

DBA MASTERY



Introduction to Query Store





DBA
MASTERY

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Experience

Over 10 years of experience as DBA
Multi platform DBA
Linux, Windows, Virtual & Cloud environments
Oracle, SQL Server, MySQL, Azure SQL DB
MCSE Data management and analytics

Community

Speaker, Guatemala SSUG group leader,
blogger, author, mentor, volunteer, like to help
people in Twitter using #SQLHelp hashtag.

DBA Mastery

SQL Server tips, scripts, best practices and
more.

MAXDOP Calculator



AGENDA

- Performance issues scenarios
- Traditional troubleshooting tools
- What is Query Store
- Architecture Overview
- Setup and configuration
 - Demo
- Exploring Query Store
 - Demo
- Use cases
- Best Practices \ Considerations



PERFORMANCE ISSUES SCENARIOS

- Had issues with execution plan changes slowing down the front end application after upgrading a SQL Server instance to latest version
- Had a performance problem with a database and was unable to determine the root cause because someone decided to reboot the server
- Had a third party application experiencing performance problems but no changes to the database schema are not allowed



- Had an application down / slow because of the database is not performing well, upper management is expecting you to push the go faster button
- Had an application that only uses AD-HOC and dynamic SQL queries



WHAT IS QUERY STORE

- Flight recorder \ black box of SQL Server
- Captures query text, estimated execution plans, execution runtime statistics and wait statistics
- It aggregates data by time intervals
- It simplifies troubleshooting by helping to find performance issues and query regressions easy
- Introduced in SQL Server 2016, existed before on Azure SQL DB



WHAT MAKES QUERY STORE SO GOOD

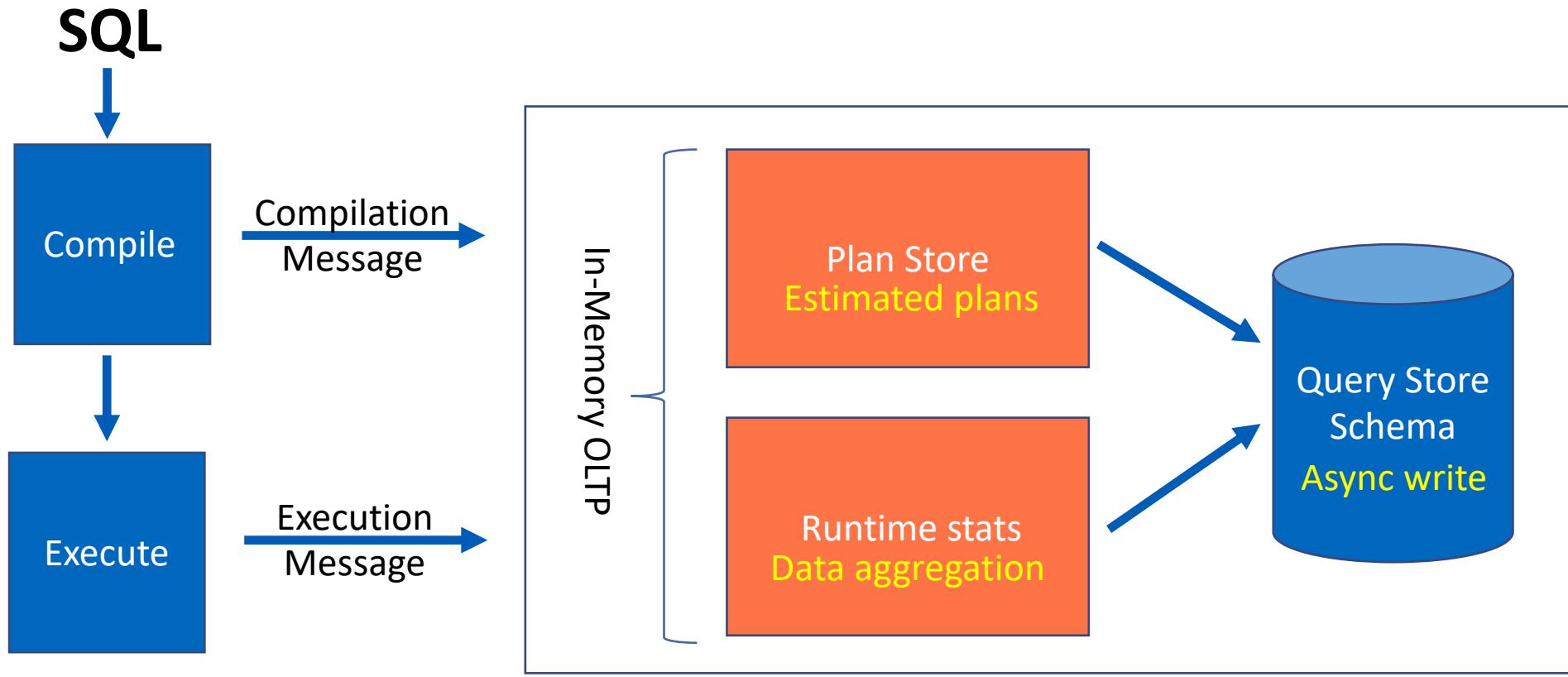
- What is the added value? Why it is so attractive for DBAs?
- It saves time!!!
- Makes query tuning less complex
- The previous solutions were not part of SQL Server engine
- Tracks information independent of what is cached
- Stores every SQL statement from a batch
- Works at database level



