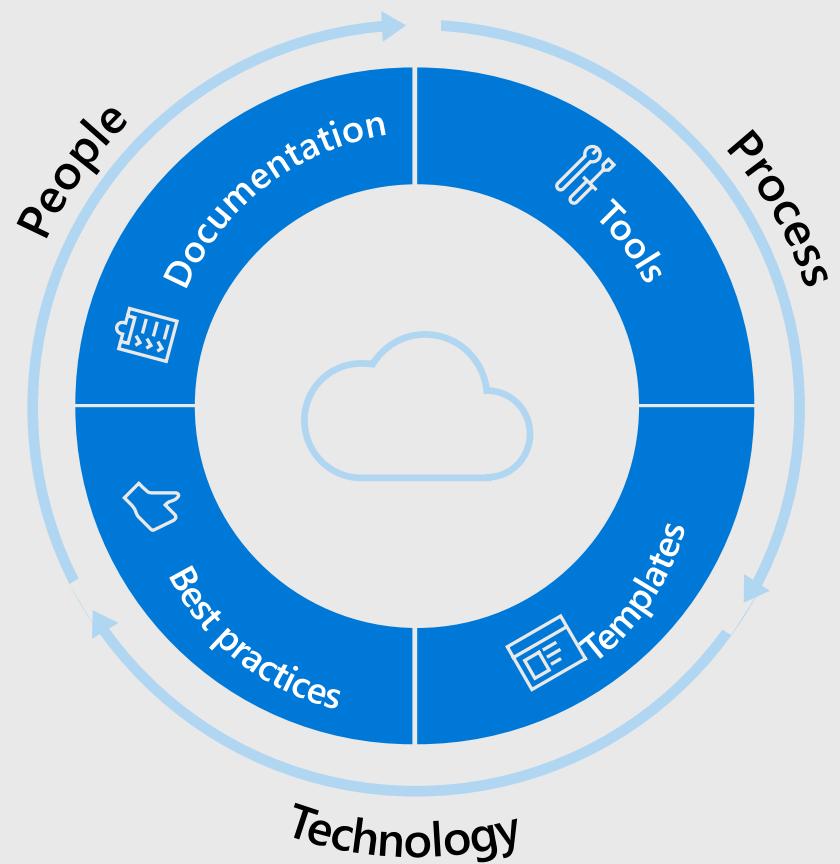
## After you move

- Unified experience to optimize cloud spends: Azure Cost Management
- Azure Advisor: Built-in best practice recommendations (e.g., turn off idle VMs)



## Modernize for longer term value

# Microsoft Cloud Adoption Framework for Azure



<https://www.aka.ms/MIG-CAF>

Align business, people and technology strategy to achieve business goals with actionable, efficient, and comprehensive guidance to deliver fast results with control and stability.

# Summary

Tailwind Traders can use Azure Migrate to

- Determine the application dependencies related to an application running on on-premises virtual machines
- Migrate VMware VMs to Azure (IaaS or Azure VMware Solution)
- Migrate Hyper-V VMs to Azure
- Migrate on-premises physical servers to Azure

Tailwind Traders can use Storage Migration Services to migrate file servers and file shares to virtual machines in Azure

# /Connect with our Team

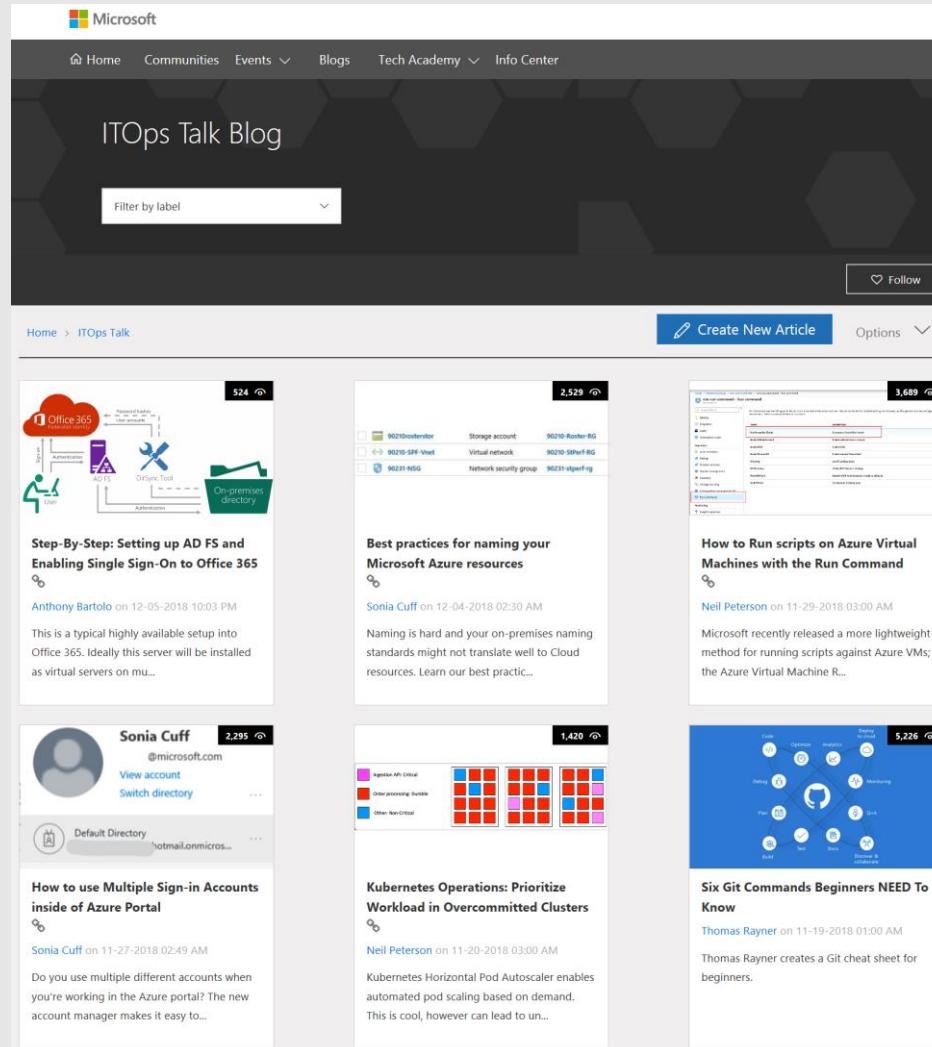
TechCommunity Blogs

[ITOpsTalk.com](http://ITOpsTalk.com)

[Azure Migration and Modernization Blog](http://AzureMigrationAndModernizationBlog.com)

Social

[#AZOps](#)





# Choosing the right migration strategy for SQL Server and Applications

# Agenda

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- Why Migrate to Azure
- Azure SQL
- Determining a Migration Strategy
- Migrate SQL and App to Azure to VMs : Azure Managed Instance



# Why Migrate to Azure

# Why Migrate to Azure

## Unparalleled Innovation

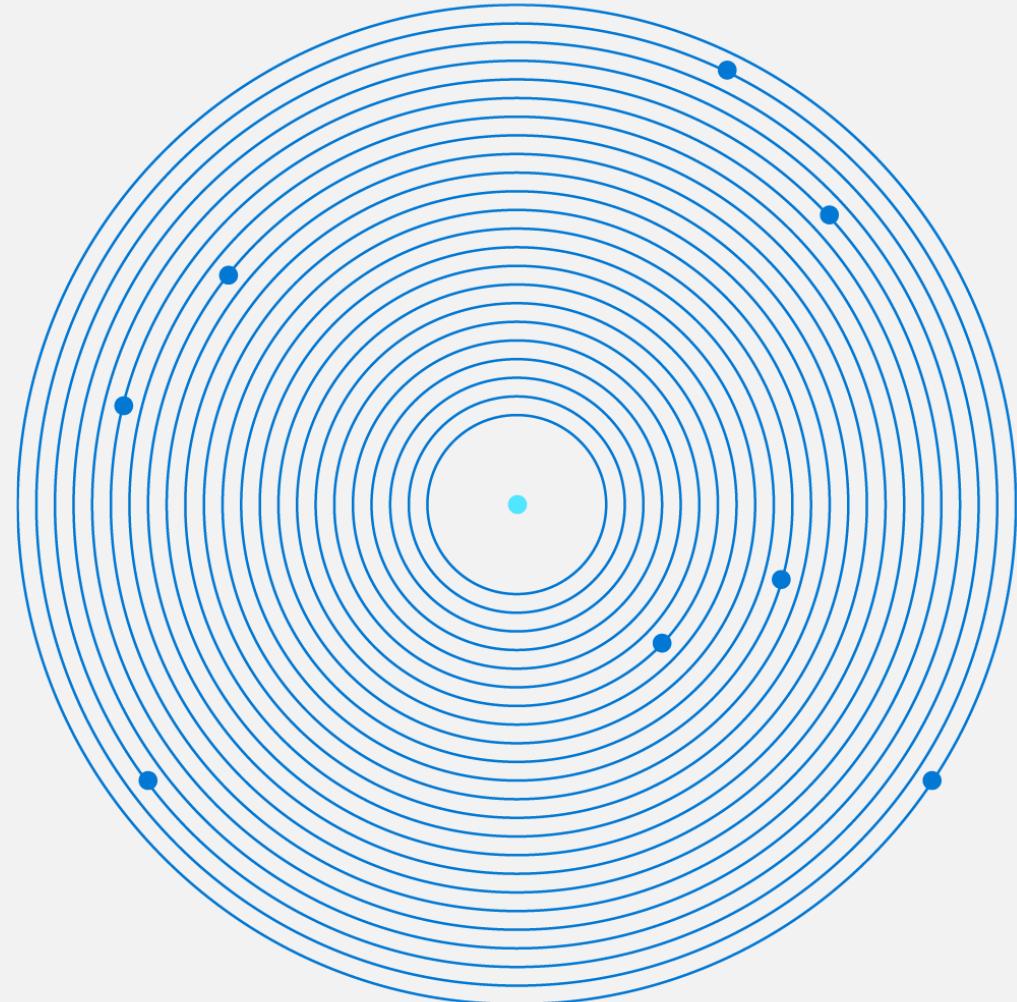
Azure SQL Database  
Azure IaaS  
Azure Migrate

## Unmatched Security

Azure Defender  
Azure Sentinel  
Confidential Computing

## Unbeatable Offers

Azure Migration and Modernization Program (AMMP)  
Azure Hybrid Benefit  
Free Extended Security Updates



# Why migrate data and applications to Azure

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## Peerless Innovation

Two decades of investment



25+ years of SQL innovation

Support for .NET, Java, PHP, Python, Node.js and other Open-Source Software platforms

With Native Visual Studio integrations, you can develop, debug, and monitor cloud applications

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## Unmatched Experience

Globally managed offerings



Shared code base ensures full parity with all Azure SQL Server deployment options

Industry leading performance and security for 9T queries daily<sup>1</sup>

Host 2M apps and 41B daily requests with 99.95% SLA<sup>2</sup>

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## Seamless Migration

Tailored tools and programs



Azure Migration and Modernization Program (AMMP) support and funding

Free App Service & Database Migration Assistants

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## Unbeatable Offers

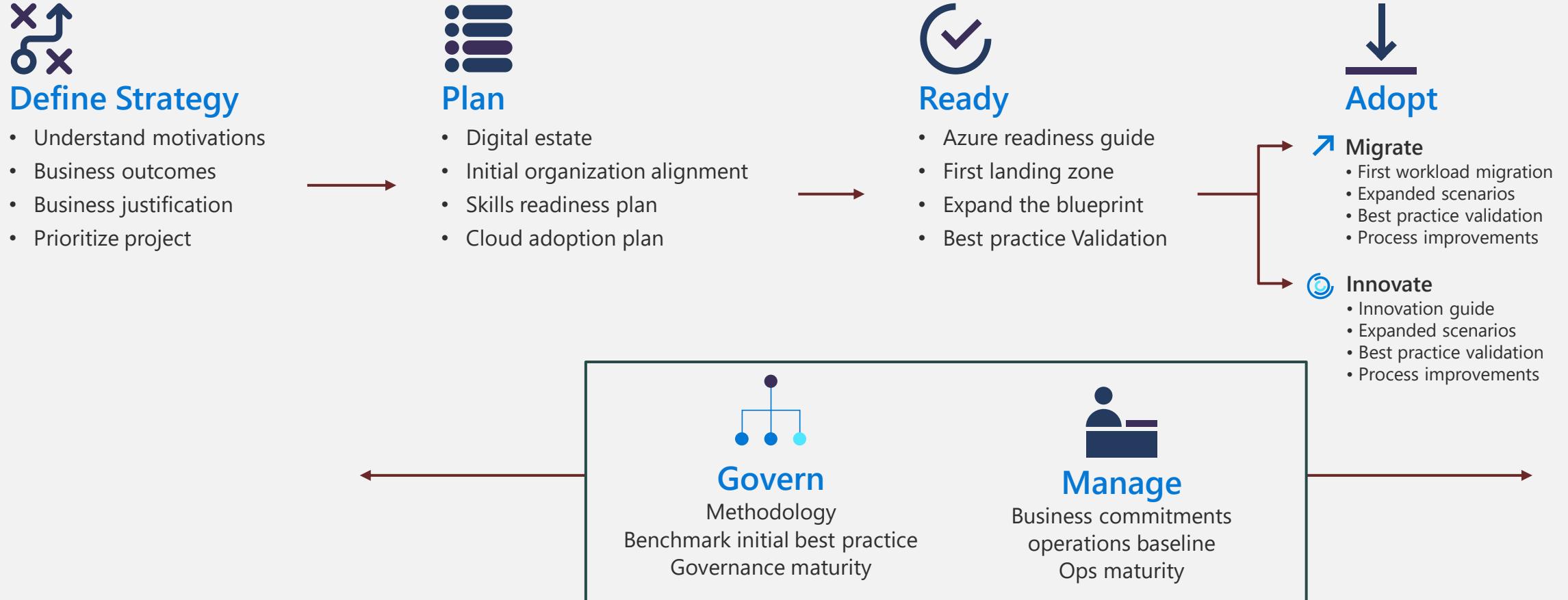
Unique for .NET and SQL



Save with Azure Hybrid Benefit and receive up to 87% better price performance than the alternatives

