SQL Server e-book series

Microsoft

An easier path to the cloud for your legacy SQL Server data

Who should read this e-book?

This e-book is intended for IT and executive decision makers, database administrators, system administrators, and others who will be key stakeholders planning to modernize legacy Microsoft SQL Server 2008 installations. After reading this e-book, you will understand the benefits of migrating your applications to use Microsoft Azure SQL Database before support ends for SQL Server 2008. Additionally, you will find Azure SQL Database Managed Instance capabilities that can help your organization make a smooth transition to the cloud, minimizing changes to your applications.

Below you will learn more about the features of Azure SQL Database Managed Instance, with technical and architectural details about how to migrate SQL Server workloads to Azure.

Contents

01
Modernize your database platform 01

02
Why Azure? 02

03
Introducing Azure SQL Database Managed Instance 03

04
How will it work for me? 05

05
How do I approach migration? 07

06
Next steps 13

01

Modernize your database platform

The speed of today's technological innovation continues to accelerate, bringing new opportunities to expand your business. Getting ahead means embracing emerging technologies and taking full advantage of the cloud. Modernizing your data platforms promises operational efficiencies and faster growth. Plus, end of support for Microsoft SQL Server 2008 and 2008 R2 occurs on July 9, 2019. This means no more updates, patches, or support, and potentially leaves you vulnerable to security and compliance challenges, so it's important to start thinking about how to transform your data ecosystem. Even better, the latest technologies enable you to move your existing SQL Server data to the cloud with minimal business disruptions and virtually no impact to your applications.

02

Why Azure?

Microsoft Azure provides the ideal cloud destination for data modernization. You can use the latest SQL Server engine and the power of Azure to help ensure reliability, security, and high performance. Upgrading to Azure brings advanced features and functionality to make your life a lot easier, including:

Enhanced performance, availability, and security

Cloud readiness and scalability

Management and programmability

Business intelligence, advanced analytics, and artificial intelligence (AI)

Various options are available on Azure for modernizing on-premises SQL Server databases across organizational requirements and use cases: Azure SQL Database with a single database, Azure SQL Database with elastic pools, SQL Server on Azure Virtual Machines (infrastructure as a service, or IaaS), and Azure SQL Database Managed Instance. Table 1 describes our focus in more detail.

Table 1: Azure SQL Database Managed Instance platform usage scenario

Target platform	Use cases	Platform delivers	Value	Unique benefits
Azure SQL Database Managed Instance	Do not own the application code, or expensive to modify Require high level of compatibility Use feature(s) of SQL Server not yet supported by Azure SQL Database	Rich instance-centric programming model Nearly 100 percent compatibility Resource guaranteed/SLA at the instance level Azure VNet isolation	Reduced OPEX/CAPEX Dynamic scale Advanced security Intelligent database self-tuning	Fully managed services while retaining high level of compatibility with SQL Server Support for SQL features such as cross-database queries, which are unavailable in Azure SQL Database

03

Introducing Azure SQL Database Managed Instance

Of all your options, Azure SQL Database Managed Instance is the simplest solution for lifting and shifting your legacy SQL Server data to the cloud. As shown in Table 1, Azure SQL Database Managed Instance is a powerful and economical cloud destination for companies that want to quickly and easily migrate their SQL Server databases from on-premises without necessarily having to change their apps. Azure SQL Database Managed Instance offers broad SQL Server compatibility and network isolation, making it ideal for an application re-host scenario. It also provides added savings by maximizing SQL Server licensing investments—companies can receive discounted rates by using Azure Hybrid Benefit for SQL Server. Azure SQL Database Managed Instance is a fully managed solution: Microsoft operates SQL for you with full PaaS capabilities, including automatic patching and version updates, automated backups, built-in high availability, and a comprehensive security portfolio—all of which dramatically reduces management overhead and TCO. You can also take advantage of your SQL Server license investments and save up to 55 percent on Azure SQL Database Managed Instance.[1]

[1] https://azure.microsoft.com/pricing/hybrid-benefit/

Additionally, the new Azure Database Migration Service accelerates migration to Azure SQL Database Managed Instance from various database versions and SQL Server editions with minimal application downtime. Azure SQL Database Managed Instance is based on virtual cores, or vCores, with additional storage and input/output (I/O) available separately—giving you greater flexibility to select the right level of resources for your workloads.

Azure SQL Database Managed Instance capabilities include:

Compatibility with native SQL Server features used in SQL Server Agent, cross-database references, and queries

High-availability built in

Automated backups and point-in-time restore

Continuous patching and automatic version updates

Fully isolated instances

Database sizes up to 35 TB

Azure Active Directory authentication for single sign-on

Azure portal, PowerShell, and command-line functionality for service provisioning, monitoring, troubleshooting, and scaling

04

How will it work for me?

