

Links

- WIFI: msevent197co
- LAB: <http://BIT.LY/2C0Dock>
- Code: ACTIVATE4662
- Github: github.com/SteveYoungCA/SQLMI_Workshop
- Stephen Giles sgiles@dstrat.com
- <https://www.linkedin.com/in/stevegiles/>

SQL Server Managed Instance Overview

Stephen Giles

Cloud Solution Architect - Infrastructure
Dimensional Strategies Inc.

Stephen Young

Cloud Solution Architect – Data & AI
One Commercial Partner (OCP)
Microsoft

11/06/2018 V1



Agenda

8:30 - 9:00 - Breakfast
9:00 - 9:30 - Introduction - Logistics
9:30 - 10:30 – Azure Data Services Introduction
10:30 - 10:45 - Coffee break
10:45 - 11:45 - Whiteboard session
11:45: - 1215 – Solution Presentations to group
12:15 - 5:00 - Lab
12:15 - 12:45 Lunch

Bonus - Time Permitting – SQL 2019 Kubernetes





We love data

Premium Microsoft Partner with over 20 years of experience in **analytics & business intelligence**

Based in the GTA & service clients worldwide

Award winning Microsoft Partner with 75+ Employees

Microsoft Partner



Gold DevOps
Gold Application Development
Gold Cloud Platform
Gold Data Analytics
Gold Data Platform

Microsoft Partner



2019 Partner of the Year Finalist
DevOps Award



Our clients



London
CANADA



DESCARTES™



RIO CAN



Weston
George Weston Limited



Empowering your journey

Analytics

Application
Development

Infrastructure
& Operations

Analytics

Turn raw data into powerful business intelligence.



Traditional

- ✓ Scorecards
- ✓ Dashboards
- ✓ Standard Reports
- ✓ Ad hoc Analysis

Advanced

- ✓ Machine Learning
- ✓ Statistical Modeling
- ✓ Predictive Analytics
- ✓ Advanced Visualizations
- ✓ R & IoT

Microsoft Tools

- ✓ SQL Server Data Platform
- ✓ Power BI
- ✓ R
- ✓ Cortana Analytics
- ✓ Azure Data Lake
- ✓ HD Insight
- ✓ Azure Data Warehouse
- ✓ Azure Data Factory
- ✓ Azure ML

Accelerator Packages

Half day to full week co-development workshops. Power BI general and advanced training, and custom engagements.

Develop and enhance your existing Power BI environment with our Power BI Embedded Framework – Connect with us to learn more about our assessment and deployment solutions

DevOps/ App Dev

Modernize legacy applications and develop new apps that empower greater productivity.

Microsoft Built Apps

- ✓ Custom Built Applications
- ✓ Web Based Applications for Your Users
- ✓ Connections to Mobile Apps or e-Commerce
- ✓ Cost Effective Support and Maintenance

Design & Development

- ✓ Elicit New Requirements From Your Users
- ✓ Design New Modern Solutions
- ✓ Implement the New Design

Application Modernization

- ✓ Upgrade Current App
- ✓ Create New Foundations to Grow Upon
- ✓ Leverage New Technology While Migrating

Cloud Migration & Deployment

- ✓ Leverage Cost and Scalability
- ✓ Move Your Applications to Azure Platform
- ✓ Take Full Advantage of Microsoft Azure Cloud



Accelerator Packages

Half day consultation to guide your app development and migration journey.

Platform

Build a modern data platform that drives growth, reduces costs and future proofs your enterprise.

Modern Data Platforms

- ✓ Data Platform Maturity
- ✓ Database Consolidation
- ✓ High Availability / Disaster Recovery
- ✓ Data Security and Risk Management
- ✓ Performance Tuning
- ✓ Data Governance
- ✓ Big Data
- ✓ Internet of Things
- ✓ Cloud Data Integration

DSI Services

- ✓ SQL Server upgrade and consolidation
- ✓ Migration from other data platforms to SQL Server
- ✓ SQL Server High Availability and Disaster Recovery
- ✓ Data governance and data quality
- ✓ Migrating your databases to Azure

DSI Advantage

- ✓ Achieved Microsoft Gold Certified Competency in Data and Cloud Platform
- ✓ A deep understanding of On-premise, Cloud, and Hybrid environments
- ✓ Experience in upgrading, consolidating and optimizing data platforms
- ✓ Innovative disaster recovery and availability solutions



Accelerator Packages

Half day to full week consultations covering database migration, database health checks and SQL workshops.

Getting started

01 App Migration Assessment

- 1-Day Health Check
- 5-Day Assessment and Workshop
- MS & DSI Marketing Investments: MTC Workshops, Webinars, Tech Summit, SQL Saturdays

02 App Migration & Deployment

- 1-Day Database Migration Workshop
- 5-Day Database Migration Assessment and Health Check
- MS & DSI Marketing Investments: MTC Workshops, Webinars

03 Power BI

- Beginner and Advanced Training
- Dashboard in a Day
- Power BI Implementation and Training Quick Start
- MS & DSI Marketing Investments: MTC Workshops, MS Store Workshops, Webinars, Shoot for the Cloud



Advanced Analytics 04

- Training
- MS & DSI Marketing Investments: Data Science workshops



Modern Data Platform 05

- Assessment and roadmap for platform modernization



BI Roadmapping & Custom 06

- Bespoke solution offering

Centris – SQL DB



“Azure SQL Database requires minimum management effort and it is scalable, a must for our type of applications. The ‘Intelligent Performance’ monitoring with its Recommendation engine and its Query Performance Insight is like having a DBA on staff, 24x7, looking at optimizing our database. We could not have it done better!”

Cezar Nasui, Director – Operations and Special Projects, Centris

<https://azure.microsoft.com/en-ca/blog/azure-sql-database-continuous-innovation-and-limitless-scale-at-an-unbeatable-price/>

Trican –SQL/WS 2008 EOS



"We have a critical application running on SQL Server 2008 R2 and Windows Server 2008 R2 that could not be upgrade before end of support. Moving the application and database to Azure VMs reassured us that our data would stay secure because Microsoft provides 3 extra years of free extended security updates in Azure. Now IT can focus on innovation rather than managing legacy hardware."

Arthur Lo, Team Lead - Infrastructure Services at Trican Well Service Ltd.

<https://techcommunity.microsoft.com/t5/Azure-SQL-Database/Beat-SQL-Server-2008-R2-End-of-Support-by-moving-to-Azure-VM-for/ba-p/745827>



SEB – SQL 2008 EOS + SQL DB

"With SQL Server 2008 approaching end of support, SEB needed to migrate two critical business applications that contained sensitive health and PII information. In Azure, we were able to get three years of Extended Security Updates for application VMs, and move the data to Azure SQL Database which significantly decreased both management and infrastructure spend. Azure's compliance certifications for HIPAA, PCI and ISO-27k, as well as data residency in Canada, were critical in meeting our regulatory requirements."

– Mario Correia, Chief Technology Officer, SEB Inc.

Descartes – SQL MI

"We felt that Azure had the right combination of services and features for us. Plus, it would be easy to extend our existing Microsoft knowledge to work with Azure."

— Murray Kristell: Vice President of Descartes MacroPoint Development
Descartes

"With Azure, we have the flexibility to quickly scale up resources as needed with just the click of a few buttons."

—Raimond Diederik: Executive Vice President of Information Services
Descartes

"The project involved a lot of planning, of course, but the performance of SQL Database managed instance and Service Fabric made this one of the best migrations I've ever worked on."

— Murray Kristell: Vice President of Descartes MacroPoint Development
Descartes

<https://customers.microsoft.com/en-ca/story/724203-the-descartes-systems-group-travel-and-transportation-azure-sql-database>

Descartes MacroPoint real-time visibility platform migrates to Azure SQL Database to support growth and improve flexibility

"Azure SQL Database provides us with the reliability, scale, and flexibility that allows us to better focus our resources on innovating and improving the Descartes MacroPoint solution."

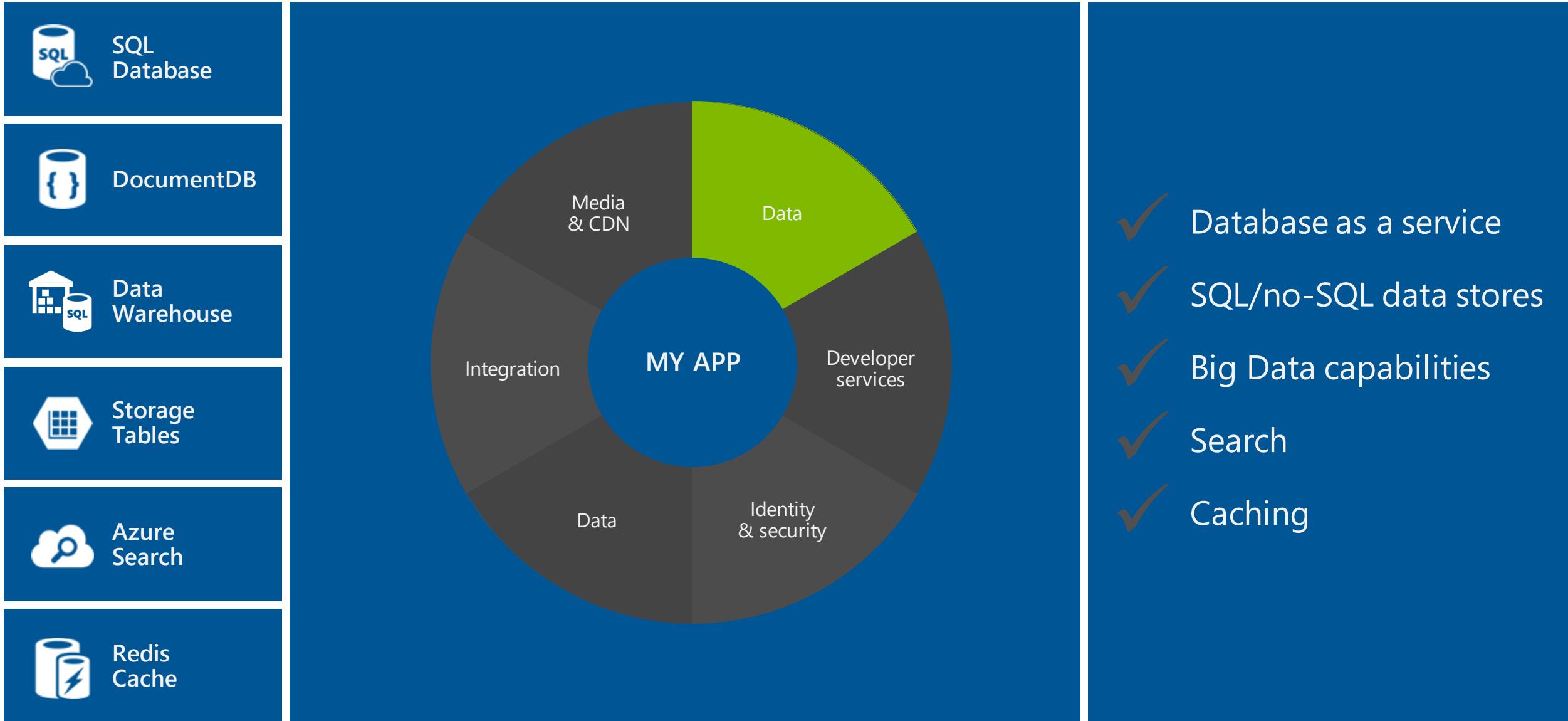
—Robert Derin: Director of Operations
Descartes MacroPoint

Descartes – Video case

<https://play.vidyard.com/p11gGLvGNFa7HwH7k9g65Z>

Azure Data Services Introduction

Data services



Migrate to the cloud with Azure SQL Database

Breakthrough
productivity &
performance



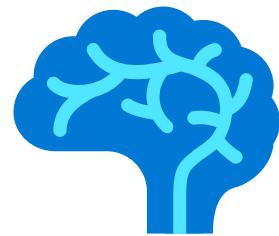
Up to 100 TB of on-demand scalable storage per DB

Industry-leading security



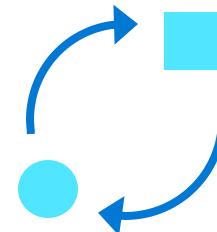
Layers of security and 99.99 percent availability SLA

Built-in intelligence



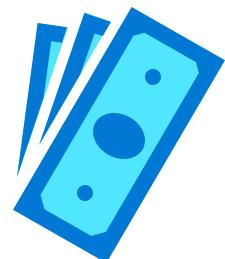
Intelligent performance tuning and intelligent protection

Seamless and compatible



The broadest SQL Server compatibility and VNET support

Competitive TCO

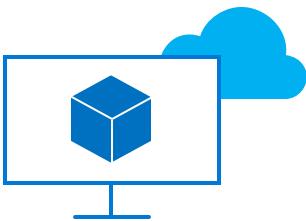


Up to 80% savings with Azure Hybrid Benefit and reserved capacity

[The best and most economical cloud destination](#)

Azure SQL

SQL virtual machines



Best for migrations and applications requiring OS-level access

SQL virtual machine

- SQL Server and OS server access
- Expansive SQL and OS version support
- Automated manageability features for SQL Server

Managed instances



Best for most lift-and-shift migrations to the cloud

Single instance

- SQL Server surface area (vast majority)
- Native virtual network support
- Fully managed service

Databases



Best for modern cloud applications. Hyperscale and serverless options are available

Single database

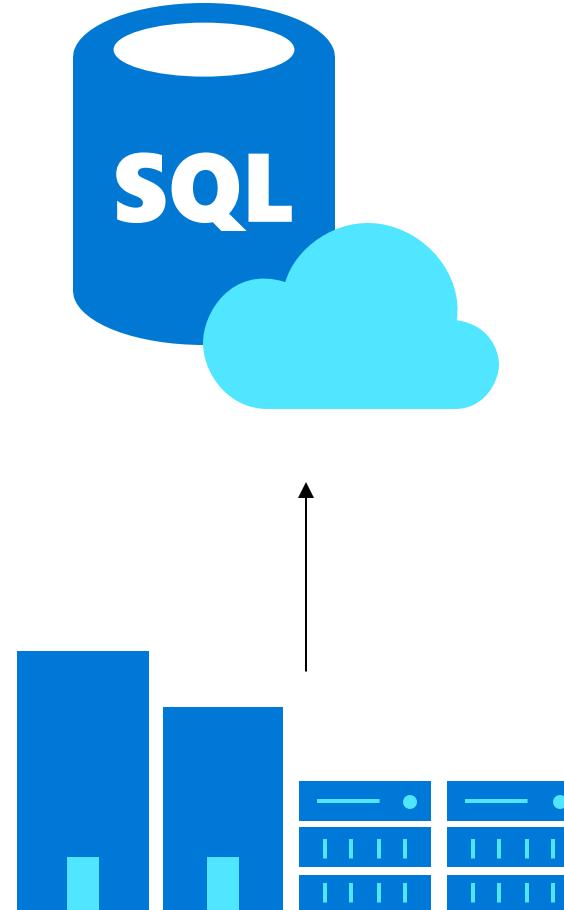
- Hyperscale storage (up to 100TB)
- Serverless compute
- Fully managed service

