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Unleash Your SQL Server Workloads

How migrating to Azure can revolutionize your data game

Creative tech for Better Change

Microsoft

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Contents

Introduction

In today's fast-paced business environment, organizations constantly seek ways to improve their operations and gain a competitive advantage. One of the ways they do this is by moving their data workloads to Microsoft Azure.

By leveraging Azure services, organizations can achieve agile scaling capabilities, pay-as-you-go models for OpEx optimization, eliminate traditional CapEx expenses, and capitalize on advanced functionalities, including automated disaster recovery, backup mechanisms and advanced data analytics. In addition, being in the cloud can free up organizations from the burden of managing and maintaining infrastructure while also providing access to better monitoring tools and integration with other cloud solutions.

However, while migrating to the cloud can be a game-changer for businesses, it's essential to remember that the process can be complex and challenging. Factors to consider when migrating your data workloads to the cloud include data security, network bandwidth and application compatibility.

Fact is that every data migration is unique. There is no one-size-fits-all approach making each organization's data migration journey special by itself.

This white paper explores the key aspects organizations should consider when migrating their data workloads to Azure. We'll also address the benefits of the migration to Azure and advise how to plan and execute a successful migration. To make this more specific, we will focus on the migration of an on-premise SQL Server instance to Azure.

The following sections will guide you through five of the key aspects when migrating your SQL Server to Azure:

1. Reasons to Migrate
Understand the benefits of Migrating to Microsoft Azure Cloud.

2. Discovery
Evaluate current systems and migration readiness.

3. Migration Options
Compare and choose Azure solutions.

4. Migration Approach
Formulate a strategy and migration plan.

5. During and After
Navigate cloud onboarding and scaling.

Reasons to migrate

Let's first delve deeper into what the Microsoft Azure Cloud offers. By understanding the benefits of Microsoft Azure, we can develop a better approach to the migration process that aligns with an organization's business goals and helps them realize the full potential of their data workloads.

We will explore some critical advantages of cloud migration, such as scalability, agility, and access to advanced features, and provide examples of how these benefits can translate into real-world value for organizations.

Scalability

Microsoft Azure allows organizations to scale their infrastructure up or down quickly and easily, depending on their needs. This means that they can promptly respond to changes on demand without worrying about capacity constraints. For example, during peak periods of activity, such as the holiday season for retail businesses, cloud-based applications and services can be easily scaled up to accommodate increased traffic and demand, and then scaled back down during quieter periods to save costs.

Additionally, scaling in the cloud can help improve application performance and availability, as resources can be quickly added or removed to maintain optimal performance levels.

Cost savings

Microsoft Azure allows organizations to reduce their expenditure throughout their cloud journey. Microsoft Azure offers a pay-as-you-go model, meaning that you only pay for what you use.

Organizations can leverage this and scaling features, start small and scale up as you understand your application needs. Additionally, once you know the resources your application needs, you can switch to a fixed subscription model, which lets you assign set resources at a discount. With cloud computing you only pay for what you use avoiding the costs of buying, maintaining, and upgrading hardware.

Security

Microsoft Azure offers built-in security features, such as identity and access management, network security, and encryption. These features help to reduce the risk of data breaches and other security incidents.

Availability

When it comes to availability, migrating to Microsoft Azure can bring several benefits. Azure offers multiple data centers across different regions. Your application and data can be replicated across various locations to ensure high availability and minimize downtime.

This can significantly reduce the risk of service disruptions due to hardware failures or natural disasters. Additionally, Microsoft Azure offers advanced features and tools to support high availability, such as automatic failover, load balancing, and disaster recovery solutions. These features ensure that your applications and data are always available to your users, even during unexpected disruptions.

Access to new technologies

Microsoft Azure constantly updates and adds new features and services to its platform, which customers can quickly and easily leverage. This means organizations can independently save time and resources they would have otherwise used researching and implementing new technologies. Microsoft Azure offers several tools in machine learning, artificial intelligence, and big data analytics, which can be used to gain new insights, improve efficiency, and drive business growth.

