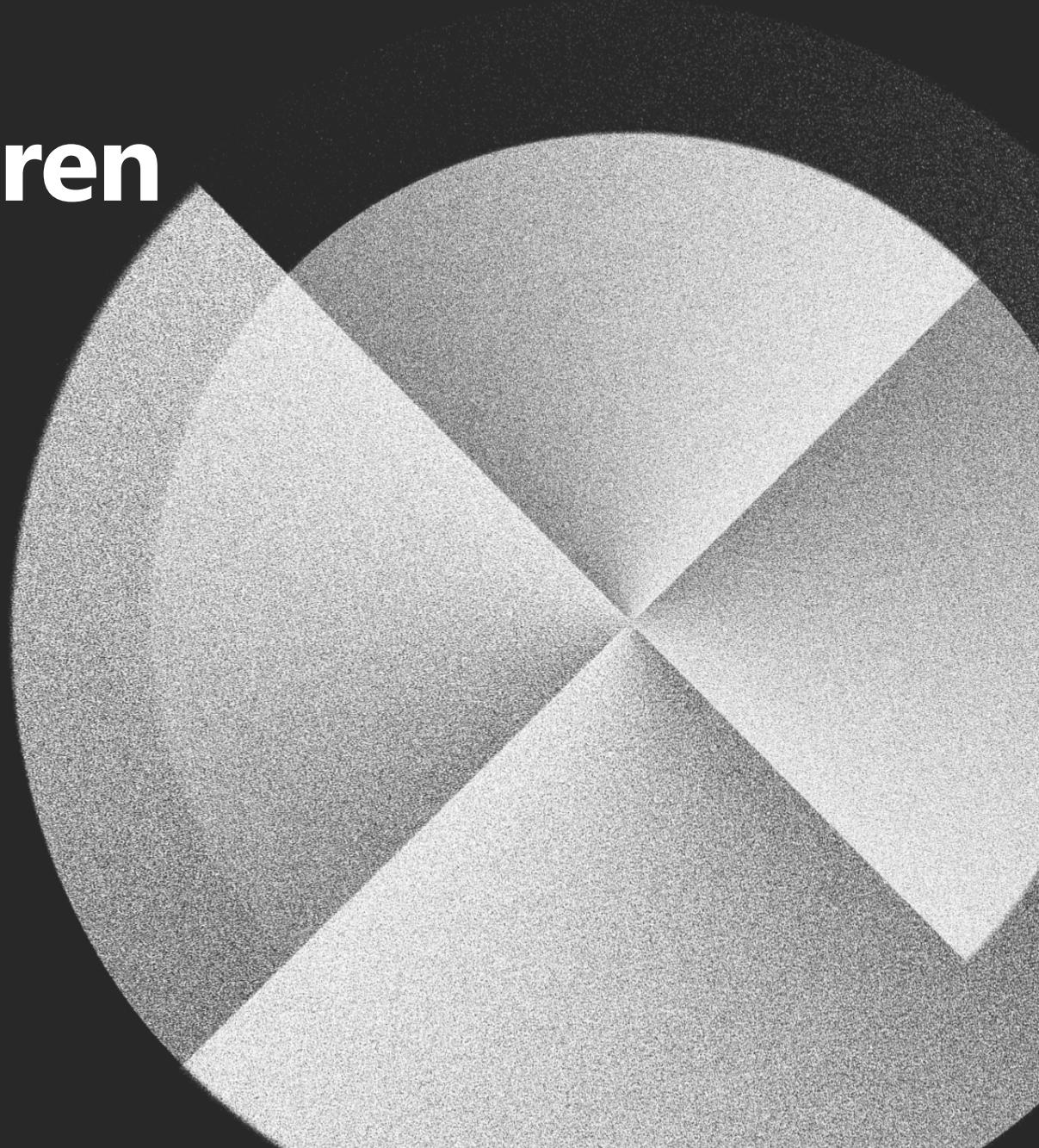




SQL Server modernisieren Aber richtig!

Wolfgang Straßer
Data Consultant



Why Upgrade?

Enable Features & Accelerate Innovation

Maintain Compliance

End All End-of-Support Issues

SQL 2008 End-of-Support

Why Upgrade?

Keep Vendor Support

Reduce Costs

Separate Application & Data Upgrade

Enable Modern Data Warehouse

Change your mindset

Minimize Risks with Data Migration Guide

Discover

Assess

Convert

Modernize

Data Sync

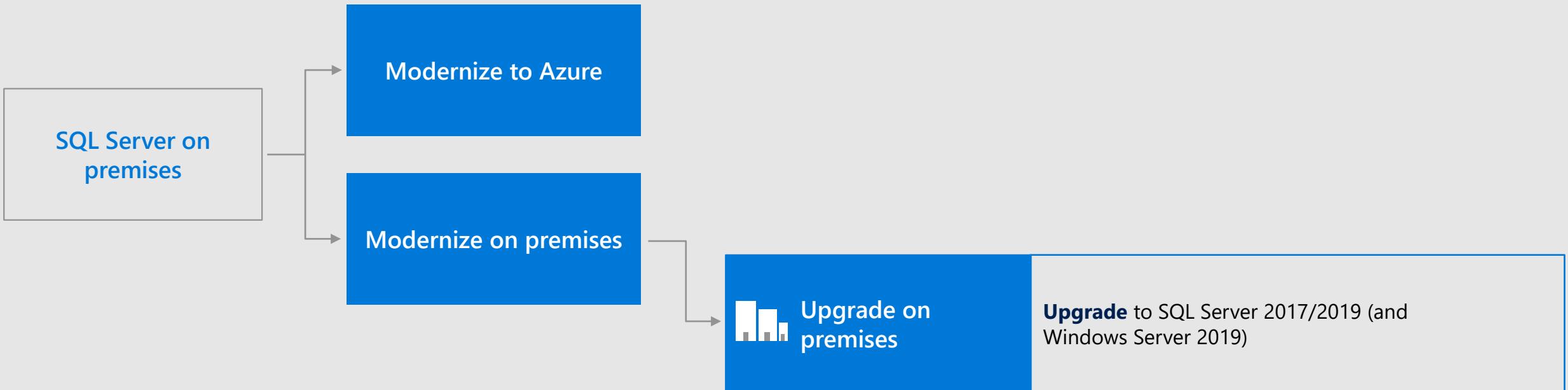
Cutover

Post Migration Duties

How to Upgrade?