Elastic pool

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

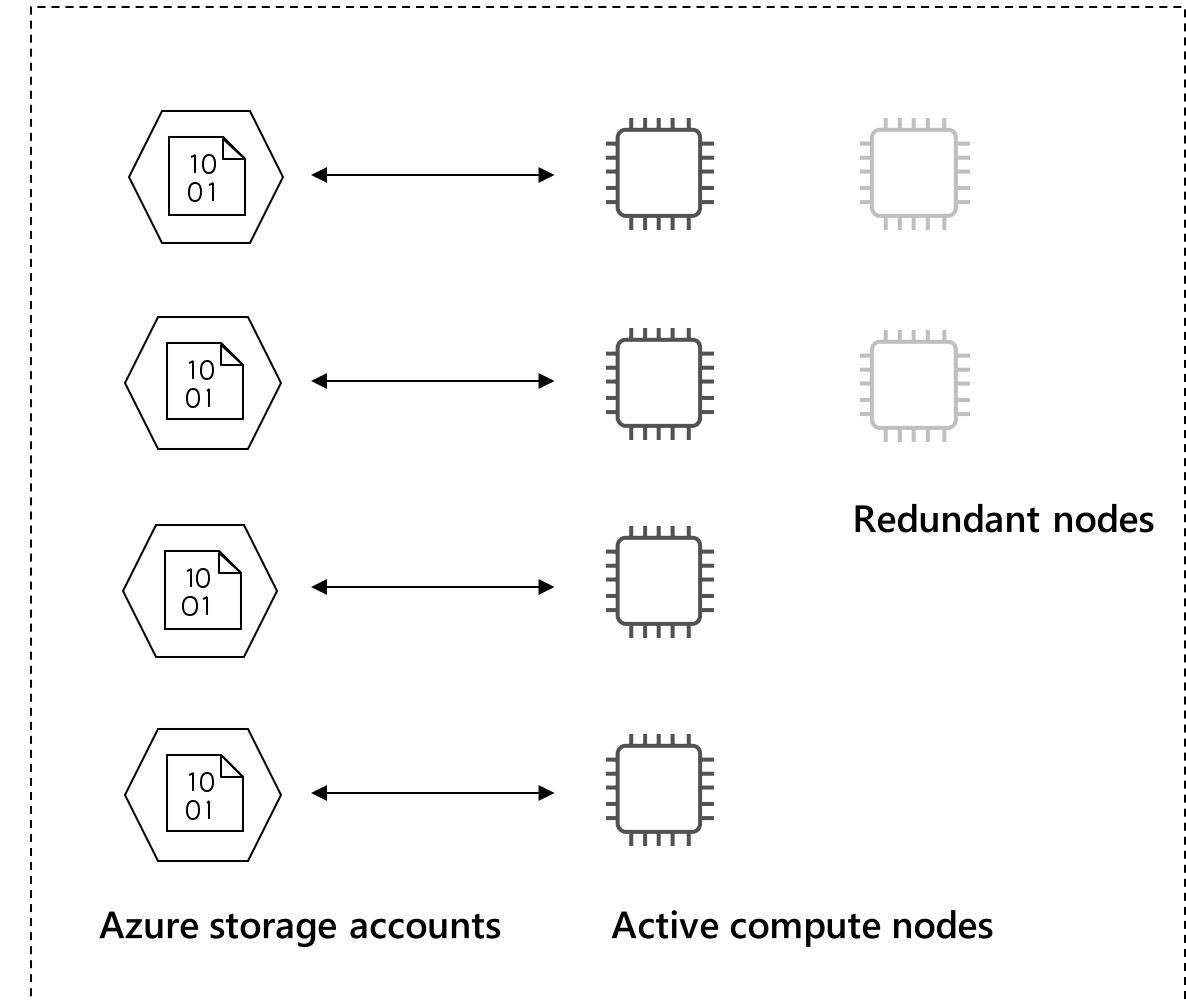
Azure SQL DB managed Instance

Customers looking to **migrate a large number of apps** from on-premise or IaaS, self-built or ISV provided, with **as low migration effort as possible** & **cost being a crucial factor**



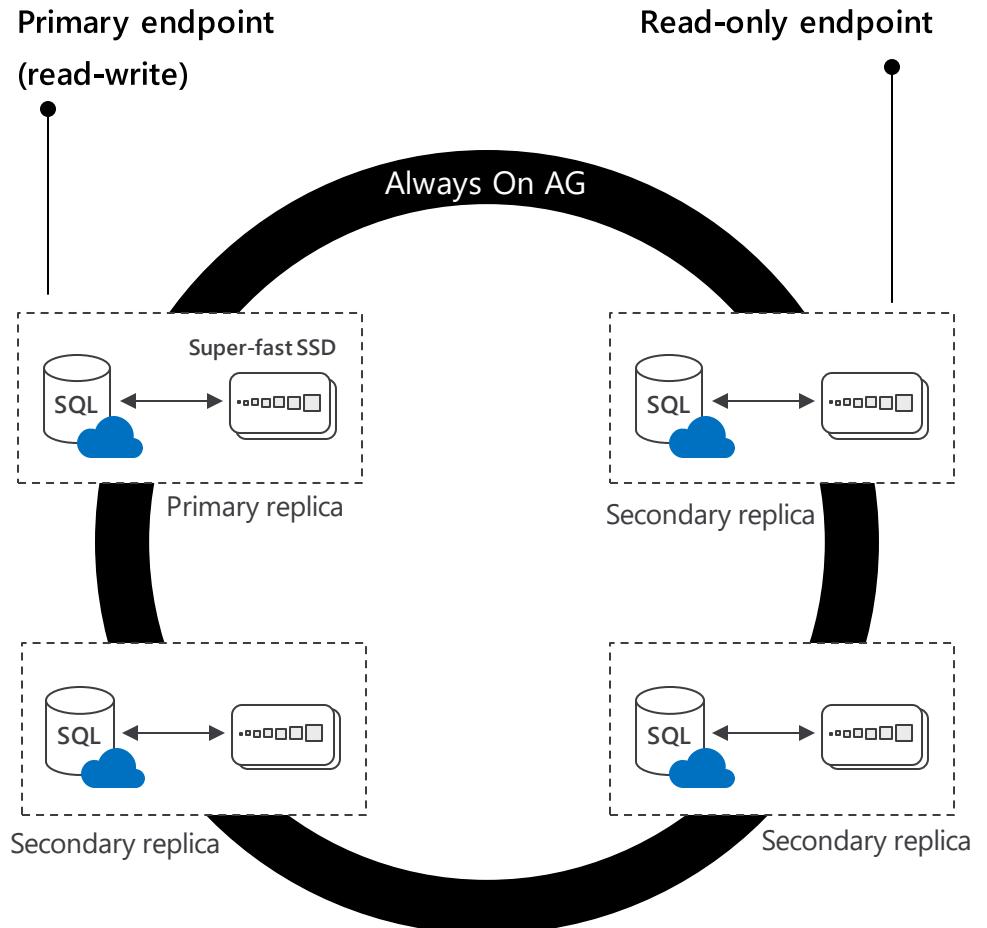
General Purpose

| Feature | Description |
|---|---|
| Number of vCores* | 8, 16, 24 (Gen 4) 8, 16, 24, 32, 40, 64, 80 (Gen 5) |
| SQL Server version / build | SQL Server (latest available) |
| Min storage size | 32 GB |
| Max storage size | 8 TB |
| Max storage per database | Determined by the max storage size per instance |
| Expected storage IOPS | 500-7500 IOPS per data file (depends on data file). See Premium Storage |
| Number of data files (ROWS) per the database | Multiple |
| Number of log files (LOG) per database | 1 |
| Managed automated backups | Yes |
| HA | Based on remote storage and Azure Service Fabric |
| Built-in instance and database monitoring and metrics | Yes |
| Automatic software patching | Yes |
| VNet - Azure Resource Manager deployment | Yes |
| VNet - Classic deployment model | No |
| Portal support | Yes |



Business Critical

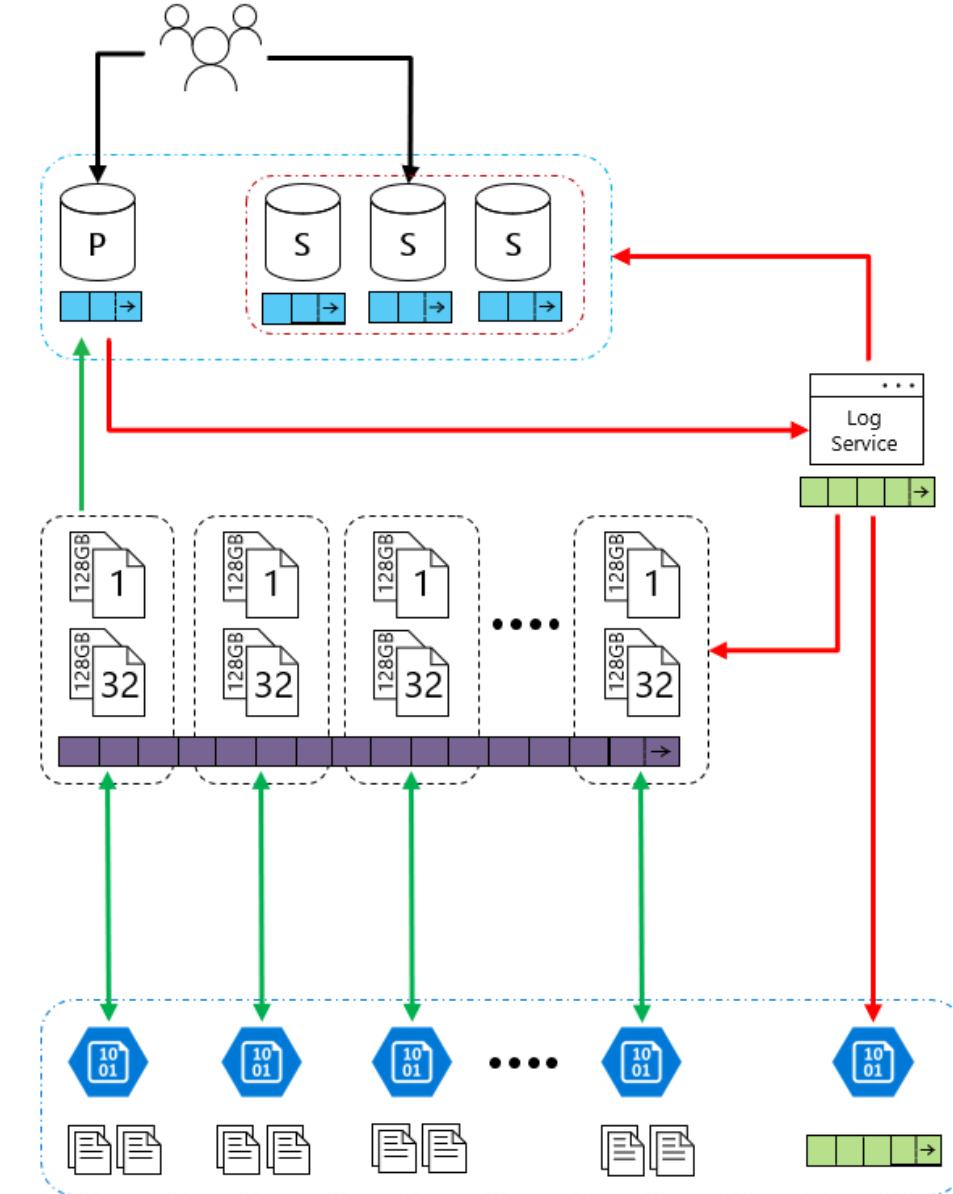
| Feature | Description |
|---|--|
| Number of vCores* | 8, 16, 24, 32 (Gen 4) 8, 16, 24, 32, 40, 64, 80 (Gen 5) |
| SQL Server version / build | SQL Server (latest available) |
| Additional features | In-Memory OLTP 1 additional read-only replica (Read Scale-Out) |
| Min storage size | 32 GB |
| Max storage size | *Gen 4: 1 TB (all vCore sizes) Gen 5: 1 TB for 8, 16 vCores • 2 TB for 24 vCores • 4 TB for 32, 40, 64, 80 vCores |
| Max storage per database | Determined by the max storage size per instance |
| Number of data files (ROWS) per the database | Multiple |
| Number of log files (LOG) per database | 1 |
| Managed automated backups | Yes |
| HA | Based on <u>Always On Availability Groups</u> and <u>Azure Service Fabric</u> |
| Built-in instance and database monitoring and metrics | Yes |
| Automatic software patching | Yes |
| VNet - Azure Resource Manager deployment | Yes |
| VNet - Classic deployment model | No |
| Portal support | Yes |



Business Critical service tier: collocated compute and storage

Hyperscale

| Feature | Description |
|---|---|
| Number of vCores* | Gen4: 1 to 24 vCore Gen5: 2 to 80 vCore |
| SQL Server version / build | SQL Server (latest available) |
| Additional features | 4 read-scale replicas 100TB Data Support Constant Time Operations |
| Min storage size | 4 GB |
| Max storage size | 100TB Grows as customer data grows |
| Max storage per database | Determined by the max storage size per instance |
| Number of data files (ROWS) per the database | Multiple |
| Number of log files (LOG) per database | 1 |
| Managed automated backups | Yes |
| HA | High Availability is ensured on the storage layer |
| Built-in instance and database monitoring and metrics | Yes |
| Automatic software patching | Yes |
| VNet - Azure Resource Manager deployment | Yes |
| VNet - Classic deployment model | No |
| Portal support | Yes |