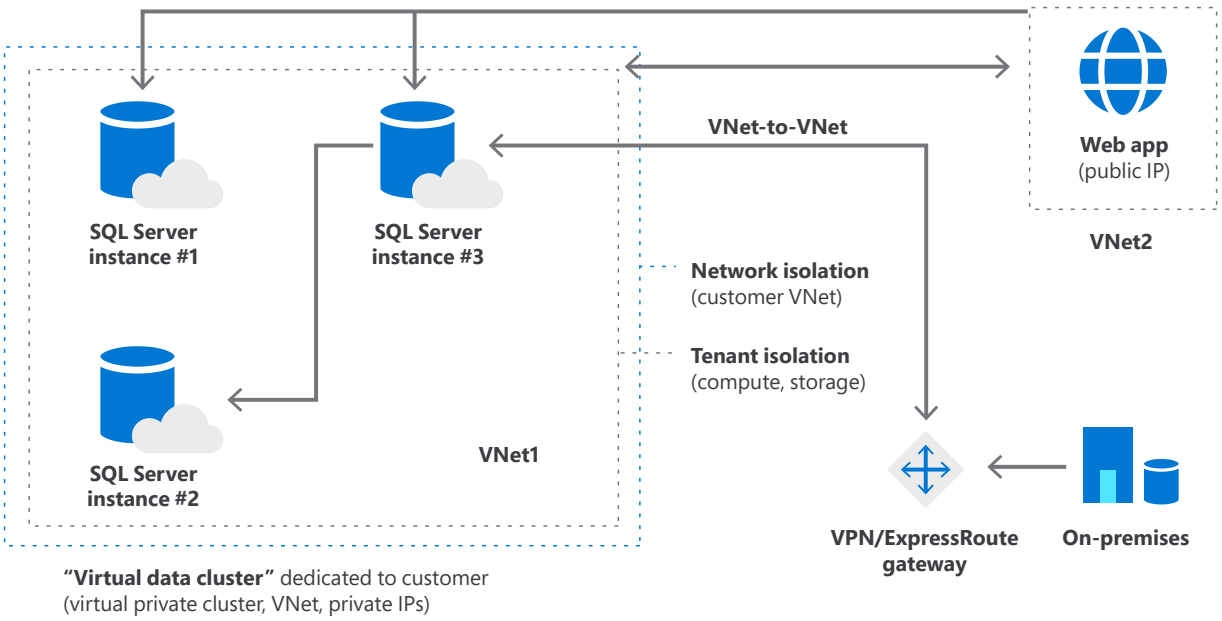
Azure SQL Database Managed Instance separates compute and storage components. You can select compute nodes with 8, 16, or 24 cores and Azure Premium Disk Storage. Azure SQL Database Managed Instance uses the same Azure SQL Database infrastructure that organizations have been using for billions of transactions daily. The only difference is that Azure SQL Database Managed Instance provides your organization with the entire SQL Server instance—instead of individual databases—while preserving PaaS capabilities. It's a fully-managed SQL Server instance in the Azure cloud, using the same SQL Server database engine, and it incorporates the latest features, performance improvements, and security patches.

You'll need to create a virtual network, and then place your database in Azure SQL Database Managed Instance inside the virtual network. From there, it will work as a private SQL Server instance on Azure. All databases within that instance are positioned on the same SQL Server instance, which gives you consistent functionality like global temp tables, cross-database queries, SQL Server Agent, and so on. All other server-level objects, such as sign-ins or SQL Server Agent sign-ins, are appropriately replicated in the environment. Multiple managed instances are grouped in a virtual cluster that can be placed in a virtual network (VNet) and isolated from the public internet. These virtual clusters provide capabilities for cross-instance queries and Service Broker messaging.

Options for application connectivity

Azure SQL Database Managed Instance supports connections from Azure only or from a hybrid environment (Figure 1). During service provisioning through the Azure portal or REST API, you can choose the VNet and subnet to achieve full networking isolation for your managed instances. Once created, instances in the VNet can be reached using Azure networking mechanisms (VPN and ExpressRoute gateways). The endpoint is exposed only through a private IP address, allowing safe connectivity from private Azure or hybrid networks.

