SQL Server 2019

Quick highlights

SQL Server End of Support

SQL Server 2008 and 2008 R2 will no longer be supported starting on **July 9, 2019**.

	Current support level	End mainstream	End extended
SQL Server 2014	Currently supporting all versions	July 9, 2019	July 9, 2024
SQL Server 2012	SQL Server 2012 SP2+ is in mainstream support until CY 2017	July 11, 2017	July 12, 2022
⚠ **SQL Server 2008 and SQL Server 2008 R2**	SQL Server 2008 and 2008 R2 are in extended support which includes security updates, paid support, and requires purchasing non-security hotfix support	**July 8, 2014**	**July 9, 2019**
⚠ **SQL Server 2005**	SQL Server 2005 support ended on April 12, 2016	**April 12, 2011**	**April 12, 2016**

Learn more about the SQL Server support lifecycle: support.microsoft.com/lifecycle/

It’s built on a strong foundation

Major capabilities of SQL Server 2016 and 2017

Intelligent performance

Query Store

Adaptive Query Processing

Automatic Tuning

Columnstore and In-Memory OLTP

“It Just Runs Faster”

Layers of security

Always Encrypted

Row Level Security

Dynamic Data Masking

Mission critical availability

Clusterless Availability Groups

Distributed Transactions for Availability Groups

Resumable Index Maintenance

Developer experience

JSON

Temporal Tables

Graph Database

Modern platform

Linux and Containers

Machine Learning Services with R and Python

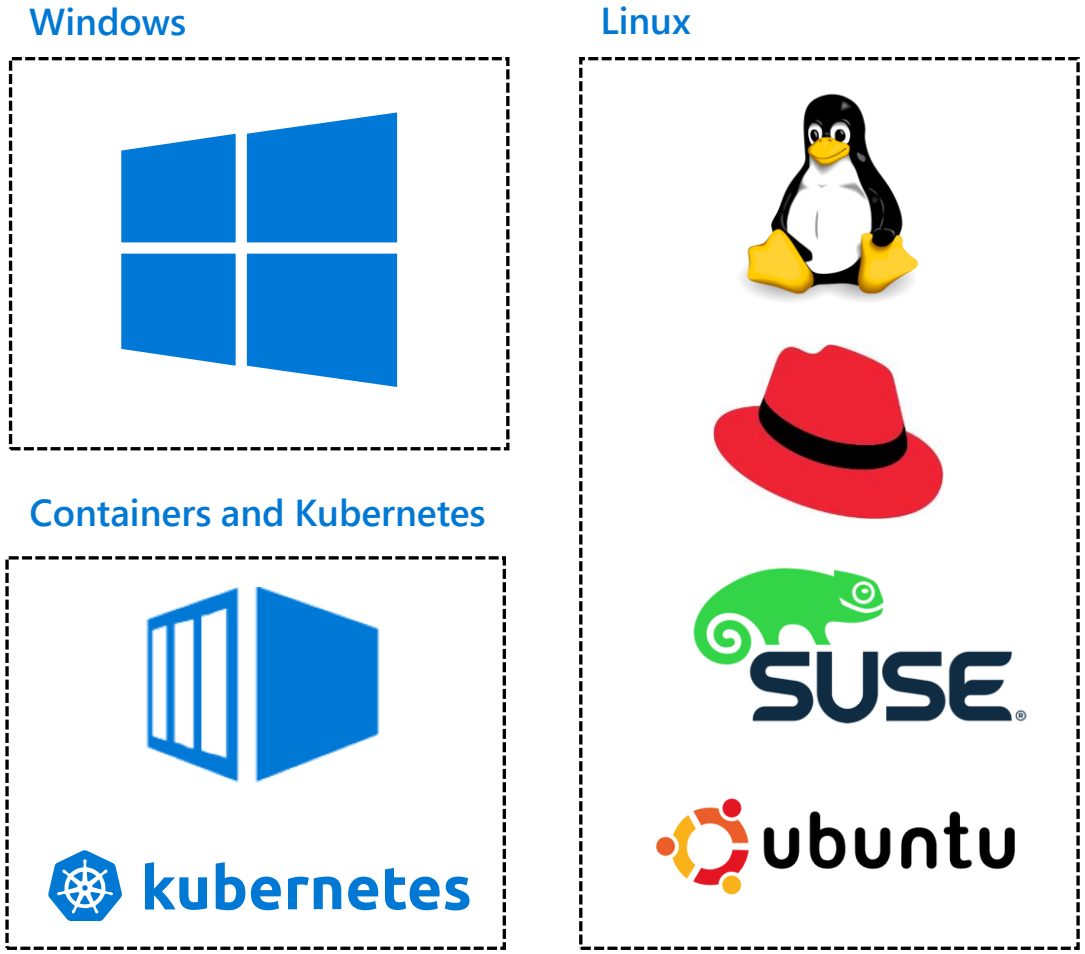
Platform of choice with compatibility

New capabilities for Linux

- Replication
- Change Data Capture
- Distributed transactions
- Machine Learning
- Polybase
- Tempdb files auto-config

Containers

- Microsoft Container Registry
- Red Hat Images
- Non-root Containers



dv01

Fintech company swiftly migrated workloads to SQL Server on Linux with minimal downtime and no performance issues

Tempdb Just Runs Faster

The problem(s)

High multi-user rates of tempdb usage can lead to latency due to….

allocation page latch waits – Multiple users needing to allocate pages for temp tables

system table page latch waits – High rates of create/drop require system table modifications

The Solution

- Create multiple files to partition allocation pages
- SQL Server 2016+ creates multiple tempdb files during setup
- Start with 8 and add by 4 until concurrency alleviated
- But…what about system tables?