Hyperscale Service Tier – Availability of Storage

Dedicated resources and familiar tools

Enable full isolation from other tenants without resource sharing

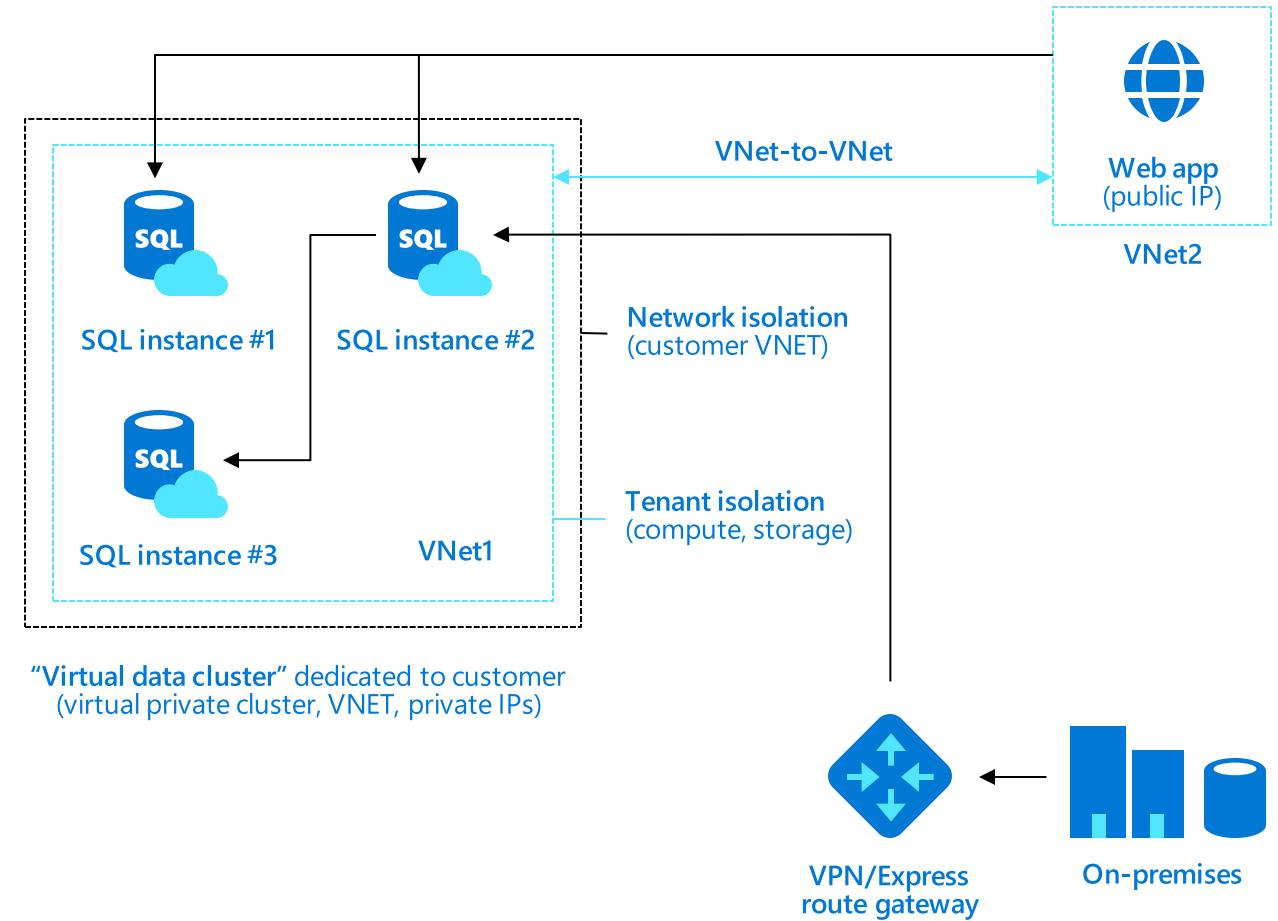
Promote secure communication over private IP addresses with native VNET integration

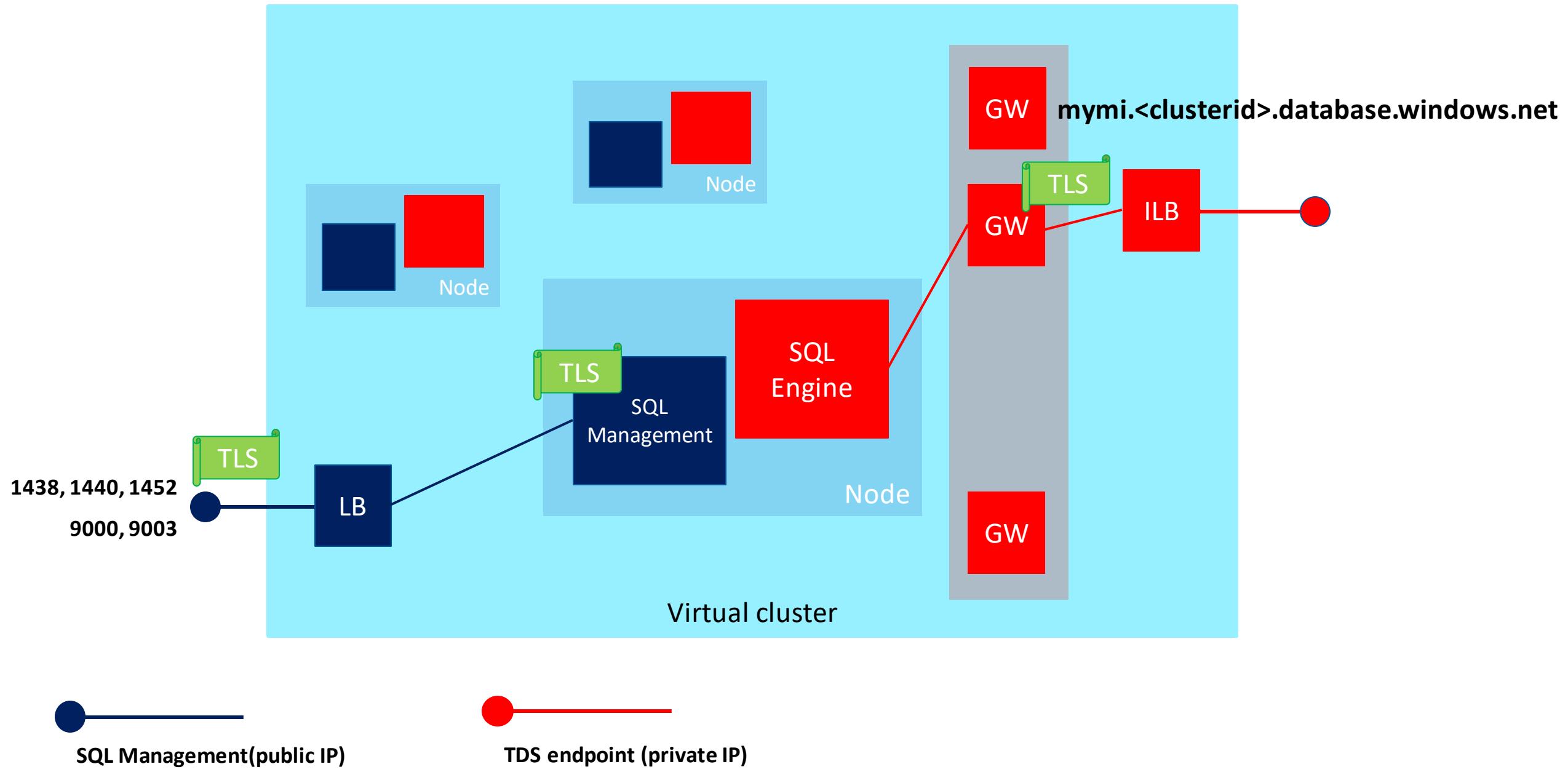
Enable your on-premise identities on cloud instances, through integration with Azure Active Directory and AD Connect

Combine the best of SQL Server with the benefits of a fully-managed service

Use familiar SQL Server features in SQL Database Managed Instance

VNET support in SQL Database Managed Instance





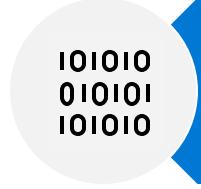
Azure SQL Database — Everything built-in



Business continuity



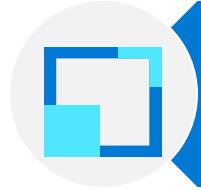
High availability



Automated backups



Long term backup
retention



Geo-replication



Scale



Advanced security



Automatic tuning



Built-in monitoring



Built-in intelligence

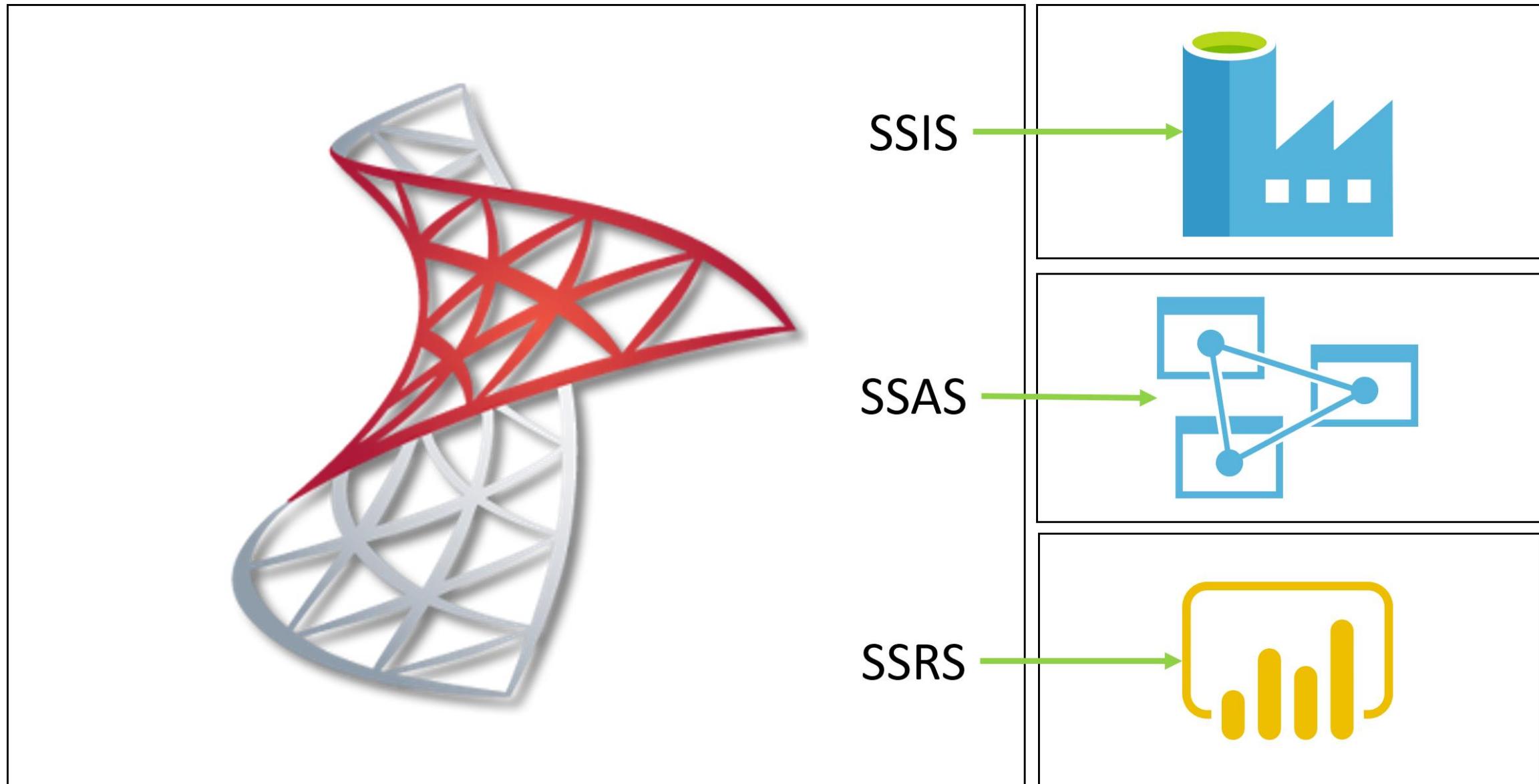
Preferred solution – Database security



APP COMPATIBILITY: WHAT'S IS MISSING?

- **Features with a better alternative in Azure**
 - Always-On Availability Groups: local HA, active geo-replication
 - Windows Authentication: Azure Active Directory is the alternative.
 - Management Data Warehouse : OMS integration is the alternative.
- **Retired features**
 - Database Mirroring: built-in HA / geo-replication
 - Extended stored procedures: customers should use CLR
- **Features considered post-GA**
 - Filestream, Filetable
 - Cross-instance distributed transactions (MS DTC)
 - Stretch Database
 - PolyBase

Preferred solution – Data warehouse + reporting



Trade in on-premises cores with Azure Hybrid benefit

Convert on-premises cores to vCores to maximize value of investments

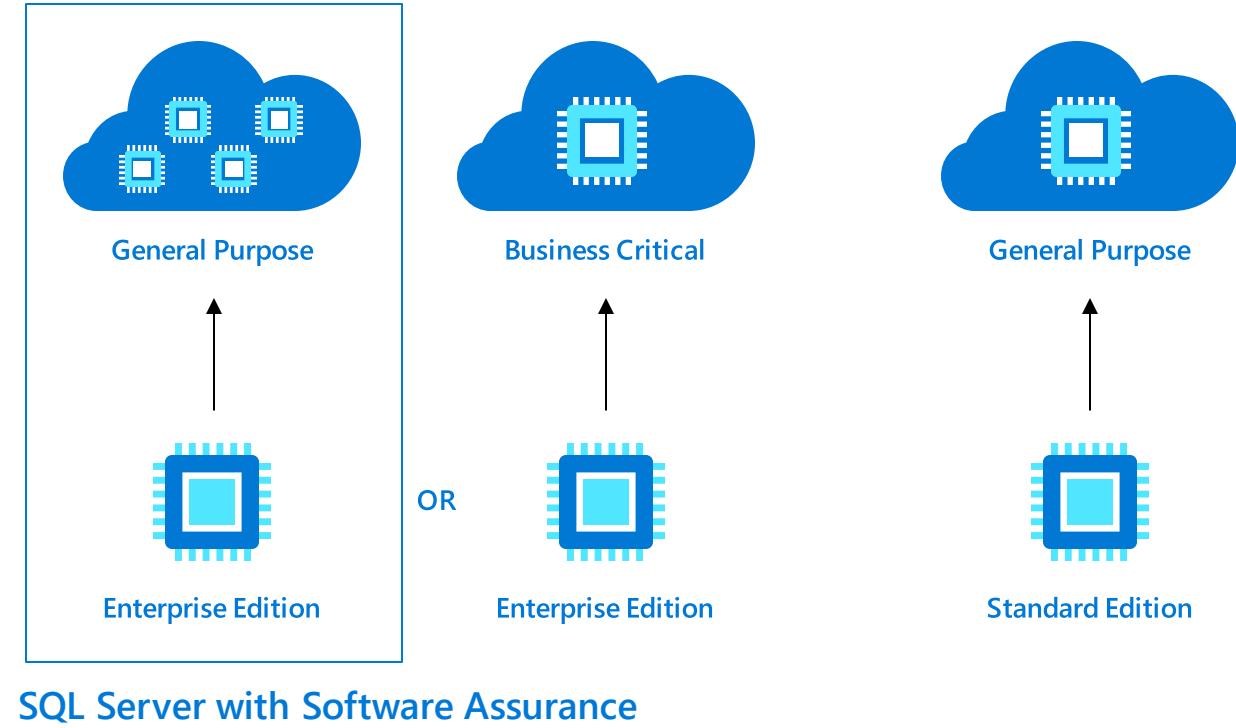
1 Standard license core =
1 General Purpose core

1 Enterprise license core =
1 Business Critical core

1 Enterprise license core =
4 General Purpose cores (virtualization benefit)

SQL Server license trade-in values

SQL Database vCore-based options



Reserved Capacity for Azure SQL Database

Reserve Azure SQL Database resources in advance and save up to 33%¹

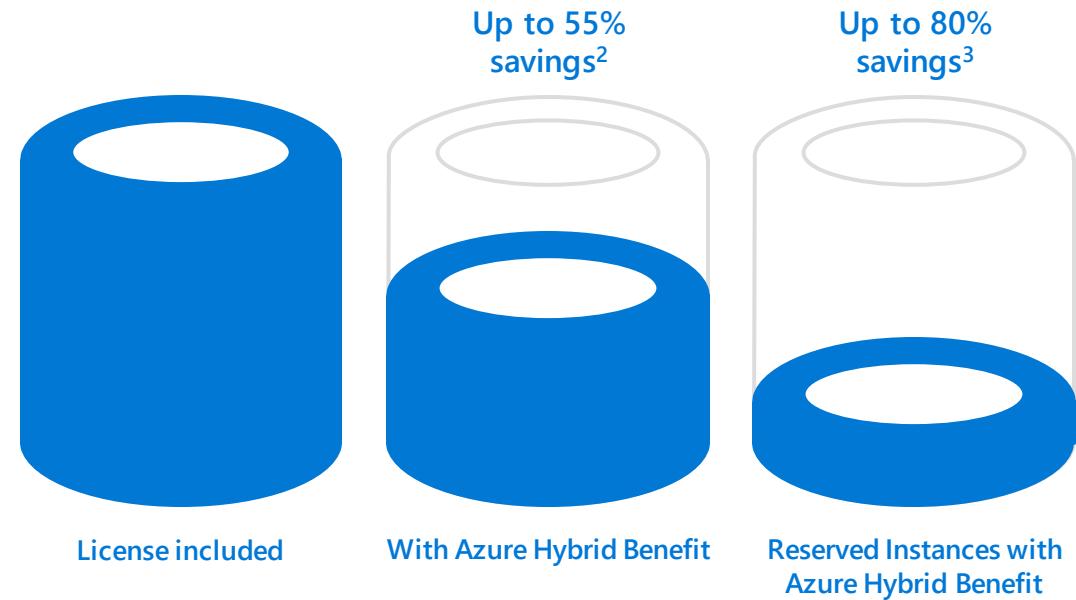
Budget and forecast better with upfront payment for one-year or three-year terms

Get prioritized compute capacity in Azure regions

Exchange or cancel reservations as your needs evolve

Scale up or down within a performance tier and region with auto-fit

Move SaaS apps between elastic pools and single databases and keep your reserved instance benefit



¹ Savings based on eight vCore Managed Instance Business Critical in East US Region, running 730 hours per month. Savings are calculated from full price (license included) against base rate (applying Azure Hybrid Benefit for SQL Server), which excludes Software Assurance cost for SQL Server Enterprise edition, which may vary based on EA agreement. Actual savings may vary based on region, instance size and performance tier. Prices as of May 2018, subject to change.

