SQL Server Cloud Service

SQL 2016 new innovations

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Hyperscale cloud

Hyperscale features

Stretch Database

Stretch operational tables in a secure manner into Azure for cost-effective historic data availability. Works with Always Encrypted and Row-Level Security.

High availability

Distributed availability groups add flexibility to HA/DR. Add Azure Replica Wizard makes it easy to implement.

Enhanced backup to Azure

Enhanced backup includes faster restore times and 50% reduction in storage. Supports larger DBs with block blobs and custom backup schedule with local staging.

Simplicity

Easy migration of on-premises SQL Server

Simple point-and-click migration to Azure

Suite of advisors for upgrading to SQL Server 2016

SQL Server 2016 Upgrade Advisor in the adoption of new SQL Server features

Consistency

Common development, management, and identity tools

Including Active Directory, Visual Studio, Hyper-V, and System Center

Consistent experience from SQL Server on-premises to Microsoft Azure IaaS and PaaS

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Stretch Database

Ever-growing data, ever-shrinking IT

Massive tables (hundreds of millions/billions of rows, TBs size)

Users want/need to retain data indefinitely

Cold data infrequently accessed but must be online

Datacenter consolidation

Maintenance challenges

Business SLAs at risk

What to do?

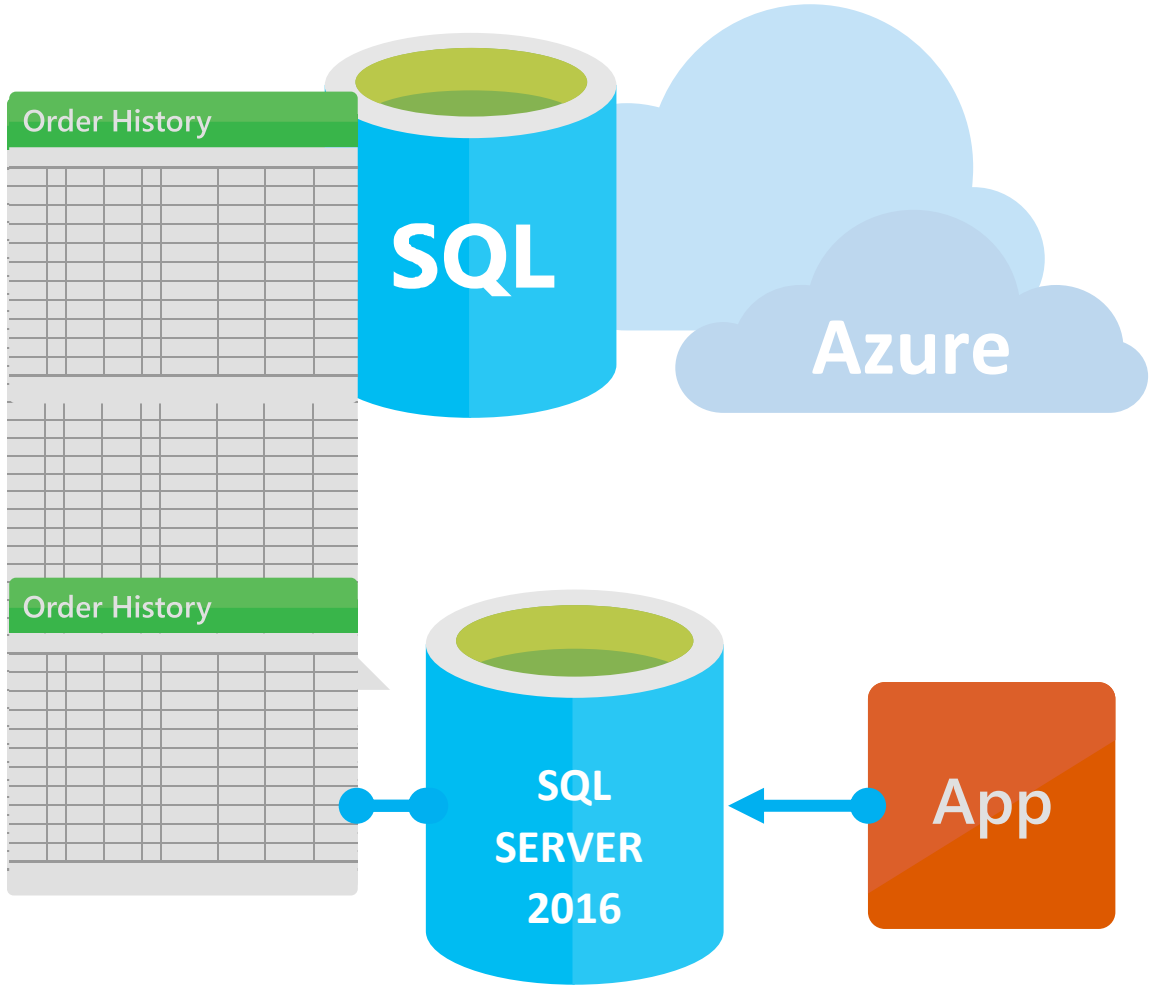
Expand server and storage

Move data elsewhere

Delete

Stretch SQL Server into Azure

Securely stretch cold tables to Azure with remote query processing



Capability

Stretch large operational tables from on-premises to Azure with the ability to query

Benefits

Cost-effective online cold data

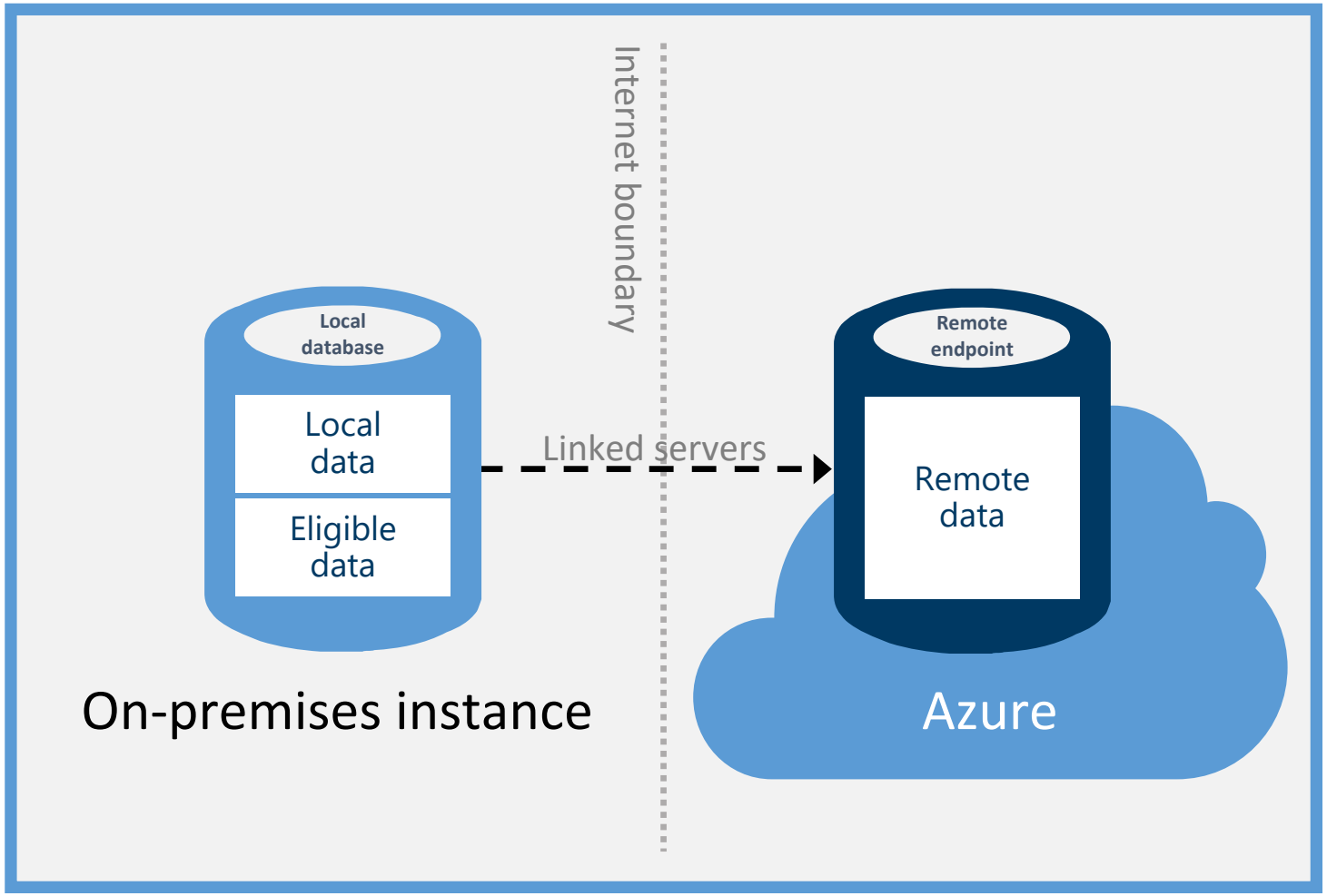
Entire table is online and remains queryable from on-premises apps

No application changes

Support for Always Encrypted and Row-Level Security

Stretching history tables of Temporal Tables a great scenario

Stretch Database architecture



How it works

Creates a secure linked server definition in the on-premises SQL Server

Targets remote endpoint with linked server definition

Provisions remote resources and begins to migrate eligible data, if migration is enabled

Queries against tables run against both local database and remote endpoint

Typical workflow to enable Stretch Database

```
-- Enable local server
EXEC sp_configure 'remote data archive' , '1';
RECONFIGURE;

-- Provide administrator credential to connect to
-- Azure SQL Database
CREATE CREDENTIAL <server_address> WITH
    IDENTITY = <administrator_user_name>,
    SECRET = <administrator_password>

-- Alter database for remote data archive
ALTER DATABASE <database name>
    SET REMOTE_DATA_ARCHIVE = ON (SERVER = server name);
GO

-- Alter table for remote data archive
ALTER TABLE <table name>
    ENABLE REMOTE_DATA_ARCHIVE
    WITH ( MIGRATION_STATE = ON );
GO;
```