It's important to identify and understand the reasons for moving to the cloud. Microsoft Azure offers a range of benefits that organizations can leverage to work more efficiently and effectively.

Discovery

Now that we understand some of the benefits of Microsoft Azure, we can start creating our plan. The first step in any SQL Server migration project is to assess your current environment.

The process involves understanding what you already have. Evaluating the database's size and complexity, identifying interdependencies or third-party applications, and determining the acceptable business downtime during the migration. Microsoft Azure offers tools that can help assess your environment, such as Azure Migrate and Data Migration assistant.

It is critical to thoroughly assess the current system and readiness before starting a migration project to ensure that nothing is overlooked while moving to the cloud. Key factors to consider are:

Data Inventory

Identify all the servers and databases that must be migrated to the cloud. This assessment includes understanding the size and complexity of each data asset, any dependencies between them and whether a partial migration approach would be beneficial. A Data inventory assessment will help determine the migration project's scope and the correct order that data assets need to migrate to the cloud.

Workload Analysis

Understand the workload of your existing systems and determine if they can handle the additional load during the migration or should be paused during the migration. Assessing your current workload will help you plan the migration approach and avoid any performance issues.

Network bandwidth analysis

This analysis includes an evaluation of the organization's current network capacity to ensure that it can handle the expected data traffic to and from the cloud environment. Additionally, the organization should consider whether additional network resources, such as virtual private networks (VPNs) or dedicated connectivity exist, assess that there is sufficient and secure network connectivity between on-premises data centers and the cloud environment.

Data Security & Compliance

Asses your data's security and compliance requirements during transit and at rest. Evaluate access control, encryption, data masking, auditing capabilities and any compliance requirements that may apply to your data, such as GDPR or HIPAA.

Downtime

Determine the acceptable downtime for your business during the migration. Assessing the acceptable offline time for your organization will help strategize the migration window and approach. A comprehensive assessment is a crucial step in the migration process of any data migration project. By taking inventory of all assets and analyzing critical factors such as performance, data security, compliance, and network bandwidth, organizations can identify potential roadblocks and help plan a suitable migration approach that mitigates risks and ensures a successful transition to the cloud.

Migration options

Now that you have made a complete assessment and clearly understand our current environment, the next step is to explore different cloud solutions to determine which option best benefits your application.

Microsoft Azure provides several options for migrating SQL Server workloads to the cloud. Each option has its own set of benefits and limitations, and the choice will depend on the unique requirements of your environment. In this step, we'll explore some of the most common SQL Server migration options in Microsoft Azure - and we will give you pros and cons of each option.

Azure SQL Database

A fully managed (PaaS) relational database service in Microsoft Azure. It provides high scalability, availability, and security for SQL Server workloads in the cloud. Azure SQL Database offers automatic patching, backups, high availability, and flexible pricing options that include serverless, vCore-based and a DTU model for when you want a blend of memory, computer and I/O.

Azure SQL Database allows you to set resources per database or have a sharable elastic pool for multiple databases. Azure SQL Database is the best option when migrating from an on-prem SQL Server to the cloud while maintaining a Data Warehouse Architecture; however, consider a Lakehouse platform like Databricks when migrating, as it will yield the most value for your application in most cases.

Pros	Cons
• High scalability and availability	• Restricted control over the underlying infrastructure
• Fully managed platform	• Limited compatibility with specific SQL Server features
• Built-in security and compliance features	
• Pay-as-you-go pricing model	• It may require application code changes

Consider Azure Database when your organization requires a fully managed, scalable and highly available database solution that can support high transaction workloads. You can do without the features not supported by Azure SQL Database, such as SQL Agent, DB Mail, Linked server, FileStream/FileTable, PolyBase, and cross-instance transactions.