Visual Studio subscribers save up to 55% off PAYG rates with Enterprise Dev/Test

# The cloud adoption journey





# Azure SQL

# What is Azure SQL

The family of SQL cloud to edge databases



**SQL Server on Azure  
Virtual Machines**

Best for lift and shift and/or  
workloads requiring OS-level access



**Azure SQL  
Managed Instance**

Best for modernizing  
existing apps



**Azure SQL  
Database**

Best for supporting  
modern cloud apps



**Azure SQL  
Edge**

Best for extending  
apps to IoT edge

**Infrastructure-as-a-Service**

**Platform-as-a-Service**

**Edge Computing**

**Azure is the cloud that knows SQL Server best**

# Comparing manageability

	SQL Server on Azure VMs	Azure SQL Managed Instance	Azure SQL Database	Azure SQL Edge*	
	Intelligent performance/security	Intelligent performance/security	Intelligent performance/security	Intelligent performance/security	Managed by customer
Applications	Applications	Applications	Applications	Applications	Managed by Microsoft
Data	Data	Data	Data	Data	Machine learning capability
Database	Database	Database	Database	Database	
SQL instance-level features	SQL instance-level features				
High Availability /DR/Backups	High Availability/ DR/Backups	High Availability/ DR/Backups	High Availability/ DR/Backups	High Availability/ DR/Backups	
Database provision/ Patch/Scaling					
Operating system	Operating system	Operating system	Operating system	Operating system (container)	
Virtualization	Virtualization	Virtualization	Virtualization	Container Platform	
Hardware	Hardware	Hardware	Hardware	Hardware & Operating System	
Datacenter management	Datacenter management	Datacenter management	Datacenter management	Device management (IoT Hub)	

\*in connected scenario

# SQL Server on Azure VMs provide the promise of the cloud while maintaining OS control



## Customer challenge

I want to migrate to the cloud as fast as possible but maintain operating system control



## Solution

Get the combined performance, security, and analytics of SQL Server, backed by the flexibility, security, and hybrid connectivity of Azure with SQL Server on Azure VMs

### Key features

- SQL Server and OS server access
- Expansive SQL and OS version support
- File stream
- DTC
- Automated manageability features for SQL Server
- Automatic security patching
- Point in time restore with Azure Backup
- Full surface area of SQL Server

### Azure differentiators

- Free Extended Security Updates for SQL Server 2012/2012R2
- 478 percent overall return on an Azure IaaS investment over three years<sup>1</sup>



Healthcare software manufacturer saves costs when reusing licenses while moving 600 on-premises VMs to Azure

# Azure SQL Database is built for modern cloud apps



## Customer challenge

I want to build a modern multi-tenant SaaS apps and scale independently when needed



## Solution

Azure SQL Database is a highly scalable cloud database service with built-in high availability and machine learning

## Key features

- Single database or elastic pool
- Hyperscale storage (100TB+)
- Serverless compute
- Fully managed service
- Private link
- High availability with AZ isolation
- Business continuity at scale

## Azure differentiators

Industry highest availability SLA of 99.995%

Industry only business continuity SLA with 5 second RPO and 30 second RTO

Price-performance leader for mission-critical workloads while costing up to 86 percent less than AWS RDS (GigaOm)



Broadcast Music, Inc. (BMI) uses Azure SQL Database Hyperscale to scale on demand and speed up song matching without managing on-premises infrastructure.

# Azure SQL Managed Instance eases cloud migration



## Customer challenge

I want to migrate to the cloud, remove management overhead and take advantage of leading features



## Solution

SQL Managed Instance combines leading security features with SQL Server compatibility and instance model designed for on-premises customers

## Key features

- Available as single instance or instance pool
- SQL Server surface area (vast majority)
- Native virtual network support
- Fully managed service
- On-premise identities enabled on cloud instances, through integration with Azure Active Directory and AD Connect

## Azure differentiators

- Near zero downtime migration using log shipping
- Fully managed business continuity with failover groups
- Projected return on investment of 238 percent over three years<sup>1</sup>
- The best of SQL Server with the benefits of a managed service



Komatsu easily migrated 1.5 TBs of data thanks to near complete compatibility with SQL Server

<sup>1</sup>. Forrester Consulting. The Total Economic Impact™ of Microsoft Azure SQL Database Managed Instance.

# Azure SQL Database Service Tiers

## General purpose

Most business workloads

Remote storage

IOPS

\$

Serverless\*



## Business critical

Workloads that require low latency,  
fast recovery, and a readable  
secondary

Local SSD Storage

IOPS++

\$\$\$

In-memory



## Hyperscale

Most business workloads with  
highly scalable storage and read-  
scale requirements

Local SSD + remote storage

IOPS+

\$\$

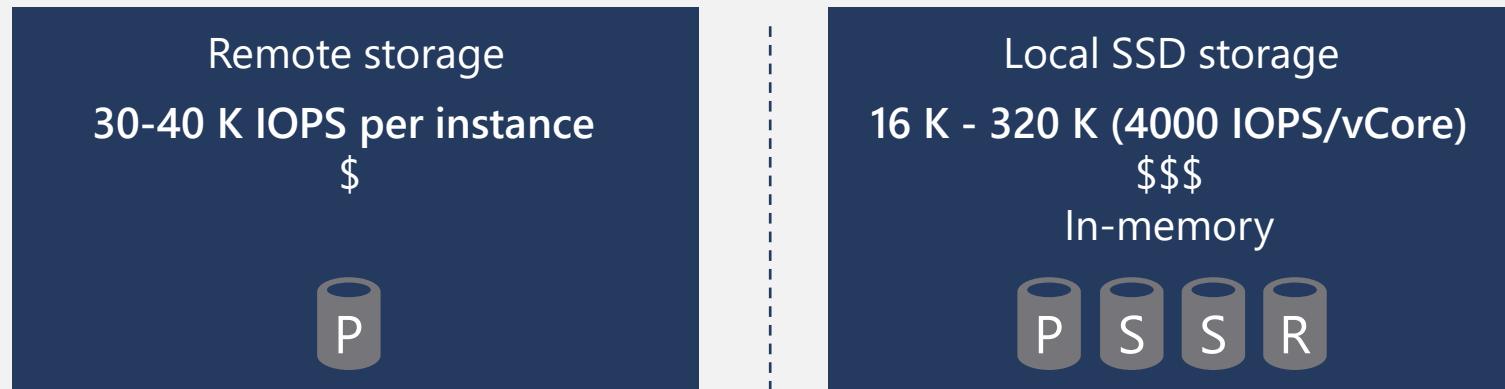
Unlimited storage



# Managed Instance Service Tiers



## vCore model Independent scalability



# Choosing between Azure SQL Database and Azure SQL MI



## Azure SQL managed instance

### Single instance

Broadest SQL Server database engine compatibility  
Support for private endpoints  
Fully managed service

### Instance pool

Pre-provision compute resources for migration  
Enables cost-efficient migration.  
Ability to host smaller instances (2Vcore)



## Azure SQL Database

### Single database

Hyperscale storage (up to 100TB)  
Serverless compute  
Fully managed service

### Elastic pool

Resource sharing between multiple databases to price optimize  
Simplified performance management for multiple databases  
Fully managed service

# Azure SQL Managed Instance migration

## Easy migration: near parity with SQL Server

Data Migration	Security	Programmability	Scenario Enablers	Operational
<ul style="list-style-type: none"><li>• Native backup/restore</li><li>• Configurable DB file layout</li><li>• DMS (migrations at scale)</li></ul>	<ul style="list-style-type: none"><li>• Integrated Auth (Azure AD)</li><li>• Encryption (TDE, AE)</li><li>• SQL Audit</li><li>• Row-Level Security</li><li>• Dynamic Data Masking</li></ul>	<ul style="list-style-type: none"><li>• Global Temp Tables</li><li>• Cross-database queries</li><li>• Linked servers</li><li>• CLR modules</li></ul>	<ul style="list-style-type: none"><li>• DMVs &amp; XEvents</li><li>• Query Store</li><li>• SQL Agent</li><li>• DB Mail (external SMTP)</li></ul>	<ul style="list-style-type: none"><li>• Service Broker</li><li>• Change Data Capture</li><li>• Transactional Replication</li></ul>



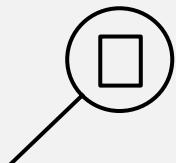
# Determining a Migration Strategy

# Azure Database migration journey



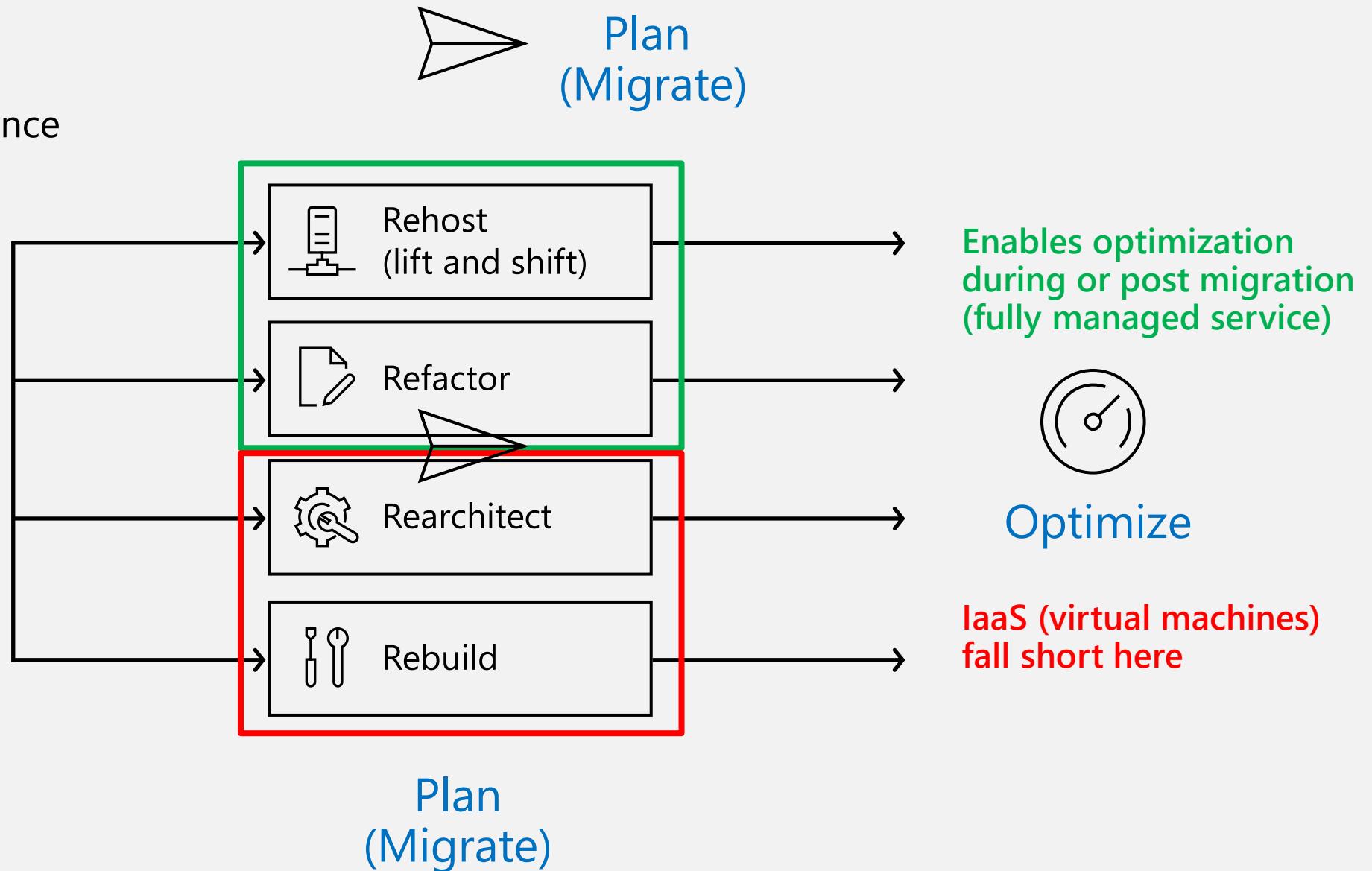
Managed Instance

Enables rehosting or light refactoring for most apps



Assess

Eliminates the need to rearchitect or rebuild your apps



# Initiate and discovery stage

## Initiation

Initiation of data platform modernization projects are typically driven by a wider business or legal requirement. For example, ensuring that an organization uses a technology that is GDPR compliant.

## Discovery

Is about understanding the situation and technology that you are starting from. It occurs after the initiation and provides that basis for your planning.

## Discovery stage covers the following areas:

### Environment

Taking an inventory of your data estate and the applications that run within the organization.

### Dependencies

Understanding how your applications interact with the databases that exist in your network.

### Workloads

Listing the workload types against the database servers that you have identified will help you understand how the server is used.

# Assessment stage

The assessment stage takes the information gained from the discovery phase and your team performs a thorough assessment of the workloads you have identified to establish the following:

## Migration blockers

Used to identify if there is a technology or process that could block the migration process.

## Breaking changes

Are there any features that are in the current application or database that will not work after the migration?

## Azure features

What Azure features can a migrated database take advantage of?

## Current workload assessment

This assessment should confirm what databases exist on each server, establish the data volumes and expected growth rates of each database, and document the average resource usage of each database.

## Workload criteria assessment.

- Performance
- Availability
- Disaster recovery
- Compliance
- Third party software

# Planning stage

## Infrastructure as a Services (IaaS)

In this approach, you will migrate your data to a virtual machine that has SQL Server installed.

## Platform as a Service (PaaS)

In this approach, you will migrate your data to a data platform service that suits your workload. For OLTP workloads, that may involve Azure SQL Database. For OLAP type workloads, this would involve Azure Synapse.

You could choose a platform by the following areas:

### Feature

Choose a platform based on the features that are on offer. For example, SQL Database elastic pools.

### Cost

Your migration may be constrained by the budget that is put aside for the migration. A single Azure SQL Database has the lowest cost.

### Migration type

Consider whether you should perform an offline or an online migration.

# Transform and optimize

Your assessment and planning would have identified aspects of your applications and database that would require post-migration work that either transforms or optimizes a feature to ensure a successful migration.