High-level steps

Configure local server for remote data archive

Create a credential with administrator permission

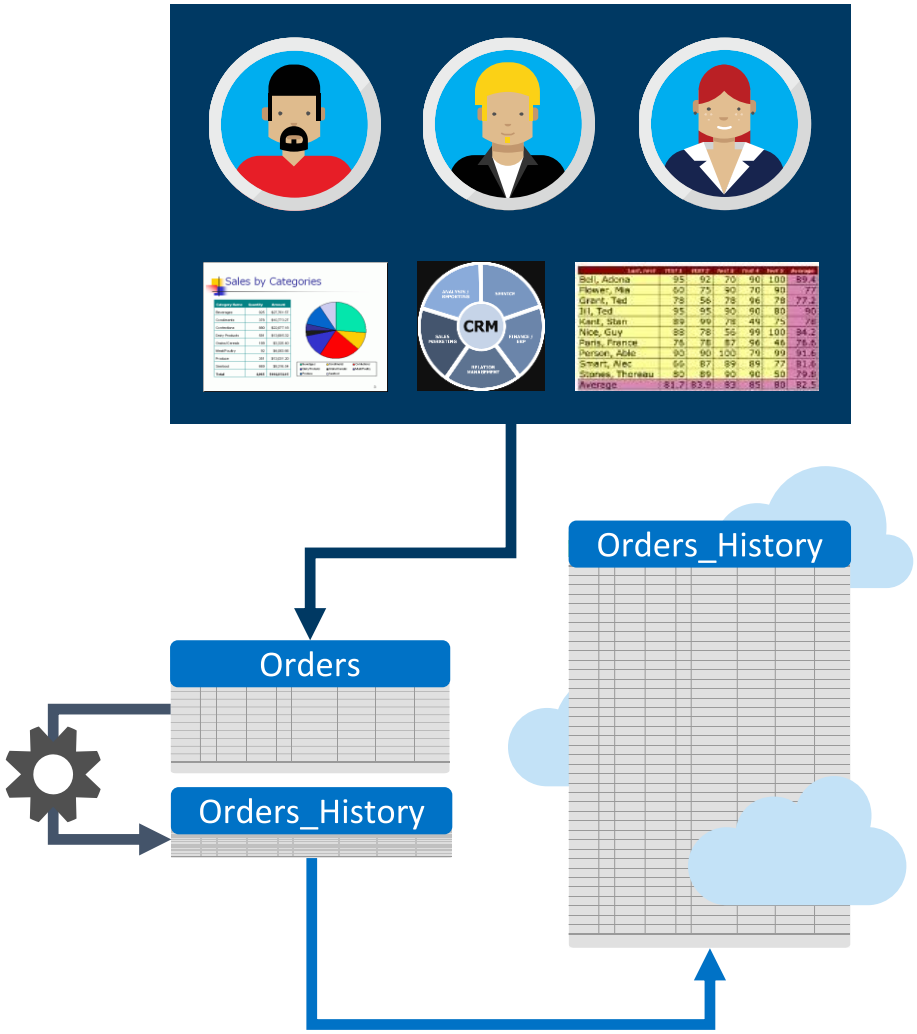
Alter specific database for remote data archive

Create a filter predicate (optional) to select rows to migrate

Alter table to enable Stretch for a table

Stretch Wizard in SQL Server Management Studio makes all this easy (does not currently support creating filter predicates)

Queries continue working

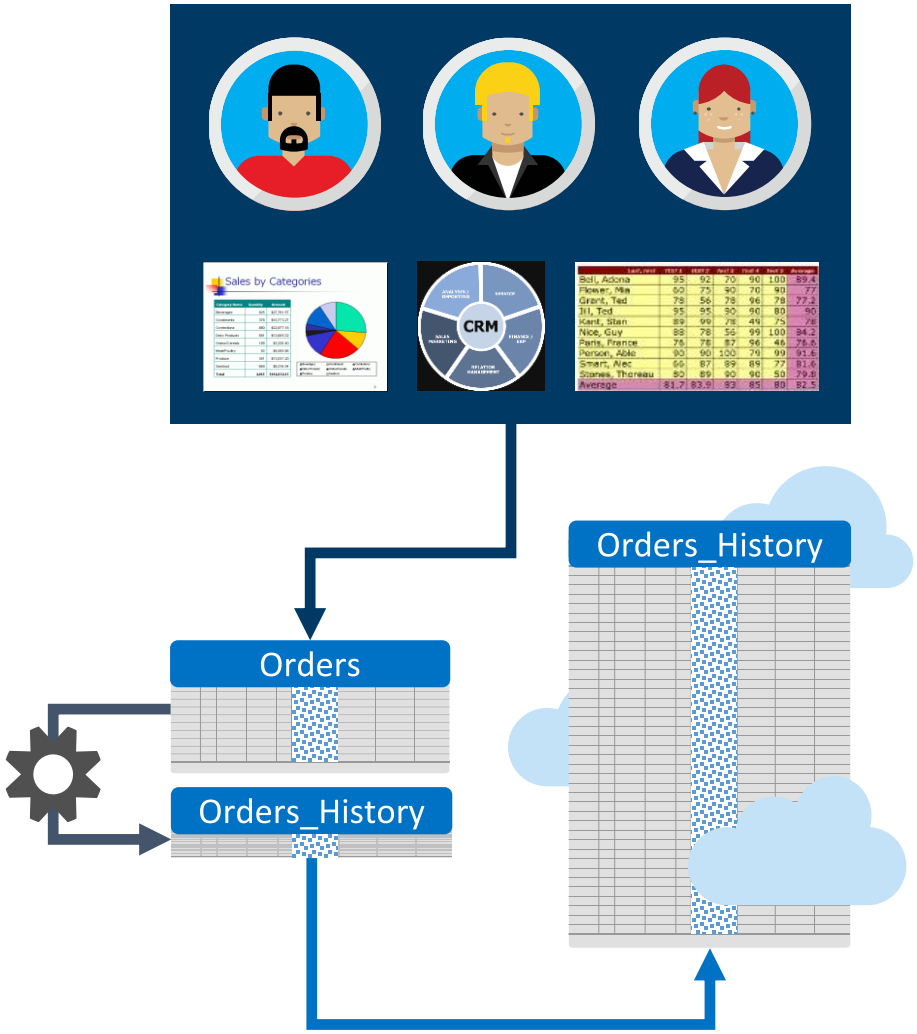


Business applications continue working without disruption

DBA scripts and tools work as before (all controls still held in local SQL Server)

Developers continue building or enhancing applications with existing tools and methods

Advanced security features supported

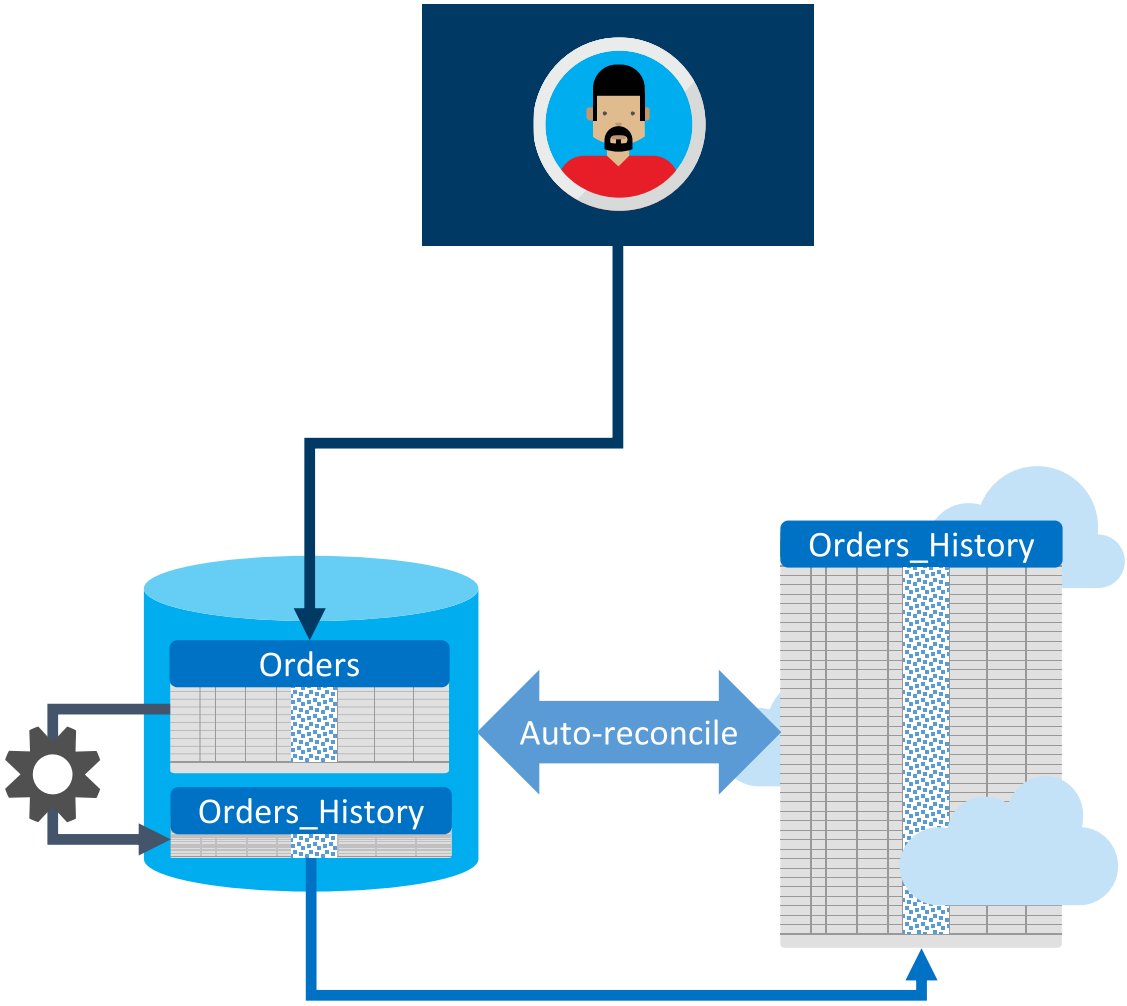


Data in motion always via secure channels (TLS 1.1/1.2)