Azure Managed Instance

A fully managed instance of SQL Server in Microsoft Azure. It provides a higher level of compatibility with on-premises SQL Server that is not available with Azure SQL Database. Azure Managed Instance offers nearly 100% of the capabilities of an on-premises SQL Server, including support for features such as SQL Server Agent, cross-database queries, and database mail.

| Pros	Cons
• High compatibility with on-premises SQL Server	• Higher costs compared to Azure SQL Database
• Fully managed platform	• Limited scalability compared to other Azure services
• Easy to migrate from on-premises SQL Server	
• native Virtual Network (VNet) integration	• Requires more management and maintenance than Azure SQL Database

Consider Azure Managed Instance when you need a native (VNet) integration with all the benefits of a fully managed platform as a service, or your workloads require features not available in SQL Database such as SQL Agent, DB Mail or Linked server.

Azure SQL Server on a VM

A lift and shift of your SQL Server into a virtual machine hosted on Microsoft Azure. This option provides complete control over the SQL Server instance, including installing and configuring any SQL Server version. Azure SQL Server on a VM is ideal for workloads requiring high control over the underlying infrastructure.

Pros	Cons
• Complete control over the SQL Server instance	• Higher cost compared to other Azure services
• Easy to migrate from on-premises SQL Server	• Requires more management and maintenance than other Azure services
• Can run any SQL Server feature	• Limited scalability compared to other Azure services

Consider Azure SQL Server on a VM when you require direct access to the operating system to install third-party or custom agents on the same location that your SQL Server is hosted. You need features not supported by Azure SQL Database or Azure Managed Instance, such as FileStream/FileTable, PolyBase, and cross-instance transactions, or you require a specific version of SQL Server.
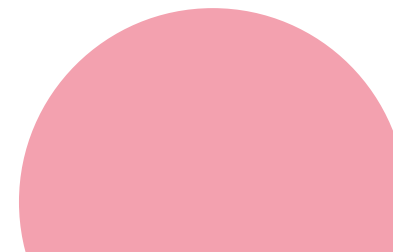
Databricks (Lakehouse platform)

A unified Apache Spark-based analytics platform that provides a collaborative environment for data scientists, engineers, and business analysts. It enables you to perform advanced analytics and machine learning on large-scale data sets using familiar tools like notebooks and repositories. Databricks allows you to work with multiple languages in one workspace, like Python, SQL, Scala and R. Databricks is the best way for organizations to leverage their data workloads in the cloud, however it has one of the more complex migration processes, as organization need to assimilate their Data Warehouse architecture to one that matches a Lakehouse architecture and workloads need to refactored to be compatible with Databricks.

Pros	Cons
· Unified analytics platform for data scientists and engineers	· Higher cost compared to other Azure services
· Supports big data processing and machine learning workloads	· It can add complexity to the migration process
· Highly scalable environment	· Requires significant data modeling and ETL effort to get started
· Support for multiple languages such as Python, SQL, Scala and R	· It may require additional training for teams unfamiliar with Databricks or a Lakehouse platform.