## Transformation

This can include:

- Install pre-migration version upgrades
- Fix any errors that are identified by the migration assessment tools
- Implement database schema changes
- Migrate existing integrated database services into Azure
- Handling SSIS workloads in the cloud

## Optimize

This can include:

- Install pre-migration version upgrades
- Assess what new features may be available on the target platform
- Re-structure workloads into more cost effective or performance effective sets
- Choose the highest service level and performance tier during the migration
- Ensure workloads are right-sized
- Disable auto-statistics during migration
- Partition tables and indexes
- Drop indexed views and recreate them once finished

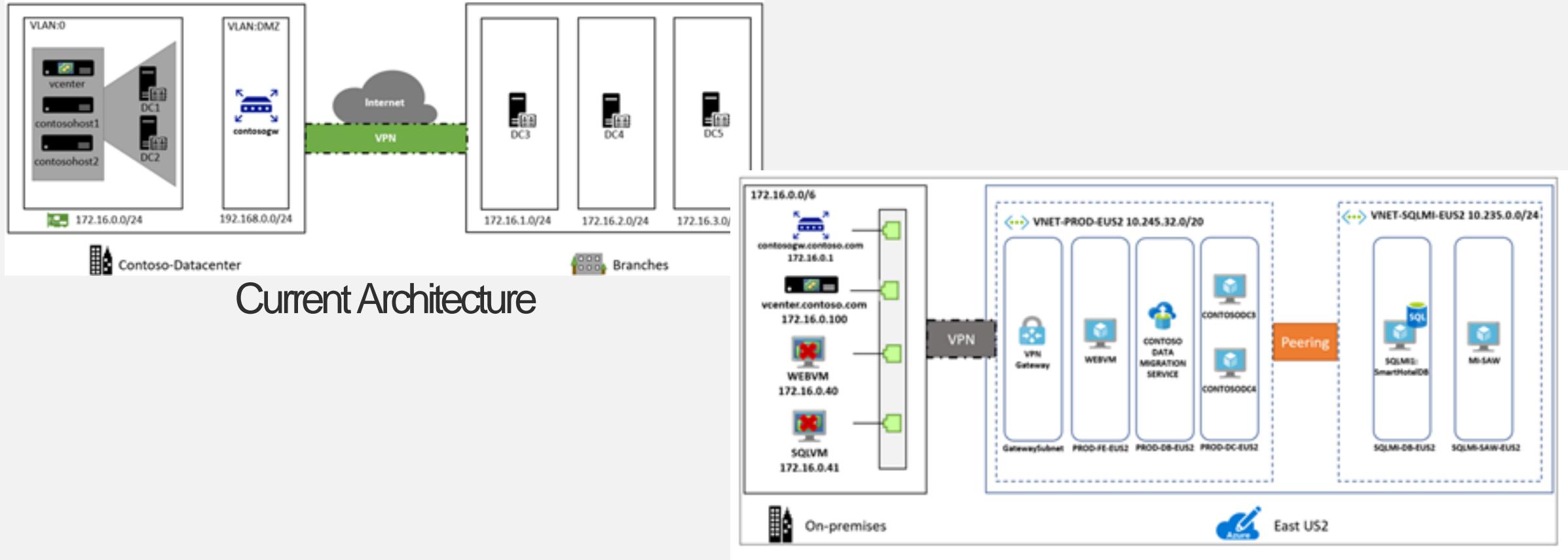
## Migrate, validate, and remediate.

- Understand your workload requirements as a starting point
- Select non-critical workloads or low priority databases for migration initially
- Run a test migration with chosen tool
- Test databases for issues
- Test the plan to mitigate risk associated with downtime and compatibility issues
- Assess migration tools based on disruption to help lower the risk of database downtime
- Repeat issue fixes until the database is fixed
- Continually iterate on your migration process
- Consider the maintenance windows that are available to the application and database targeted for migration
- Take old databases and application offline
- Test third-party applications
- Create new disaster recovery and maintenance plans
- Use toolsets to give you greater insight into your environment and assist with the migration process



# Migrate SQL and App to Azure to VMs : Azure Managed Instance

# Moving from on-premise VMs to Azure VMs and Azure SQL MI



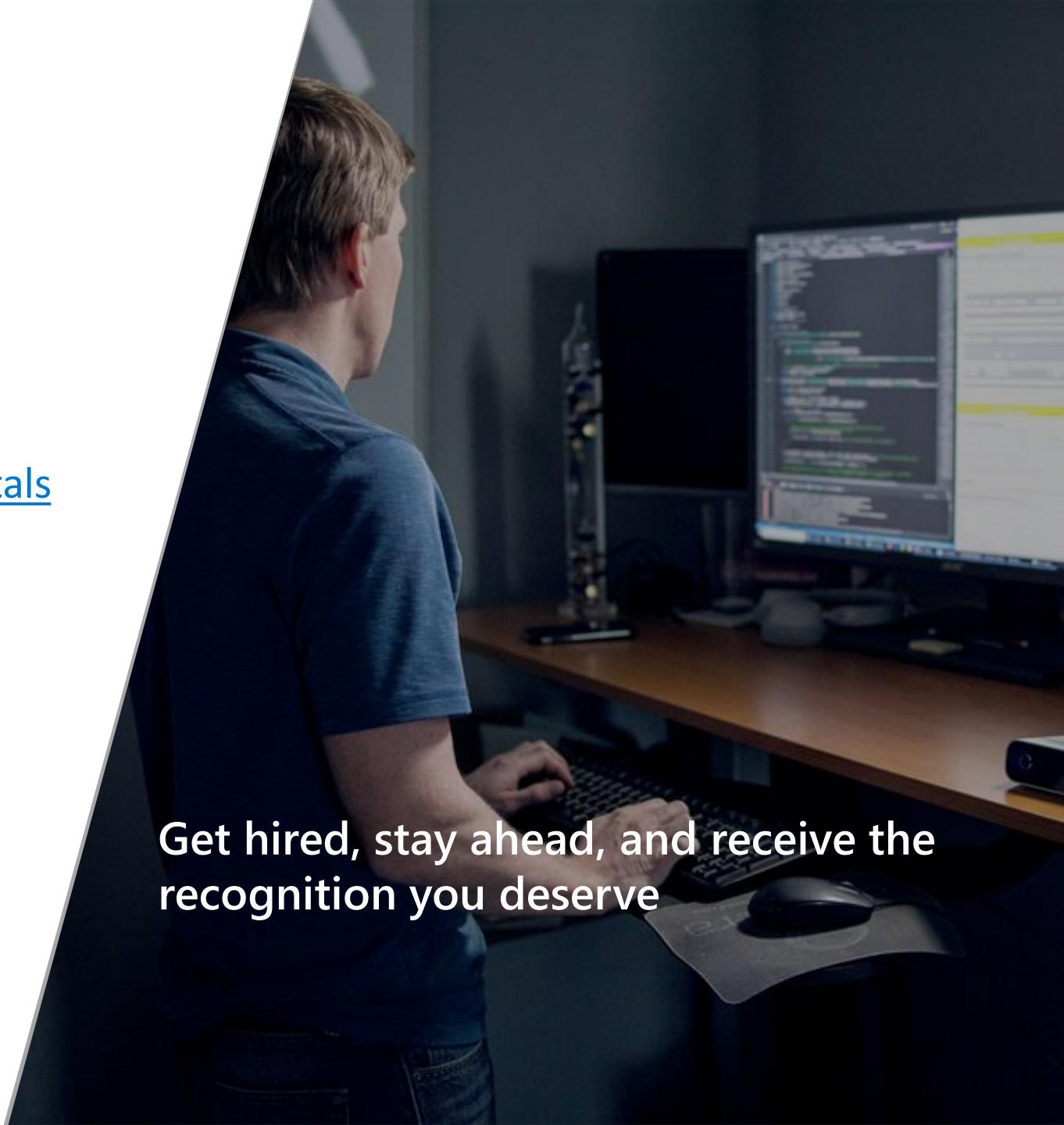
Proposed Architecture

**DEMO**

**Rehost an on-premises application by  
migrating to Azure VMs and Azure SQL  
Managed Instance**

# /Microsoft Certification

- [Microsoft Certified Azure Data Fundamentals](#)
- Microsoft Certified:  
[Azure Database Administrator Associate](#)

A photograph of a man from behind, wearing a blue polo shirt, sitting at a desk in a dimly lit office. He is looking at two computer monitors displaying code and data. His hands are on a keyboard and a mouse. The scene conveys a sense of focused work and technology.

Get hired, stay ahead, and receive the recognition you deserve



# Migrate SQL Workloads to Azure

# Agenda

---

- Azure SQL
- Azure Migrate
- Additional Data Migration Tools



# Azure SQL

# What is Azure SQL

The family of SQL cloud to edge databases



**SQL Server on Azure  
Virtual Machines**

Best for lift and shift and/or workloads requiring OS-level access



**Azure SQL  
Managed Instance**

Best for modernizing existing apps



**Azure SQL  
Database**

Best for supporting modern cloud apps



**Azure SQL  
Edge**

Best for extending apps to IoT edge

**Infrastructure-as-a-Service**

**Platform-as-a-Service**

**Edge Computing**

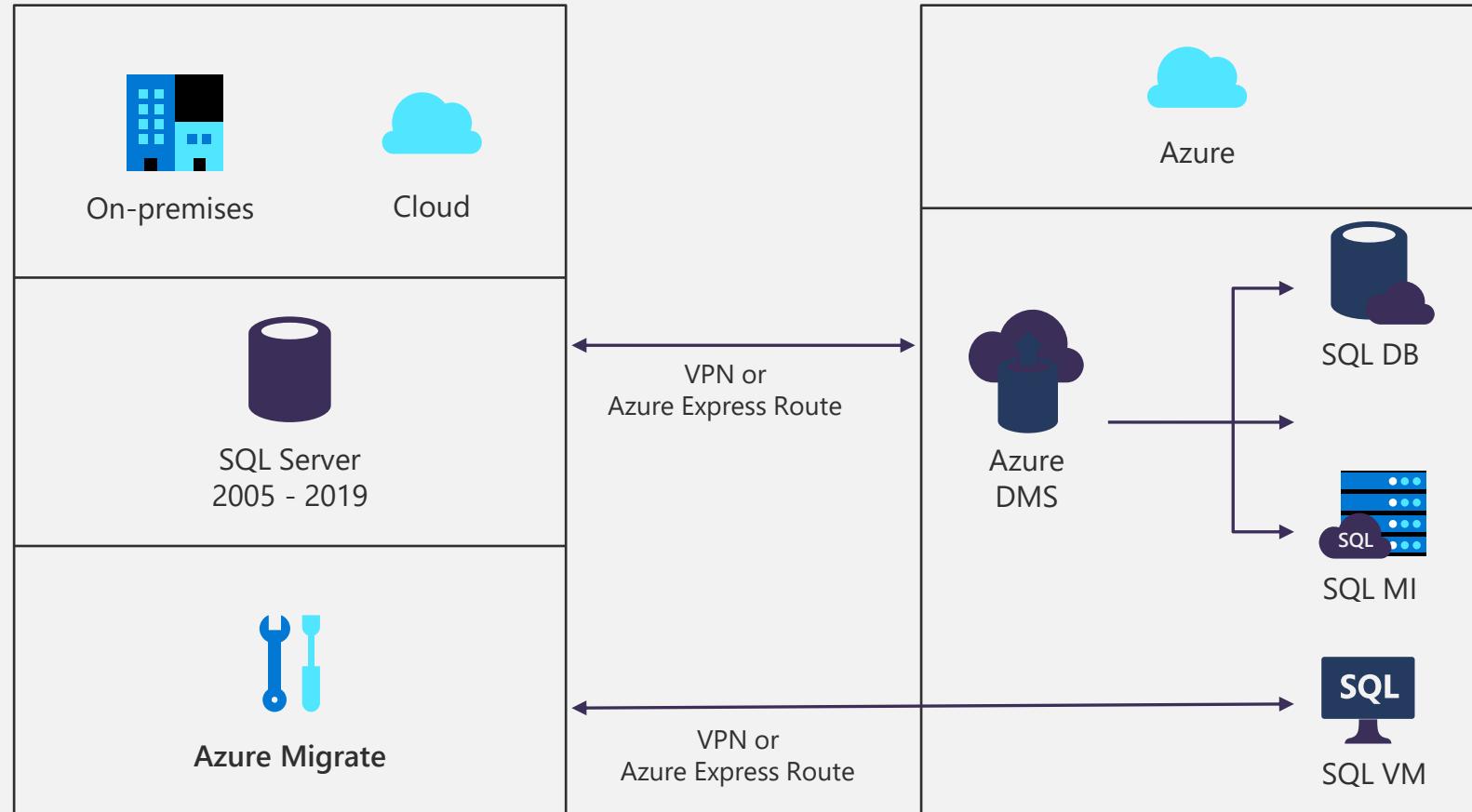
Azure is the cloud that knows SQL Server best

# Simplify Migration with free tools

## SQL Server to Azure SQL

Lift-and-shift or modernize existing applications with few changes to your code and database

- **Azure Migrate** assesses on-premise databases for migration and rehosts SQL Server to Azure VMs
- **Database Migration Services (DMS)** enables massive cloud migrations at near zero downtime
- Free DMS offline; free online up to 6 months with 4vCores



Database migration guide: [datamigration.microsoft.com/](http://datamigration.microsoft.com/)



# Data Migration Tools

# Azure Migrate: a central hub for datacenter migration



Azure Migrate



## Multiple Scenarios

Migrate Windows and Linux Servers, Databases, Data, Web Applications and Virtual Desktops



## Diverse Capabilities

Comprehensive discovery, assessment, and migration capabilities powered by Azure and third-party tools