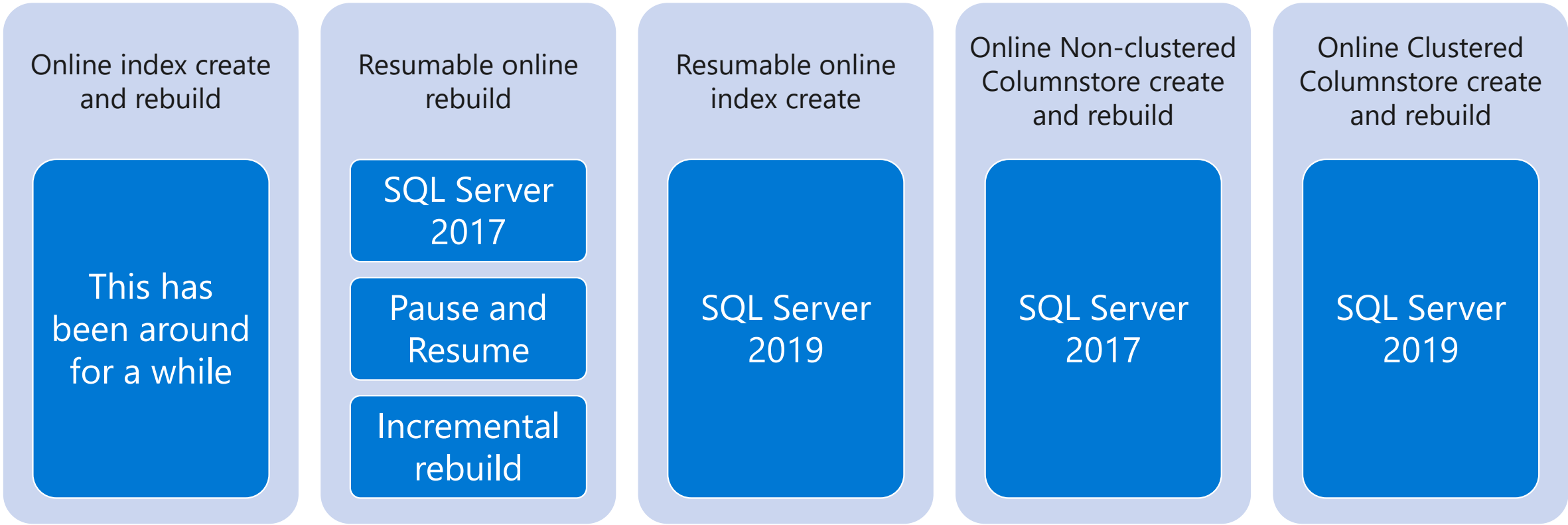
The SQL 2019 Solution

- Key tempdb system tables become SCHEMA_ONLY memory optimized tables
- Latch and lock free
- Turn on with ALTER SERVER CONFIGURATION
- This is NOT user data just metadata so memory requirements small

Using Online Indexing in SQL Server 2019

The problem