Consider Databricks to handle large datasets, run complex data processing tasks, or perform advanced analytics. You may also consider Databricks when you need to integrate data from different sources or have complex data transformations that are challenging to achieve with traditional SQL.
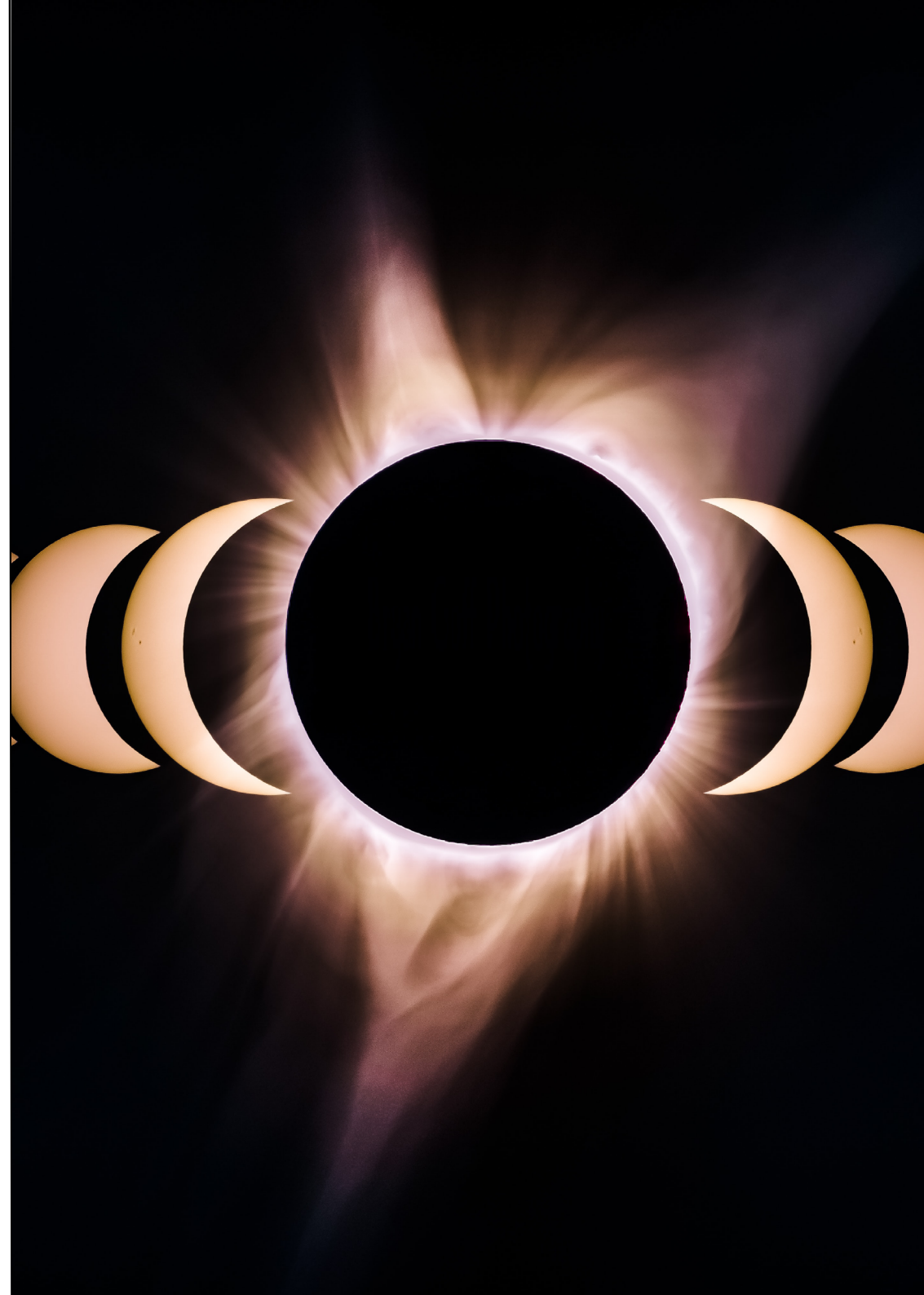
Hybrid solution with Data Factory

Azure Data Factory enables a seamless connection between your on-premises SQL Server and the cloud, allowing for data transfer and processing in the cloud while still using your on-premises server as the primary source. This type of solution would require using some other type of Storage and Data Analytics platform to further generate insights from your Data, for example, by moving data to Azure Blob Storage and using the Databricks Lakehouse platform to generate insights.

Pros	Cons
· Allows for a gradual migration approach	· It can require more resources and maintenance
· Easy to implement	· There may be more cost-effective solutions
· Allows for data ingestion source to continue being on-premise when that is an important factor	· Requires on-premises infrastructure and maintenance
	· Can create security challenges with the on-premises infrastructure

Consider a hybrid solution when there is a need to keep some of the on-premises infrastructure in place but you still want to take advantage of the benefits of the cloud. It can also be beneficial when you want to migrate gradually to the cloud.

Using the assessment we have done in the first part, we should be able to evaluate which option fits better with your organization. Before making a plan on how we want to migrate to the cloud, we should take a look at each available option and weigh them against our needs.

Strategizing an approach

Once you have selected the migration option that best meets your requirements, it's time to formulate a plan for migrating your SQL Server workloads to Microsoft Azure.
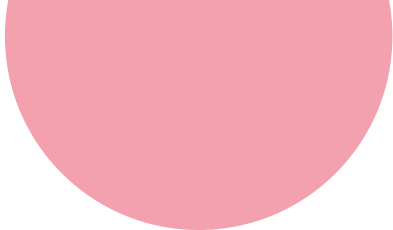
The migration approach will depend on several factors, including the size and complexity of your database environment, the amount of downtime your organization can tolerate during the migration, and the available network bandwidth for transferring data to the cloud.