## Centralized Visibility

Centralized migration repository delivering end-to-end tracking and insights

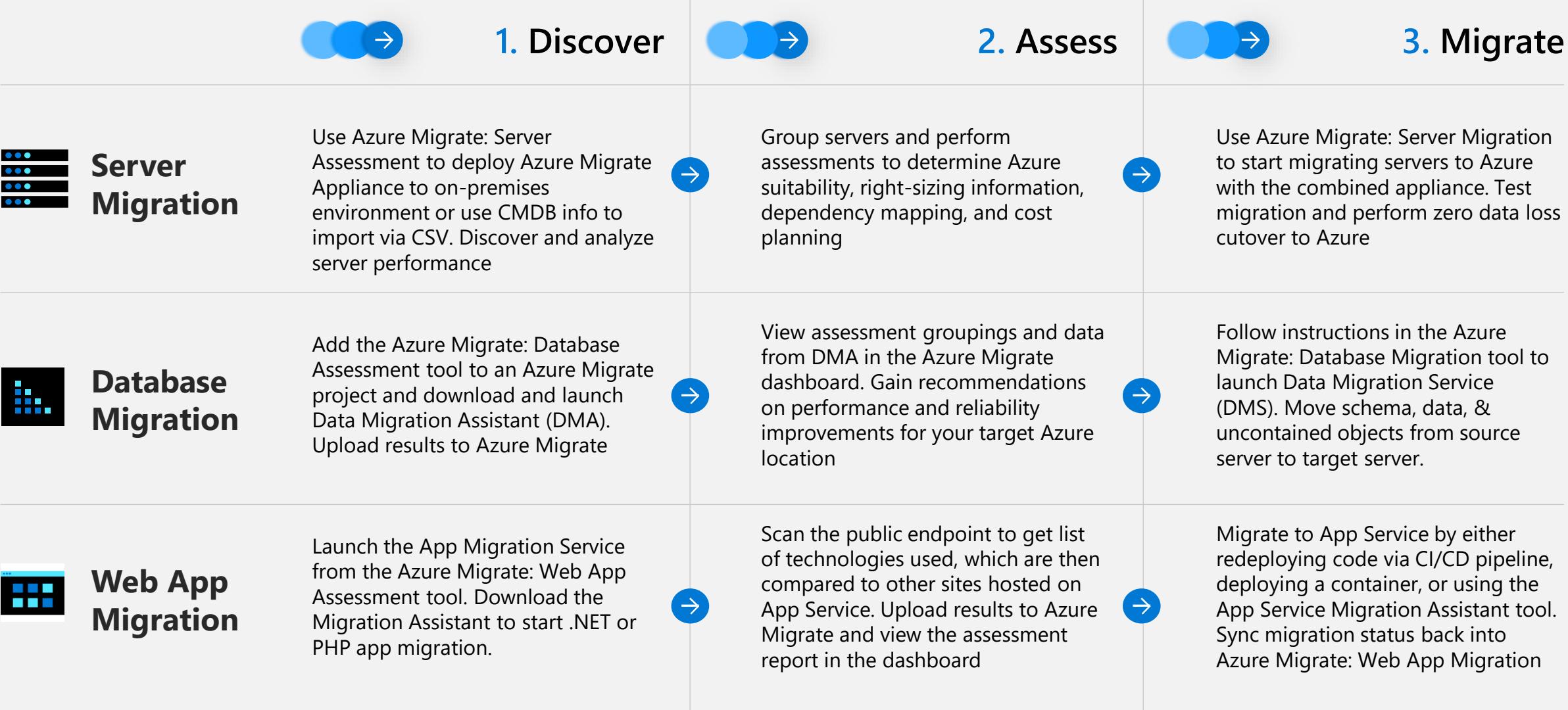
# Azure Migrate Multiple Scenarios

## Migrate Windows and Linux Servers, Databases, Data, Web Applications and Virtual Desktops

- Windows Server and Linux migration
- SQL and non-SQL database migration
- Web App assessment and migration via App Migration Service
- Virtual Desktop Infrastructure assessment and migration
- Data migration using Data Box
- Holistic across VMware, Hyper-V, physical server
- On premises, AWS, or GCP migration

The screenshot shows the Microsoft Azure Azure Migrate service homepage. The left sidebar contains navigation links: Home, Azure migrate, Overview, Migration goals (Servers, Databases, Web Apps, Data), Manage (Discovered items, Migration projects), Support + Troubleshooting (New support request), and Useful links. The main content area features a banner with the text "Migrate your on-premises datacenter" and "With Azure migrate you can easily discover, assess and migrate your on-premises applications". It includes two sections: "Windows and Linux servers" (Discover, assess and migrate your on-premises VMware and Hyper-V virtual machines or Physical servers to Azure) with a "Assess and migrate servers" button, and "SQL and other databases" (Discover, assess and migrate your on-premises databases to Azure SQL Database Managed Instance or Azure SQL Database) with a "Assess and migrate databases" button. There are also "Need help?" and "Understand ownership cost..." links at the bottom.

# Migration phases with Azure Migrate





# Additional Migration tooling on Azure

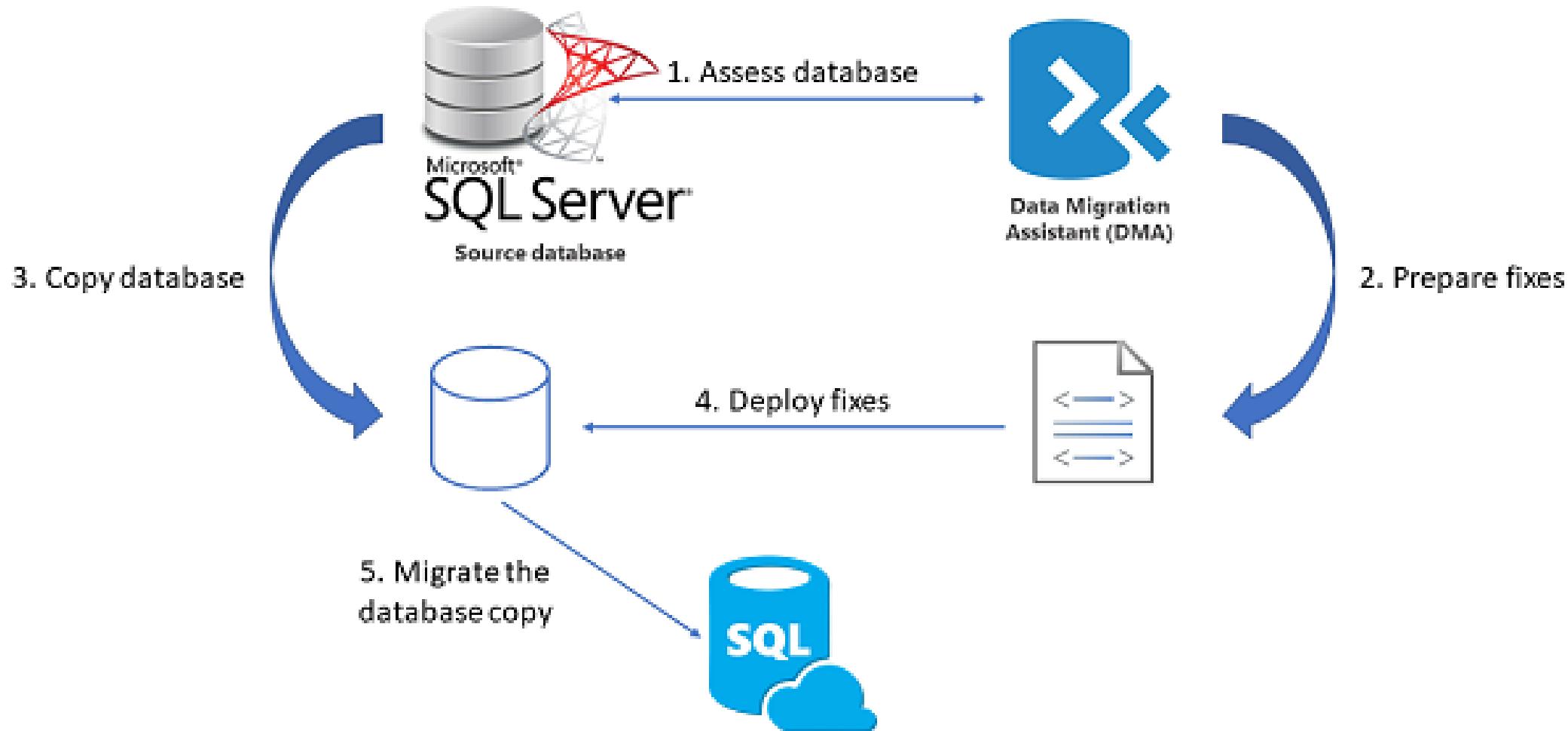
# Database Assessment with Azure Migrate and DMA

- Launch the Data Migration Assistant (DMA) from the Azure Migrate tool
- Assess your on-premises database readiness
- DMA report includes SKU recommendations based on collected performance data
- Based on recommended SKU, receive an estimated monthly cost of migrating your on-premises environment to Azure

The screenshot shows the Microsoft Azure portal interface for the Azure Migrate service. The main navigation bar at the top includes the Microsoft Azure logo, a search bar, and user account information (abhemraj@...). Below the header, the URL is "Home > Azure Migrate | Databases".  
**Assessment tools:**  
Azure Migrate: Database Assessment  
+ Assess  
Assessed database instances: 1  
Assessed databases: 1  
Databases ready for Azure SQL...: 1  
Databases ready for Azure SQL...: 1  
Next step: Start migration using [Database Migration Service](#)  
Add more assessment tools? [Click here.](#)  
**Migration tools:**  
Azure Migrate: Database Migration  
Quick start:  
1: **Migrate databases**  
Database Migration Service helps you migrate your on-premises database to Azure. [Learn more](#)  
2: **Get Started with DMS**  
Get started with DMS by creating a DMS service instance

Learn more about the [Data Migration Assistant](#)

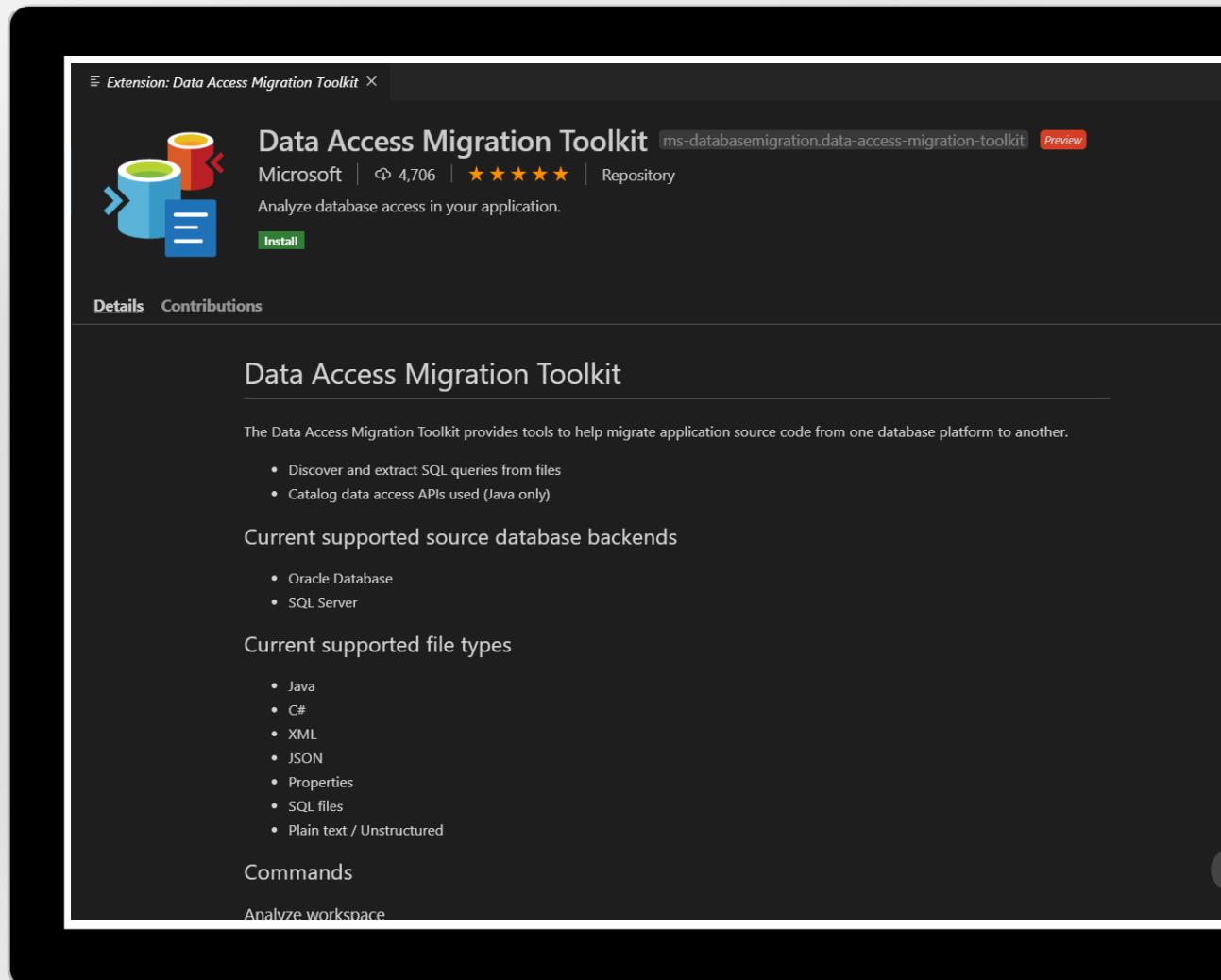
# Migrate using the Data Migration Assistant



# Data Access Migration Toolkit

- Tool designed to help migrate application source code from one database platform to another
- Scan your entire workspace for database usage and SQL queries, or analyze a sole file for the same
- Use the tool to find compatibility issues between your on-premises SQL Server and your Azure SQL Database

Learn more about the [Data Access Migration Toolkit](#)



DEMO

# Azure Migrate

# Database Migration Service (DMS)

Fully managed service designed to enable seamless online or offline migrations from multiple data sources to Azure Data Platforms

- Database-sensitive migration moves data, schema and objects to Azure
- Easy-to-understand process helps you get the job done right the first time
- Highly resilient and self-healing migration service provides reliable outcomes with near-zero downtime.

Supports:

- Microsoft SQL Server, MySQL, PostgreSQL, MongoDB, and Oracle migration to Azure from on-premises and other clouds.

The screenshot shows the Microsoft Azure Azure Migrate service homepage. The top navigation bar includes 'Microsoft Azure', 'Home > Azure migrate', a search bar, and tabs for 'What's new', 'Get started' (which is selected), and 'Tutorials & Demos'. The main content area features a heading 'Migrate your on-premises datacenter to Azure' with a subtext 'With Azure migrate you can easily discover, assess and migrate your on-premises application to the cloud'. Below this are two sections: 'Windows and Linux servers' (with a 'Discover, assess and migrate your on-premises VMware and Hyper-V virtual machines or Physical servers to Azure.' subtext and a 'Assess and migrate servers' button) and 'SQL and other databases' (with a 'Discover, assess and migrate your on-premises databases to Azure SQL Database Managed Instance or Azure SQL Database.' subtext and a 'Assess and migrate databases' button). A sidebar on the left lists 'Migration goals' (Servers, Databases, Web Apps, Data) and 'Manage' (Discovered items, Migration projects). At the bottom are links for 'Useful links', 'Need help?', and 'Understand ownership cost...'.