Modernization Options for your SQL Databases

The best destination for SQL workloads in the cloud



SQL Server 2019 New Features

Big Data Clusters

Relational Engine
Spark
HDFS
S3 Coming Soon!

Security & Compliance

Data Discovery & Classification
Vulnerability Assessment
Always Encrypted Secured Enclaves
GDPR Labelling & Tracking

Choice of Platform

Windows
Linux
Kubernetes
On Premises, Cloud & Edge!

High Availability

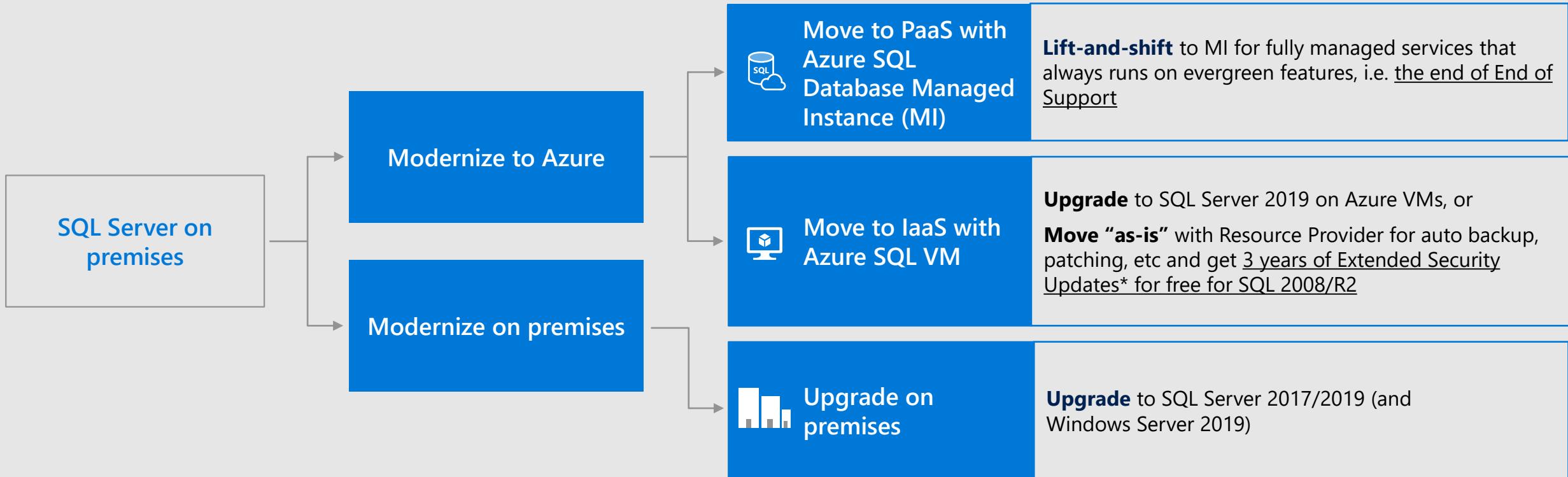
Accelerated Database Recovery
Online Index Enhancements
Availability Groups Enhancements

Artificial Intelligence All Inside

Intelligent Query Processing
Machine Learning Services

Modernization Options for your SQL Databases

The best destination for SQL workloads in the cloud



* ESU worth 75% of license every year for the next three years after EOS

Azure SQL

SQL virtual machines

Best for migrations and applications requiring OS-level access



Managed instances

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



Databases

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



SQL virtual machine

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

Single instance

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

Instance pool

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

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

The Azure PaaS Database Platform differentiation

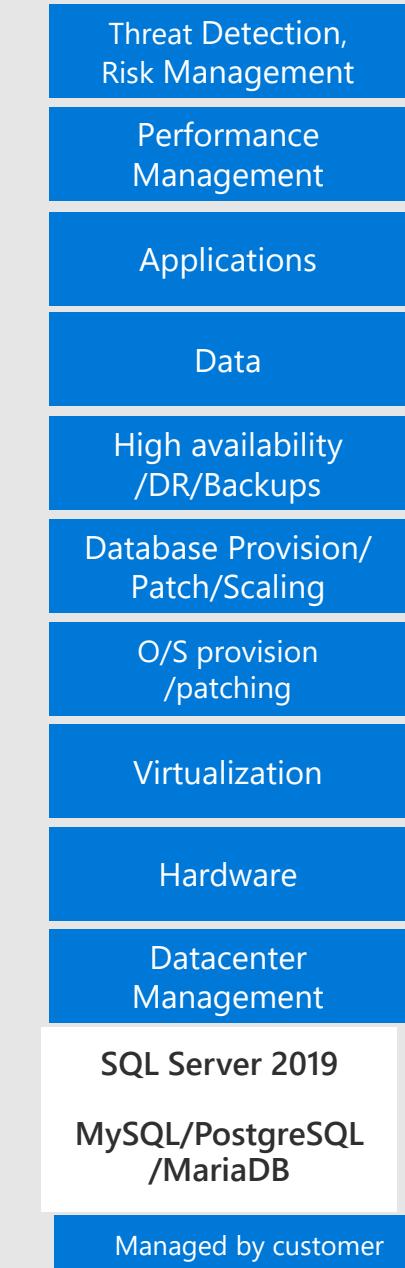
Built-in intelligence learns unique database patterns and automatically tunes for improved performance