Index maintenance causes concurrency problems and application downtime



Gain performance without changing the application

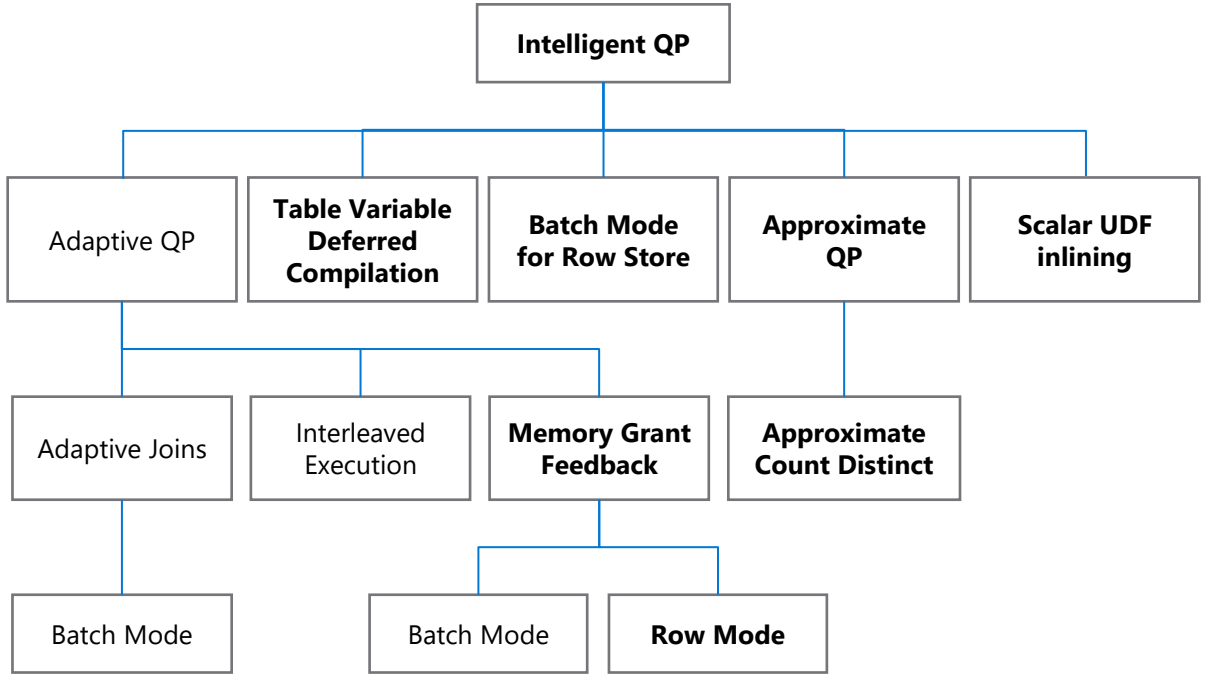
Intelligent Query Processing

Sequential Key Insert Performance

In-Memory technologies

- Hybrid Buffer Pool
- Persistent Memory Support
- Memory-Optimized TempDB Metadata