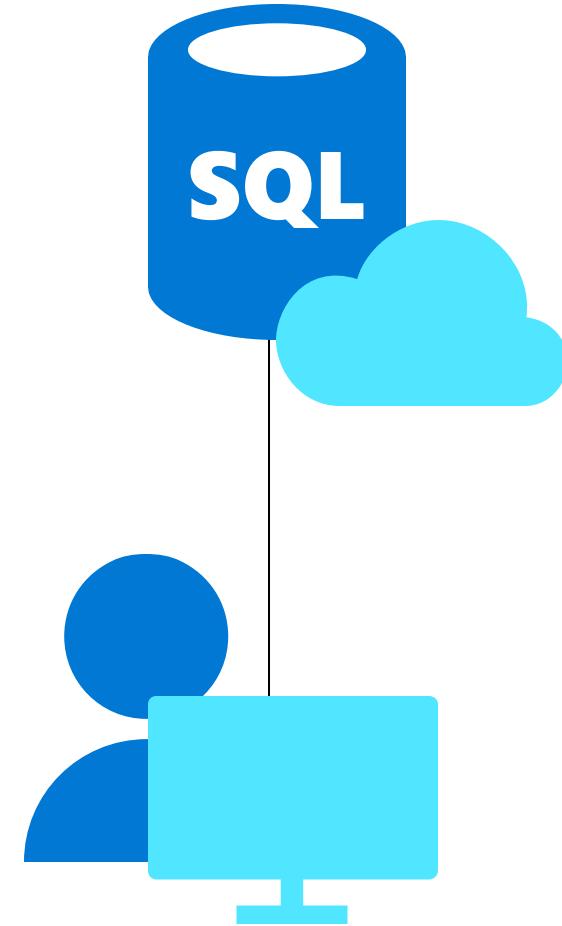
² Savings based on eight vCore SQL Database Managed Instance Business Critical in West 2 US Region, running 730 hours per month. Savings are calculated from on demand full price (license included) against base rate with Azure Hybrid Benefit plus 3-year reserved capacity commitment. Savings excludes Software Assurance cost for SQL Server Enterprise edition, which may vary based on EA agreement. Actual savings may vary based on region, instance size and performance tier. Prices as of May 2018, subject to change.

Azure Dev/Test pricing for SQL Database

Discounted rates up to 55% off to support your ongoing development and testing

Dev/Test pricing available for vCore-based deployment options

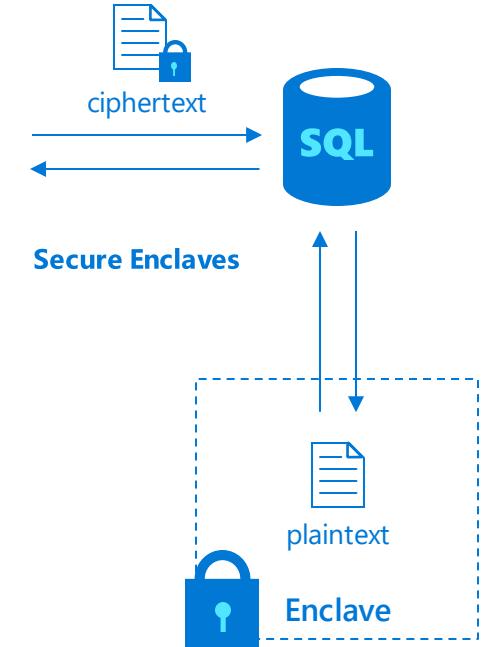
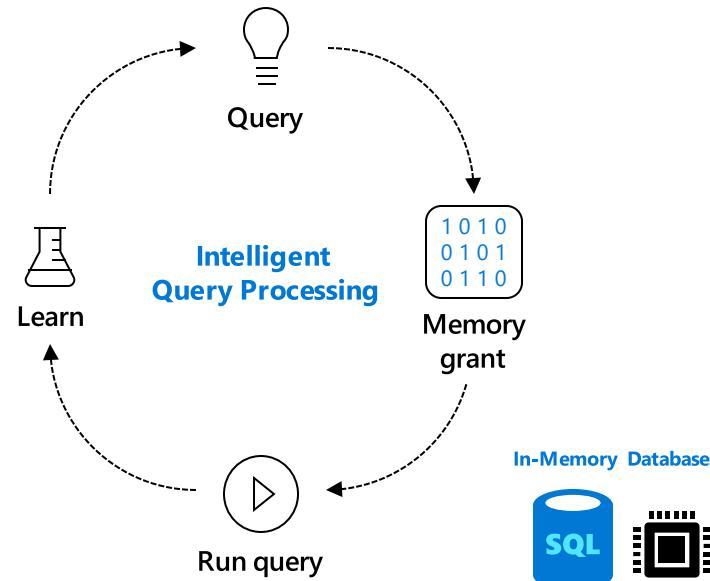
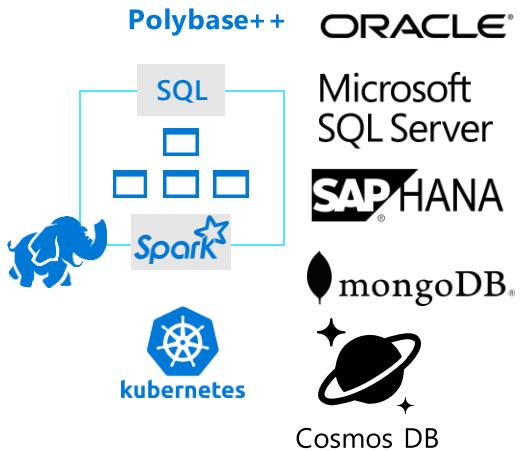
Eligible with active Visual Studio subscription



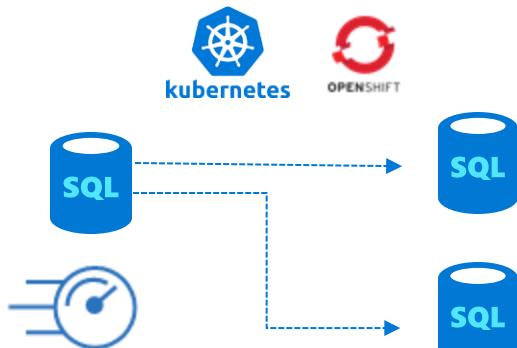
SQL Server 2019

SQL Server 2019

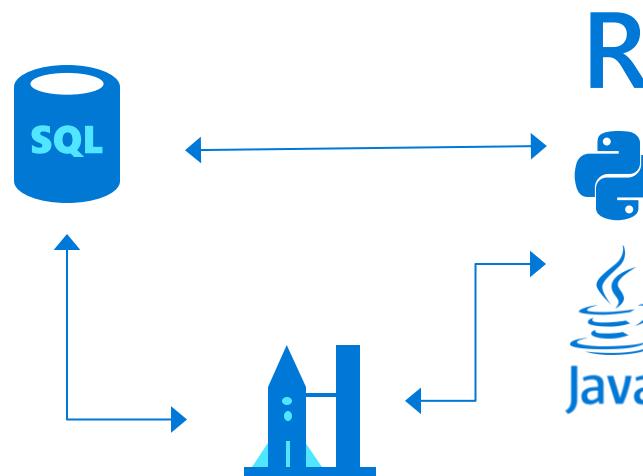
Key New Functionality



High Availability



Built-in Machine Learning and Extensibility



Modern Platforms with Compatibility

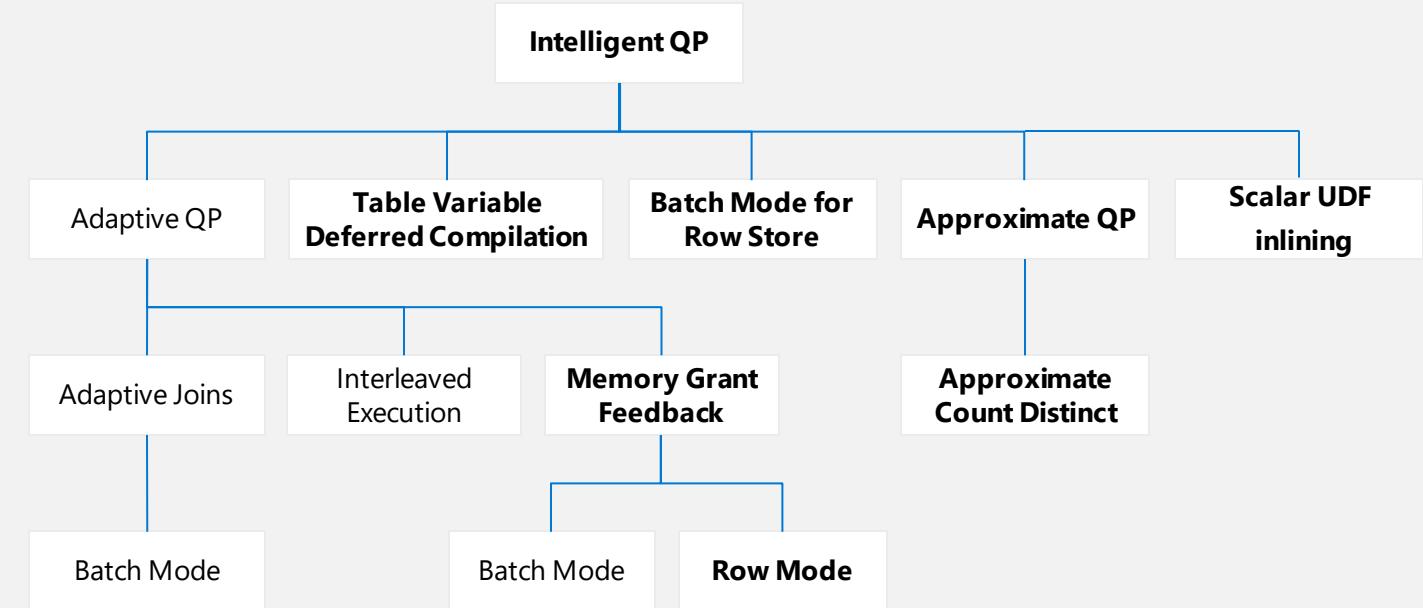


Intelligent Performance with SQL Server

The intelligent database

- **Intelligent Query Processing**
- Performance insights anytime and anywhere with **Lightweight Query Profiling**
- Accelerating I/O performance with **Persistent Memory**
- **Tempdb: It Just Runs Faster** (Planned)