Intelligent Threat Detection monitors, detects, and alerts on malicious activities

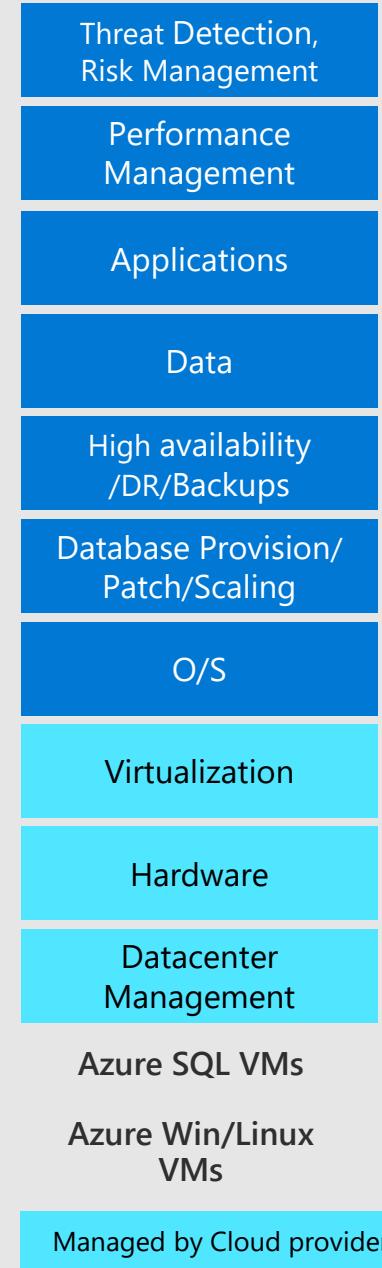
Vulnerability Assessment discovers, tracks and remediates potential database vulnerabilities



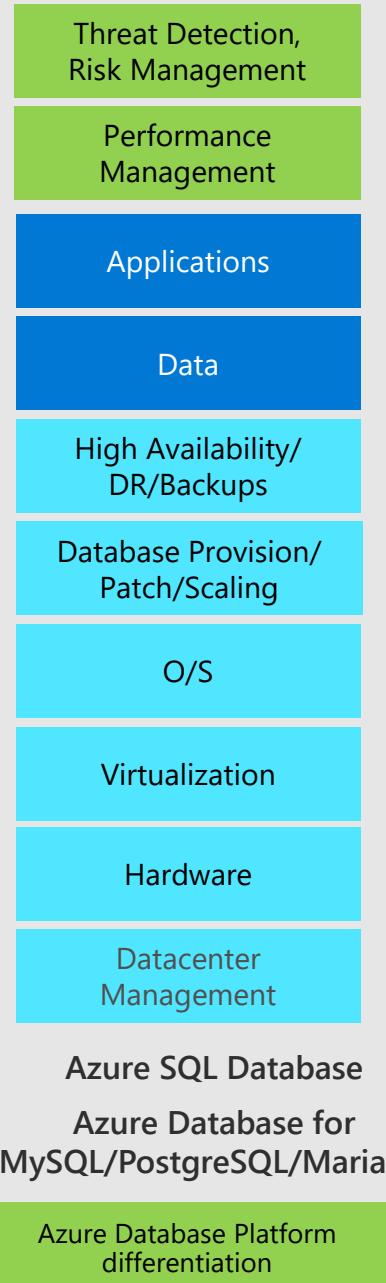
On-premises



Infrastructure as a Service



Platform as a Service



Select SQL deployment option

Microsoft

 Feedback<https://portal.azure.com/#create/Microsoft.AzureSQL>

How do you plan to use the service?



SQL databases

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

Resource type

Single database

[Create](#)[Hide details](#)

SQL managed instances

Best for most migrations to the cloud. Lift-and-shift ready.

Resource type

Single instance

[Create](#)[Show details](#)

SQL virtual machines

Best for migrations and applications requiring OS-level access. Lift-and-shift ready.

Image

Please select an offer

[Create](#)[Show details](#)

Single database

Single databases are a great fit for modern, cloud-born applications that need a fully managed database with predictable performance.

Featured capabilities:

- Hyperscale storage (up to 100TB)
- Serverless compute
- Easy management



Elastic pool

Elastic pools provide a cost-effective solution for managing the performance of multiple databases with variable usage patterns.

Featured capabilities:

- Resource sharing for cost optimization
- Simplified performance management



Database server

Database servers are used to manage groups of single databases and elastic pools.