The Intelligent Query Processing feature family



Bold indicates new and improved features in SQL Server 2019

Accelerated Database Recovery

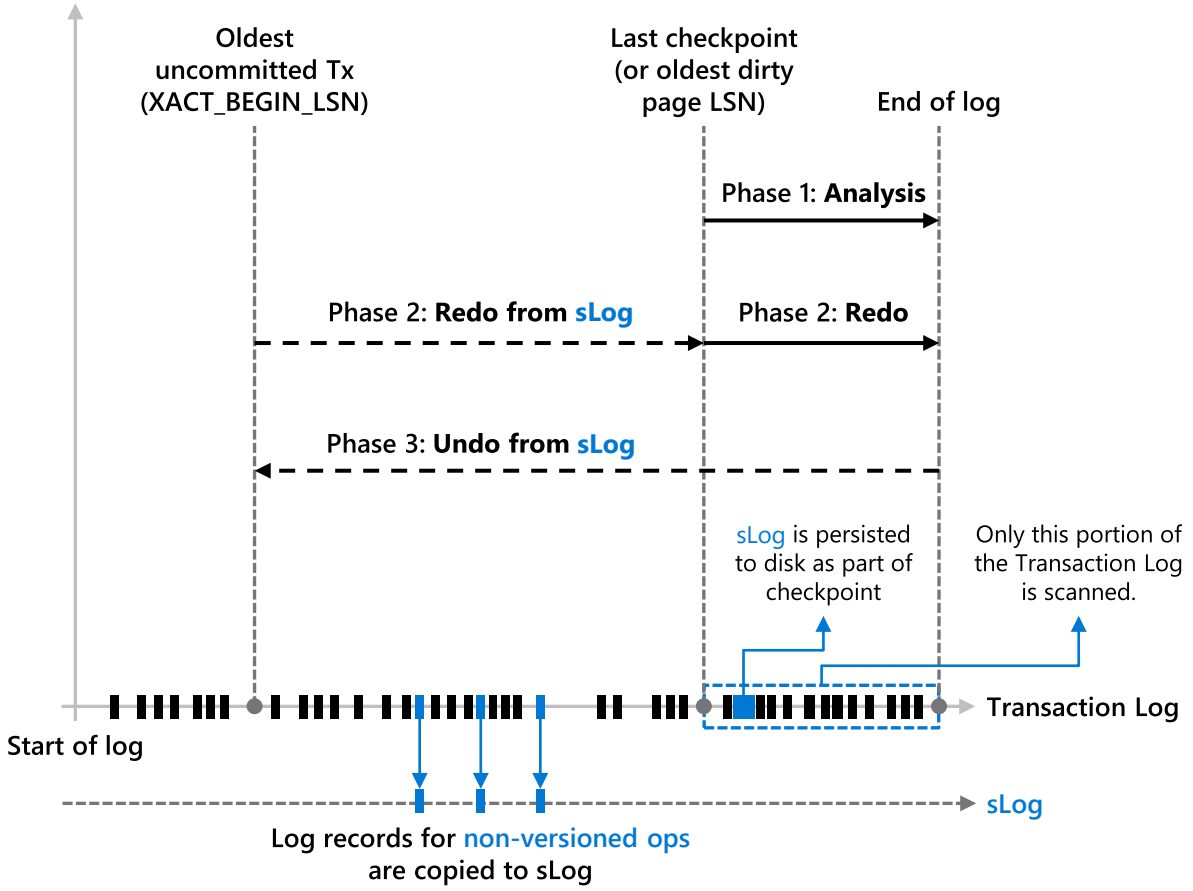
Challenge

- Log Grows out of Control
- Long rollback blocks applications
- Long Recovery prolongs downtime
- Index operations resource intensive

Solution

- Accelerated Database Recovery (ADR)
- Online Index enhancements
- Availability group enhancements

The New Recovery Process with ADR



Bank achieves high availability of mission critical data thanks to Accelerated Database Recovery

Voice of the customer

User experience

- #1 voted customer feedback item: String Truncation
- MAXDOP and Memory Config during Setup
- Memory Grant Percent in Resource Governor
- Estimate compression for Columnstore indexes

Diagnostics

- Troubleshoot page waits with new built-in T-SQL
- Diagnostics for auto stats blocking
- Custom capture policy for the Query Store
- Columnstore stats in DBCC CLONEDATABASE