# Azure Database Migration Service



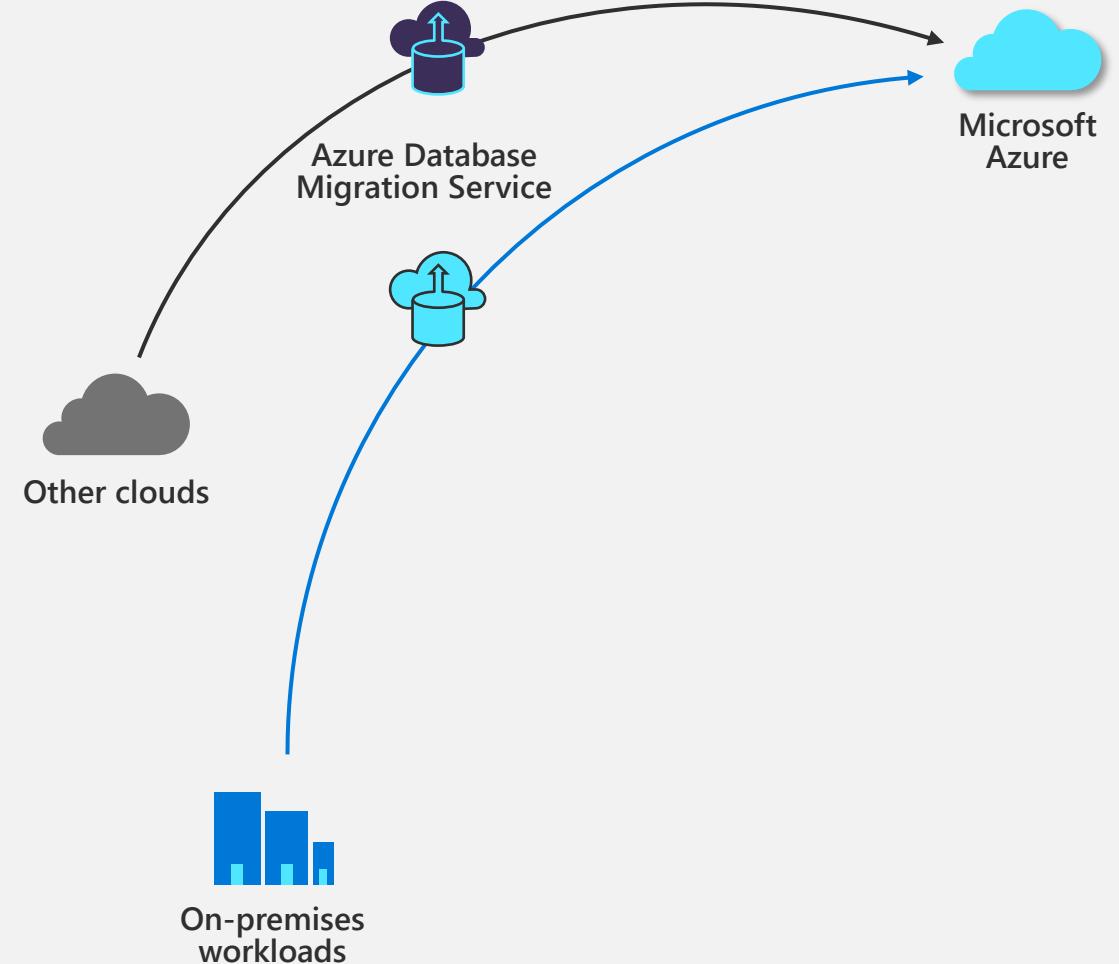
A comprehensive service, including a detailed guide, designed for seamlessly migrating your databases to Azure



Highly resilient and self-healing migration experience, with near-zero downtime



Completely automate your database migration project and find the migration scenario that best fits your needs



# Azure Database Migration Service

## Database Migration Guide

Step-by-step guidance for modernizing  
your data assets

- This guide gives step-by-step guidance on migrating any SQL Server 2005 version or newer to Azure
- Migrations are also supported for SQL Server on Virtual Machines, Amazon Web Services (AWS) EC2, Compute Engine (GCP), and AWS RDS
- The guide covers pre-migration, migration, and post-migration scenarios to help ensure an easy migration to Azure
- Migrate your current databases, applications, and SQL Server logins

The screenshot shows the landing page for the Azure Database Migration Guide. At the top, it says "Azure Database Migration Guide" and "Step-by-step guidance for modernizing your data assets". Below this, there's a section titled "Select your source and target to..." with a link "Need a recommendation?". The page features a grid of logos for various database systems:

- Microsoft SQL Server
- ORACLE®
- DB2
- mongoDB.
- cassandra
- MariaDB
- Microsoft Azure Table Storage

# Database Experimentation Assistant

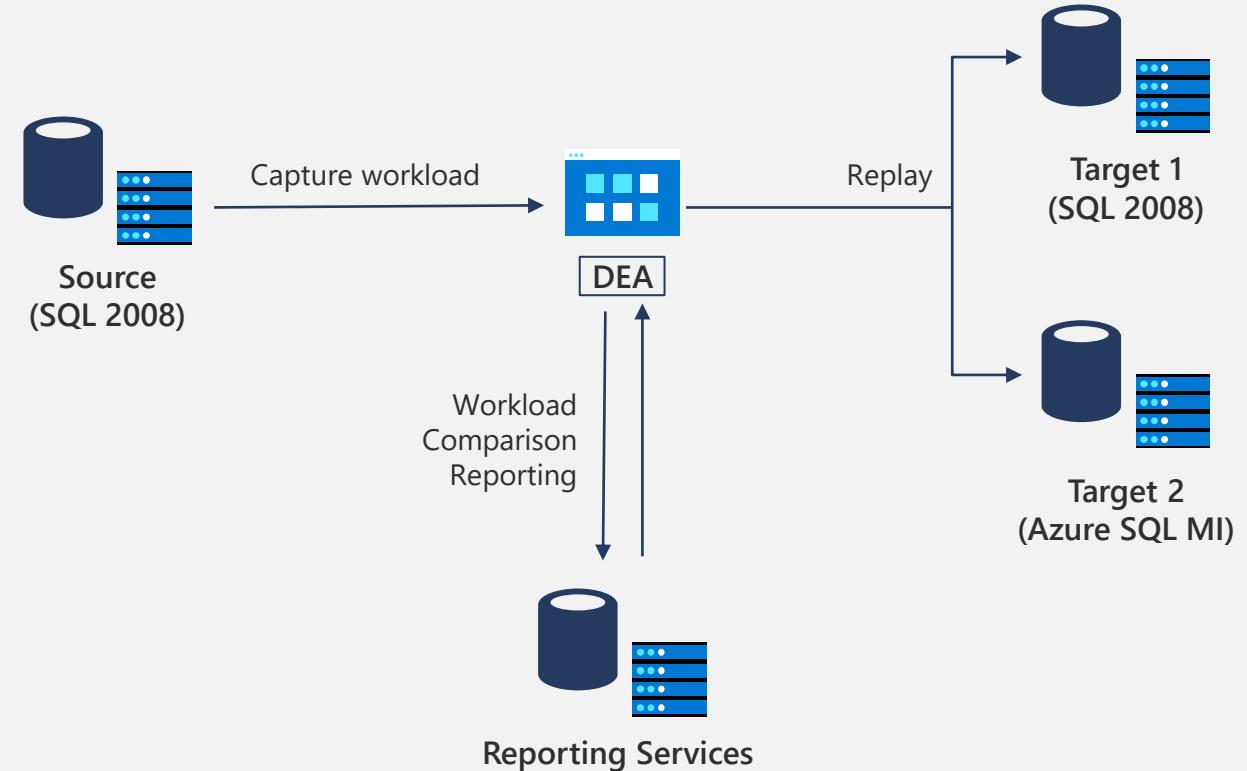
## An experimentation solution for SQL Server upgrades

Evaluate the performance of an upgraded environment by conducting experiments across two SQL Server versions using production workloads

Build confidence about upgrading your SQL Server by obtaining metrics including queries with compatibility issues and degraded queries or query plans

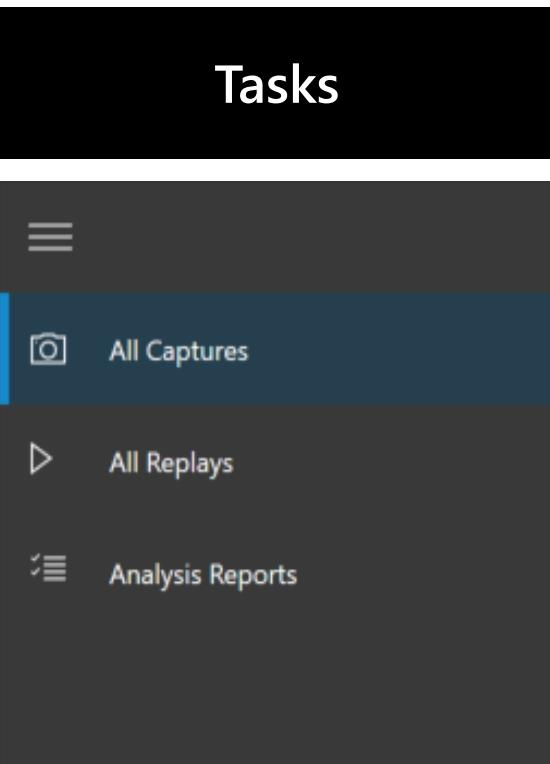
Compatible with SQL Server 2005 and newer

Learn more about the [Database Experimentation Assistant](#)



# Working with the Database Experimentation Assistant

There are 3 high level tasks that you perform in the Database Experimentation Assistant

Tasks	Captures	Replays	Analyze
	<p>You should define:</p> <ul style="list-style-type: none"><li>• Trace name</li><li>• Duration</li><li>• SQL Server instance name</li><li>• Database name</li><li>• Path to store source trace file on SQL Server machine</li></ul>	<p>You should define:</p> <ul style="list-style-type: none"><li>• Replay name</li><li>• Controller machine name</li><li>• Path to source trace file on controller</li><li>• SQL Server instance name</li><li>• Path to store target trace file on SQL Server machine</li></ul>	<p>You should define:</p> <ul style="list-style-type: none"><li>• Report name</li><li>• Trace for Target 1 SQL Server</li><li>• Trace for Target 2 SQL Server</li></ul>



# Migrate SQL Workloads to Azure

# Migrate to Azure App Service

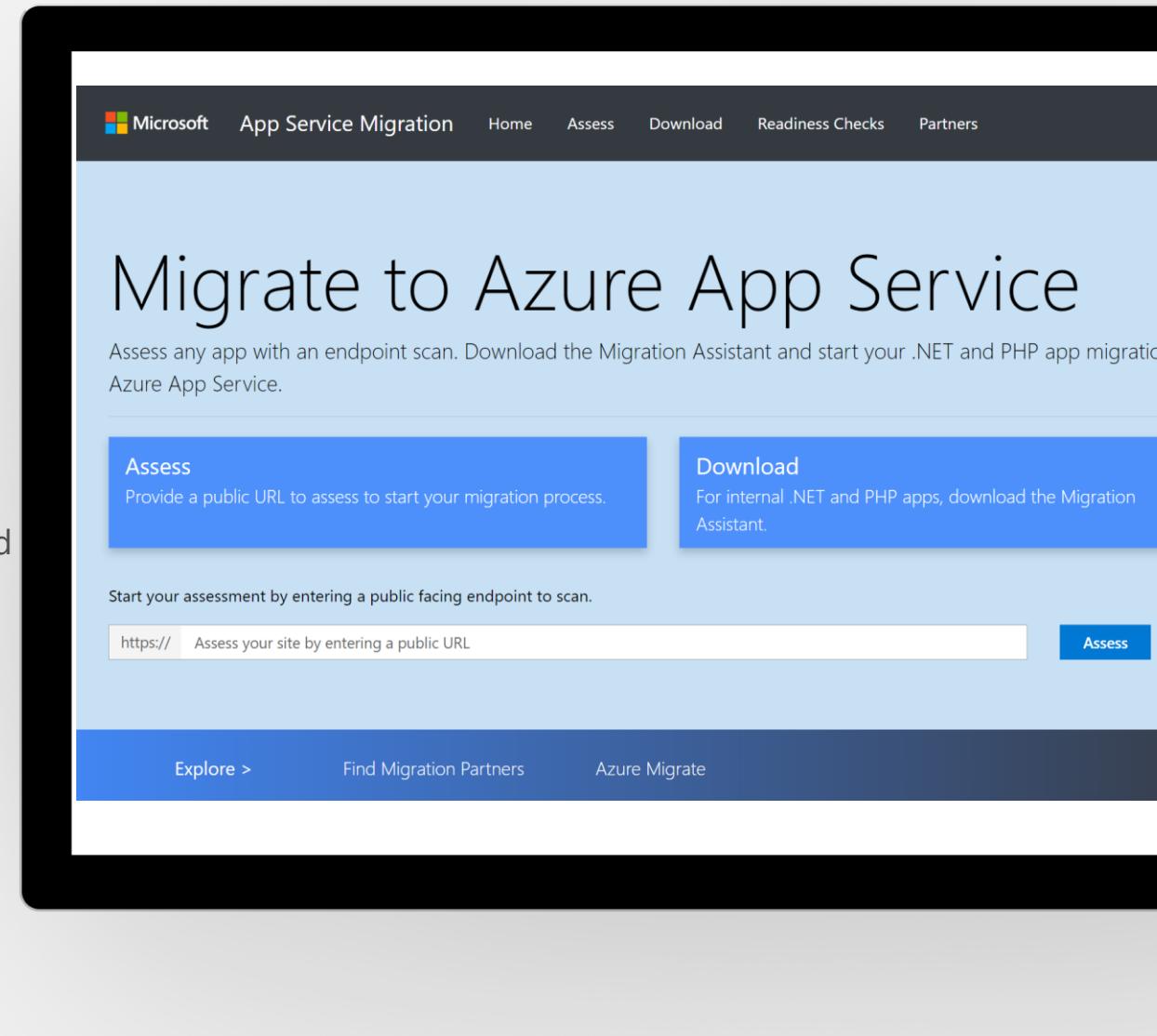
## Assess any app with an endpoint scan

### Assess your site

- Assess your site to get a detailed report of all the technologies used and whether they can be hosted on App Service.