Featured capabilities:

- Access management
- Backup management
- Business continuity management

SQL cloud migration guidance

Breakdown of SQL Estate

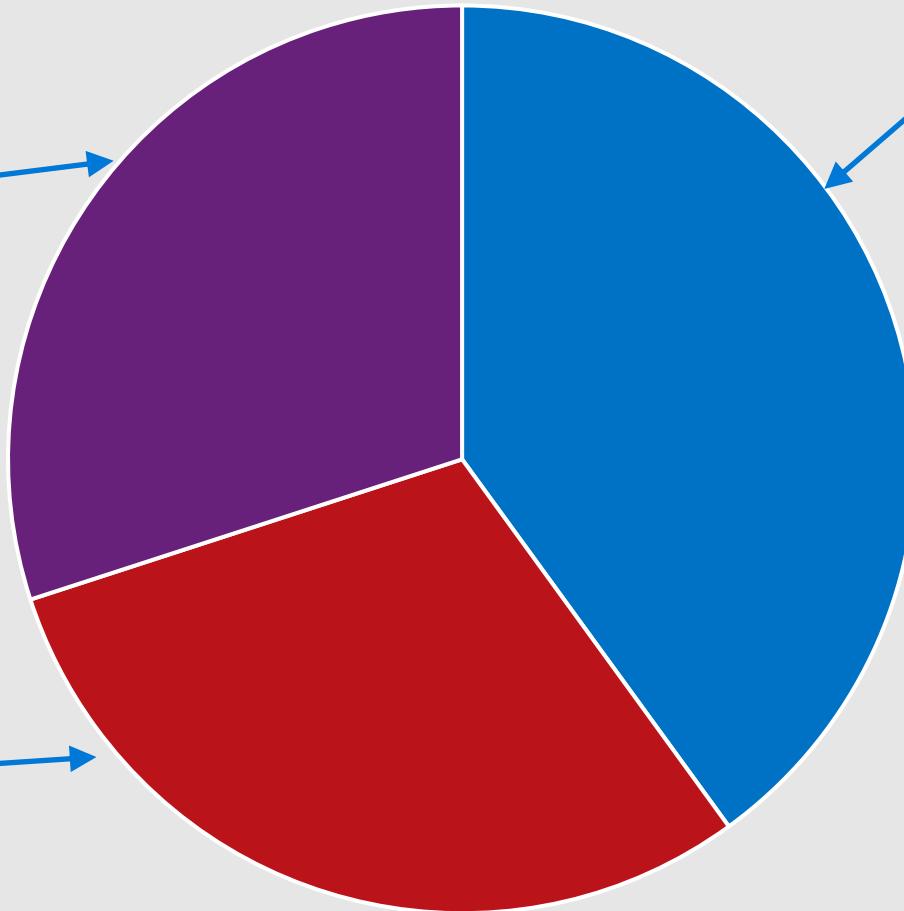
OLTP + OLAP → MI (or VM)

Datamarts → MI
(or DW or VM)

SSRS → VM (or PBI)

SSIS → ADF (or VM)

SSAS → VM (or SSAS)



D365, SPS → MI (or VM)

3rd party apps → VM (or MI)

■ ISV Apps

■ BI (SSRS, SSIS, SSAS)

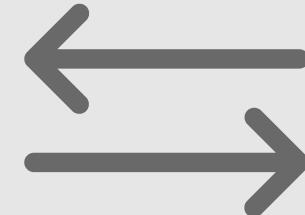
■ Custom apps (OLTP, Datamart)

Change Your Mindset

Target a Compatibility Level

Not a Platform

Not a Named SQL Server Version



Microsoft Database Compatibility Level Protection

Full Functional protection
once assessment tools
runs clean with
no errors.

Query Plan shape
protection on comparable
hardware.

Maintaining
backward compatibility
is very important
to SQL Server team.

Microsoft Database Compatibility Level Protection

Not everything goes...

Behavior changes resulting in different outcomes

```
SELECT DATEPART (year, '2019/10-12')
```

Changes in system objects

`sys.dm_os_sys_info.single_pages_kb` renamed to `sys.dm_os_sys_info.pages_kb`

Discontinued functionality

```
SELECT * FROM HumanResources.Employee WITH (FASTFIRSTROW)
```

Let's Upgrade!

Database Migration Guide

Microsoft Data Migration Guide x +

datamigration.microsoft.com

Microsoft Microsoft 365 Azure Office 365 Dynamics 365 SQL Windows 10 All Microsoft Search Cart

Azure Database Migration Guide

Step-by-step guidance for modernizing your data assets

Select your source and target to get started

[Need a recommendation?](#)