Performance

- Reduce recompiles for tempdb workloads
- Indirect Checkpoint Scalability
- Concurrent PFS updates
- Worker stealing
- Inline log writing

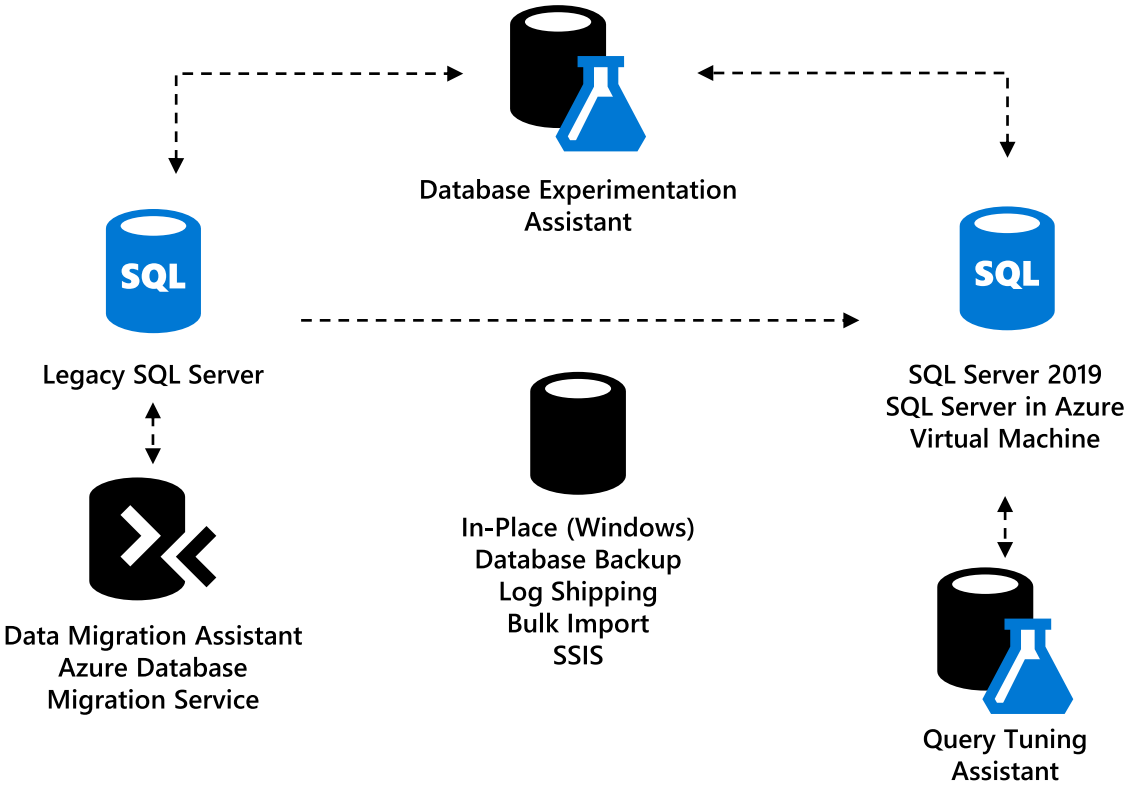
```
String or binary data would be truncated
```

```
String or binary data would be truncated
in table '%.*ls', column '%.*ls'.
Truncated value: '%.*ls'
```