Always Encrypted supported if enabled by user (encryption key remains on-premises)

Row-Level Security and Auditing supported

Backup and restore benefits



DBAs only back up/restore local SQL Server hot data

StretchDB ensures remote data is transactionally consistent with local

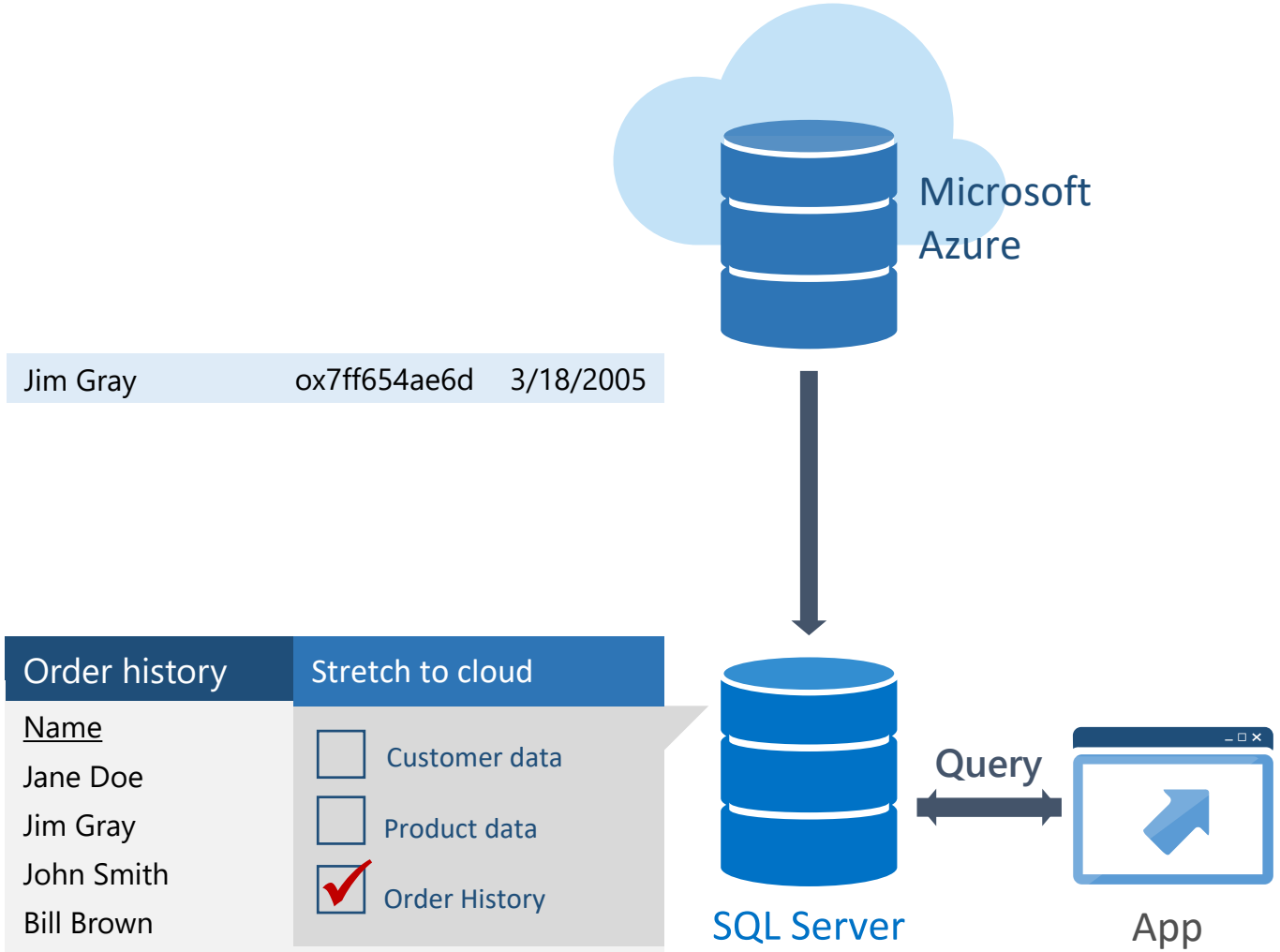
Upon completion of local restore, SQL Server reconciles with remote using metadata operation, not data copy

Time of restore for remote not dependent on size of data

Current limitations that block stretching a table

- Tables with more than 1,023 columns or more than 998 indexes cannot be stretched
- FileTables or FILESTREAM data not supported
- Replicated tables, Memory-optimized tables
- CLR data types (including geometry, geography, hierarchyid and CLR user-defined types)
- Column types (COLUMN_SET, Computed columns)
- Constraints (Default and check constraints)
- Foreign key constraints that reference the table in a parent-child relationship. You can stretch the child table (for example Order_Detail)
- Full text indexes
- XML indexes
- Spatial indexes
- Indexed views that reference the table

Summary: Stretch SQL Server into Azure



Capability

Stretch cold database tables from on-premises SQL Server databases to Azure with remote query processing

Benefits

Cost-effective historical data

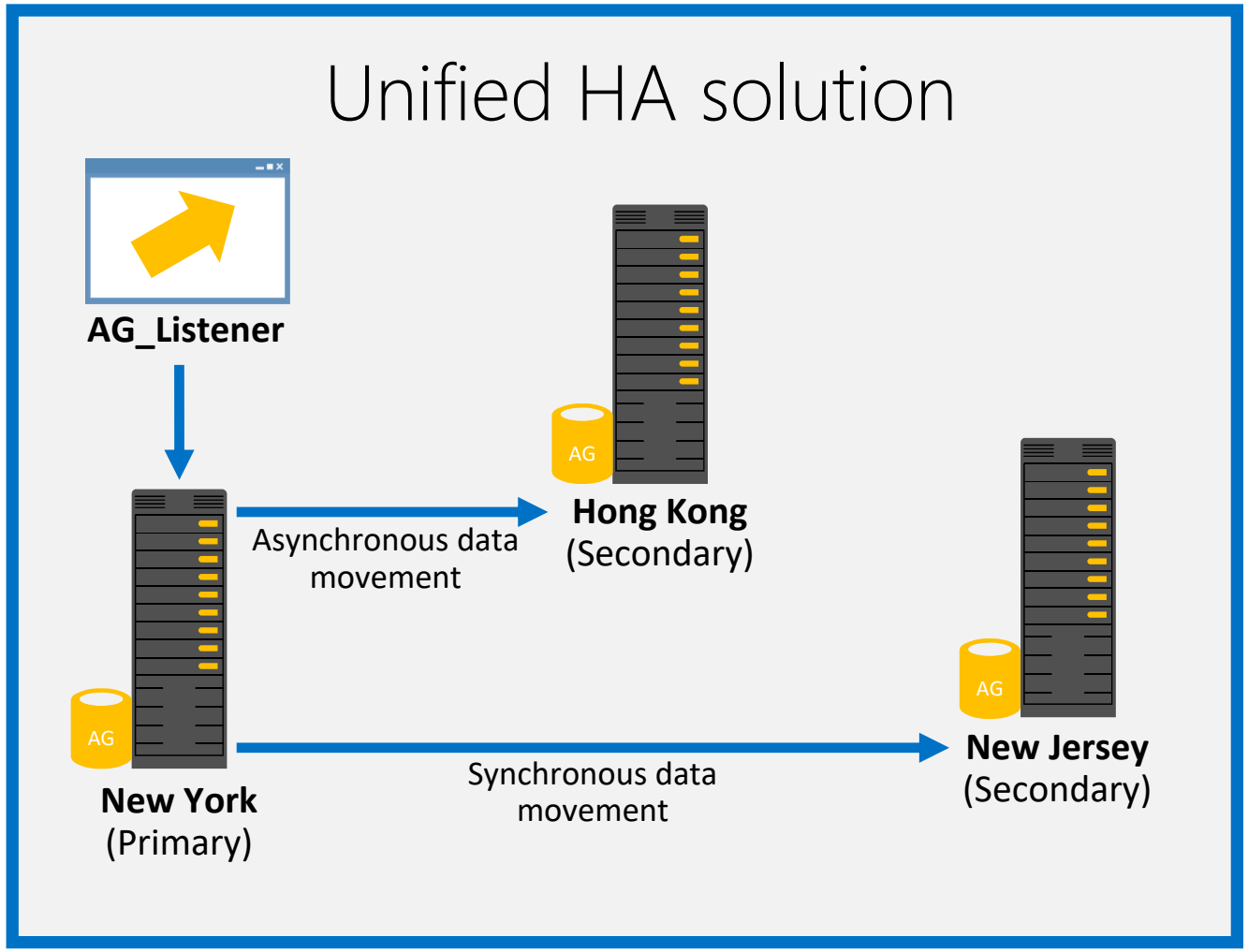
Entire table is online and remains queryable from on-premises apps

Transparent to applications

Support for Always Encrypted and Row-Level Security

High availability

Enhanced Always On Availability Groups



Greater scalability

Load-balancing readable secondaries

Increased number of automatic failover targets

Log transport performance

Improved manageability

DTC support with limitations (see Mission Critical section for details)

Database-level health monitoring

Group Managed Service Account

Domain Independent Availability Groups

Domain Independent Availability Groups

Environments supported:

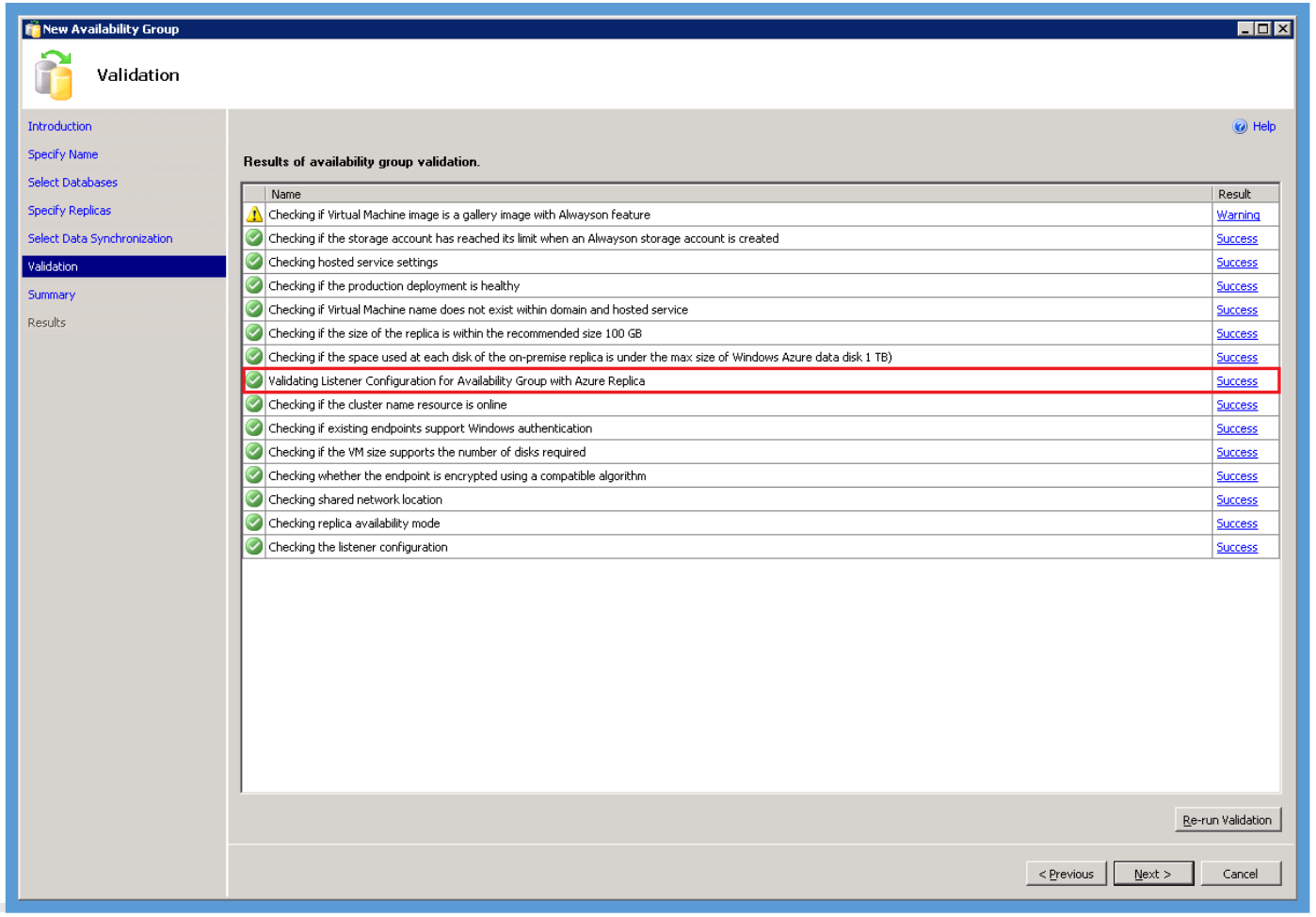
- Cross domains (with trust)
- Cross domains (no trust)
- No domain at all

On-premises databases can use AG with:

- Azure Blob Storage
- Azure VM with SQL Server 2016

Simplified Add Azure Replica Wizard

Automatic listener configuration



Previously listener configuration in Azure was manual

SQL Server 2016

Allows configuring availability group listener in Azure

Clients can connect to Azure replica after failover using listener name

Simplified Add Azure Replica Wizard

Add Azure Replica Wizard adds a replica of your databases to Azure Blob Storage

Group listener is created and configured within the wizard

Clients can seamlessly connect to the Azure replica after failover, as soon as the wizard completes its setup and without additional complex steps

Enhanced backup

Enhanced backup to Azure

Managed backup

Granular control of the backup schedule

Local staging support for faster recovery and resiliency to transient network issues

Support for system databases

Support for simple recovery mode

Backup to Azure block blobs

Cost savings on storage

Significantly improved restore performance

More granular control over Azure Storage

Azure Storage snapshot backup

Fastest method for creating backups and running restores

SQL Server database files on Azure Blob Storage

Managed backup

Support for system databases

Support for databases in simple recovery mode

Leveraging backup to block blobs: more granular control

Allows customized backup schedules: full backup and log backup

Customized scheduling

Step1: Run the Scheduling SP to configure custom scheduling

```
EXEC Managed_Backup.sp_backup_config_schedule
@database_name = 'testDB'
,@scheduling_option= 'Custom'
,@full_backup_freq_type = 'weekly’
,@days_of_week = 'Saturday'
,@backup_begin_time =  '11:00'
,@backup_duration =  '02:00'
,@log_backup_freq =  '00:05'
```

Step2: Run the Basic SP to configure Managed Backup

```
EXEC msdb.managed_backup.sp_backup_config_basic
@database_name= 'testDB',
@enable_backup=1,
@container_url='https://storage account name.blob.core.windows.net/container name',
@retention_days=30
```

Backup to Azure block blobs

2x cheaper storage

Backup striping and faster restore

Maximum backup size is 12 TB+

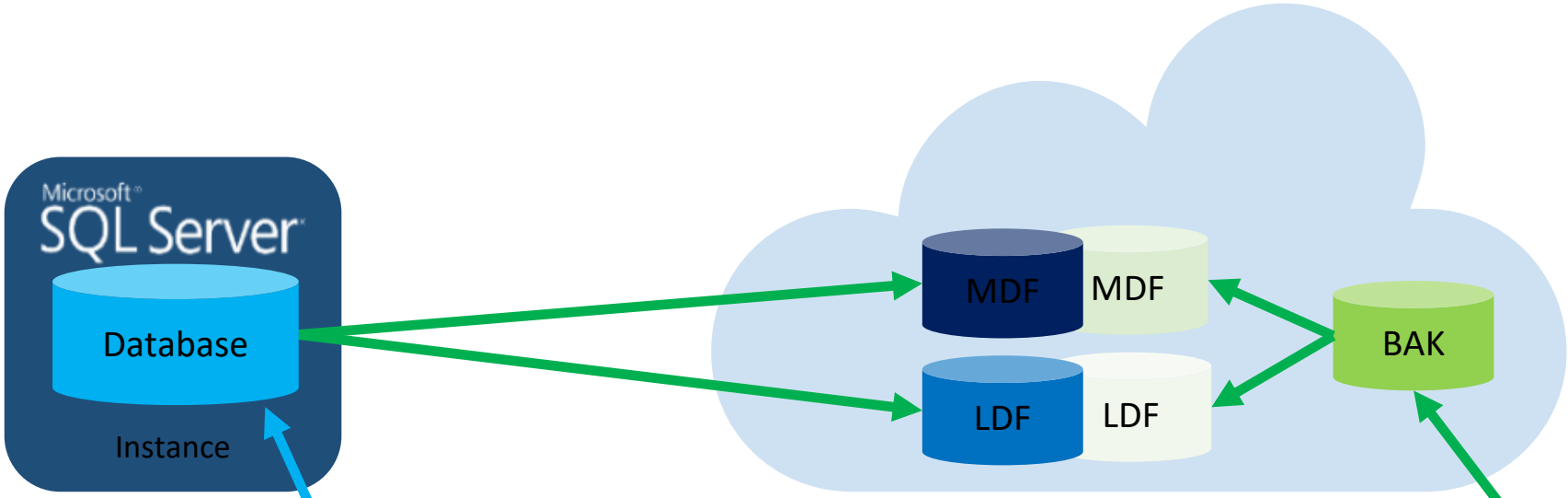
Granular access and unified credential story (SAS URIs)

Support for all existing backup/restore features (except append)

```
CREATE CREDENTIAL [https://<account>.blob.core.windows.net/<container>]
WITH IDENTITY = 'Shared Access Signature',
SECRET = 'sig=mw3K6dpwV%2BWUPj8L4Dq3cyNxCI‘

BACKUP DATABASE database TO
 URL = N'https://<account>.blob.core.windows.net/<container>/<blob1>',
 URL = N'https://<account>.blob.core.windows.net/<container>/<blob2>'
```

Backup to Azure with file snapshots




```
BACKUP DATABASE database TO
  URL = N'https://<account>.blob.core.windows.net/<container>/<backupfileblob1>'
  WITH FILE_SNAPSHOT
```

Backup to Azure with file snapshots

Available to users whose database files are located in Azure Storage

Copies database using a virtual snapshot within Azure Storage

Database data does ***not*** move between storage system and server instance, removing IO bottleneck