### Migrate using Migration Assistant for your .NET and PHP Apps

- Post-assessment
- Step-by-step guided migration of .NET and PHP apps



DEMO

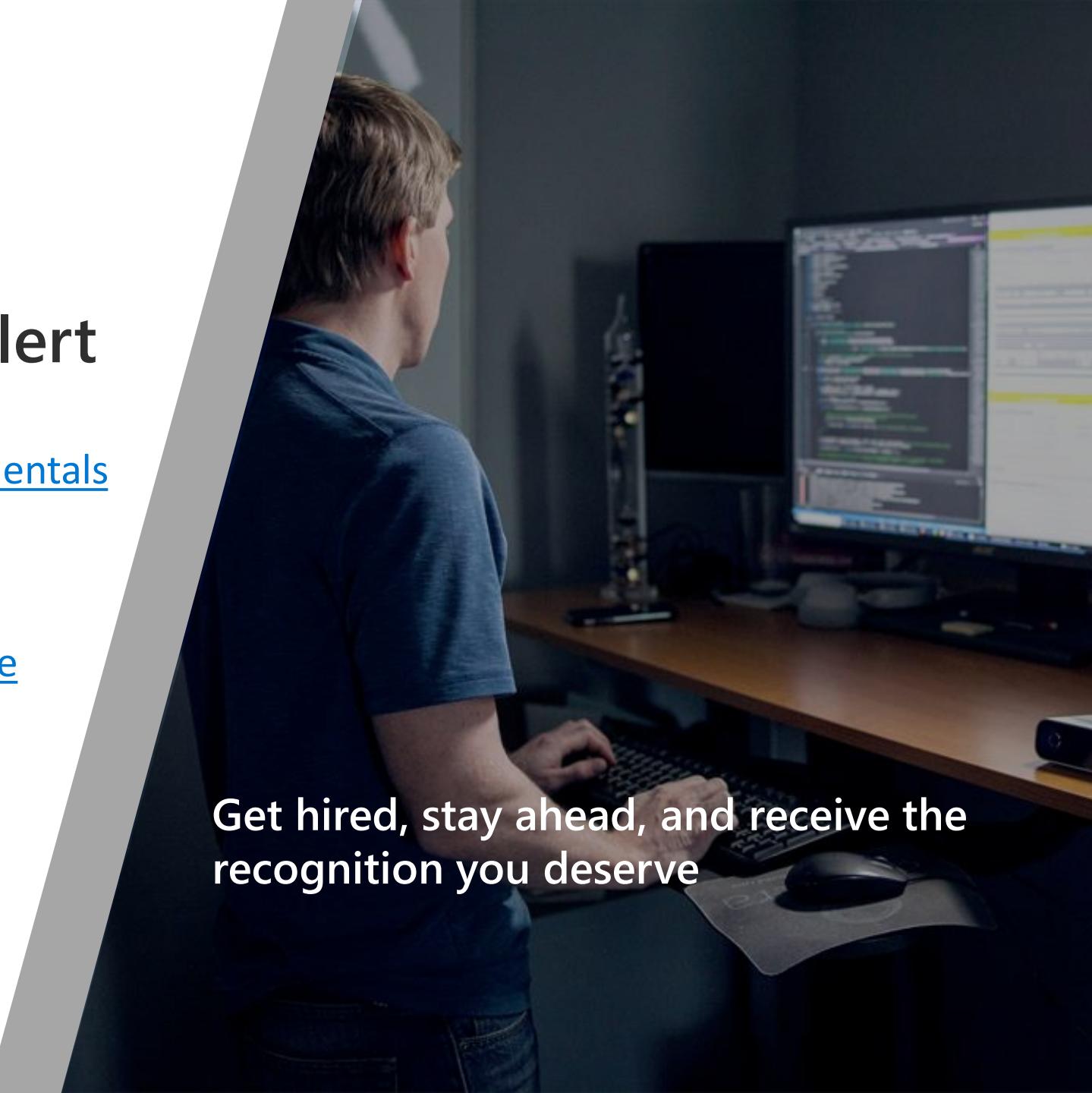
# Data Migration Assistant

**DEMO**

## Migrate SQL Workloads to Azure

# /Microsoft Certification alert

- [Microsoft Certified Azure Data Fundamentals](#)
- [Microsoft Certified:  
Azure Database Administrator Associate](#)



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# Protect, Manage, Monitor, and Optimize Workloads in Azure

# Tailwind Traders Requirements

A number of Windows Server VMs to be migrated to Azure need access to Active Directory Domain Services

Several applications rely upon custom AD schema extensions

Several applications need access to data stored in an Active Directory Domain Services partition

Some applications require group policies applied consistently across VMs in different application tiers

With a hybrid identity and access solution in place, migrated workloads must still strengthen their cloud security posture and implement adequate threat protection

# **AD DS on IaaS**

**Connect on-premises network to Azure using VPN or ExpressRoute**

**Deploy AD DS domain controllers as IaaS VMs on the Azure virtual network**

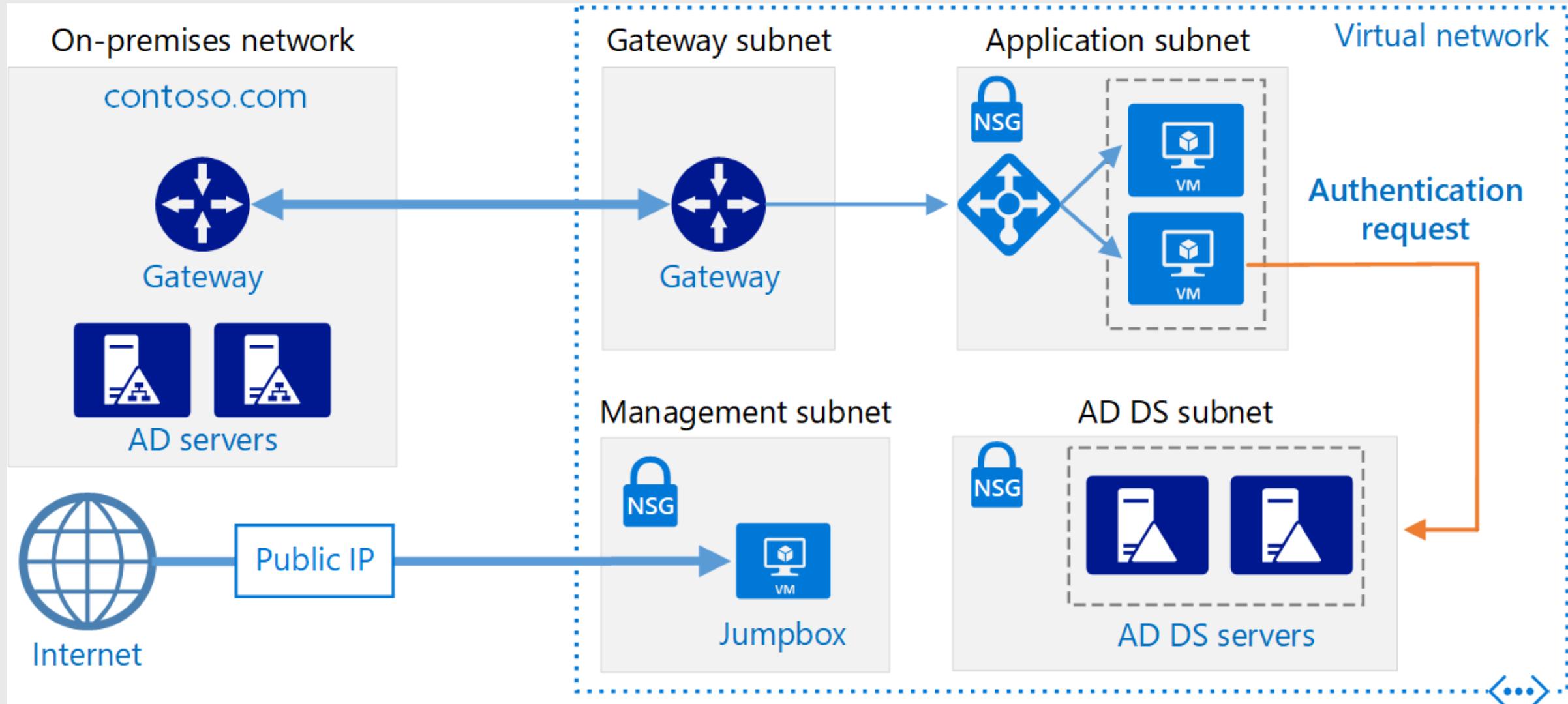
Can be configured as AD DS domain controllers in a separate site

Can be configured as AD DS domain controllers in a subdomain of on-premises forest

**Supports: Custom GPO, Schema extensions, custom AD partitions**

**Drawbacks: You need to manage VMs and pay for IaaS running costs**

# AD DS on IaaS



# **AD DS Resource Forest on IaaS**

**Connect on-premises network to Azure using VPN or ExpressRoute**

**Deploy AD DS domain controllers as IaaS VMs on the Azure virtual network and configure as new forest**

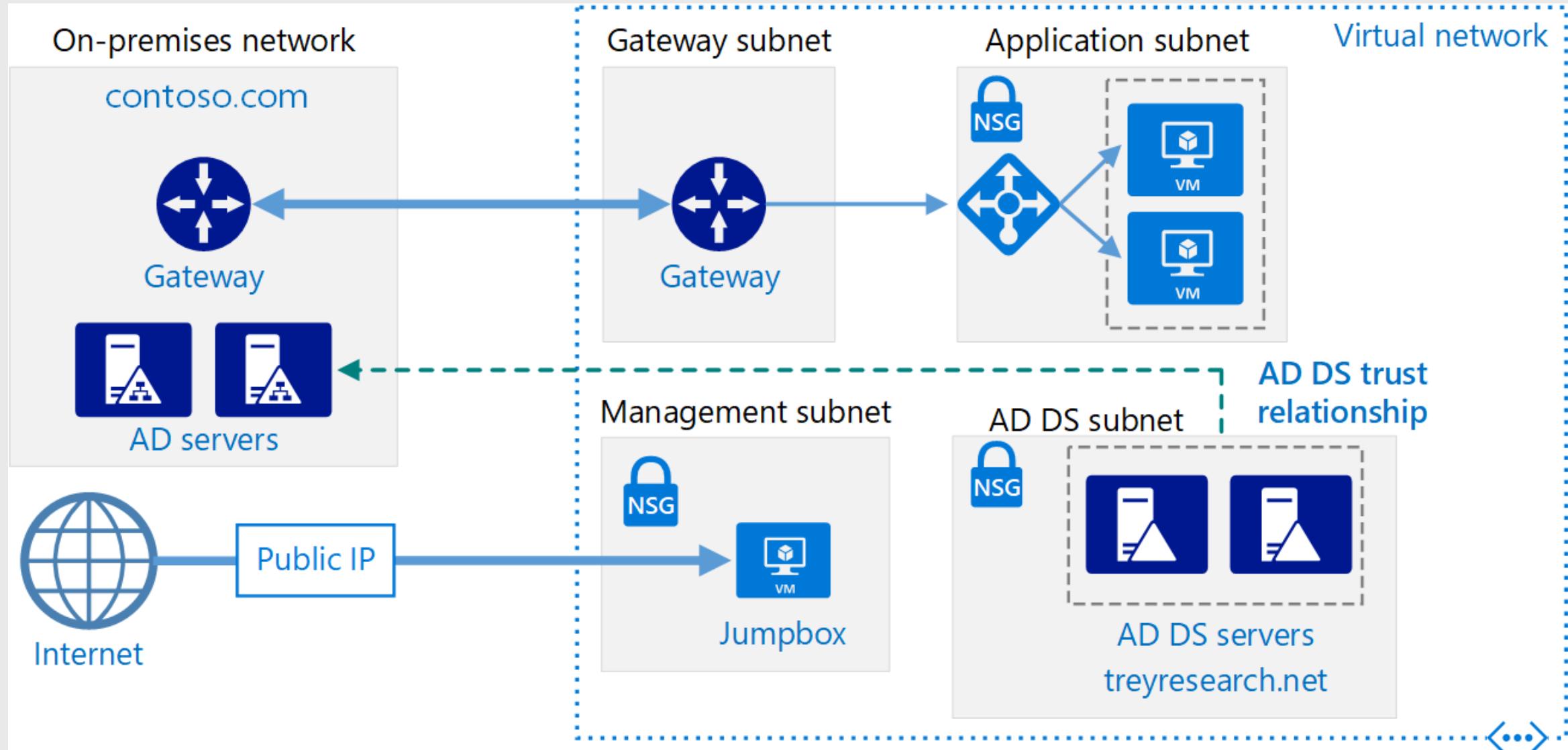
Configure one way trust relationship with on-premises AD DS forest

Minimized replication traffic and security over AD DS on IaaS architecture

**Supports: Custom GPO, Schema extensions, custom AD partitions**

**Drawbacks: You need to manage VMs and pay for IaaS running costs**

# AD DS Resource Forest on IaaS Architecture



# Azure Active Directory



## Azure Active Directory

Microsoft's Cloud-Based  
Identity and Access  
Management Service



## AAD Tenant

A dedicated and trusted instance  
of Azure AD that represents a  
single organization



## Custom Domains

Initial Domain will be  
[x.onmicrosoft.com](https://x.onmicrosoft.com)