The Intelligent Query Processing feature family



Bold indicates new and improved features in SQL Server 2019

Mission critical security

Confidential computing

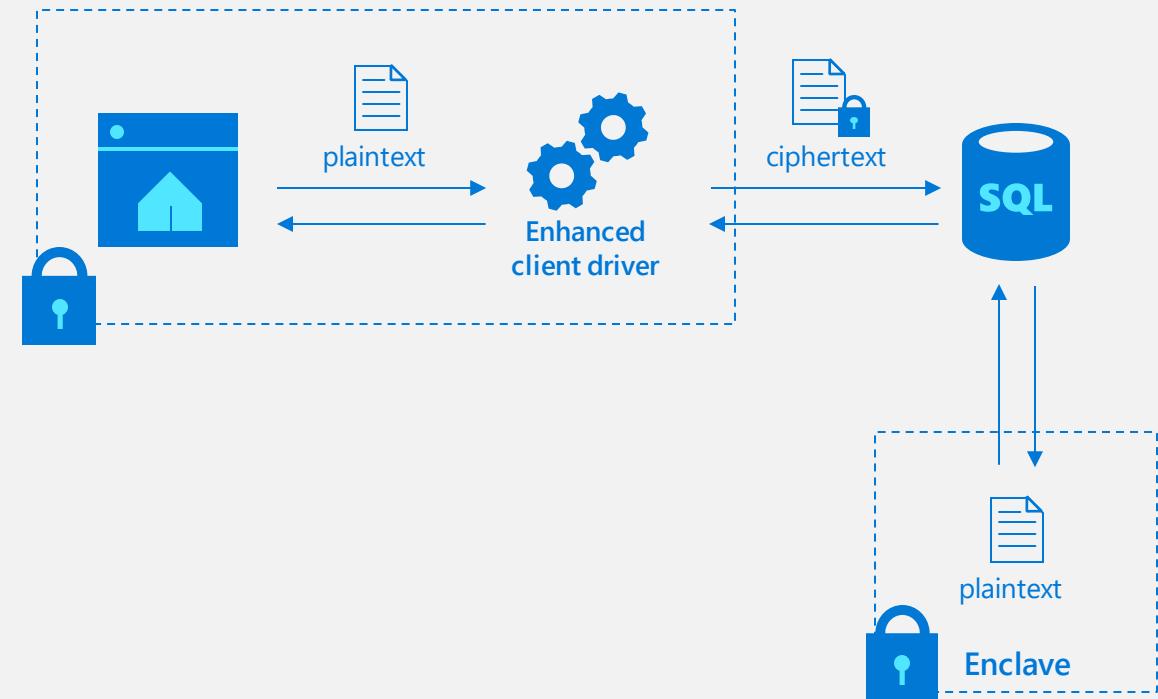
Always Encrypted with secure enclaves

Data Classification and auditing built-in

TDE scan suspend and resume

Simplified certificate management

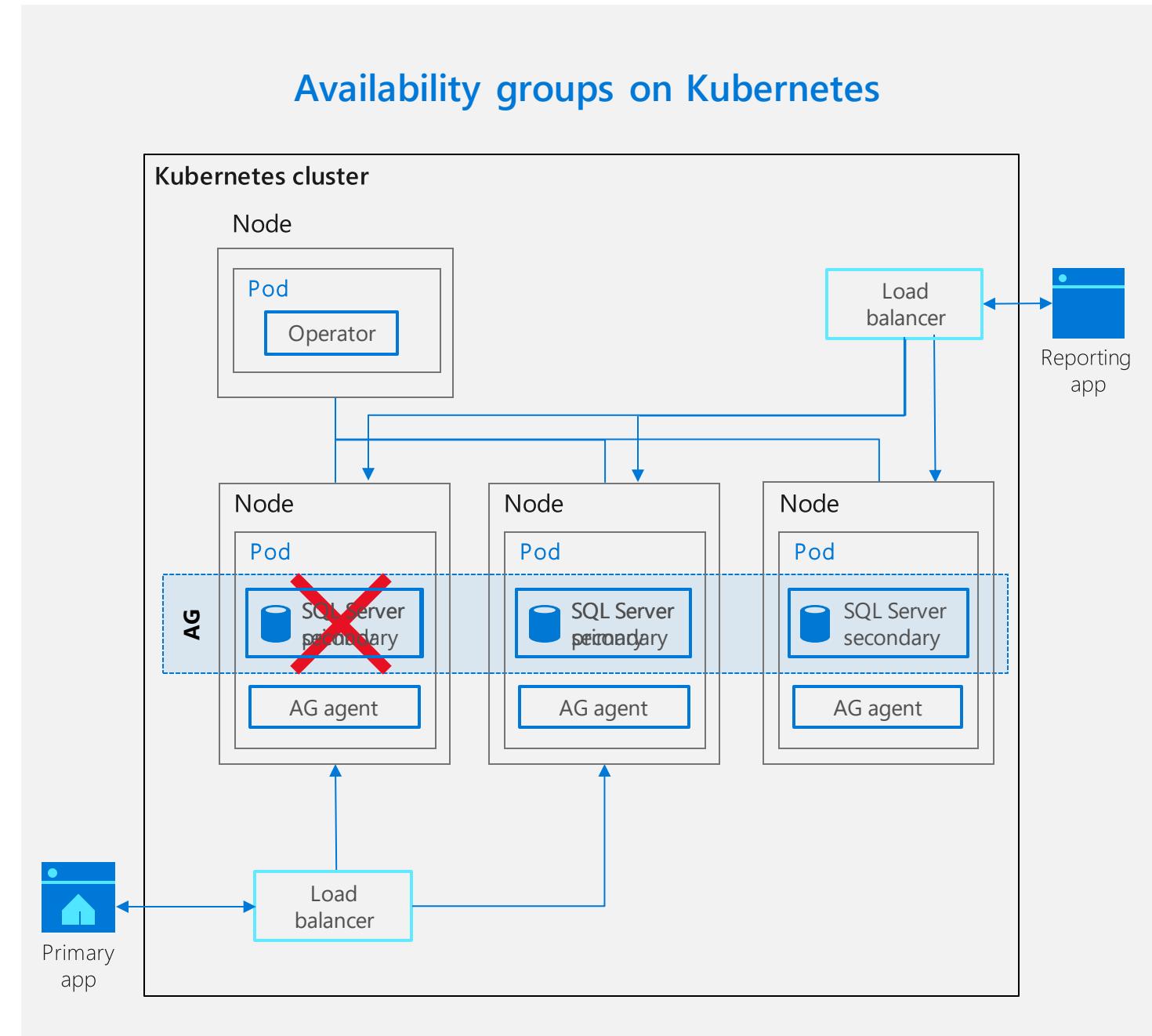
Always Encrypted with secure enclaves



SQL Server 2019

Always On Availability Groups on Kubernetes

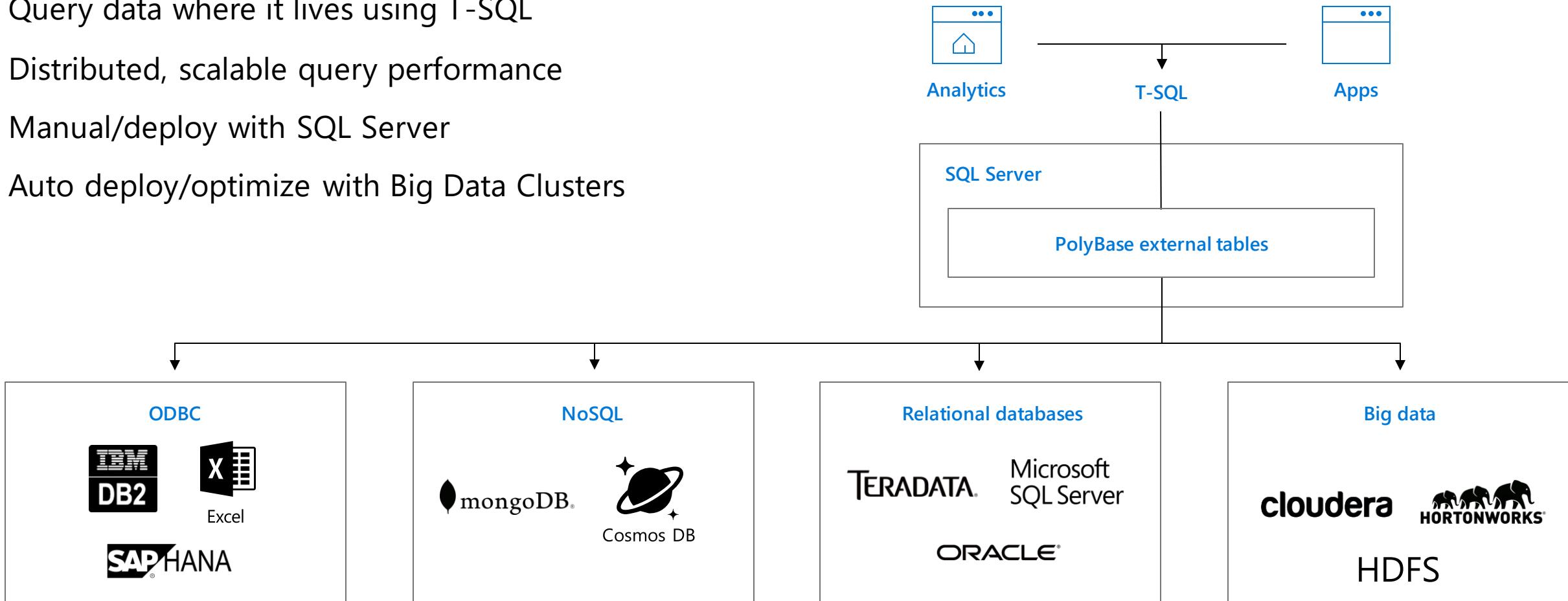
- SQL Server/k8s failover integration
- Operator deployment
- AG concepts all apply
- Load Balancer for Primary App
- Load Balancer for Secondary Replica Readers



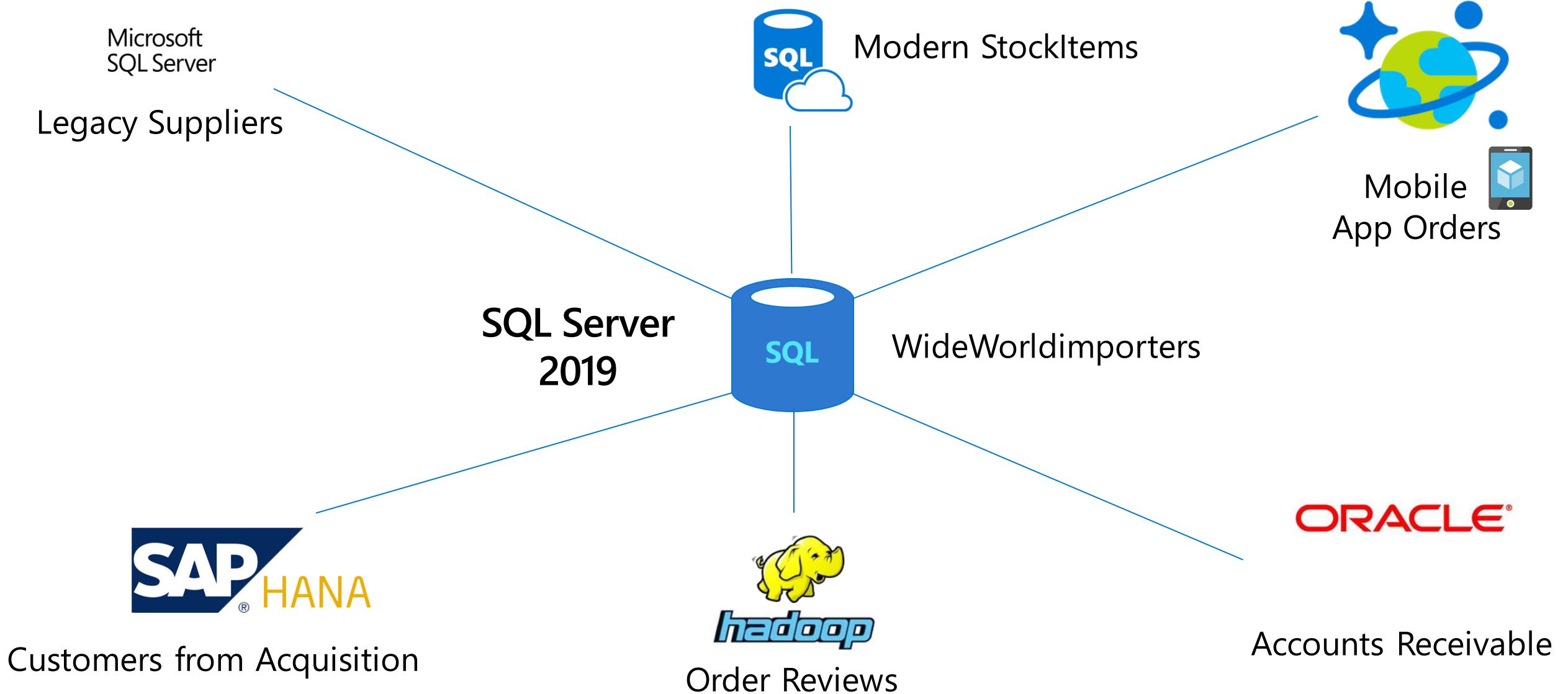
What is SQL Server Polybase?

“It's all about
Data Virtualization”

- ✓ Distributed compute engine integrated with SQL Server
- ✓ Query data where it lives using T-SQL
- ✓ Distributed, scalable query performance
- ✓ Manual/deploy with SQL Server
- ✓ Auto deploy/optimize with Big Data Clusters

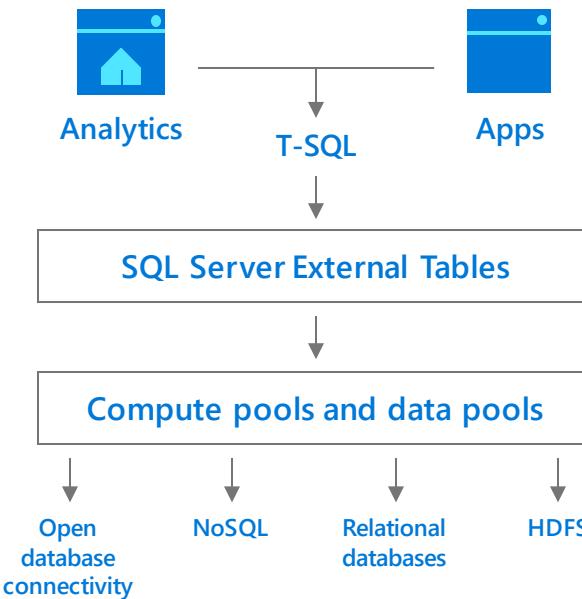


SQL Server 2019: Data Virtualization



SQL Server 2019 Big Data Clusters

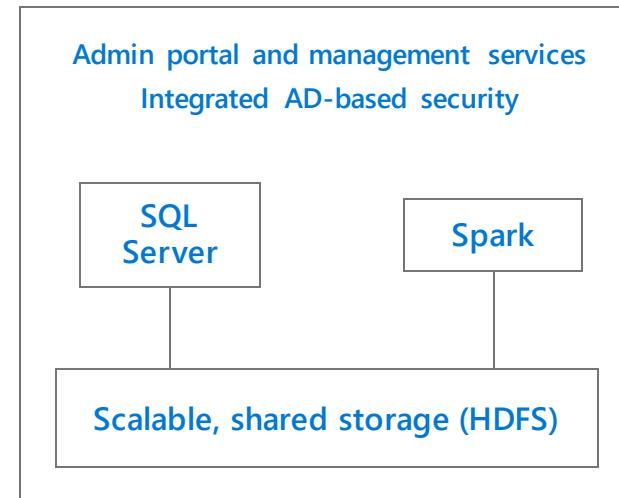
Data virtualization



Combine data from many sources without moving or replicating it

Scale out compute and caching to boost performance

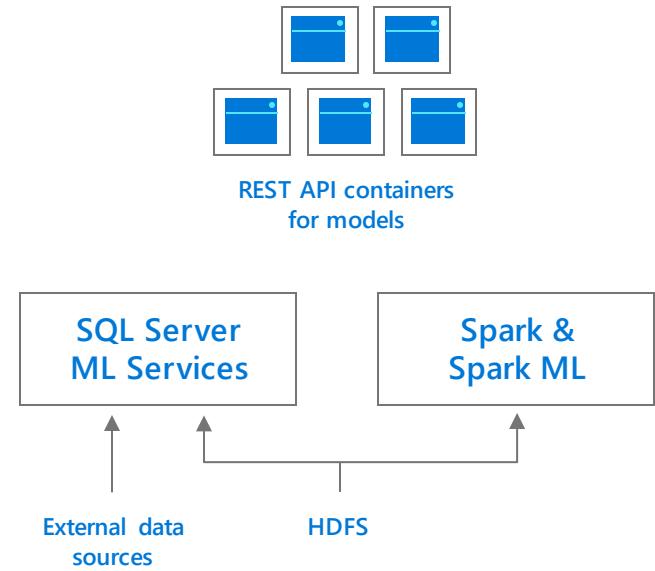
Managed SQL Server, Spark, and data lake



Store high volume data in a data lake and access it easily using either SQL or Spark

Management services, admin portal, and integrated security make it all easy to manage