Uses only a fraction of the space that a traditional backup would consume

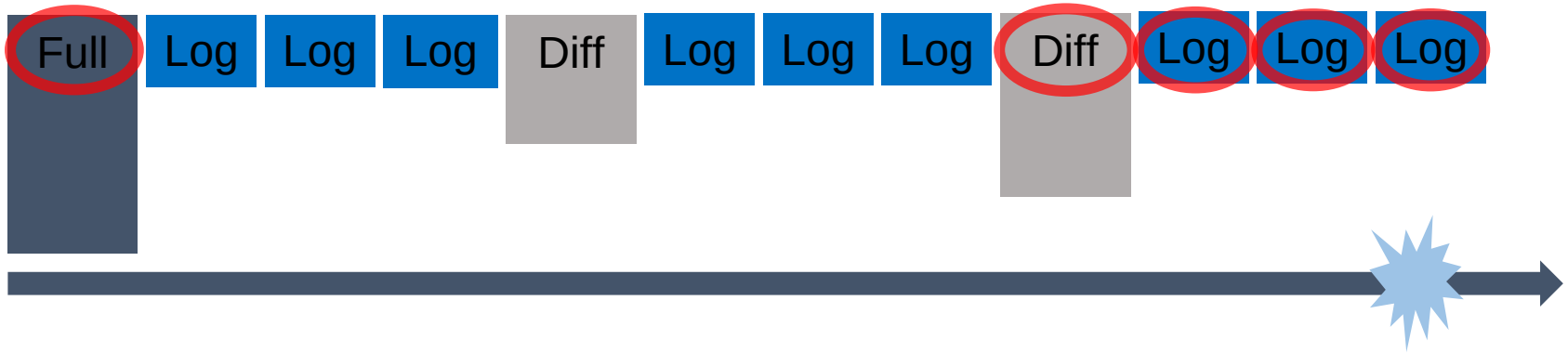
Very fast

Point-in-time restore with file snapshots

Traditional backup

Multiple backup types

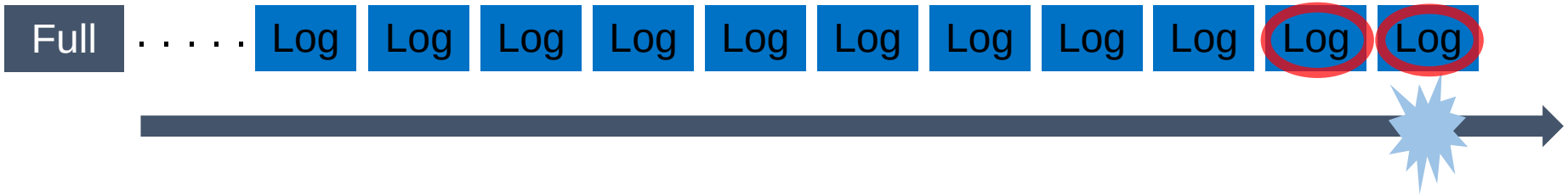
Complex point-in-time restore process



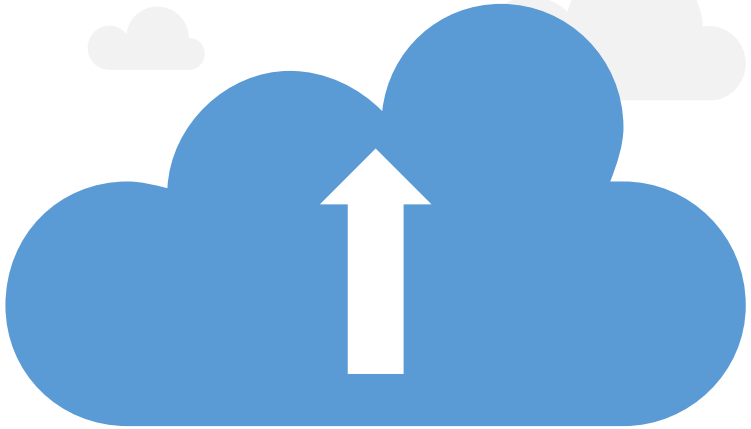
Backup to Azure with file snapshots

Full backup only once

Point-in-time only needs two adjacent backups



Summary: Enhanced backup



Capability

Major backup enhancements in SQL Server 2016:

- Backup to Azure block blob
- Backup to Azure with file snapshots
- Managed backup

Benefits

- Cost savings on storage
- More granular control
- Simple and significant recovery process
- Minimize use of SQL Server resources to accomplish backup

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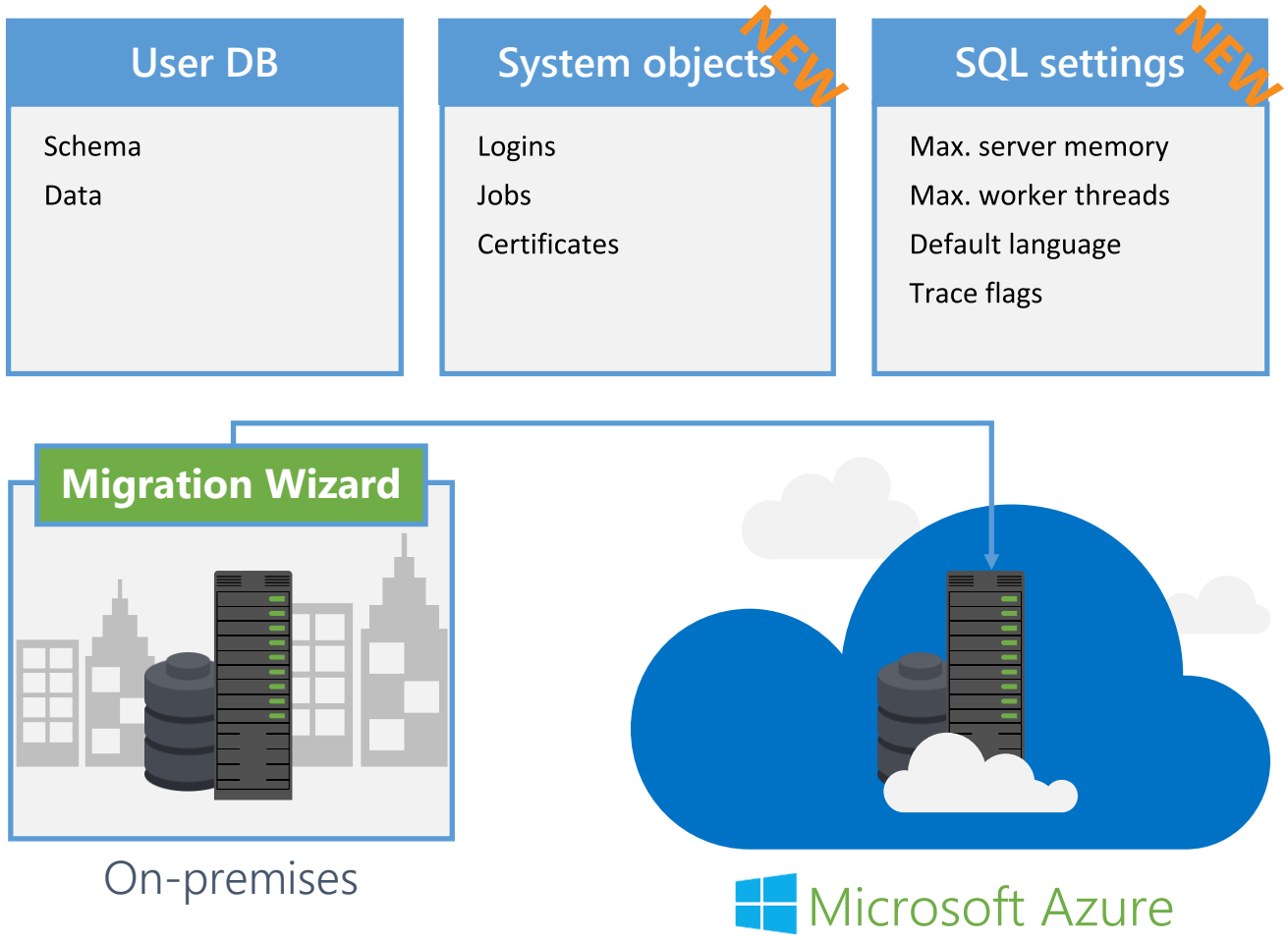
Migrate databases to Azure

Easily migrate to Microsoft Azure

Simple single-click migration experience



Capability

Along with schema and data, migrate other system objects (logins, jobs, and certificates)

Migrate SQL Server settings (trace flags, default language, and memory settings)