Microsoft SQL Server ORACLE DB2 MySQL PostgreSQL

mongoDB cassandra MariaDB Access SAP ASE

Microsoft Azure Table Storage

Migration process overview

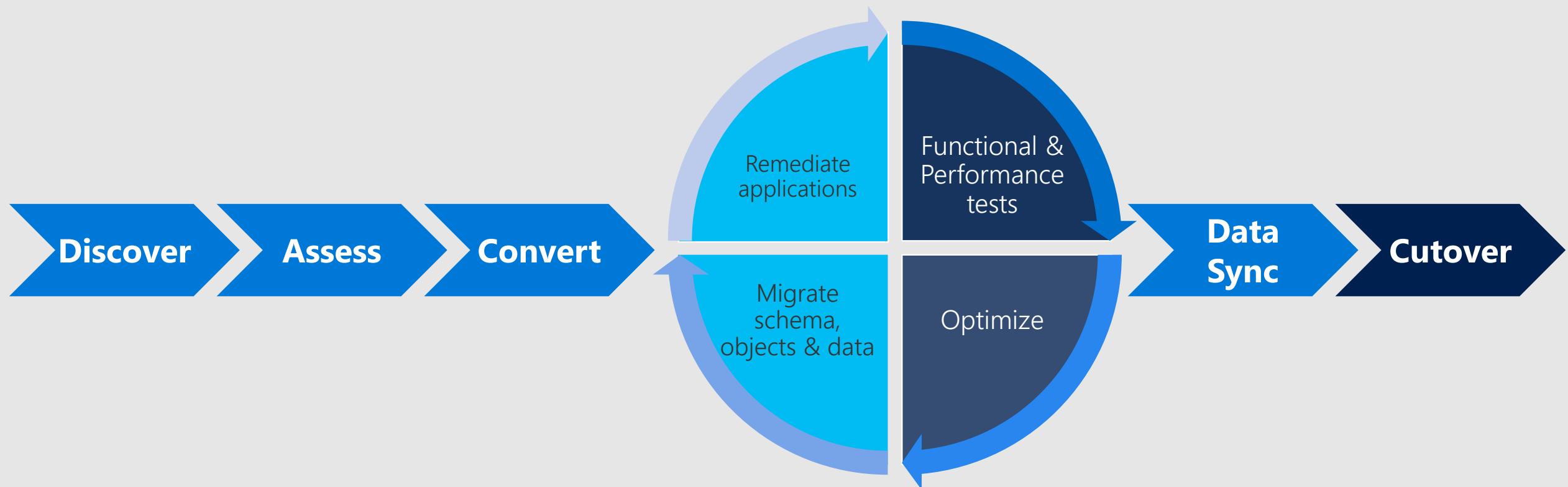
Pre-migration

Discover → Assess → Convert

Discover Assess Convert

Minimize Risks with Data Migration Guide

<http://datamigration.microsoft.com>



Discover

MAP Toolkit

The screenshot shows the MAP Toolkit interface with the following details:

- Database** tab selected.
- Steps to complete:** Collect inventory data (3,402 Machine(s), 0 % Success on 8/28/2015 1:07 PM).
- Options:** Create/Select database.
- Scenarios:**
 - SQL Server Discovery:** 3 Total Count (0 SQL Server 2014, 0 SQL Server 2012, 1 SQL Server 2008 R2, 2 SQL Server 2008, 0 SQL Server 2005, 0 SQL Server 2000).
 - Azure VM Readiness:** 1 Machines with SQL Server (1 Ready, 0 Ready after changes).
 - Oracle Products:** 3 Total Count (2 Oracle 11, 0 Oracle 10, 1 Oracle 9).

Discover

SQL Server inventory

Versions

Editions

Components

Cores per server

Databases per instance

Size of databases

Instance and database settings

Lots more!

Assess

- Data Migration Assistant

The screenshot shows the Data Migration Assistant interface. At the top, it says "Target Platform: Azure SQL Database Managed Instance". Below that, it lists "ADworks / SQL Server 2008 R2 Compat 80 Size 21.94 MB". A navigation bar at the top right includes "2 Select sources" and "3 Review results". The main area is titled "Compatibility 140 (4)". It shows a list of issues under "Breaking changes (3)" and "Behavior changes (1)". Under "Breaking changes", there are entries for "Non ANSI style left outer join usage" (2), "FASTFIRSTROW table hint usage" (1), and "[46022] FASTFIRSTROW is not..." (1). Under "Behavior changes", there is one entry for "Unqualified Join(s) detected" (2). There are also sections for "Deprecated features (0)" and "Information issues (0)". On the right side, there are tabs for "Issue", "Impacted objects", and "Object details". The "Object details" tab shows two Ad hoc queries: "dbo.msdma_adhocquery_1" and "dbo.msdma_adhocquery_3". A "Recommended Fix(s)" section contains a message about non-ANSI syntax and a "No Suggested Fix" button.

Assess

Compatibility issues

Breaking changes

Behavior changes

Deprecated features

Suggest target Compatibility Level

Discover new features

Performance

Storage

Security

Convert

Data Migration Assistant

The screenshot shows the Data Migration Assistant interface. At the top, it says "Target Platform: Azure SQL Database Managed Instance". Below that, it lists "ADworks / SQL Server 2008 R2 Compat 80 Size 21.94 MB". A navigation bar at the top right shows "2 Select sources" and "3 Review results". The main area is divided into two sections: "Issue" and "Impacted objects". The "Issue" section shows "Compatibility 140 (4)" selected, with a list of issues including "Non ANSI style left outer join usage" (Breaking changes), "FASTFIRSTROW table hint usage" (Behavior changes), and "Unqualified Join(s) detected" (Deprecated features). The "Impacted objects" section shows a list of objects affected by these issues, such as "Ad hoc query dbo.msdma_adhocquery_1" and "Ad hoc query dbo.msdma_adhocquery_3". A "No Suggested Fix" button is visible at the bottom right.

Convert

Connect to source and target servers

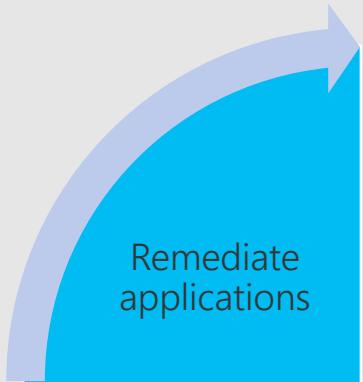
Choose databases

Monitor migration

Migration reports

Remediate Applications

You're not alone there



MAP Toolkit

App Service Migration Assistant

Azure Site Recovery

More...