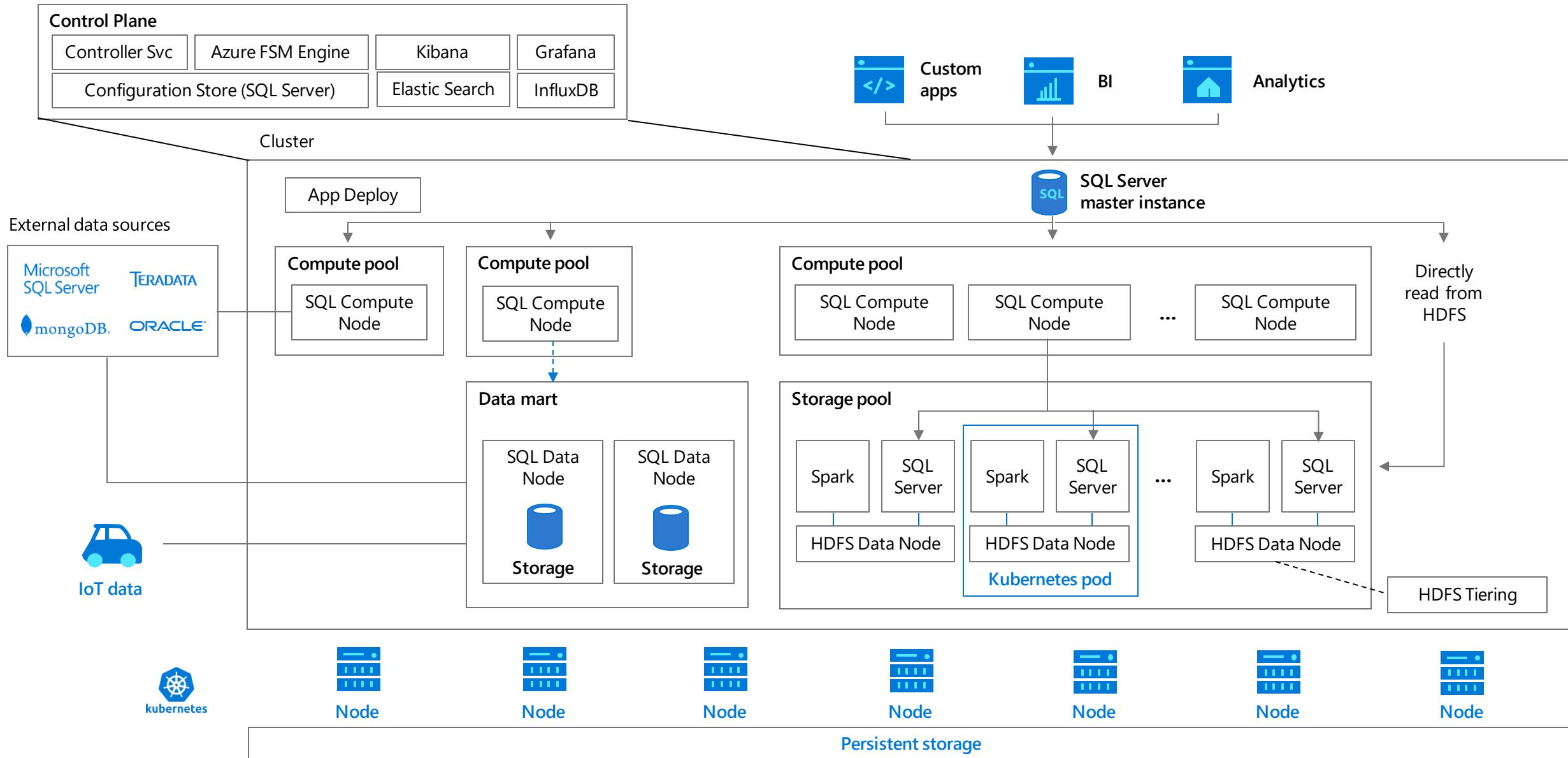
Complete AI platform



Easily feed integrated data from many sources to your model training

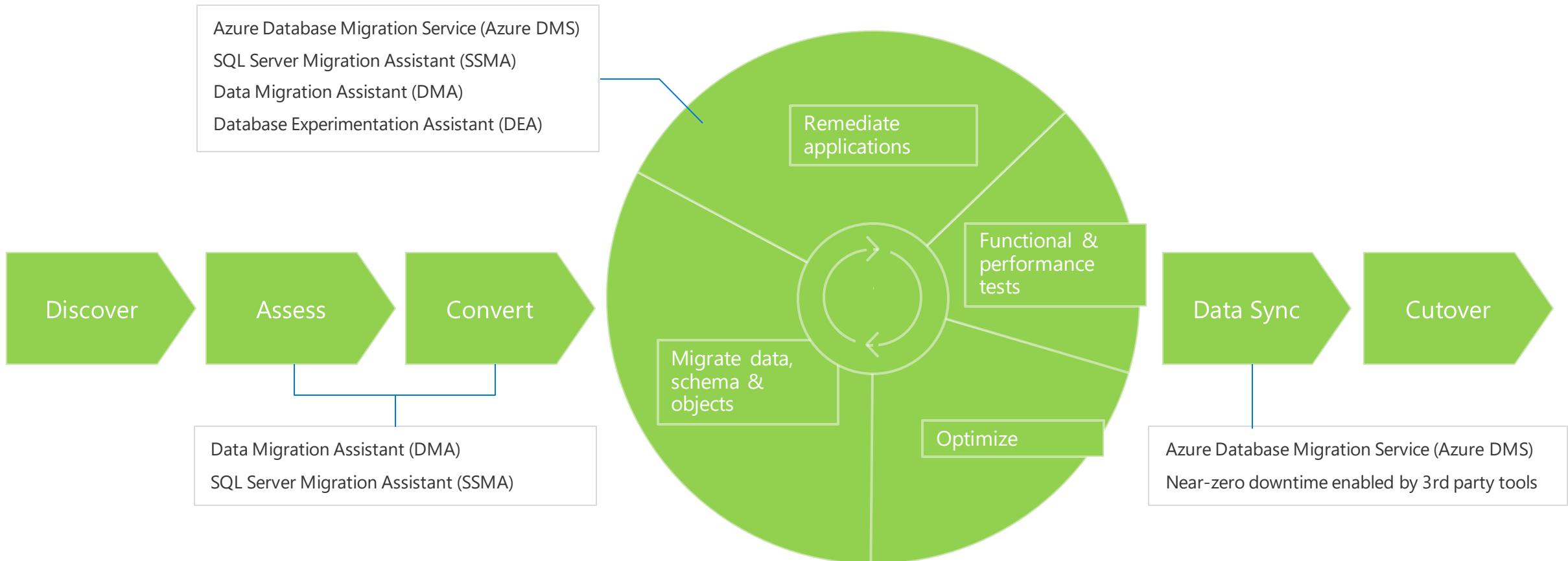
Ingest and prep data and then train, store, and operationalize your models all in one system

SQL Server Big Data Cluster Architecture

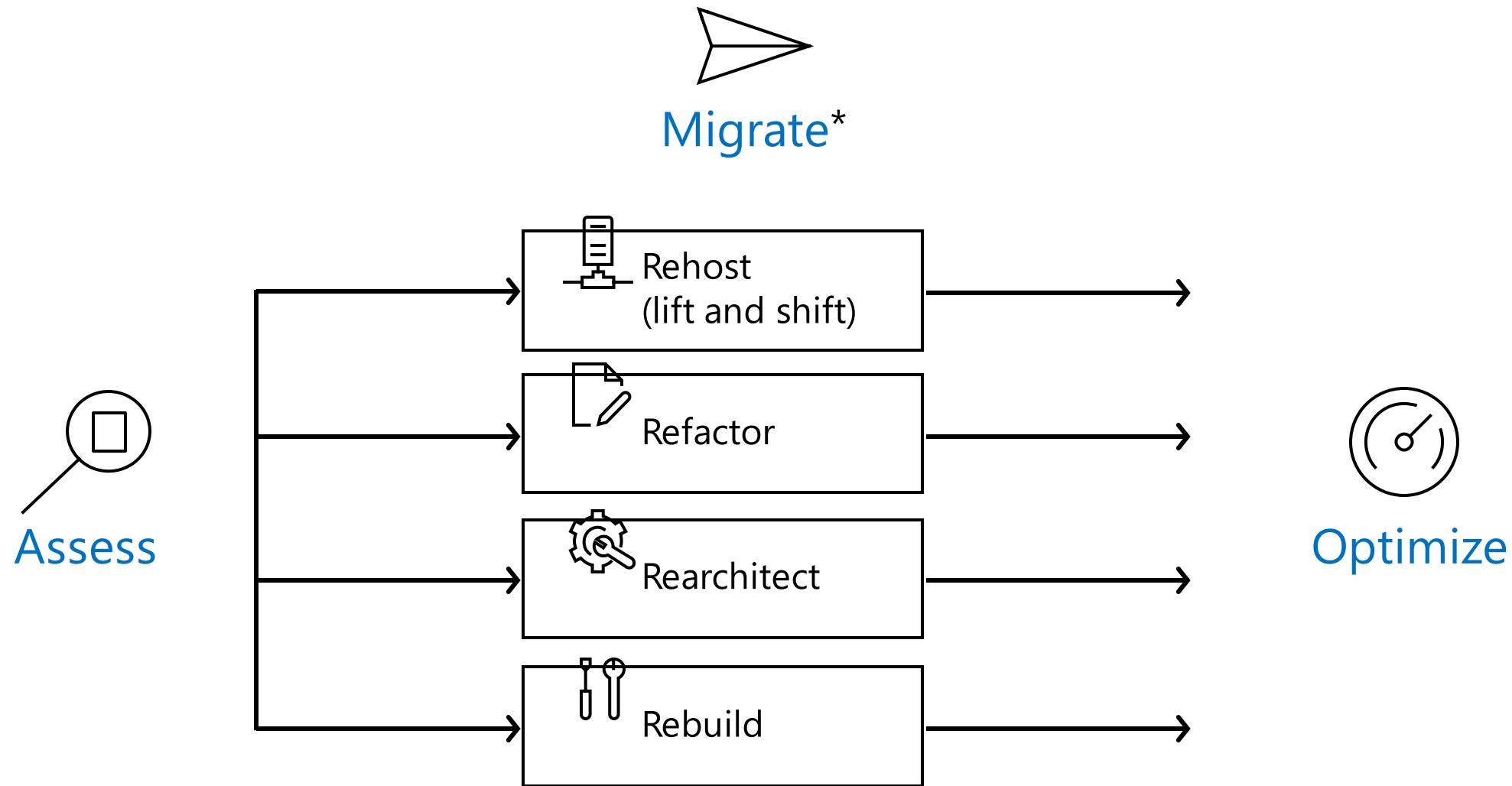


Migration\Upgrade lifecycle

Microsoft tools to accelerate your journey to the cloud during the migration lifecycle



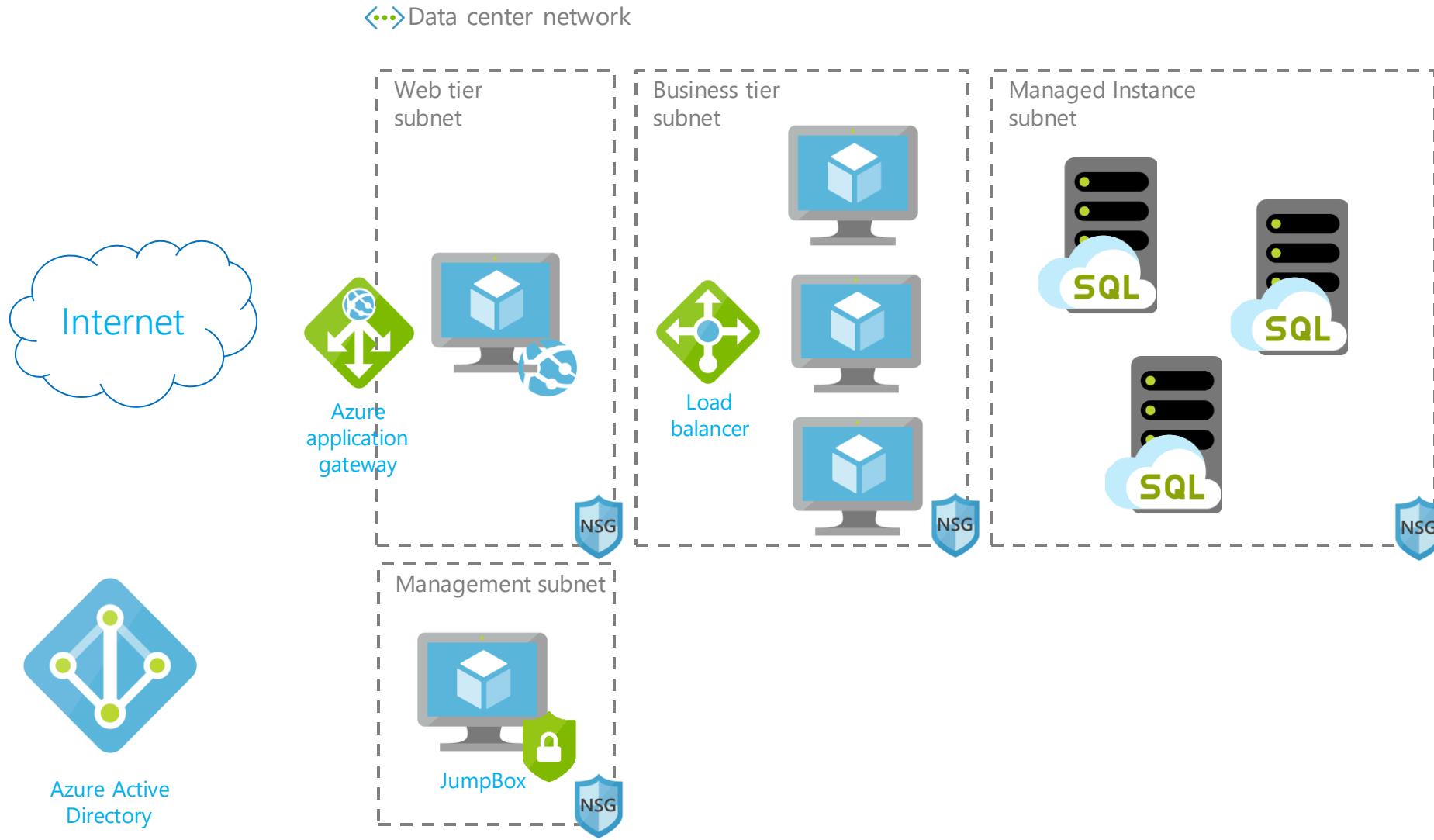
Azure Database migration journey



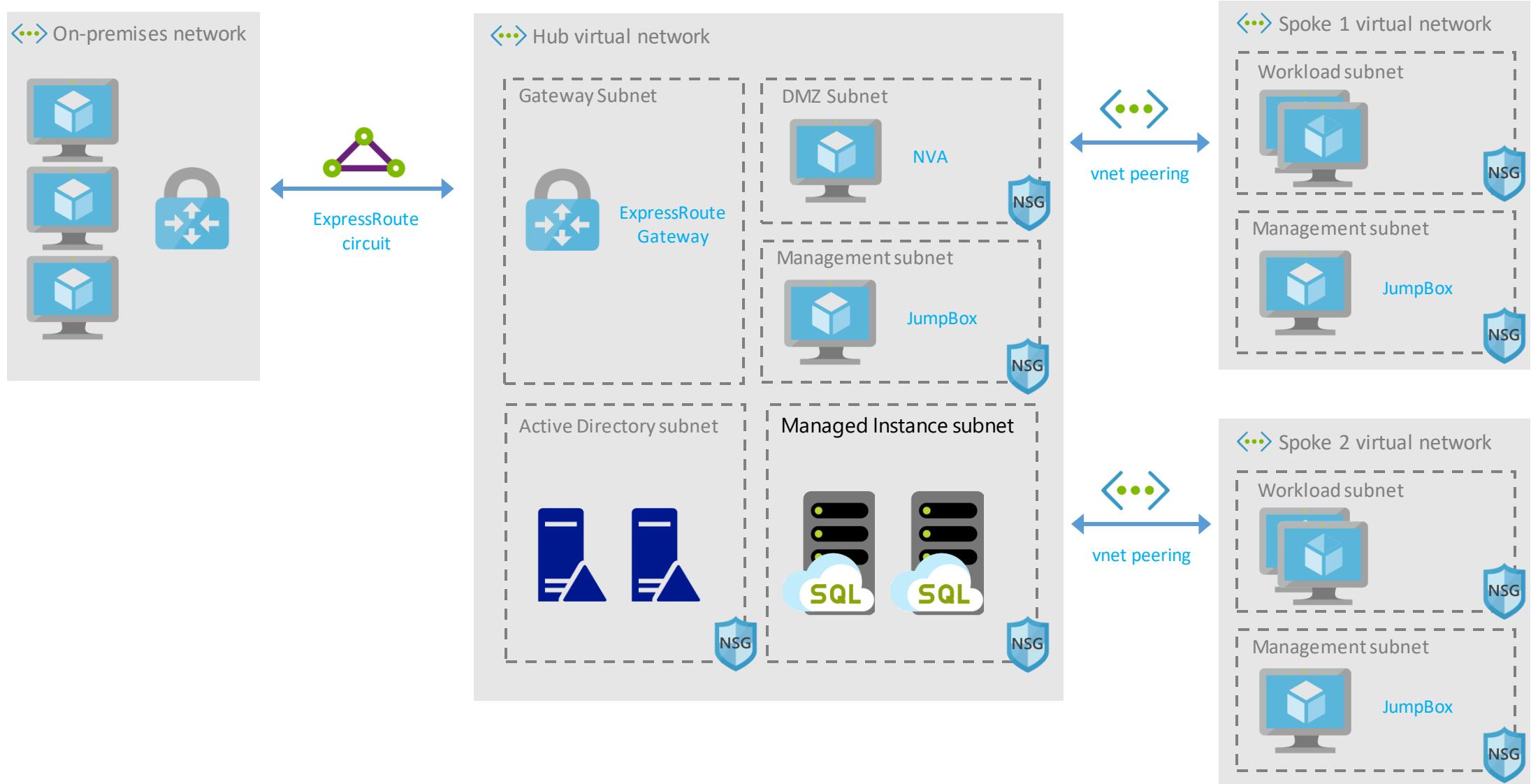
* These migration strategies are adopted from Gartner research. Gartner also calls out a 5th strategy called "Replace," which is all about SaaS. We won't focus on that here.