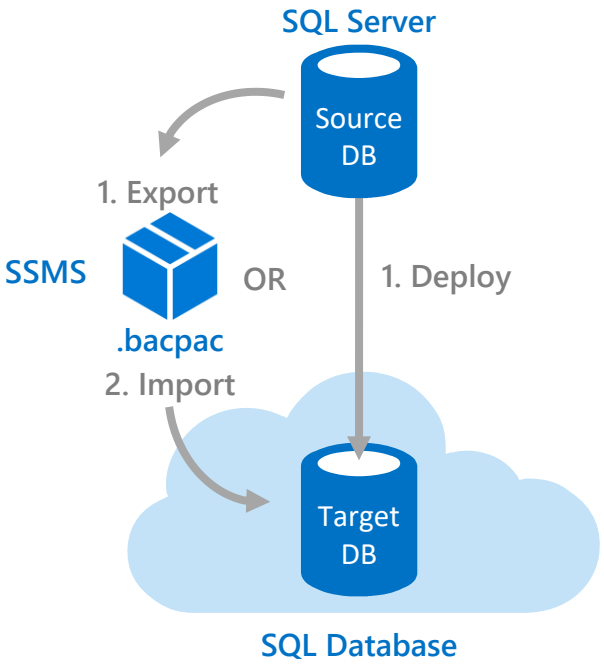
Benefits

Provide recommendations for image size and virtual machine size

Literally as simple as point and click

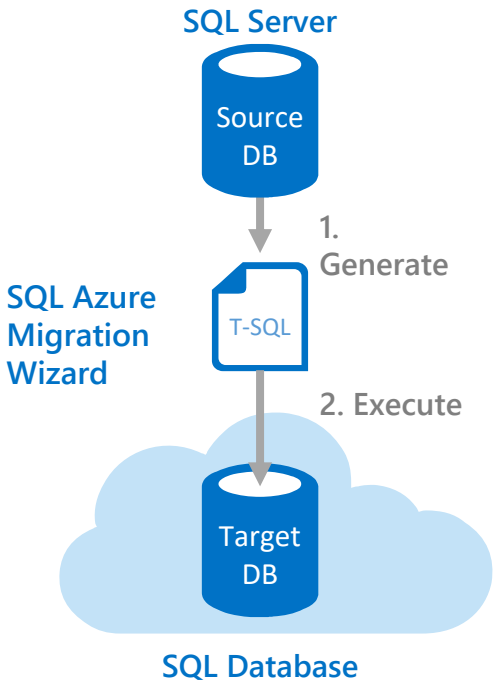
Migration methodologies

Method 1



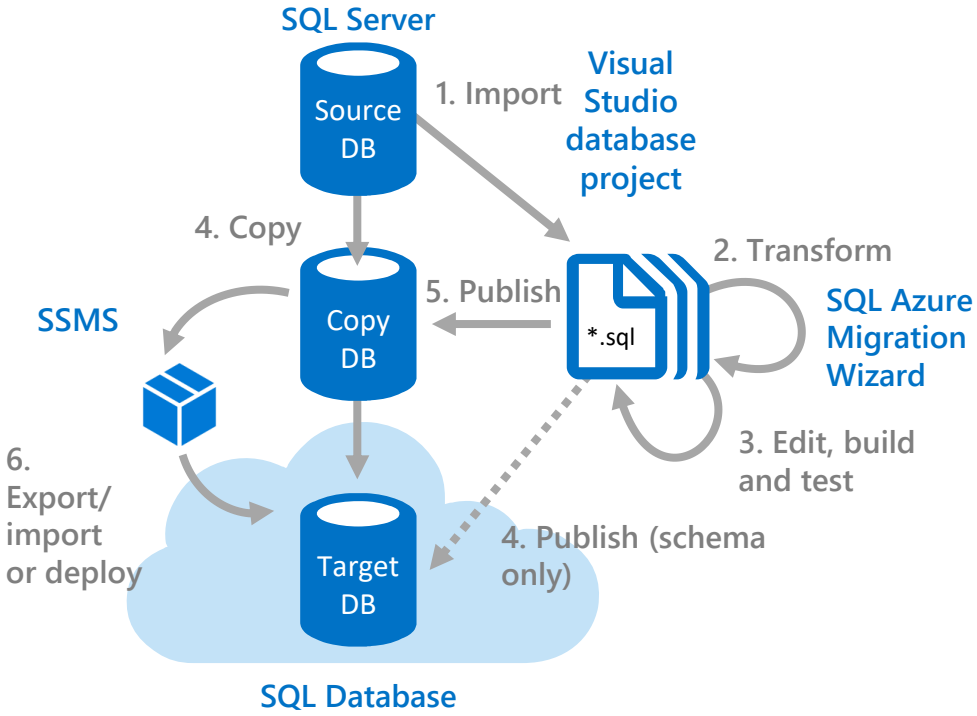
Migrate a compatible database using SSMS

Method 2



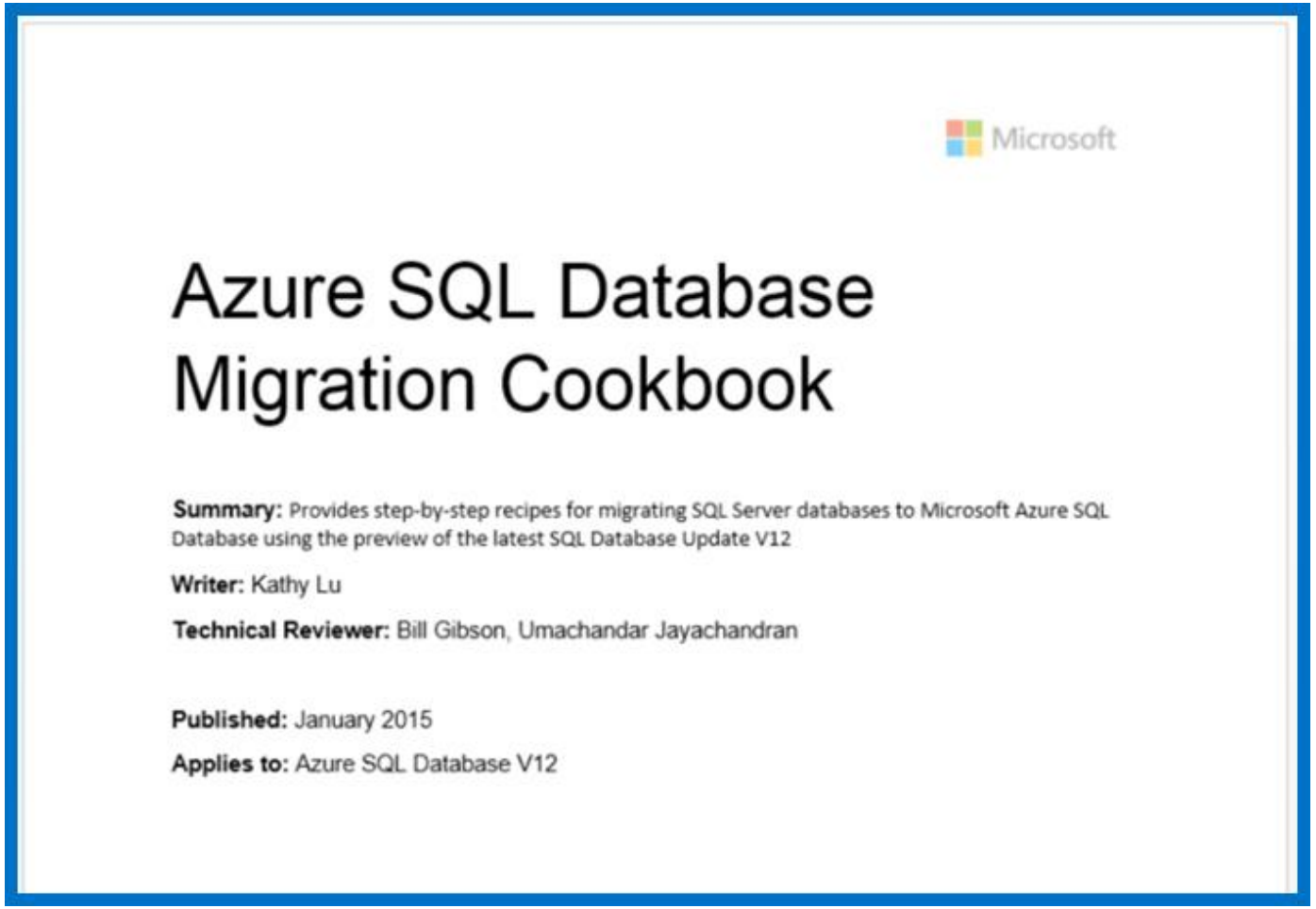
Migrate a near-compatible database using SAMW

Method 3



Update database schema offline using Visual Studio and SAMW, and then deploy it with SSMS

Migration Cookbook



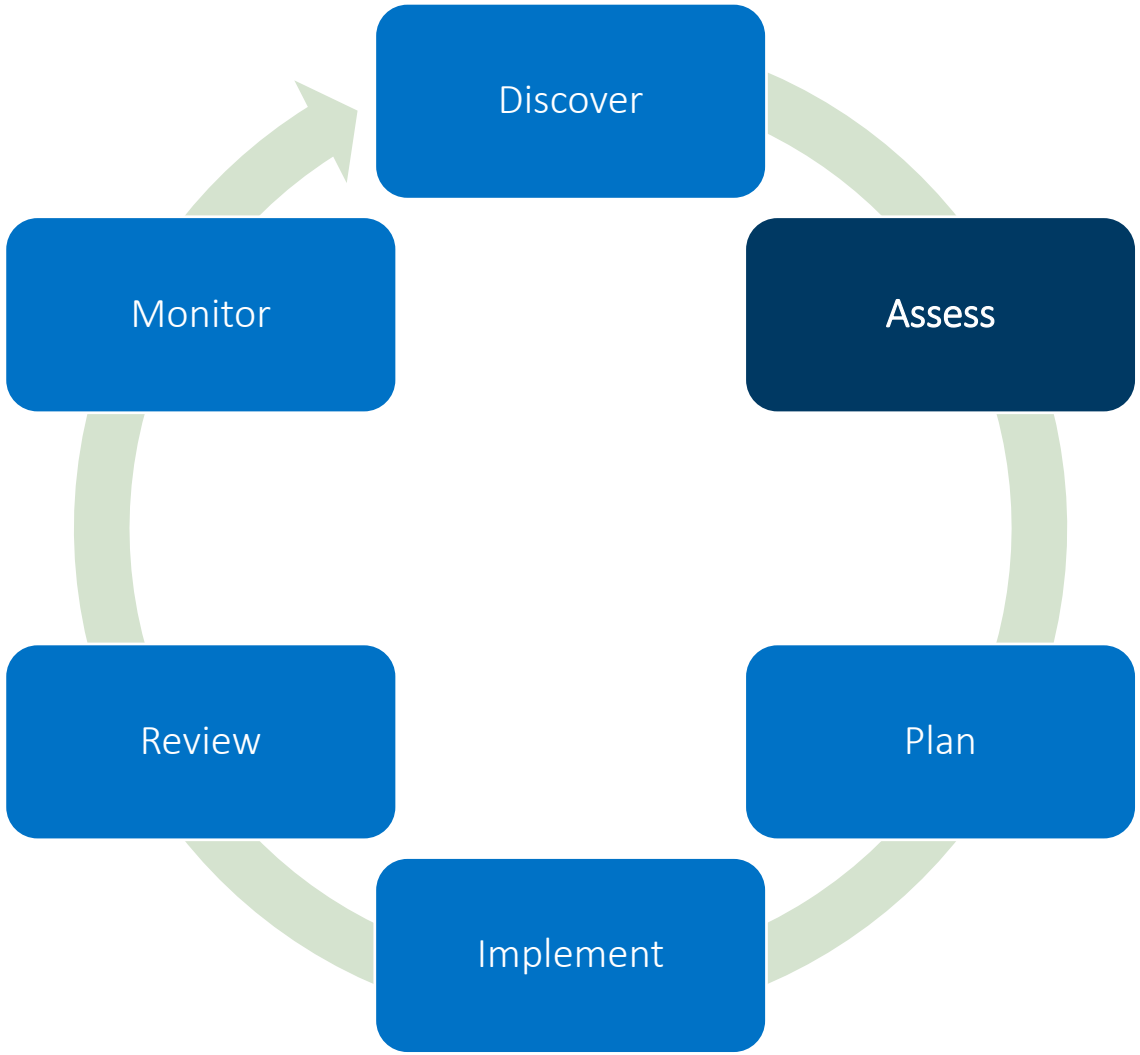
Migrate an on-premises SQL Server database to SQL Database (v12)

The Migration Cookbook describes various approaches to migrate an on-premises SQL Server database to the latest SQL Database update (v12)