Network connectivity

Before migrating your SQL Server to Microsoft Azure, you must ensure that you have the right connections to transfer your data to the cloud. If your database environment is on-premise, you must establish a secure, high-speed connection to Microsoft Azure to ensure a fast and reliable migration process.One solution to bridge this connection is Azure Data Factory and an Integration Runtime on your on-prem machine, which enables you to create hybrid data integration workflows between on-premises and cloud environments.

Data encryption

If your data is encrypted on-premises, you must consider moving the data directly to the cloud or decrypting and re-encrypt the data after migration. Moving encrypted data directly to the cloud requires a high level of security.

It is only possible if your encryption keys are managed in a way that allows them to be used in the cloud. Suppose your encryption keys cannot be used in the cloud. In that case, you must decrypt and re-encrypt the data after migration, which will require additional time and effort.

Load considerations

Another essential factor to consider is the load that your existing systems can handle during the migration. Moving large amounts of data to the cloud can strain your network and on-premises systems. It is essential to test your network bandwidth and on-premise systems to ensure that they can handle the expected load during the migration process.

There are several tools you can use to migrate your data. During this part of planning your approach, you can look at the different tools offered by Microsoft Azure to migrate your data, such as Azure Data Migration Service, Bulk Copy, Transactional Replication and SQL Data Sync.

Partial migration

In some cases, performing a partial migration of your SQL Server may be possible. This can be done by migrating a subset of your databases to Microsoft Azure first before migrating the rest of your environment or creating ETL pipelines that will generate the rest of the data based on the already migrated data. Partial migration can reduce the downtime required during the migration process and make the overall migration more manageable.

By considering these factors, you can formulate an approach to migration, tailored to your organization's specific needs. It's important to remember that every migration differs and there is no one-size-fits-all approach. Planning carefully and testing your migration strategy before moving forward with the actual migration is essential.

During and after migration

Moving to the cloud can offer many benefits and lead to a more agile and flexible organization. However, it's essential to be aware of the challenges that can arise during migration.

Fine-tuning performance

One of the most common pain points is the initial performance hit that can occur when moving to the cloud. This is often due to a lack of familiarity with the cloud platform, which can lead to suboptimal configurations and less-than-ideal resource allocation. However, organizations can gradually fine-tune their cloud environment to maximize performance and efficiency by starting small and scaling up as needed.

Onboarding personnel

Another challenge of moving to the cloud is onboarding personnel. Cloud platforms often require new skill sets and training for IT staff, which can be a significant investment of time and resources. However, by investing in the training and development of employees, organizations can create a more agile and adaptable workforce that can take advantage of the many benefits of the cloud.

Despite these challenges, the benefits of moving to the cloud are many. By migrating to the cloud, organizations can more easily scale their SQL Server resources and expand their toolsets. This can lead to a more flexible and agile IT infrastructure that can keep up with the demands of a rapidly changing business landscape.

In addition, the cloud offers many new features and capabilities that aren't available or are harder to achieve in on-premises environments, which can help organizations stay ahead of the curve and remain competitive in the long term.

Conclusion

Migrating SQL Server workloads to the Azure Cloud can offer many benefits, including increased scalability, flexibility, agility and lowering cost on operational needs allowing you to focus on what is important to your organization.

By carefully considering the available migration options, formulating a sound migration strategy, and utilizing the right tools, organizations can ensure a successful migration to the Microsoft Azure Cloud.

While the migration process can present challenges, the benefits far outweigh the costs in the long term. As organizations become more comfortable with the cloud and develop the necessary skill sets, they can take full advantage of the many benefits Microsoft Azure offers.

Ultimately, a successful SQL Server migration to the Microsoft Azure Cloud can help organizations remain competitive and future-proof their IT infrastructure for years.

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