Test & Optimize

Database Experimentation Assistant



Functional &
Performance
tests

A/B testing

Compatibility execution errors

Degraded queries

Workload comparison

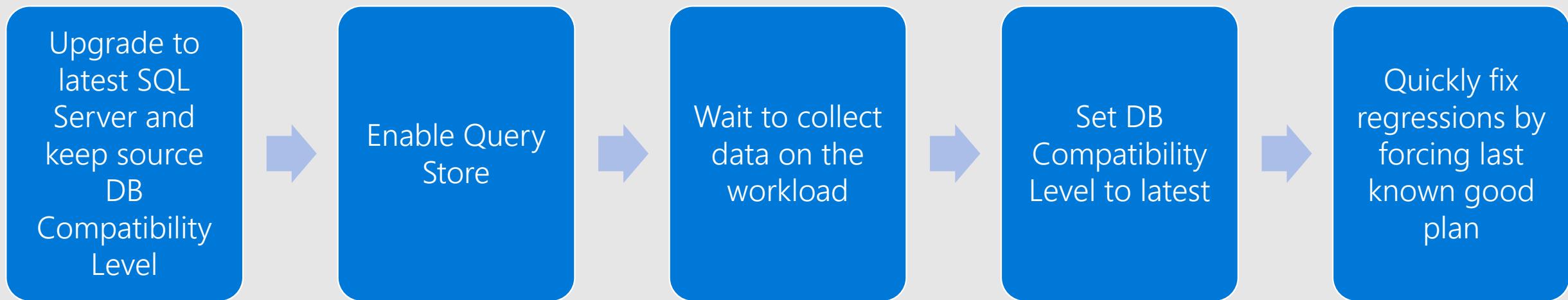
Hardware comparison

Configuration setting comparison

Optimize

Post Migration Duties

Quick Fix Underperforming Queries



Post Migration Duties

Uncover Performance Gains by Query Tuning Assistant

Query Tuning Assistant [AdventureWorksDW2012] X
AdventureWorksDW2012 > Query Tuning Assistant > Analysis
AdventureWorksDW2012 11/23/2018 1:16:45 AM - Session ID 2

1. Setup 2. Data Collection 3. View Analysis 4. View Findings 5. Verification

Top 10 regressed queries

Refresh Queries to show: 10 Metric: Duration Aggregation: Avg

#	Query ID	Query Text	Runs	Baseline Metric	Observed Metric	% Change	Tunable
0	<input type="checkbox"/> 1	IF @maxWeight <= (SELECT Weight from DimProduct WHERE ProductKey = @productKey)	300	0.4	0.65	+62.50	False
1	<input checked="" type="checkbox"/> 12	SELECT OrderDateKey, SUM(SalesAmount) AS TotalSales FROM FactInternetSales GROUP BY OrderDateKey...	300	26.88	28.2	-4.91	True
2	<input checked="" type="checkbox"/> 8	SELECT NumberCarsOwned FROM DimCustomer GROUP BY YearlyIncome, NumberCarsOwned	300	10.26	10.75	-4.78	True
3	<input checked="" type="checkbox"/> 14	SELECT * FROM FactInternetSales fis INNER JOIN DimProduct dp ON fis.ProductKey = dp.ProductKey WHERE...	300	1184.14	1236.23	-4.40	True
4	<input checked="" type="checkbox"/> 6	SELECT CustomerKey, SUM(SalesAmount) AS sas FROM FactInternetSales GROUP BY CustomerKey WITH (...	300	55.38	56.66	-2.31	True
5	<input checked="" type="checkbox"/> 11	SELECT SalesAmount FROM FactInternetSales GROUP BY SalesAmount, SalesAmount*1.10	300	50.61	51.41	-1.58	True
6	<input checked="" type="checkbox"/> 10	SELECT SalesAmount, SalesAmount*1.10 SalesTax FROM FactInternetSales GROUP BY SalesAmount	300	23.05	23.35	-1.30	True
7	<input checked="" type="checkbox"/> 9	SELECT (SalesAmount + TaxAmt + Freight) AS TotalCost FROM FactInternetSales GROUP BY SalesAmount, ...	300	33.22	33.29	-0.21	True
8	<input type="checkbox"/> 2	(SELECT @productKey AS ProductKey, EnglishDescription, Weight, 'This product is too heavy to ship and ...	300	0.02	0.02	0.00	False
9	<input checked="" type="checkbox"/> 13	SELECT TOP (10) r.ResellerName, r.AnnualSales FROM DimReseller AS r ORDER BY AnnualSales DESC, Resel...	300	0.56	0.56	0.00	True

Cancel Sessions Next

Quick Recap on Tools

MAP Toolkit

Microsoft Assessment and Planning Toolkit

Discover databases and their configurations

Discover servers and their configurations

Enable dependency **analysis** of workloads

Provides hints regarding migration effort

DMA

Data Migration Assistant

Readiness assessment:
blocking issues
breaking changes,
behavior changes

Moves schema, data and uncontained objects (like logins) to Azure SQL Database

Backup / Restore to another SQL Server (Keeps source DB Compatibility Level)