Download: http://aka.ms/azuresqlmigration

Suite of advisors for upgrading

Upgrade workflow today



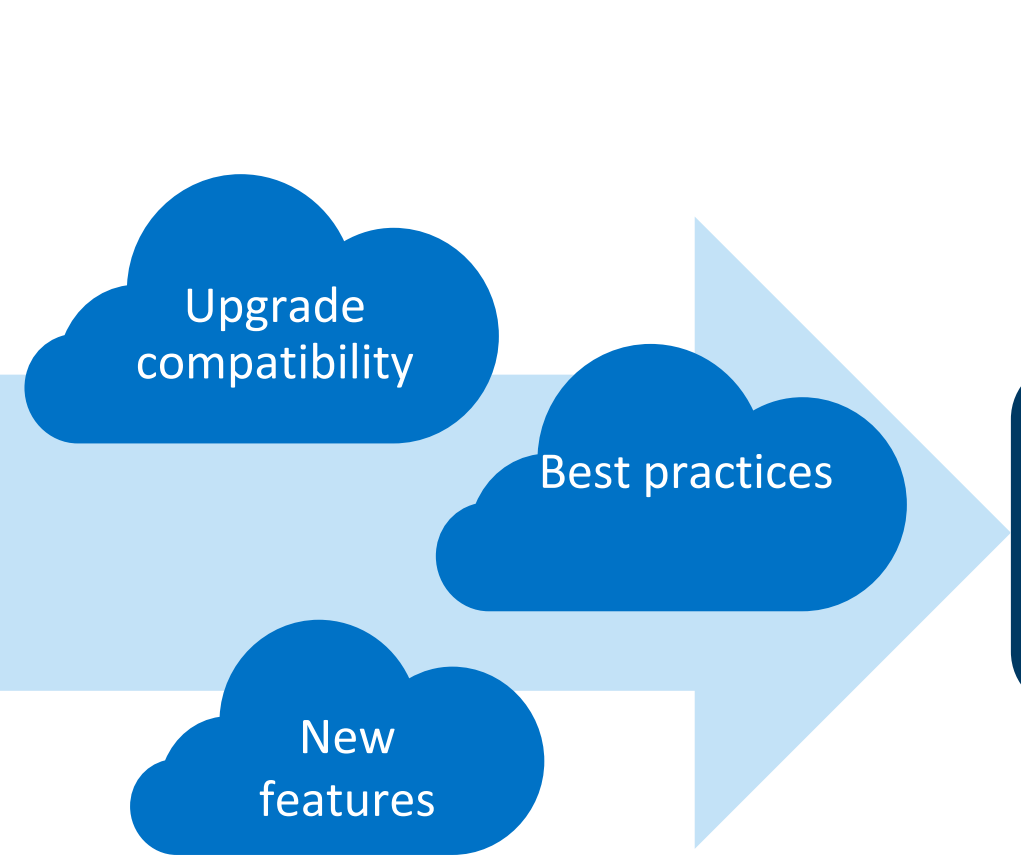
Upgrade is a complicated process with many considerations

Most upgrades are actually “migration projects”

Wave of SQL 2005 upgrades coming

Upgrade Advisor focused on the “assess” phase: find functional blockers

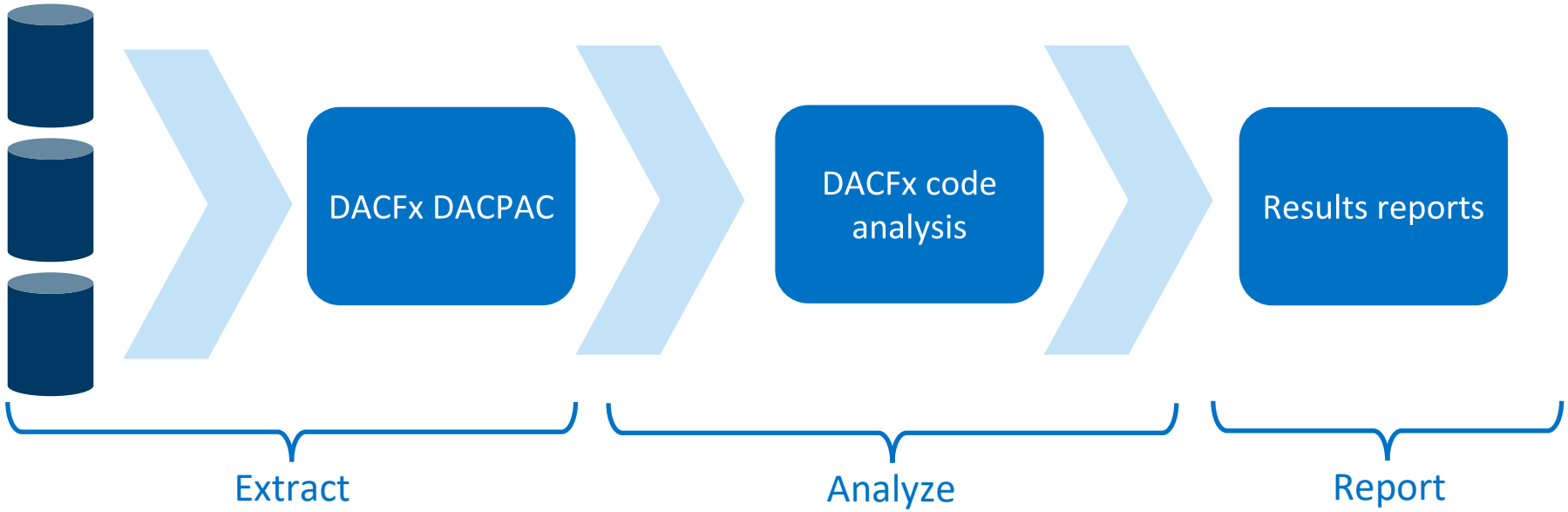
Suite of advisors



SQL Server 2016 Upgrade Advisor

- Modern, scenario-driven user experience
- Suite of advisors
- Rules built on DACFx
- Modern telemetry and feedback pipeline
- Designed to move to a community project
- Upgrade Advisor and Stretch Database initial scenarios
- Independent install via WebPI or download center
- Auto-update notifications

Upgrade Advisor Analysis Wizard



Built on DACFx as a standard runtime

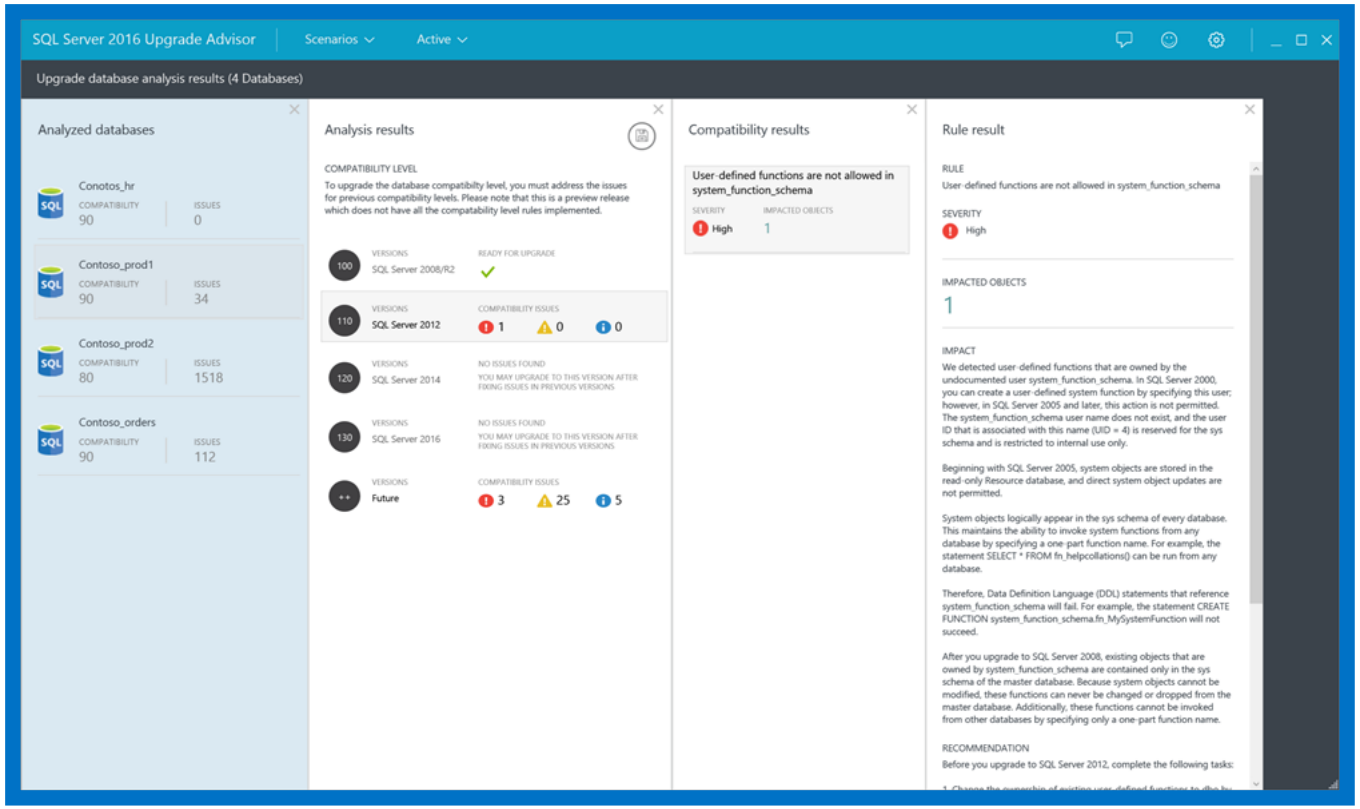
Cataloged and ported rules from all known tools

Designed to have community-written rules

Support for SQL Server 2005 (compat level 80)