- Easy identification of top consuming queries
- Resource usage patterns
- Easy plan forcing (it depends ...)



ARCHITECTURE OVERVIEW



Aggregated data flush → Async checkpoint mechanism

CONFIGURATION

- Available in all SQL Server editions
- It is enabled at database level (but master and TempDB)
- Permissions
 - Access Query Store data \ reports → VIEW DATABASE STATE
 - Query plan forcing → DB_OWNER
- To enable it from T-SQL

```
ALTER DATABASE MyDatabase SET QUERY_STORE = ON;
```



DEMO



OPTIONS RELATED TO DATA COLLECTION

- Operation mode
 - Default Read-Write
 - Read Only
- Query capture mode
 - Default ALL for SQL Server 2016+
 - Default AUTO for Azure SQL Server DB
 - NONE
- Max plans per query
 - Default 200



OPTIONS RELATED TO DATA STORE

- Max storage size MB
 - Default 200 MBs
- Size based cleanup mode
 - AUTO
 - OFF
- Cleanup policy
 - Stale query threshold in days
 - Default 30 days



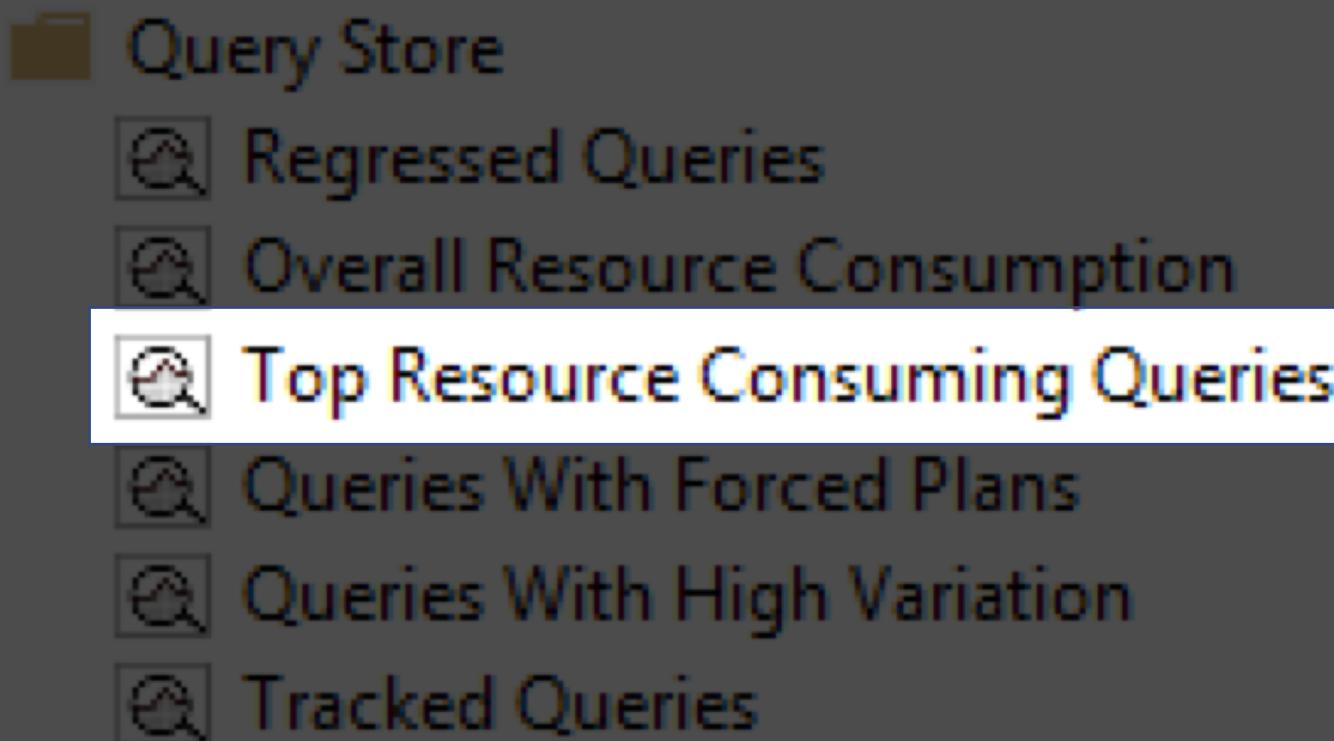
OPTIONS RELATED TO DATA AGGREGATION

- Data flush interval
 - Default 15 minutes
 - Flushing runtime and wait stats data from memory to disk
 - In case of memory pressure data will be flushed to disk immediately
- Interval length minutes
 - Default 60 minutes
 - 1, 5, 10, 15, 30, 60, 1,440 (24 hours)
- Wait stats capture



HOW TO USE QUERY STORE

- SQL Server Management Studio (SSMS)
- T-SQL through DMVs



DMVs

- Plan store
 - Query plan & query text
 - Query context settings