- Cannot be changed or modified
- Can add and verify custom domain

# Azure Active Directory

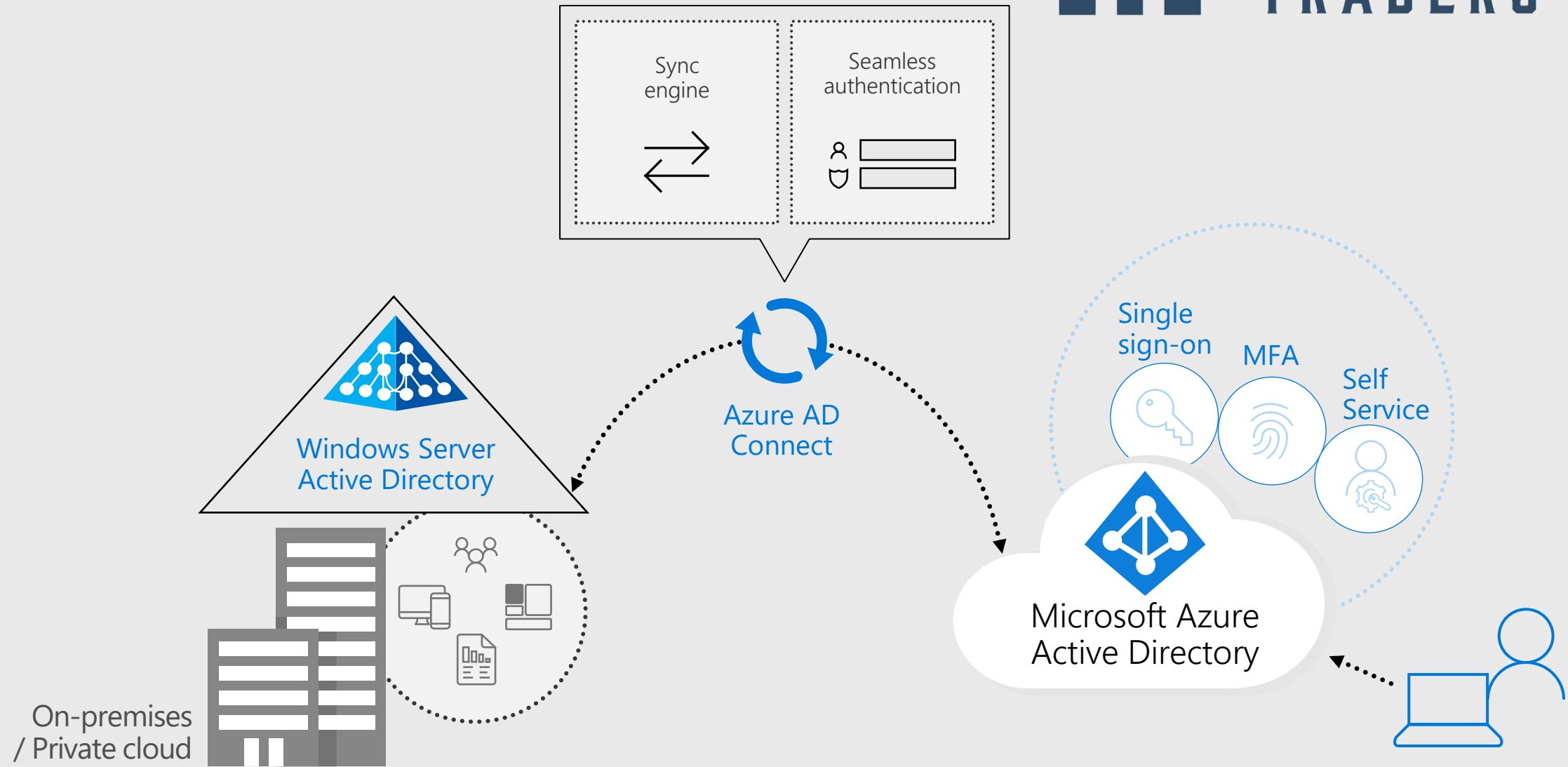
No domain controllers

No replication to manage  
between Cloud regions

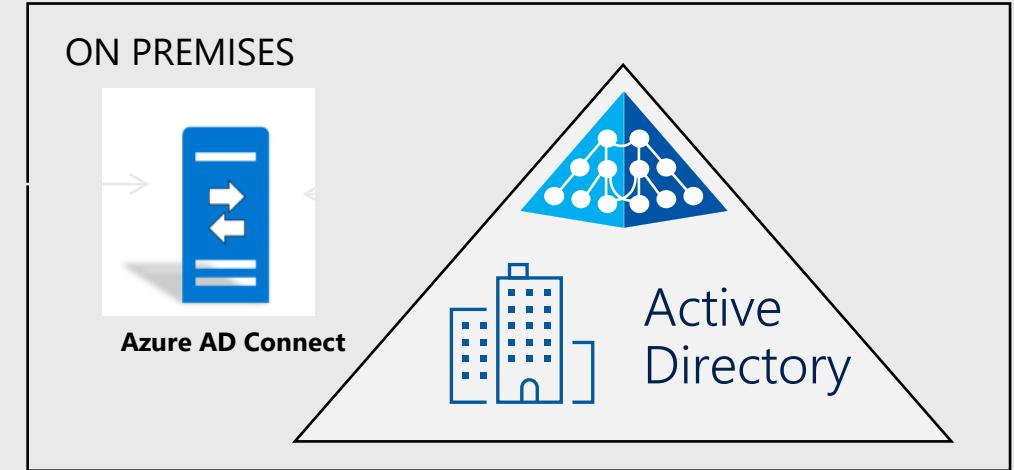
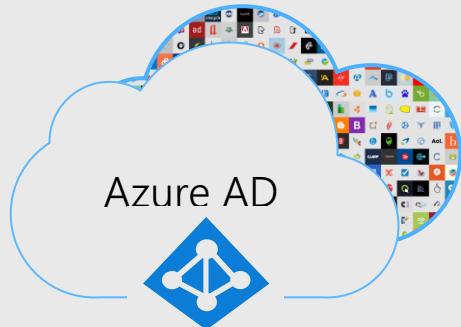
No OUs – flat structure



# Azure AD Connect



# Password Hash Sync



## Great user experience

- Same passwords for cloud-based and on-premises apps
- Disaster recovery option in case other authN methods are unavailable

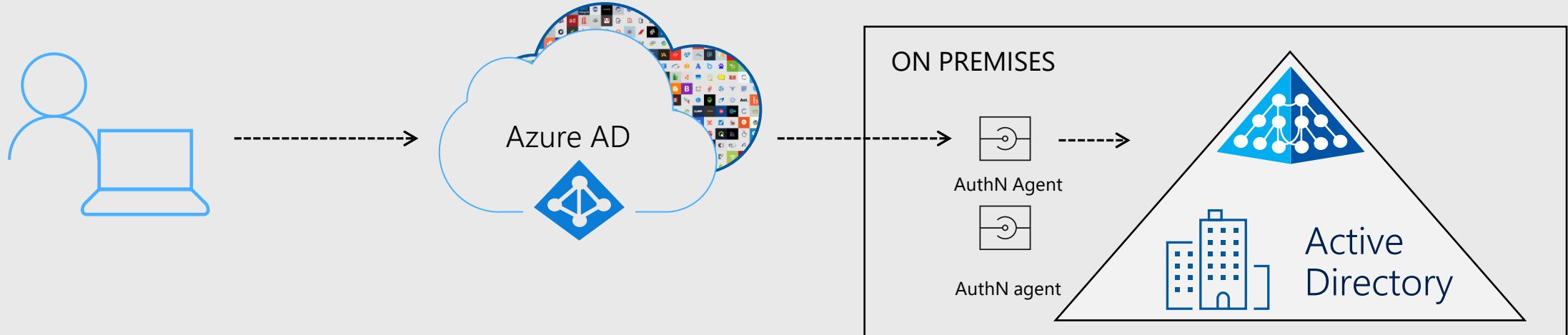
## Secure and compliant

- Only non-reversible hashes are stored in the cloud
- Leaked credential report available
- Integrated with Smart Lockout, Identity Protection and Conditional Access

## Easy to deploy & administer

- No on-premises agent needed
- Small on-premises footprint

# Pass thru Authentication



## Great user experience

- Same passwords for cloud-based and on-premises apps
- Integrated with Self-Service Password Reset

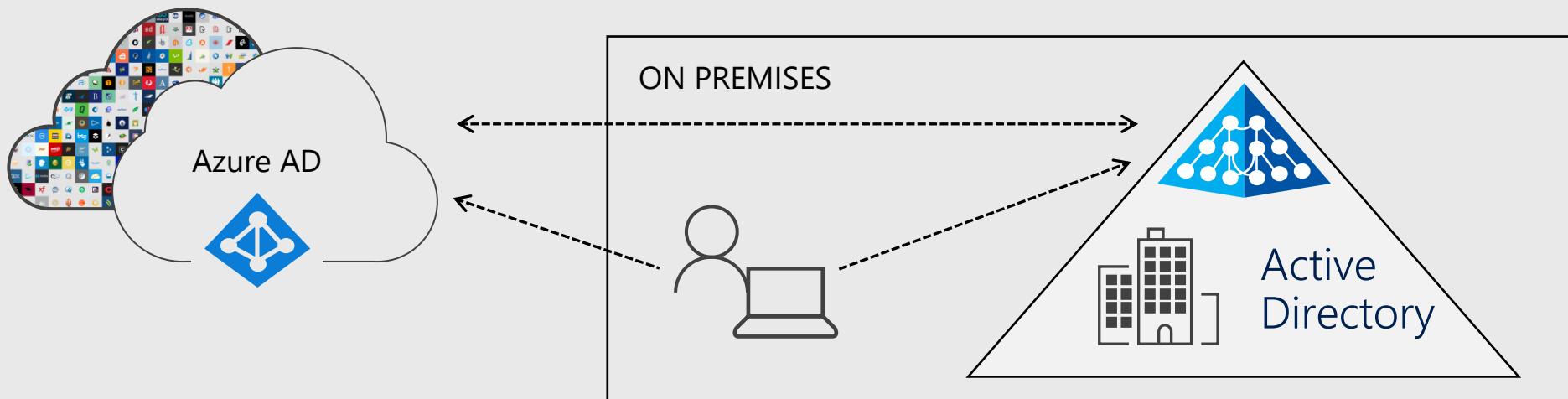
## Secure and compliant

- Passwords remain on-premises
- No DMZ and no inbound firewall requirements
- Integrated with Smart Lockout, Identity Protection and Conditional Access

## Easy to deploy & administer

- Agent-based deployment
- High availability out-of-the-box
- No complex on-premises deployments or network config
- Zero management overhead

# Seamless Single Sign On



## Easy to integrate

- Works with Password Hash Sync and Pass-through Authentication
- Supports Alternate Login ID

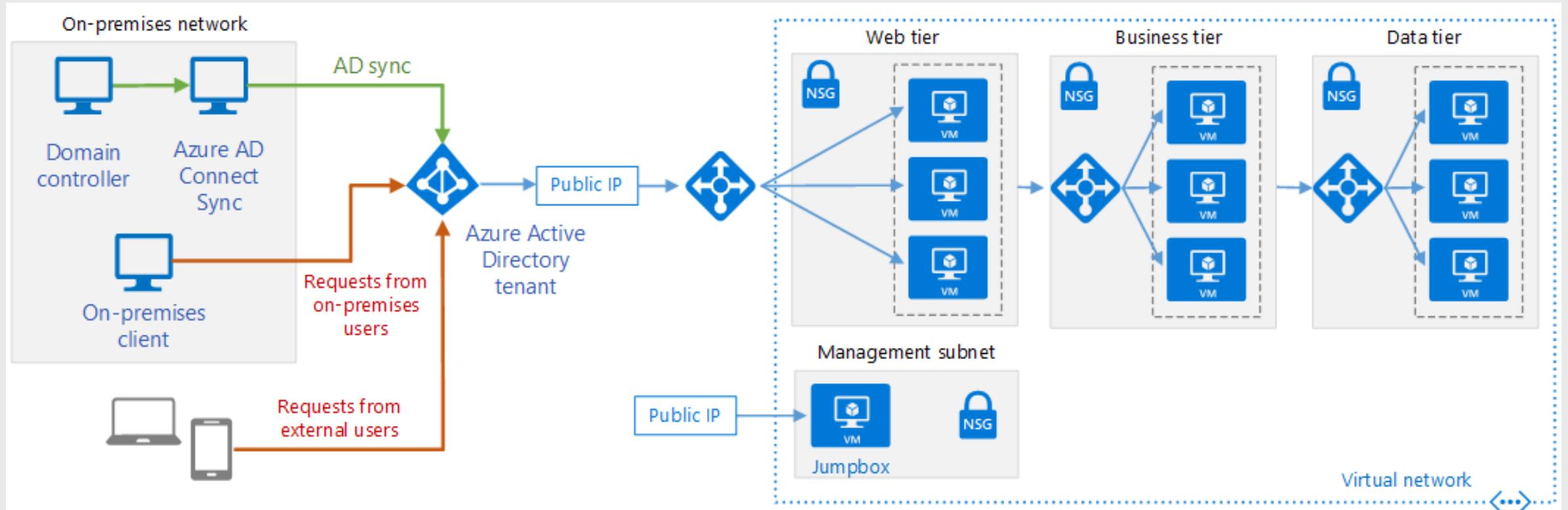
## Easy to administer

- No additional on-premise infrastructure
- Register non-Windows 10 devices without AD FS

## Great user experience

- SSO experience from domain-joined devices within your corpnet

# Azure AD Connect Architecture



# Demo

## Azure AD Connect

# Azure AD Domain Services

Provides managed AD DS domain controller service

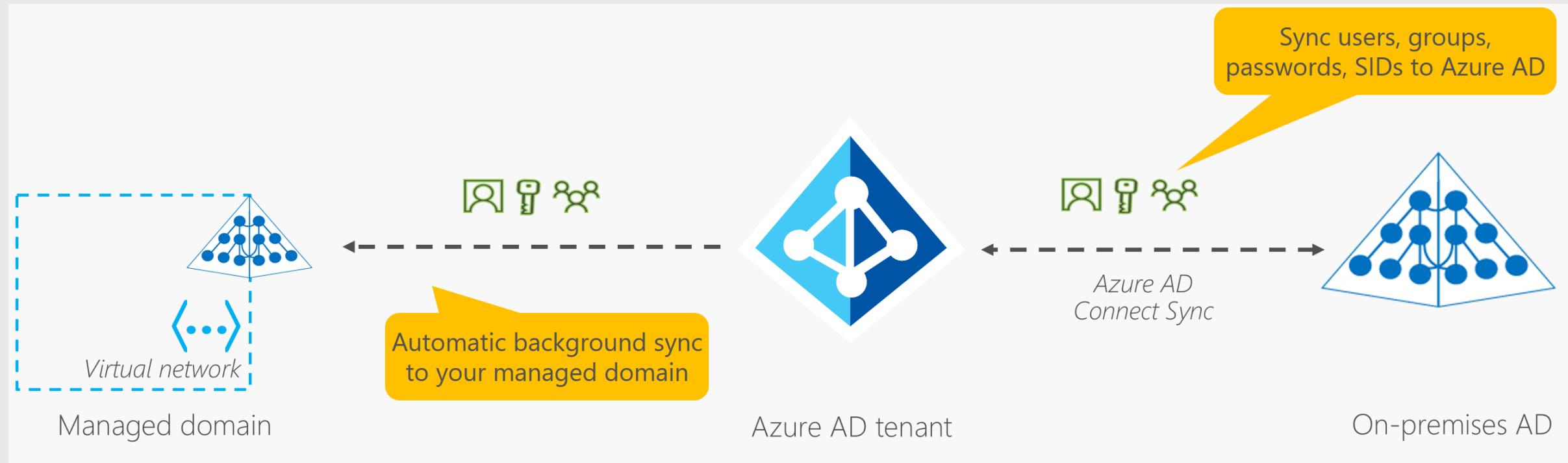
Uses Azure AD as account database and can be synchronized with on-premises AD DS through Azure AD Connect

Windows IaaS VMs can be domain joined as though AD DS domain controllers were present

Doesn't require care and maintenance of AD DS domain controller IaaS VMs

Disadvantage: Doesn't support custom schema, domain partitions or complex group policy