HTML and CSV reports

Advisor for upgrade issues and recommendations



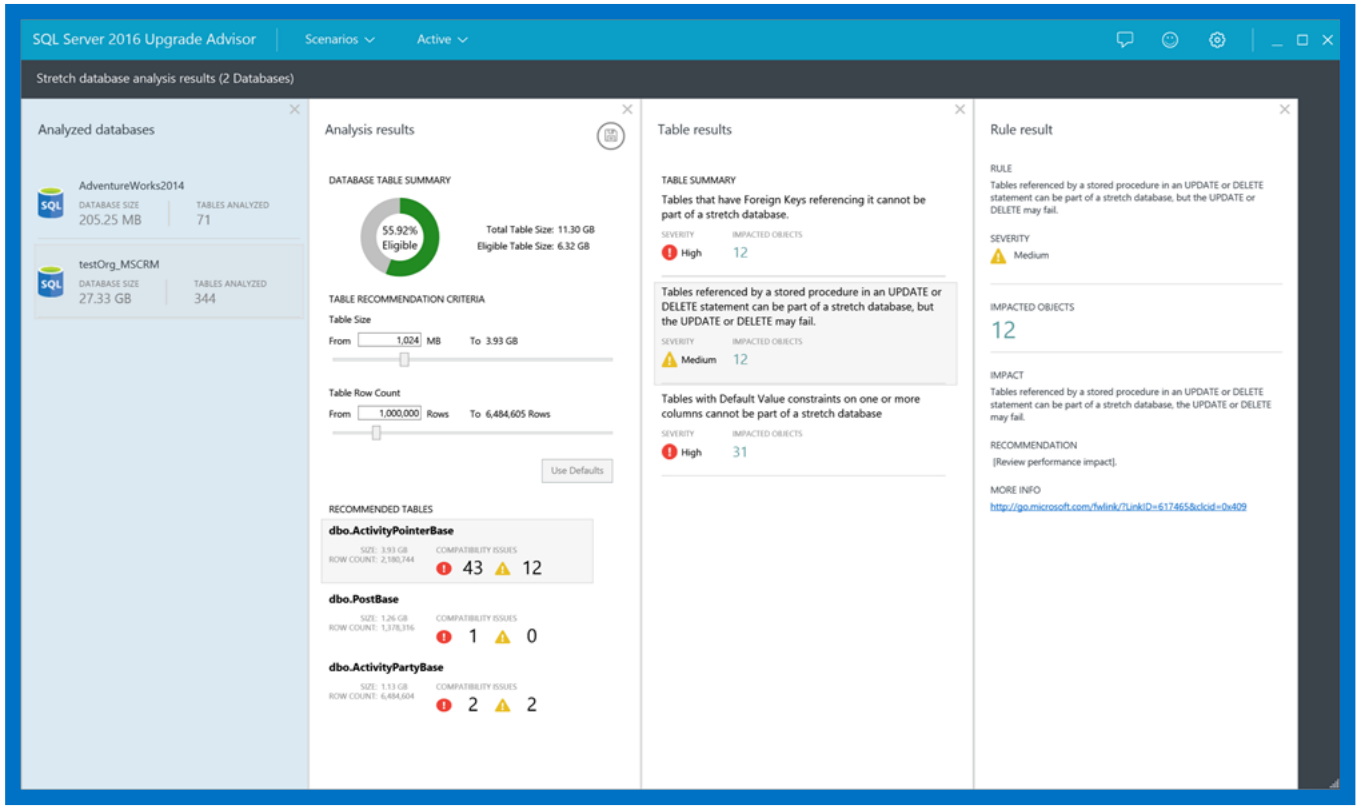
Analyzes instance for potential upgrade issues:
Pre-upgrade issues
Pre-upgrade recommendations
Post-upgrade considerations

Delivers feature advisors

First scenario is Stretch Database Advisor

Download: https://www.microsoft.com/enus/download/details.aspx?id=48119

Guidance and customer feedback



New engine for defining guidance rules

Self-contained HTML results as well as CSV

Smaller, more frequent releases

New delivery methods

Built-in auto-update notifications

Customer feedback

Modern telemetry pipeline

Built-in feedback feature

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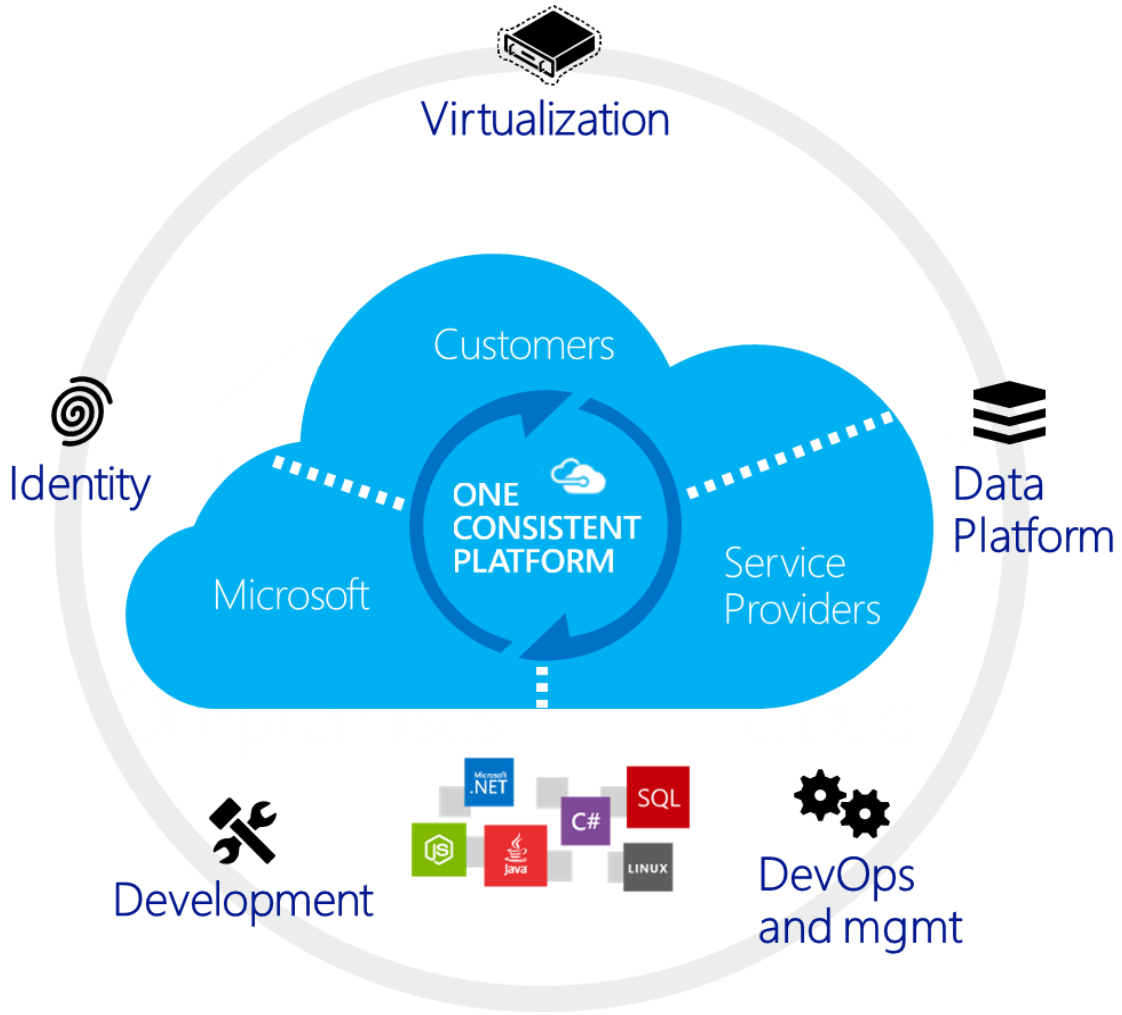


Consistent and integrated platform

Virtualization

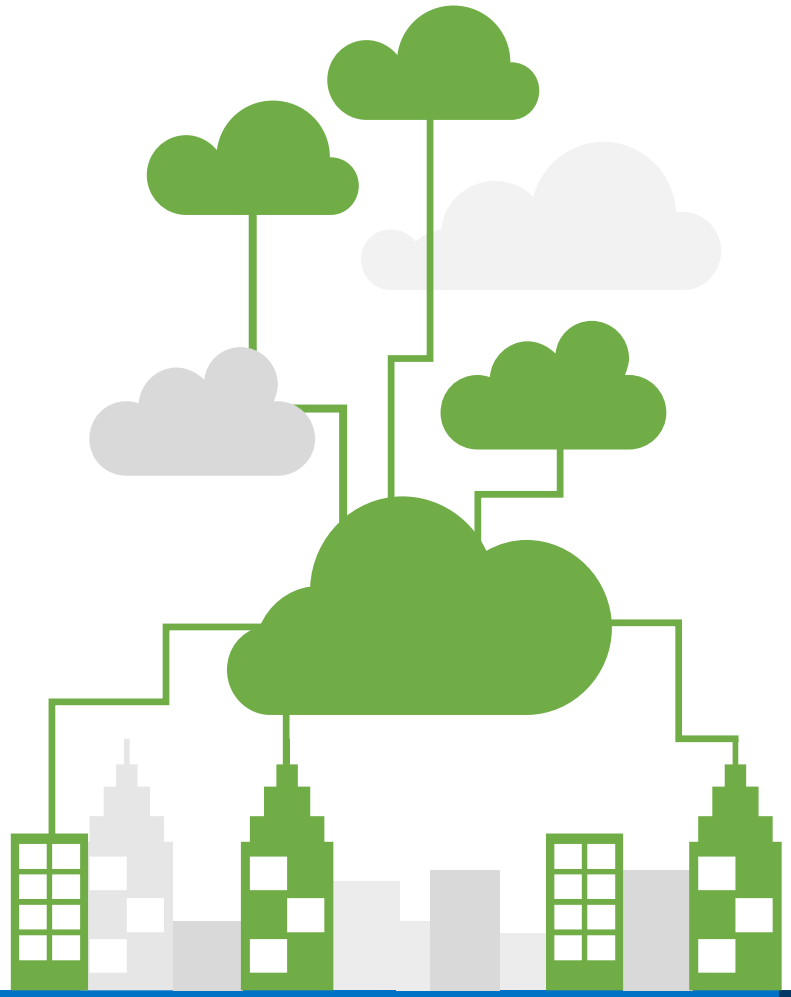
Complete data platform

Unified management and DevOps

Flexible development paradigm

Common identity

Consistent tools



Consistency across:

On-premises, private cloud, public cloud

SQL Server local, VM, SQL Database

Scalability, availability, security, identity, backup and restore, and replication

Plethora of data sources

Reporting, integration, processing, and analytics

All supports hybrid cloud

Microsoft