Modern Data Solution Architectures

N-tier Architecture in Azure



Hub & spoke architecture with MI

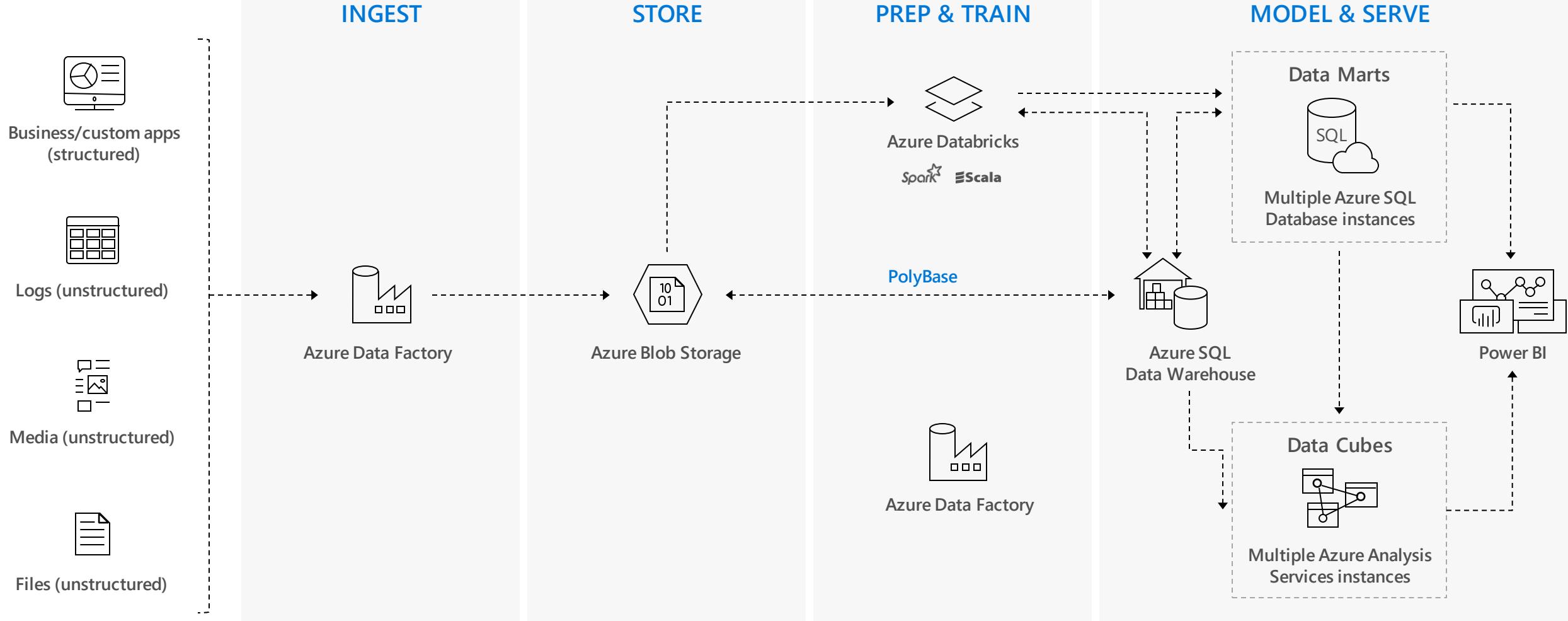




Azure

Active Directory

hub & Spoke architecture for BI

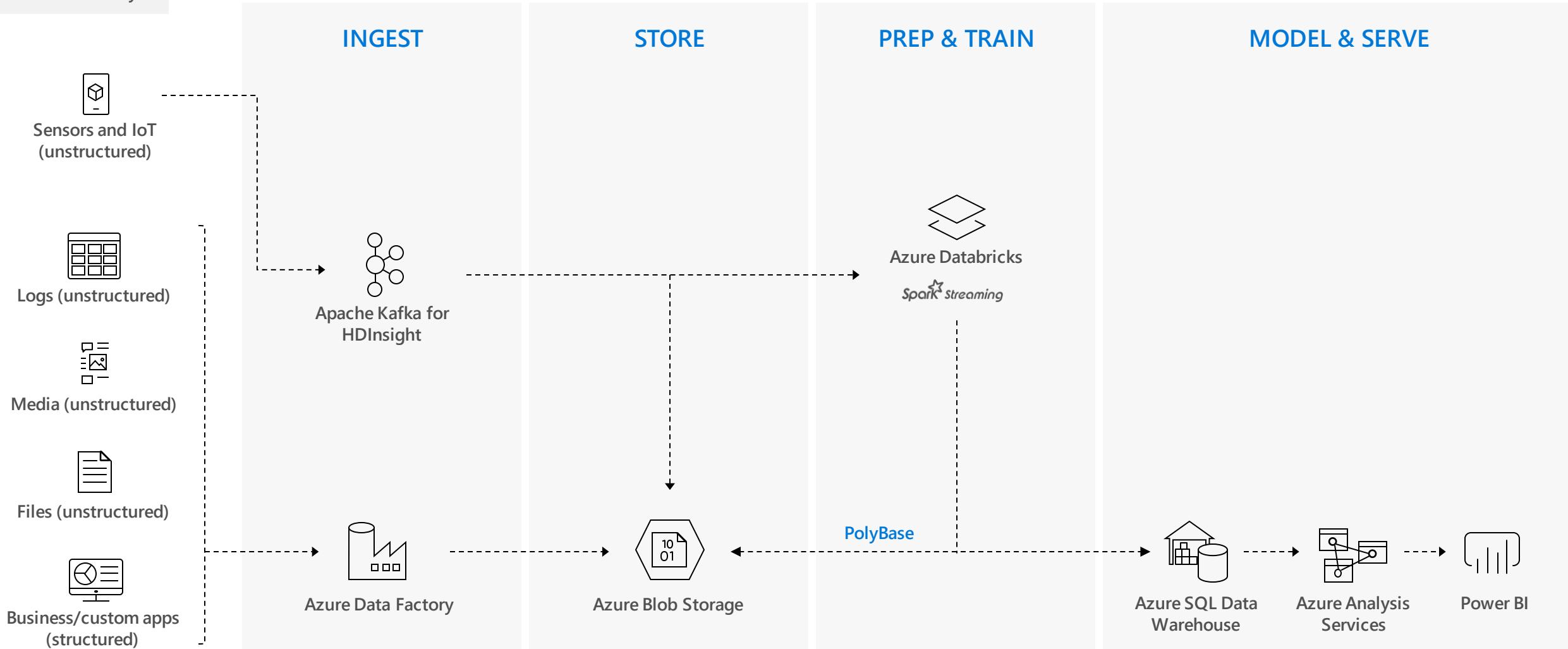




Azure

Active Directory

Real time analytics



Microsoft Azure also supports other Big Data services like Azure IoT Hub, Azure Event Hubs, Azure Machine Learning and Azure Data Lake to allow customers to tailor the above architecture to meet their unique needs.

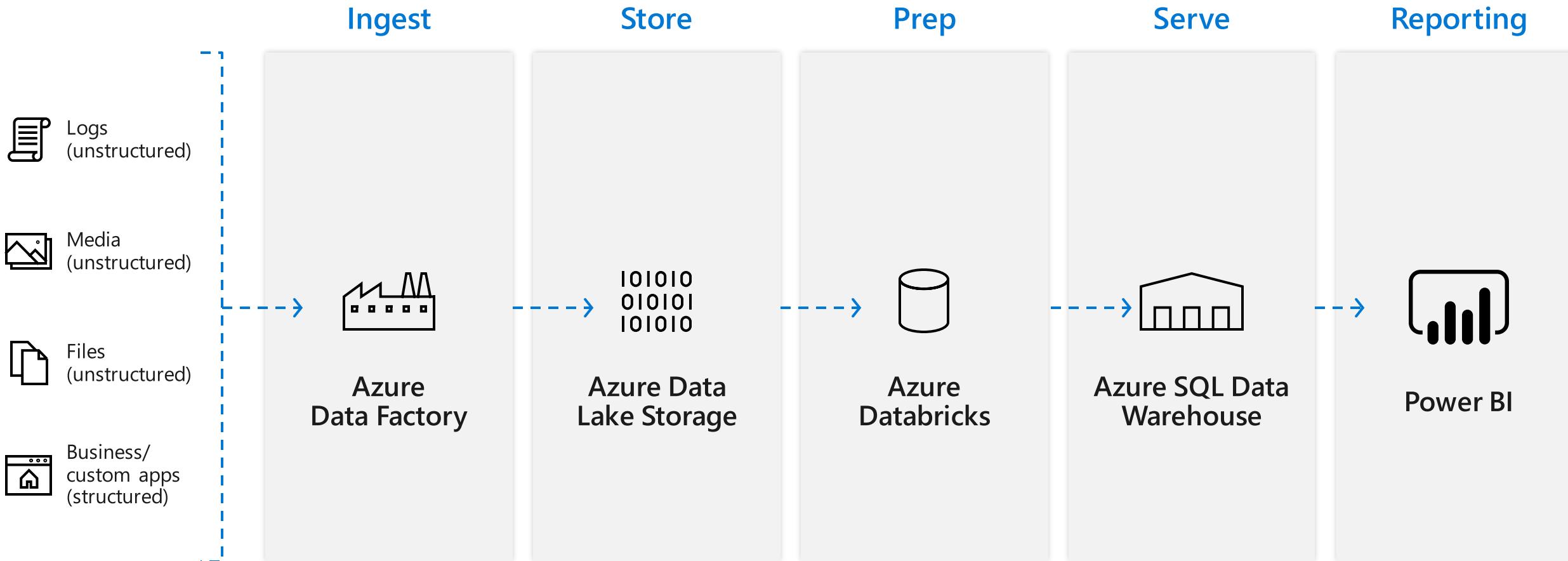


Azure
Active Directory

CLOUD SCALE ANALYTICS



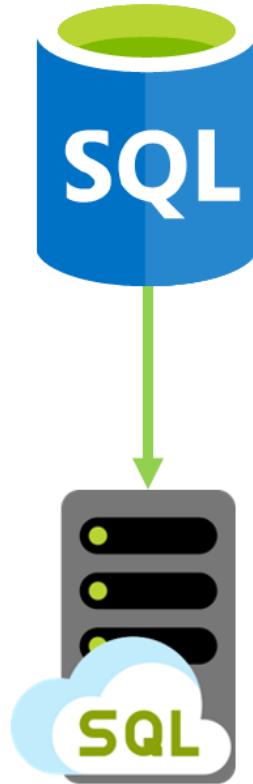
Cloud Scale
Analytics



Whiteboard Session

Customer situation

- Tailspin Toys is an online gaming company experiencing exponential growth
- Struggling to manage expanding database infrastructure
- Lack ability to easily scale
- Looking to migrate gaming services to the cloud



Customer situation



Gaming
Service
VMs



SQL 2008
Databases



Data
Warehouse



Reports

Customer needs

- Migrate all gaming services into cloud
- Move data warehouse and associated services to cloud
- Want to minimize migration costs



Customer needs

- Looking to improve database security
- Want to improve gamer experience
- Disaster recovery from regional outage



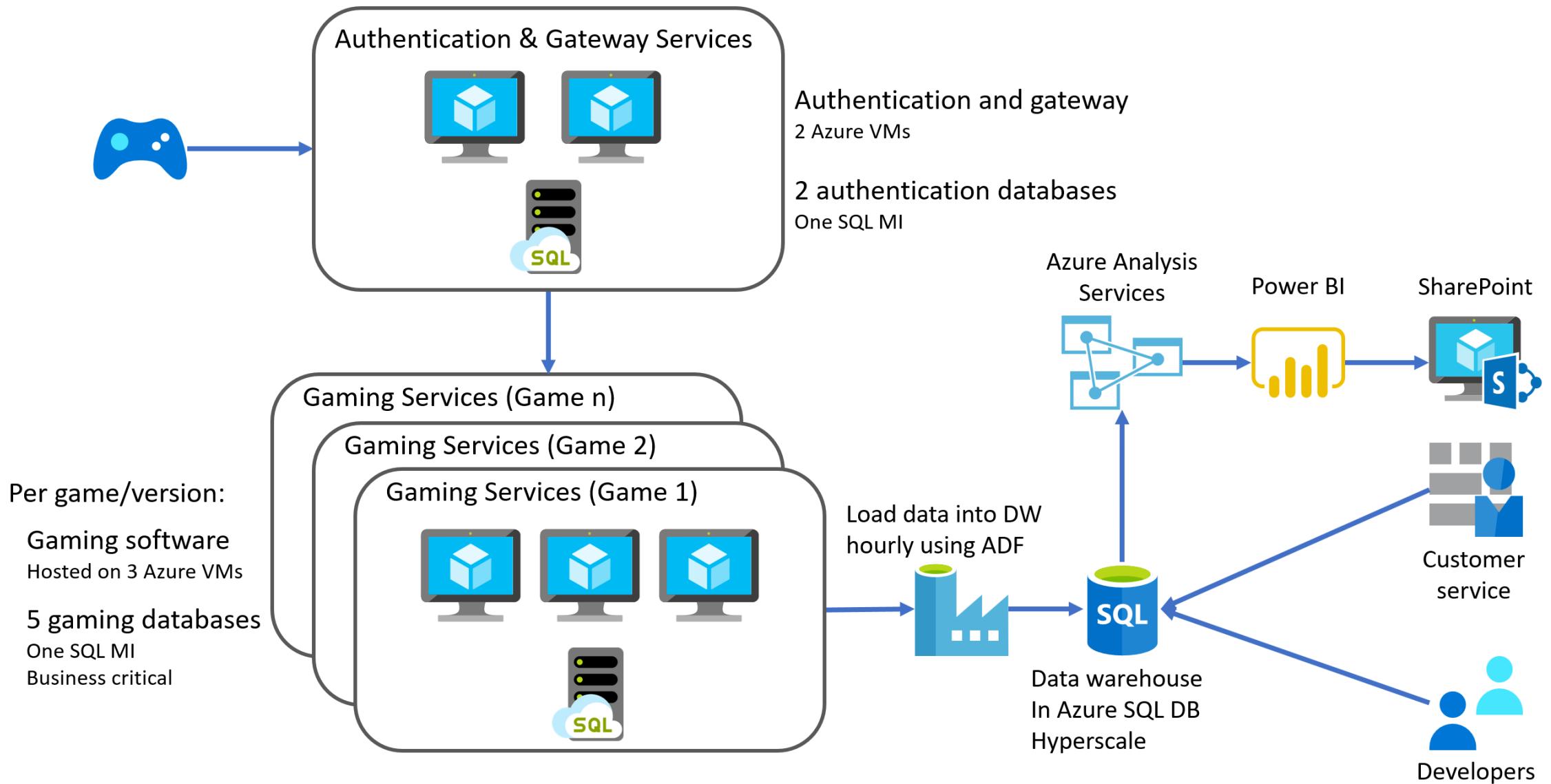
Customer objections

- Looking for comparison of SQL database hosting options in Azure.
- What tools can help evaluate databases against target platforms and identify potential issues?
- Can we have network isolation and secure channel access from on-premises?
- Don't want to be locked into a cloud vendor.