New feature recommendation

DEA

Database Experimentation Assistant

A/B Testing

Capture and Replay workload
for performance testing and reporting

Also reports on migration blockers because of failed T-SQL syntax

QTA

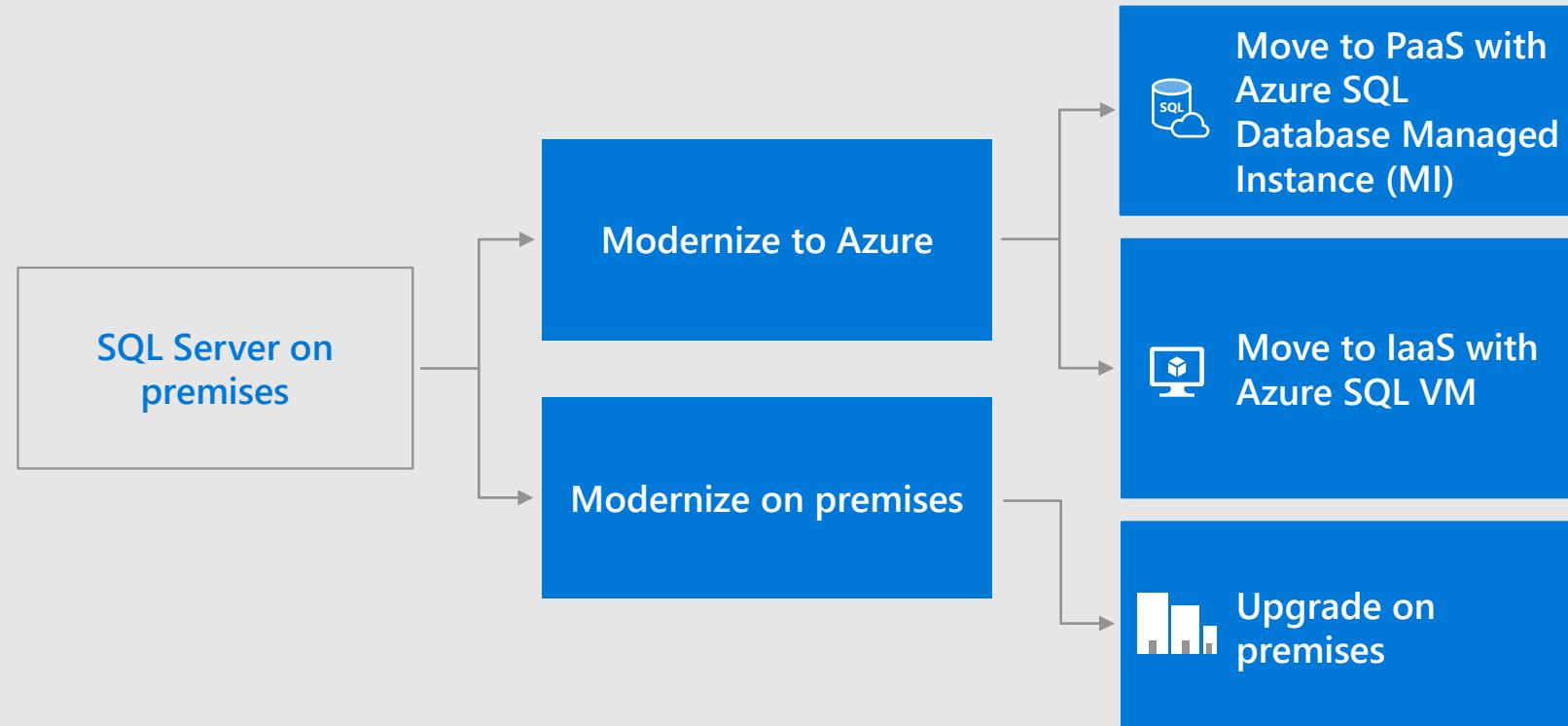
Query Tuning Assistant

Upgrade Database Compatibility Model to desired state

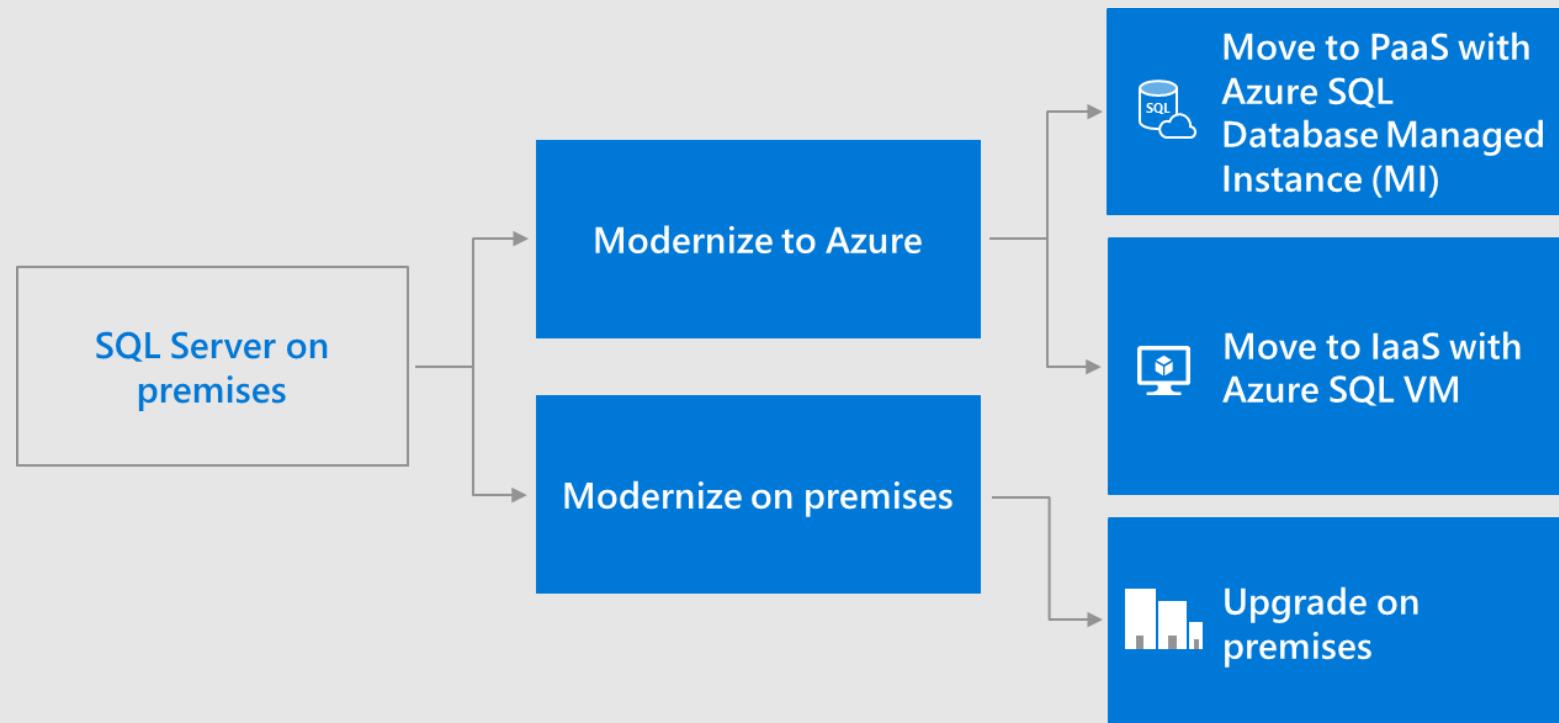
Detects workload regressions, and tests CE model variations (subsets)