Figure 1: Options for application connectivity



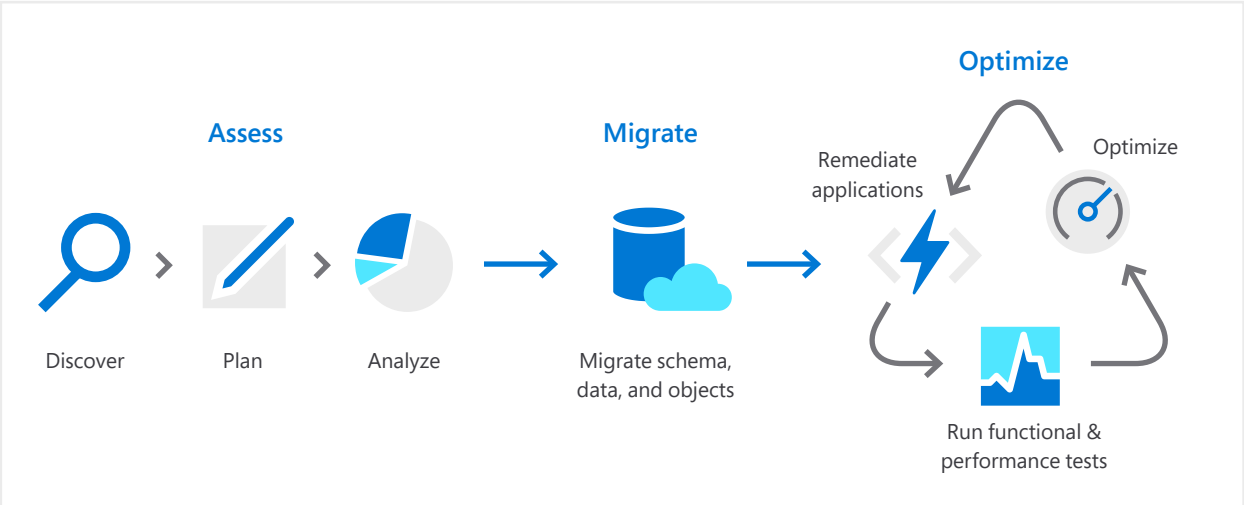
05

How do I approach migration?

Successful cloud migration requires solid planning and a clear methodology. It's common for companies to seek a cloud-first approach, but still be unsure of how and where to start.

To address your concerns, Microsoft has developed a three-step migration strategy: Assess, Migrate, and Optimize (Figure 2). Each step includes a set of integrated tools and offerings to ensure you can choose the scope of your migration—from a single database to an entire datacenter. Using this migration approach and tools from Azure at various stages, you can rapidly lift and shift existing SQL Server 2008 or 2008 R2 databases to Azure SQL Database Managed Instance.

Figure 2: Three-step cloud migration strategy from Microsoft



Step 1: Assess

The first step toward migration is to understand your database footprint, discover on-premises database servers, and identify app and server dependencies. Then, you need to plan and analyze whether the targeted Azure SQL Database Managed Instance is compatible with the database requirements of your application. It's important to understand your database performance needs and to determine how you would deliver that performance on Azure after migration. In the case of Azure SQL Database Managed Instance, this might require computing the number of vCores needed for each database. If you have specific security or regulatory requirements, you also need to consider them during the assessment process. To achieve these goals, Microsoft has made available many resources and tools, including:

Azure Database Migration Guide
This one-stop guide for database migration provides step-by-step guidance from source to target. It also showcases recommended partners and customer case studies. View the Database Migration Guide.

Data Migration Assistant

You can use Data Migration Assistant (DMA) to spot potential compatibility issues that can affect database functionality on Azure SQL Database Managed Instance. DMA assesses the readiness of your database for migration to Azure SQL Database and enables performance and reliability improvements for your target environment.

Step 2: Migrate

After you assess your databases, you need to complete the schema, data, and object migration process. Azure offers migration tools and services that analyze data platform solutions, recommend the best options, and then enable seamless execution.

Azure Database Migration Service

A comprehensive, fully managed offering, Azure Database Migration Service (DMS) reduces the complexity of cloud migration by facilitating the movement of data, schema, and other objects from heterogeneous sources to Azure database platforms—all with minimal downtime. To start, DMS provides assessment reports that highlight the changes required before performing a migration. After conflicts are resolved, DMS performs all steps associated with the migration process.

An Azure SQL Database instance can be created based on different regions, with a variety of vCore options available. By allocating more vCores, you can accelerate migration to meet a desired timeline, but with an additional cost.

Backup and restore

Azure SQL Database Managed Instance delivers a robust backup and restore functionality for migration. You can take a native SQL backup of on-premises SQL Server databases, put it on Azure Blob storage, and restore it directly to Azure SQL Database Managed Instance. Although it requires some downtime, this method enables quick and easy offline database migration.

We were able to migrate an app with zero friction to a [Azure SQL Database] Managed Instance, with features like CLR and SQL Agent just working. [Azure] Database Migration Service will be crucial for pulling off migrations like this at scale.

Sankar G. Prayaga
Lead Engineer
EY

Step 3: Optimize

After migration, you're ready to transform and optimize, making any changes required for your applications to run smoothly and efficiently. You can use Azure tools and services to perform tests, address performance or security issues, and then retest to confirm improvements. You can also review new SQL features available on the Azure platform and implement them, as appropriate.