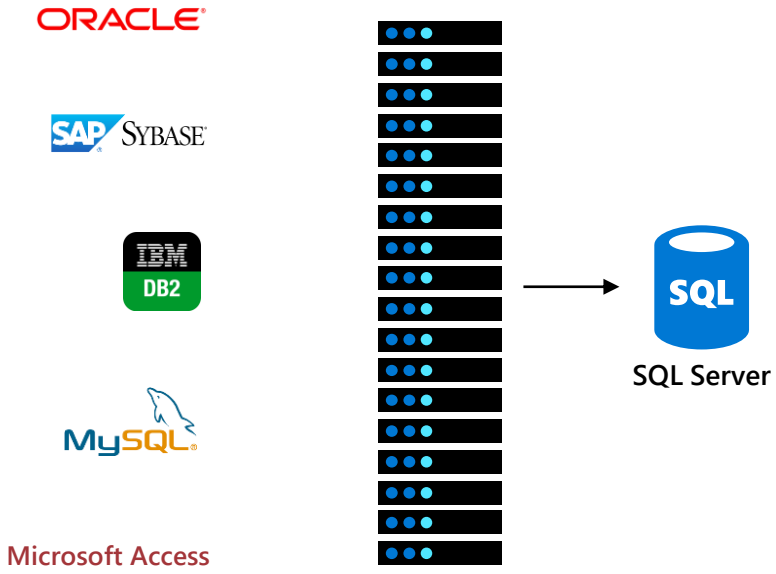
```
SELECT page_info.*
FROM sys.dm_exec_requests AS d
   CROSS APPLY
   sys.fn_PageResCracker(d.page_resource) AS r
   CROSS APPLY sys.dm_db_page_info(r.db_id,
   r.file_id, r.page_id,'DETAILED')
      AS page_info;
```

Migrate to the modern SQL Server

Migration from legacy SQL Server



Migration from external databases

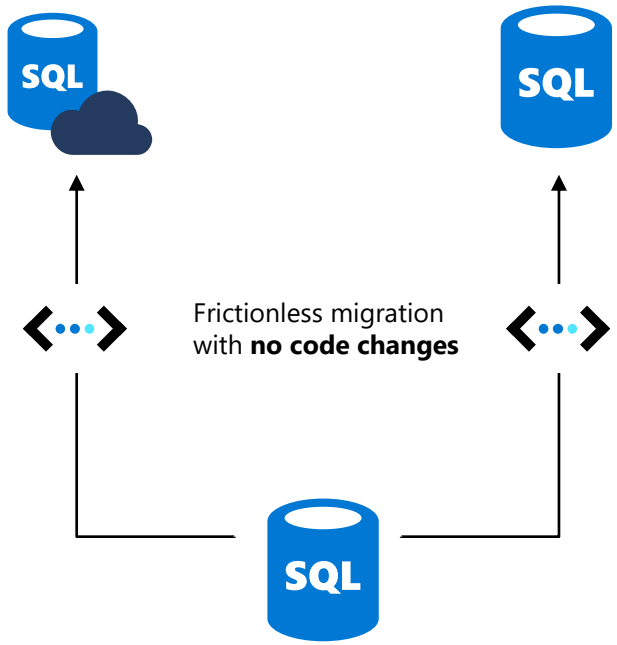


SQL Server Migration Assistant (SSMA)

Certify once with Compatibility Certification

Upgrade & modernize your SQL Server database on-premises, in the cloud and on the edge with Compatibility Certification that eliminates risks of application compatibility

Upgrade to the latest SQL Server Database Engine without changing your critical applications



Compatibility Certification benefits

Unified application certification

Applications tested and certified on a given SQL Server version are also implicitly tested and certified on that SQL Server version native database compatibility level

Reduce upgrade risks

Separate application and platform layer upgrade cycles for less disruption

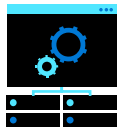
Microsoft fully supports Compatibility Certification

Upgrade to latest SQL Database Engine version

Upgrade your SQL Server Database Engine or move instances to the cloud with no code changes

SQL Server 2019 Editions

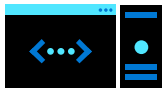
Build once and deploy across any SQL Server edition without changing your app



Express/web
Free, entry-level database for small web and mobile apps

Feature highlights

- Up to 16 cores of CPU
- Up to 64 GBs of memory
- Encryption with secure enclaves NEW
- UTF-8 character encoding NEW
- Data classification and auditing NEW
- In-memory OLTP and Columnstore
- Full T-SQL surface area
- Support for Linux containers



