SQL Server 2017: Summary

• Currently in Public preview, CTP 2.0 shipped 4/19/17
• Targeted for General Availability mid-CY2017:

  • Graph data support
  • Adaptive Query Processing
  • Availability for Linux and Docker containers
  • Machine Learning Services now supports Python
  • Ability to host Power BI reports on premises
  • New developer and administrative tools
  • Resumable online index rebuilds
  • Clusterless scale of read-only AlwaysOn replicas, Distributed AGs *
  • New Migration Tools
The power to query over any type of data

- Bring graph data support to your relational data to store and analyze new types of relationships
- Query data stored in Hadoop with PolyBase
- Hadoop combined with SQL Server provides value and insight from data lakes

Graph data support

HR team can determine which staff are working on which projects

DATA SOURCES
Introducing SQL Graph

Create Graph Objects
- Create Nodes and Edges
- Properties associated with Nodes and Edges

CREATE TABLE Person (ID INTEGER PRIMARY KEY, name VARCHAR(100)) AS NODE;

CREATE TABLE Organization (ID INTEGER PRIMARY KEY, name VARCHAR(100)) AS NODE;

CREATE TABLE Manages AS EDGE;

CREATE TABLE works_for (StartDate date) AS EDGE;
Introducing SQL Graph

Create Graph Objects
Query Language Extension
• Multi-hop navigation and join-free pattern matching

SELECT p2.name
FROM Person p, Manages m, Person p2,
works_at wa, location l
WHERE MATCH(p-(m)->p2-(wa)->l)
AND p.name = ‘Shreya’
Introducing SQL Graph

Create Graph Objects
Query Language Extension
Integrated in SQL Engine

- Queries can lookup against existing SQL database tables and graph nodes/edges.
- Column store, Advanced Analytics/ML, HA, etc.
- Security and Compliance
Introducing SQL Graph

Create Graph Objects
Query Language Extension
Integrated in SQL Engine
Tooling and Eco-system

- Existing tools will all work out of the box, for example backup and restore, import and export, etc.
Industry-leading performance with SQL Server 2017

Real-time operational analytics with hybrid transactional-analytical processing (HTAP)

- Improve transactional performance with row-based **in-memory OLTP**
- Speed analytics and reduce storage needs with **ColumnStore** compression
- Combine for **real-time operational analytics (HTAP)**
- Speed query performance without tuning using new **Adaptive Query Processing**
- Maintain performance when making app changes with **Automatic Plan Correction**

**Challenge to manage massive credit card data**
- Pair active data with In-Memory OLTP table for quick access
- Speed performance by compressing data in In-memory Columnstore
- Faster queries and processing enables real-time detection of errors
Database engine enhancements

Optimized query processing with machine learning

Improved efficiency with Adaptive Query Processing

- **Generate estimates** for challenging queries to improve performance
- **Replicate memory grants** for repeatable queries to avoid over or under allocating
- Adjust data join strategy for small or large tables to **speed joins**
Power of SQL Server on the platform of your choice

- **Linux distributions** including RedHat Enterprise Linux (RHEL), Ubuntu, and SUSE Enterprise Linux (SLES)
- **Docker**: Windows & Linux containers
- **Windows Server / Windows 10**
- **Package-based installation**, Yum Install, Apt-Get, and Zypper
What’s working already?

**Operations Features**
- Support for RHEL, SUSE, Ubuntu, Docker
- Package based installs, Docker image
- Support for Open Shift, Docker Swarm
- Failover Clustering through Pacemaker
- Backup/Restore
- Replication
- Log Shipping
- Transparent Data Encryption
- SCOM Management Pack
- DMVs
- Always On Availability Groups (coming in February)
- SQL Agent (coming in February)
- Full Text Search (coming in February)

**Programming Features**
- All major language driver compatibility
- In memory OLTP and ColumnStore
- Compression
- Always Encrypted, Row Level Security, and Data Masking
- Service Broker
- Change Data Capture
- Partitioning
- Auditing
- Common Language Runtime (CLR) - .NET Framework
- JSON, XML

...and more!
### What’s coming in SQL Server on Linux

<table>
<thead>
<tr>
<th>Editions</th>
<th>Developer, Express, Web, Standard, Enterprise</th>
<th>Windows</th>
<th>Public Preview on Linux</th>
<th>Linux GA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Services</td>
<td>Database Engine, R Services, Integration Services, Analysis Services, Reporting Services, MDS, DQS</td>
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<tr>
<td>Mission critical performance</td>
<td>Maxmimum number of cores</td>
<td>Unlimited</td>
<td>TBD</td>
<td>TBD</td>
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<tr>
<td></td>
<td>Maximum memory utilized per instance</td>
<td>12 TB</td>
<td>TBD</td>
<td>TBD</td>
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<td></td>
<td>Maximum database size</td>
<td>524 PB</td>
<td>TBD</td>
<td>TBD</td>
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<tr>
<td></td>
<td>Basic OLTP (Basic In-Memory OLTP, Basic operational analytics)</td>
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<tr>
<td></td>
<td>Advanced OLTP (Advanced In-Memory OLTP, Advanced operational analytics)</td>
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<td></td>
<td>Basic high availability (2-node single database failover, non-readable secondary)</td>
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<td></td>
<td>Advanced HA (Always On - multi-node, multi-db failover, readable secondaries)</td>
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<tr>
<td>Security</td>
<td>Basic security (Basic auditing, Row-level security, Data masking, Always Encrypted)</td>
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<td></td>
<td>Advanced security (Transparent Data Encryption)</td>
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<tr>
<td>Data warehousing</td>
<td>PolyBase</td>
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<tr>
<td></td>
<td>Basic data warehousing/data marts (Basic In-Memory ColumnStore, Partitioning, Compression)</td>
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<tr>
<td></td>
<td>Advanced data warehousing (Advanced In-Memory ColumnStore)</td>
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<td>Advanced data integration (Fuzzy grouping and look ups)</td>
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<tr>
<td>Tools</td>
<td>Windows ecosystem: Full-fidelity Management &amp; Dev Tool (SSMS &amp; SSDT), command line tools</td>
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<tr>
<td></td>
<td>Linux/OSX/Windows ecosystem: Dev tools (VS Code), DB Admin GUI tool, command line tools</td>
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<tr>
<td>Developer</td>
<td>Programmability (T-SQL, CLR, Data Types, JSON)</td>
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<td>Windows Filesystem Integration - FileTable</td>
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<tr>
<td>BI &amp; Advanced Analytics</td>
<td>Basic Business Intelligence (Multi-dimensional models, Basic tabular model)</td>
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<td>Basic “R” integration (Connectivity to R Open, Limited parallelism for ScaleR)</td>
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<tr>
<td></td>
<td>Advanced “R” integration (Full parallelism for ScaleR)</td>
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</table>
Mission critical availability on any platform