Performance optimization

You can run performance validation queries against both the source and Azure SQL Database Managed Instance databases, and then analyze and compare the results. For example, you might want to change the database compatibility level for query regressions. You can use Query Store as the optimal tool for getting information about workload performance before and after this change. You can also check for missing, duplicate, redundant, rarely used, and completely unused indexes, and then resolve them using the Database Engine Tuning Advisor and Dynamic Management Views (DMVs).

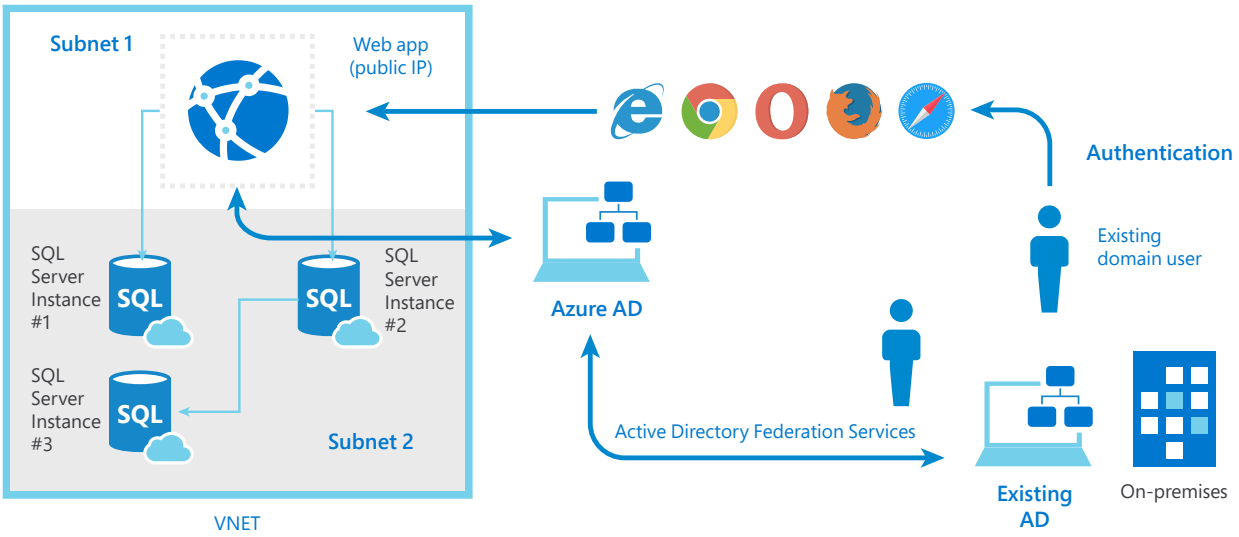
Pricing optimization

After migration, you can right-size your on-premises SQL workloads in Azure. Azure SQL Database Managed Instance introduces a pricing model based on vCores, which lets you select the right level of resources (storage and compute) for your workloads by comparing vCores to physical cores on-premises.

Security optimization

It's easy to optimize security in Azure through Azure Active Directory authentication at the database level (Figure 3). With the free Microsoft Azure Active Directory Connect tool, you can synchronize your on-premises Active Directory to Azure Active Directory and enable single sign-on with Windows user credentials. Azure SQL Database Managed Instance also adheres to compliance standards available in Azure SQL Server, so there isn't a lot of administrative overhead.

Figure 3: Optimizing security with Azure Active Directory



Plus, with auditing and threat detection features, you can monitor activities and use Row-Level Security and Dynamic Data Masking to control access to sensitive and privileged data. You can also use firewall rules at the database and server levels to specify a range of IPs that can access the instance. Likewise, you can manage virtual network rules using firewalls.

06
Next steps

To successfully modernize to the cloud, you can't leave anything behind. This requires cloud compatibility with legacy databases. Azure SQL Database Managed Instance offers near full compatibility with SQL Server, which means it's ideal for migrating to Azure. Azure SQL Database Managed Instance facilitates lift-and-shift migration from on-premises SQL Server to the cloud while Azure Hybrid Benefit for SQL Server can help maximize your current on-premises license investments. Plus, with the Microsoft three-step strategy for migration (Assess, Migrate, Optimize), you can take advantage of Azure Database Migration Service and other tools for a seamless, reliable, and optimized migration—at scale and with minimal downtime.

Prepare for SQL Server 2008 and SQL Server 2008 R2 end of support

Sign up for an Azure free trial—$200 credit for 30 days, 12 months of free services

Take advantage of Azure Hybrid Benefit for SQL Server

Find out about Azure Database Migration Service

View the Azure Database Migration Guide