Provides tangible **recommendations** for tuning queries

Your Way to Modern (Azure) SQL



Let's Walk the Way to Modern (Azure) SQL Together



Wolfgang Strasser

Data Consultant @



Reach me at

 w.strasser@cubido.at

 @wstrasser

Read more at

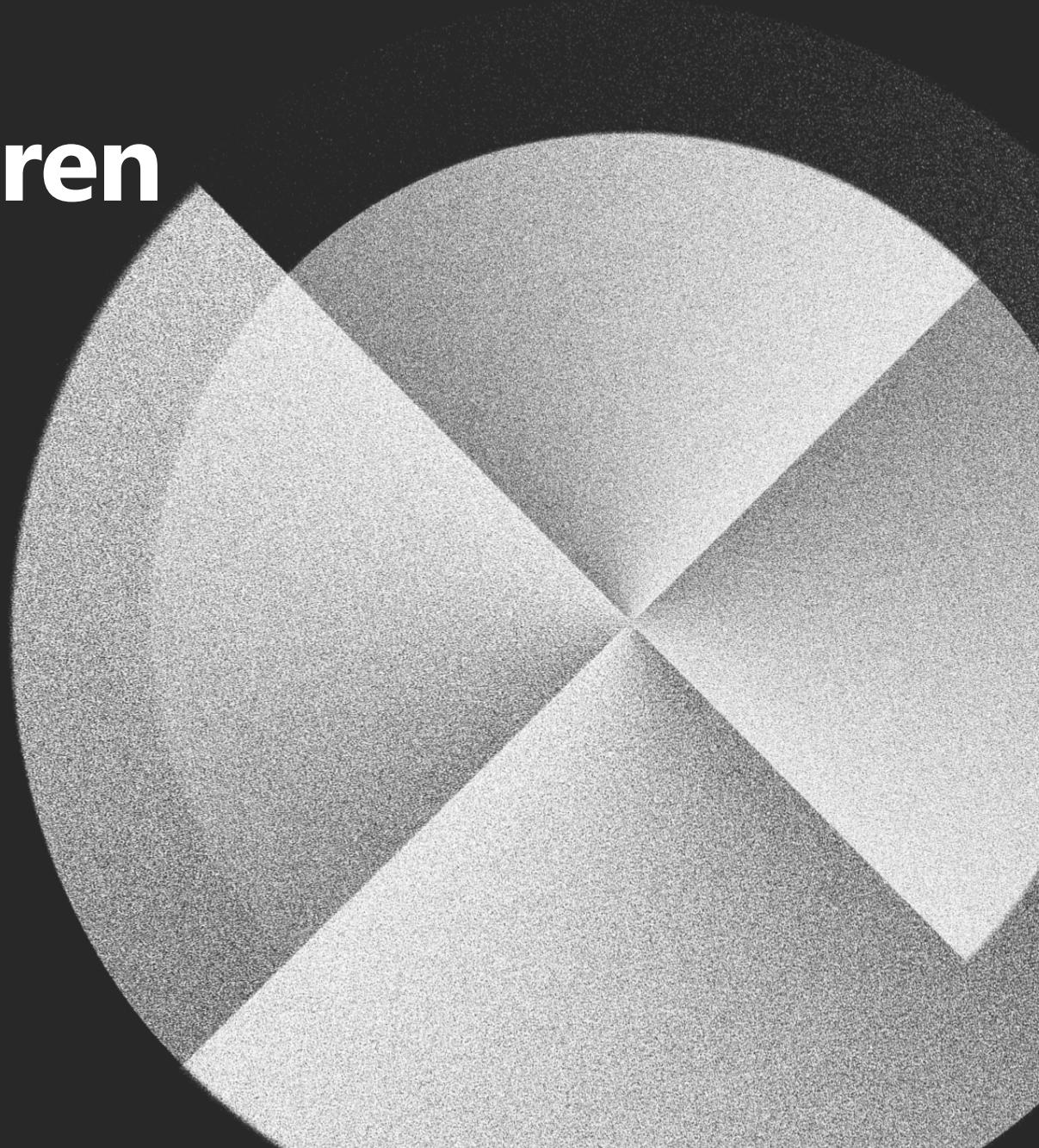
<https://workingondata.wordpress.com>





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 **Azure Migrate**
Microsoft

 Search (Ctrl+ '/')

Get started

 Overview

Migration goals

 Servers

 Databases

 VDI

 Web Apps

 Data Box

Manage

 Discovered items

Support + troubleshooting

 New support request



Windows and Linux servers

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

[Assess and migrate servers](#)



SQL and other databases

Discover, assess and migrate your on-premises databases to Azure SQL Database Managed Instance or Azure SQL Database.

[Assess and migrate databases](#)



Web apps, data and Virtual Desktop Infrastructure

Assess and migrate web apps, migrate data and assess virtual desktop infrastructure (VDI).

[Assess and migrate web apps \(new\)](#)

[Assess virtual desktop infrastructure \(new\)](#)

[Migrate data](#)

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](#)