- Runtime stats store
 - Compilation time, duration & last execution
 - CPU & DOP
 - Logical reads & physical reads
 - Writes
 - Wait statistics (SQL Server 2017)



Plan Store

`sys.query_store_query`
`sys.query_store_plan`
`sys.query_store_query_text`
`sys.query_context_settings`

`sys.query_store_runtime_stats`
`sys.query_store_wait_stats`
`sys.query_store_runtime_stats_interval`

Runtime Statistics Store

Table Valued Function
[QUERY_STORE_RUNTIME_STATS]
Cost: 3 %

TVF

In-Memory
Data

On-Disk
Data

T-SQL Queries

DEMO



USE CASES

- Pinpoint and fix queries with plan choice regressions
- Identify and tune top resource consuming queries
- A/B testing, application changes
- Keep performance stability during the upgrade to newer SQL Server



BEST PRACTICES \ CONSIDERATIONS

- SSMS latest version
 - Update file in case SSMS is already installed
- XE monitoring
- T-SQL monitoring
- Persisted after backup \ restore
- CPU additional load ~3-5%



- PerfMon
 - Query Store CPU usage
 - Query Store logical reads, writes
 - Query Store physical reads (ASYNC writer)
- Database datafile distribution
 - PRIMARY (For internal objects and Query Store) MAIN (User objects)



QUESTIONS ?



- For more information

[Best practices according to Microsoft](#)

[How Query Store Collects data](#)

[Monitoring performance by using Query store](#)

[Query Store Usage Scenarios](#)





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THANKS !!!