Solution

Preferred solution



Preferred solution

- Azure Hybrid Benefit
- Prepay for reserved capacity
- Azure Database Migration Service
- Azure Site Recovery
- Partner engagement



Preferred solution - PoC



Gaming
Service
VMs



SQL MI
Databases



SQL DB
Hyperscale
Data
Warehouse



Power BI
Reports

Preferred solution – IaaS vs PaaS

- Cost
- Administration
- SLAs
- Time to move

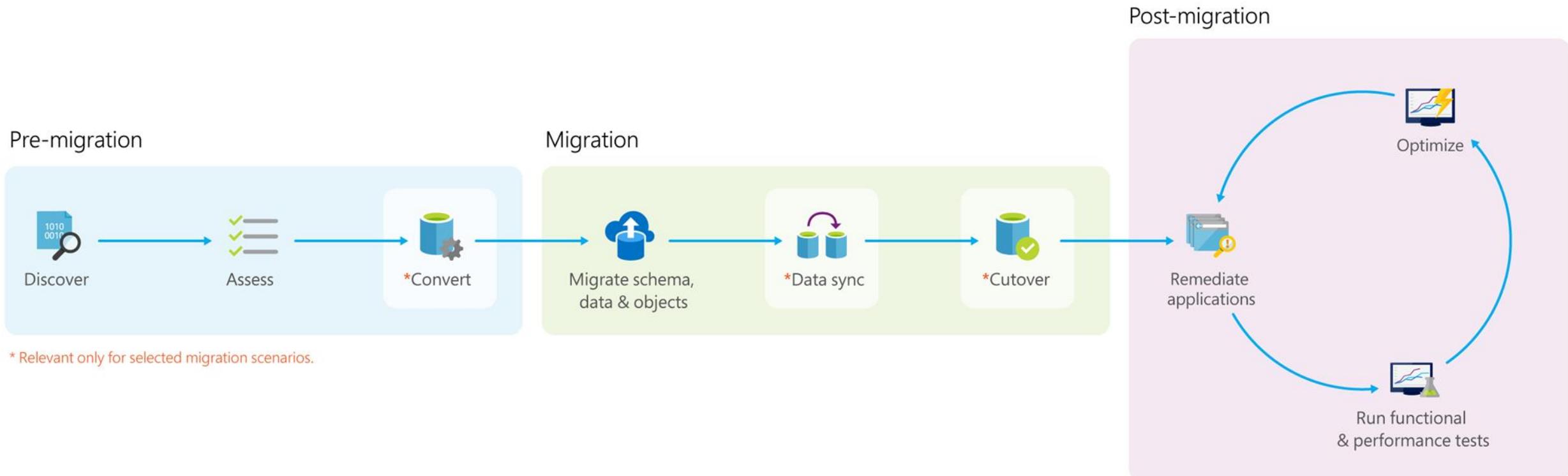
Preferred solution – Recommended database

Azure SQL Database Managed Instance

- Platform-as-a-Service (PaaS)
- Supports database migration from on-premises with minimal to no database changes
- Provides all of the PaaS benefits of Azure SQL Database but adds capabilities that were previously only available in SQL VMs
- Includes a native virtual network (VNet) and near 100% compatibility with on-premises SQL Server

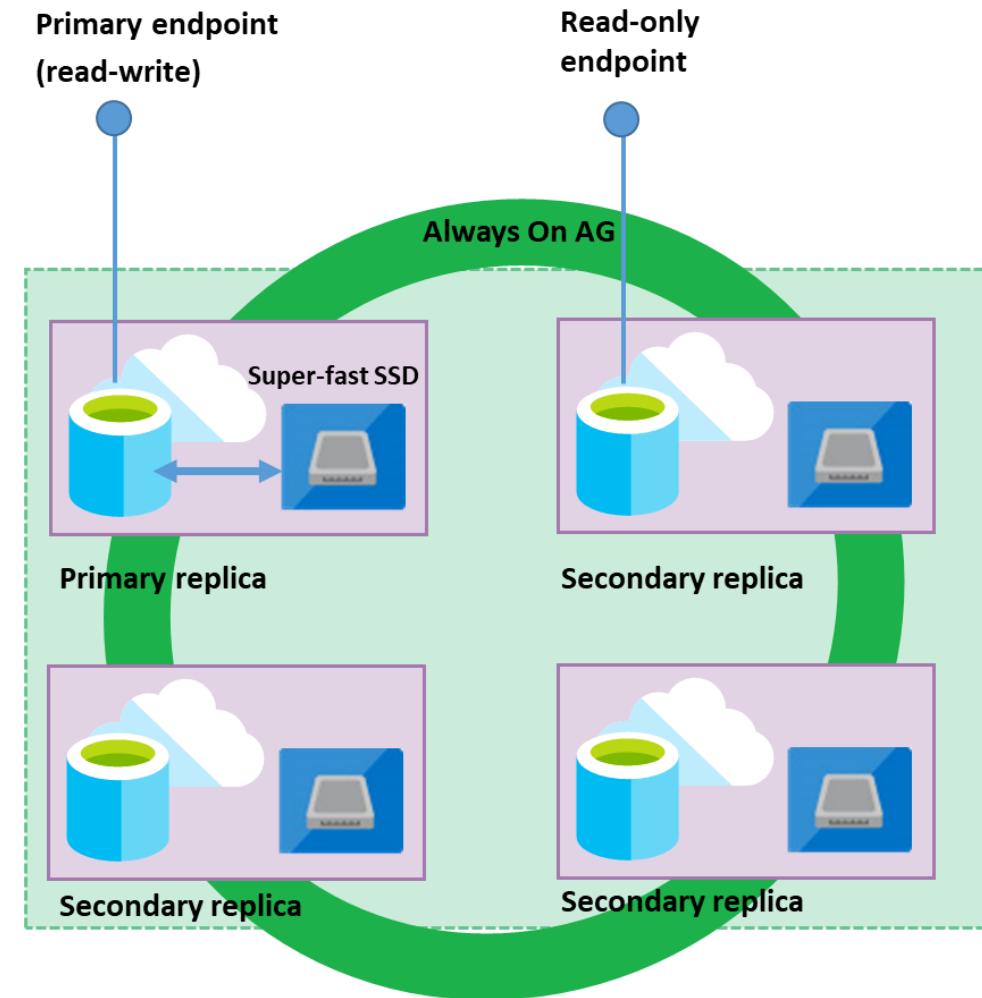


Preferred solution – Data migration



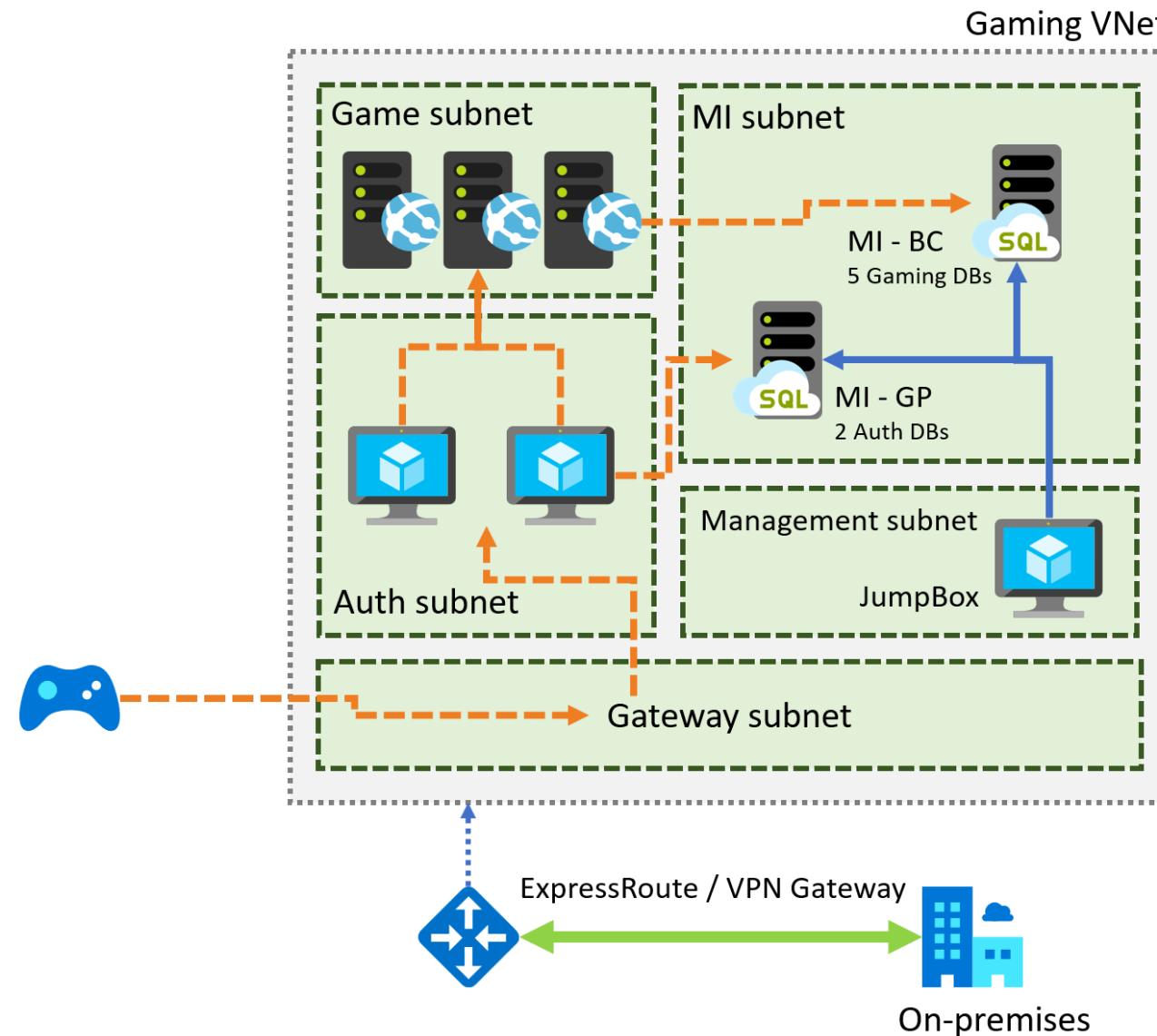
Preferred solution – Read-only reporting

- Read Scale-out
- Read-only replica
- Free with SQL MI BC



Business Critical service tier: collocated compute and storage

Preferred solution – Gaming services



Appendix

Documentation

| Document | When to use it |
|---|--|
| What is a Managed Instance | High level details about SQL MI – service description and positioning |
| Azure SQL Database pricing page | Business model and pricing details |
| Azure Hybrid Use Benefit (AHUB) | Discount details for customers with SQL Server licenses |
| Feature comparison: Azure SQL Database versus SQL Server | High level feature availability matrix and need comparison with SQL Server and rest of SQL Database |
| Azure SQL Database Managed Instance T-SQL differences from SQL Server | Detailed functional behavior of SQL MI |
| Create Managed Instance - Tutorial | How to create SQL MI and connect to it (quick getting started guide) |
| How To: Configure a VNet for Azure SQL Database Managed Instance | How to makes sure that VNet is compliant with SQL MI requirements |
| How To: Configure a Custom DNS for Azure SQL Database Managed Instance | Networking misconfiguration is currently the most frequent reason that prevents customers from deploying SQL MI successfully |
| Connect your application to Azure SQL Database | High level of detail how to connect app to MI (supported scenarios, high level steps, links on detailed how-to) |
| SQL Server instance migration to Azure SQL Database Managed Instance | Various options to migrate application to SQL MI |
| https://docs.microsoft.com/en-us/azure/sql-database/sql-database-managed-instance-resource-limits | Subscription-level quotas and official process to obtain larger quota |
| Azure Support plans | Explore the range of Azure support options and choose the plan that best fits, whether you're a developer just starting your cloud journey or a large org. deploying business-critical, strategic applications |
| How to create Azure support request | Step by step instructions to open support ticket |

Blogs, best practices

| Document | When to use it |
|--|---|
| Managed Instance ARM template reference | SQL MI management through ARM templates & PowerShell (official docs and blogs) |
| Create SQL MI using ARM templates | |
| Change size of SQL MI using PowerShell | |
| Cross-instance point-in-time restore in Azure SQL Database Managed Instance | How to restore database to another instance |
| CAT Blog: CPU and Memory Allocation on Azure SQL Database Managed Instance | Explains how to interpret various information exposed in SSMS and DMVs regarding resource allocation in SQL MI |
| CAT Blog: Storage best practices in General Purpose | In this article, we describe database storage architecture on Azure SQL Database Managed Instance (MI), for General Purpose (GP) instances specifically. We also provide a set of best practices to help optimize storage performance |
| CAT Blog: Consume SQL MI Error Log | How to filter out unnecessary info from SQL error log and focus on what's important to your app using <code>sp_readmierrorlog</code> |
| CAT Blog: Real time performance monitoring for Azure SQL DB Managed Instance | Configuring and using <code>Telegraf</code> for real-time perf. monitoring in SQL Managed Instance |
| BLOG: How to send emails in SQL MI using DbMail | |
| SCOM Management Pack for SQL MI | The blog announcement for SCOM MP for SQL MI and scope details |