Always On cross-platform capabilities

- **Always On availability groups for Linux**<sup>NEW*</sup> and Windows for HA and DR
- Flexibility for **HA architectures**<sup>NEW*</sup>
- Ultimate HA with **OS-level redundancy and failover**
- Load balancing of readable secondaries
In-database analytics with R and Python

- **In-database analytics with R and now Python** enables users to push intelligence to where data lives.
- **Parallelized** and at scale.
- Industry-leading innovation in **artificial intelligence** to discover insights faster.
- Advanced **machine learning algorithms** with GPUs.

**Data from 8M vehicle loans**

- Age, original balance, interest rate, loan remaining months, credit score

**1M predictions per sec**

- Store predictions
- **R**
- **Power BI dashboard**
- **Predicts loan defaults**
- **Business user**
- **In-memory OLTP**
- **Visualize**

**Prepare for analytics**

**ColumnStore**
Bring your data to life with reporting anywhere

- **Mobile Reporting**—online and offline—on iOS, Windows, Android mobile devices
- **Updated Report Viewer**<sup>NEW</sup>
a free developer component
What's coming in SQL Server vNext for Linux

Tools and programmability

- Windows-based SQL Server tools like SSMS, SSDT, Profiler work when connected to SQL Server on Linux
- 3rd party tools continue to work
- Native command line tools: sqlcmd, bcp, sqlpackage
- Visual Studio Code extension
- New cross-platform DB admin GUI tool (planned)
- All existing drivers and frameworks supported
SQL Tools Available Today

- Connect to SQL anywhere
- Editor + IntelliSense
- Run ad-hoc T-SQL
- View results
- Export results as CSV, JSON

- Online/Offline project-based dev
- Visual DB/table design
- Source Code Control
- CI/CD
- Schema Compare
- Data Compare
- DB Unit Testing

- HA + DR
- Backup / Restore
- DB config, maintenance
- Data security & compliance
- Generate T-SQL scripts
- Monitor
- Troubleshoot Performance

CLI Tools
SQL PowerShell cmdlets
sqlcmd: run ad-hoc T-SQL
bcp: bulk load/save data
mssql-conf: configure SQL
Additional Resources

• Get started programming with SQL Server
  • http://aka.ms/sqldev

• New Code Project samples:
  • https://github.com/twright-msft/dotnet-mssql-connect
  • https://github.com/twright-msft/example-voting-app
  • https://github.com/twright-msft/columnstore-demo
  • Benchmarking tool – coming soon!

• Join us in the community
  • Reddit.com/r/sqlserver
  • Stack Overflow – tag: sql-server
  • Twitter - @SQLServer, #SQLServer
  • Connect.microsoft.com for feature requests and bug reports
Availability Group
Distributed Availability Group
Protect your data at all times on Windows and Linux

**Always Encrypted**

- **Most secure platform**, with the least vulnerabilities in the NIST vulnerability database
- Encrypt data at rest and in motion with **Always Encrypted** on new driver libraries
- Conceal sensitive information with **Dynamic Data Masking**
- Control access to database rows based on user characteristics with **Row-Level Security**
- File-level protection with **Transparent Data Encryption**

**Always Encrypted**

[Diagram showing Always Encrypted process]

**Data set**

<table>
<thead>
<tr>
<th>Customer</th>
<th>Credit card #</th>
<th>Exp.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tim Irish</td>
<td>1x7fg655se2e</td>
<td>7/19</td>
</tr>
<tr>
<td>Denny Usher</td>
<td>0x7f654ae6d</td>
<td>5/17</td>
</tr>
<tr>
<td>Alicia Hodge</td>
<td>0y8f754ea2c</td>
<td>4/18</td>
</tr>
</tbody>
</table>

**CIPHERTEXT**

- Column master key
- Column encryption key
Easy cloud migration

- **Azure SQL Database preview** with instance-level control for greater security and flexibility
- **Database migration service** helps move your data from legacy databases to SQL Server in an Azure VM or Azure SQL Database
- Sign up for private preview
SOLUTION ASSESSMENT USING MOVERE

Empower customers with rich, **data-driven insights** into their use of Microsoft technology, providing opportunities to accelerate their **digital transformation**. Movere’s real-time data can support customers with **datacenter and platform modernization** projects and **transition to the cloud**.

**MICROSOFT AZURE AND CLOUD PROFILING**

**DATA PLATFORM MODERNIZATION**

**DATACENTER MODERNIZATION**

**WINDOWS SERVER CORE PREPAREDNESS**