Standard
Full featured database with Big Data Clusters for mid-tier applications and data marts

Feature highlights

- Up to 24 cores of CPU
- Up to 128 GBs of memory
- SQL Server 2019 Big Data Clusters NEW
- Data virtualization through PolyBase NEW
- Accelerated Database Recovery NEW
- **Transparent Data Encryption** NEW
- Enhanced in-memory performance
- Automatic intelligent database tuning

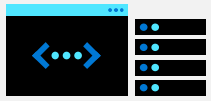
+ Express/web features

Enterprise
Mission-critical performance and intelligence for tier 1 databases

Feature highlights

- Unlimited cores of CPU
- Unlimited memory
- Industry-leading performance with unmatched scalability
- Unlimited virtualization benefits
- Petabyte scale data warehousing
- Business critical HA on Windows and Linux
- Access to Power BI Report Server

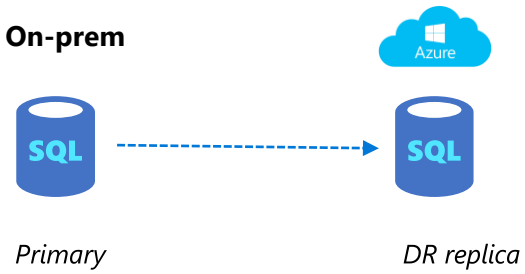
+ Standard features
+ Express/web features



Developer
Free to use with all the features of Enterprise Edition specifically for dev/test in non-production environments

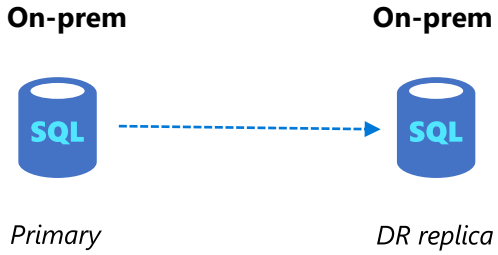
New SA Benefits

Free Hybrid DR on Azure



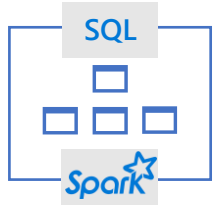
One async replica for each primary SQL Server Instance on-prem for backup in Azure

Reduced DR costs on-prem



Simplified licensing with an async passive replica for DR in addition to existing passive replica for HA

SA entitlement for free Big Data Node cores



For each core of SQL Server license used in the BDC master node, SA customers get free big data node cores:

- 8 free big data node core for each SQL Server EE core in master node
- 1 free big data node core for each SQL Server SE core in master node

https://aka.ms/tigertoolbox

Modernizing SQL Server The Right Way

https://aka.ms/sqlworkshops

Check_MK SQL Server

Notes

Microsoft SQL Server plugin

- General overview - Database Monitoring with Checkmk
- Relies on Windows agent - https://docs.checkmk.com/latest/en/agent_windows.html
- Github location - checkmk/agents/windows/plugins at master · tribe29/checkmk (github.com)
  - mssql.vbs
  - The current implementation of the check uses the "trusted authentication“ where no user/password needs to be created in the MSSQL server instance by default. It is only needed to grant the user as which the Check_MK windows agent service is running access to the MSSQL database.
  - When credentials are needed: mssql.ini file in MK_CONFDIR

Notes

- SQL Server is recognized as version - mssql_instance: add MSSQL 2019 to known instances (checkmk.com)
- Looks actively maintained - https://checkmk.com/werks
  - Filter on MSSQL, last fix: *Wednesday, March 16, 2022*
  - Last release containing a significant update related to mssql: 2.1.0b1 (Feb 28,2022)
- Concerns:
  - Job monitoring (possible but how to handle exclusions)
  - SQL Server permissions - https://forum.checkmk.com/t/monitoring-microsoft-sql/24534

- Other options
  - SQLWATCH https://sqlwatch.io/
  - Oracle Enterprise Manager https://www.oracle.com/technetwork/oem/extensions/pr-mssql-121060-2640498.pdf