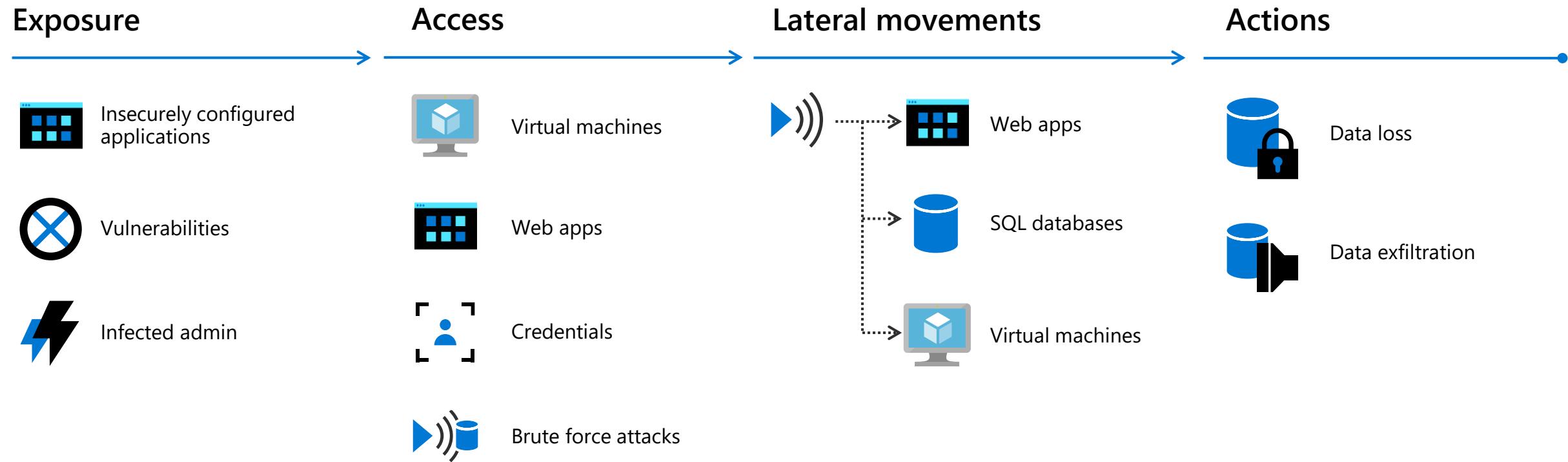
# Azure AD Domain Services architecture



# Demo

Azure AD DS

# The cloud kill chain model



# Azure Security Center



Strengthen security posture

Cloud security posture management

Secure Score  
Policies and compliance



Protect against threats

For servers

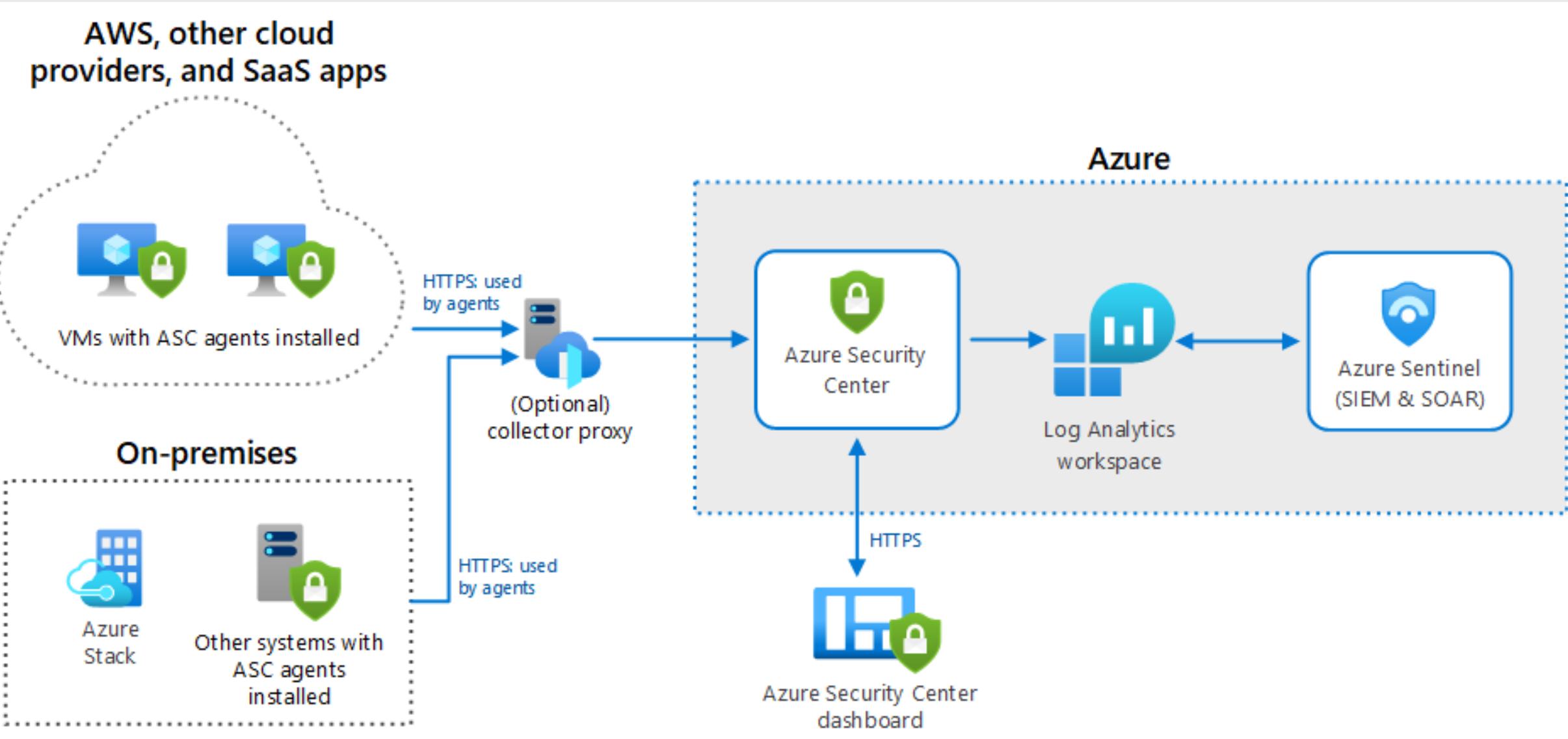
For cloud native workloads

For databases and storage



Get secure faster

# Azure Security Center architecture



# Azure Security Center and Azure RBAC

Azure Security Center uses Azure RBAC to assign roles to users, groups, and services in Azure

Assesses resource configuration to identify security issues and vulnerabilities

Two additional roles specific to Azure Security Center

Security Reader: role has viewing rights to Security Center but cannot make changes

Security Admin: same rights as Security Reader, but can also update security policies and dismiss alerts and recommendations

Best practice: assign the least permissive role needed for users to complete their tasks

# Overview of Azure Defender

Security Center's integrated cloud workload protection platform

Advanced, intelligent, protection of Azure and hybrid resources and workloads

Enabling Azure Defender allows for addition of custom policies and initiatives

Security alerts and advanced threat protection for virtual machines, SQL databases, containers, web applications, networks, and more.

Utilize Azure Defender to protect a hybrid cloud environment

Non-Azure servers

VMs in other clouds (such as AWS and GCP)

Generates security alerts, describing details of affected resources, suggested remediation steps, and in some cases options for a response

# Azure Defender dashboard

Security Center | Azure Defender   

Showing 40 subscriptions

Subscriptions    What's new

**1 Azure Defender coverage**

691 TOTAL

Category	Total	Status
Servers	161/170	Upgrade
Kubernetes	10/22	Upgrade
Container registries	4/9	Upgrade
App Service	60/84	Upgrade
SQL servers on machines	3/9	Install
Key Vault	13/35	Upgrade
Azure SQL database servers	46/51	Upgrade
Storage	258/303	Upgrade

Fully covered (555)    Agent not installed (8)    Install    Not covered (128)    Upgrade all

**2 Security alerts**

Bar chart showing security alerts over time:

Date	High severity	Medium severity	Low severity
13 Sun	21	44	19
20 Sun	21	44	19
27 Sun	21	44	19

**3 Advanced protection**

VM vulnerability assessment 126 Unprotected	Just-in-time VM access 18 Unprotected	Adaptive application control 47 Unprotected	Container image scanning 3 Unprotected
Adaptive network hardening 15 Unprotected	SQL vulnerability assessment 29 Unprotected	File integrity monitoring	Network map

**4**

**Enable just-in-time VM access**

Just-in-time VM access is enabled on 84% of the 116 relevant VMs. Use just-in-time VM access to lock down the inbound traffic to your VMs.

[Click here to enable >](#)

**Enable adaptive application controls**

Adaptive application control is enabled on 41% of the 80 relevant VMs. Use adaptive application control to trigger alerts when unexpected applications run.

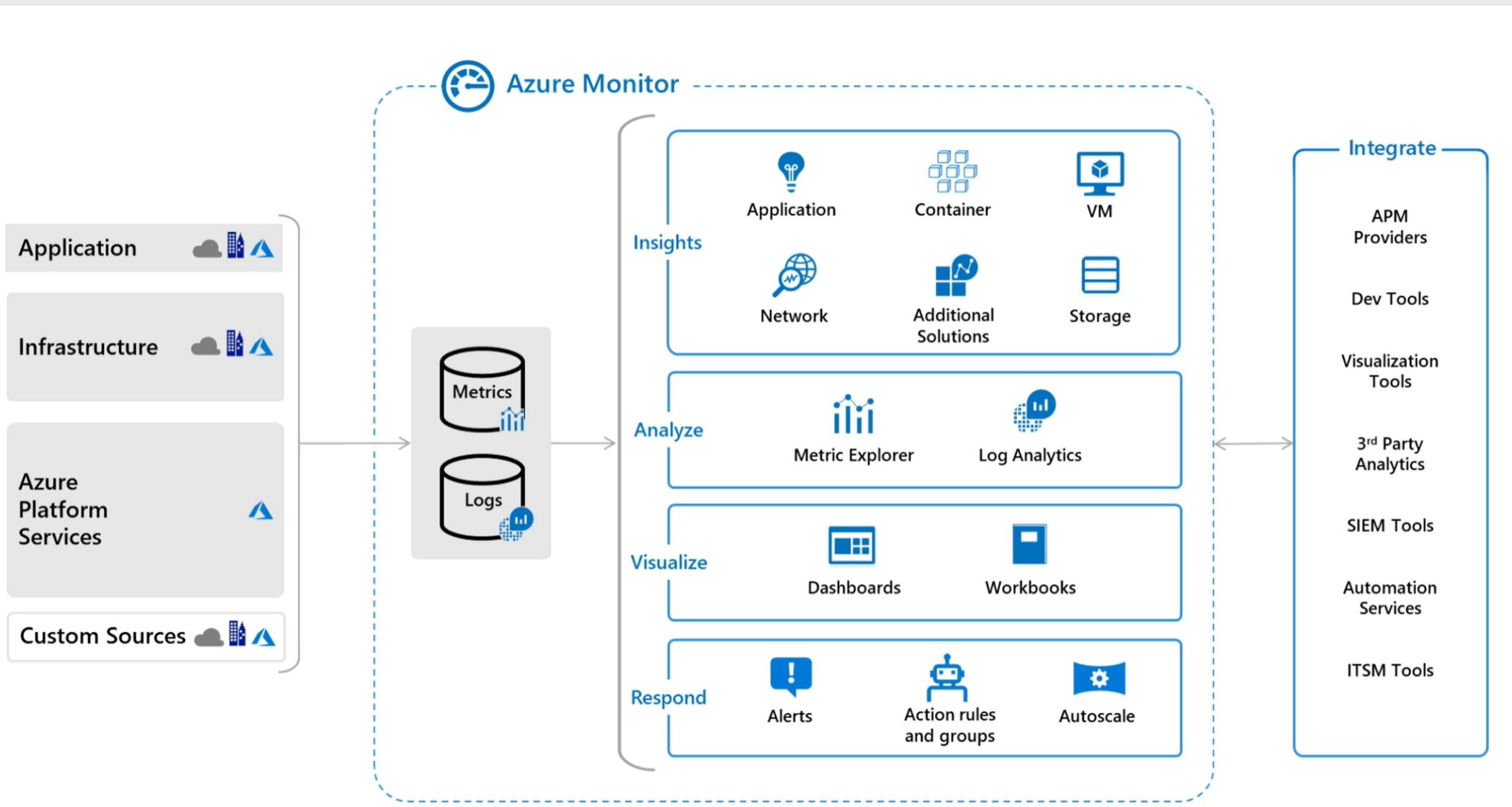
[Click here to enable >](#)

**Enable adaptive network hardening**

Adaptive network hardening is enabled on 88% of the 130 relevant VMs. Adaptive network hardening dramatically reduces the attack surface of your internet-facing VMs.

[Click here to enable >](#)

# Azure Monitor



# Cost optimization

**Make cost optimization a continual process and take appropriate action**

Use reserved instances on long running workloads

Lower costs by using discount prices, such as Azure Hybrid Use Benefit

Use a scale-in and scale-out policy to address variable demand

**Reevaluate design choices**

Choose the right storage tier and the right data store

Choose Spot VMs for low priority workloads

Use Azure Content Delivery Network (CDN) and caching service to reduce load on front-end servers

Use managed services such as Azure PaaS or SaaS to offset cost of maintaining infrastructure

# Azure Cost Management and Azure Advisor

Use Azure Advisor to identify idle or underutilized resources

Decommission, resize, or shut down underutilized VMs

The screenshot shows the Azure Cost Management: Contoso (Demo) - Advisor recommendations page. The left sidebar includes links for Overview, Go to billing account, Access control, Diagnose and solve problems, Cost analysis, Cost alerts, Budgets, Advisor recommendations (which is selected), Cloudyn, Settings, Exports, Cloud connectors (Preview), Support + troubleshooting, and New support request. The main content area displays the following information:

- Subscriptions:** All 17 selected – Don't see a subscription? Open Directory + Subscription settings.
- Total recommendations:** 6
- Recommendations by impact:** 2 High impact, 3 Medium impact, 1 Low impact
- Impacted resources:** 61
- Potential yearly savings:** 272,575 USD
- For more cost management and optimization capabilities, visit Azure Cost Management.**

IMPACT	DESCRIPTION	POTENTIAL YEARLY SAVINGS*	IMPACTED RESOURCES	UPDATED AT
High	Right-size or shutdown underutilized virtual machines	114,031.09 USD	26 Virtual machines	2/19/2020, 11:54:16 AM
Medium	Delete Public IP address not associated to a running Azure resource	446.40 USD	13 Public IP addresses	2/19/2020, 8:12:42 AM
Low	Provision the optimal amount of Request Units for Azure Cosmos DB	5,308.42 USD	2 Cosmos DB accounts	2/19/2020, 8:25:34 AM
High	Buy virtual machine reserved instances to save money over pay-as-you-go costs	96,766.90 USD	17 Virtual machines	2/19/2020, 10:03:34 AM
Medium	Delete ExpressRoute circuits in the provider status of Not Provisioned		2 ExpressRoute circuits	2/19/2020, 7:59:08 AM
Medium	(PREVIEW) Unused/Empty Azure Data Explorer clusters	56,021.76 USD	1 Azure Data Explorer Cluster	2/19/2020, 11:41:44 AM

# Summary

TWT can use AD DS on IaaS or a resource forest architecture to support applications on Windows IaaS VMs that rely upon custom AD schema extensions

TWT can use AD DS on IaaS or a resource forest architecture to support applications that need access to data stored in an Active Directory Domain Services partition

TWT can use AD DS on IaaS or a resource forest architecture to support applications that require group policies applied consistently across VMs in different application tiers

TWT can use Azure Security Center, Azure Defender, and Azure Monitor to harden their security posture and protect against threats