DelphiDay italian conference

PIACENZA EDITION

2019 - XVIII Edizione

SQL Server Query Store e Automatic Tuning

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AGENDA

- SQL Server Query Store
  - Query plan choice change can cause performance issues
  - What does the Query Store do for you?
- Automatic Tuning in SQL Server 2017 and Azure SQL Database

Test Environment for you

- ➔ Download and install the last version of SQL Server Management Studio
  - ➔ https://bit.ly/2K7Jzgu
- ➔ Connect to Azure SQL Database
  - ➔ Server: delphi-day-2019.database.windows.net
  - ➔ User: UserDDay2019
  - ➔ Password: h5AZP5M7t3MZ3YSfGZQ9CPNtU
  - ➔ Database: AdventureWorks2017, QueryStore
- ➔ Enjoy ☺

SQL Server Query Store

Plan changes can cause performance issues

Web site is down	• Database is not working • How to fix it ASAP?
Temporary perf. issues	• Impossible to predict the root cause
SQL Server upgrade	• Performance regression caused by the new version

Why do plan changes happen?

- ➔ Query Optimizer generates and evaluates many plans for the same query
- ➔ Data changes every hour, so the QO might select a different plan
- ➔ Generally, boundary plans have the same performance

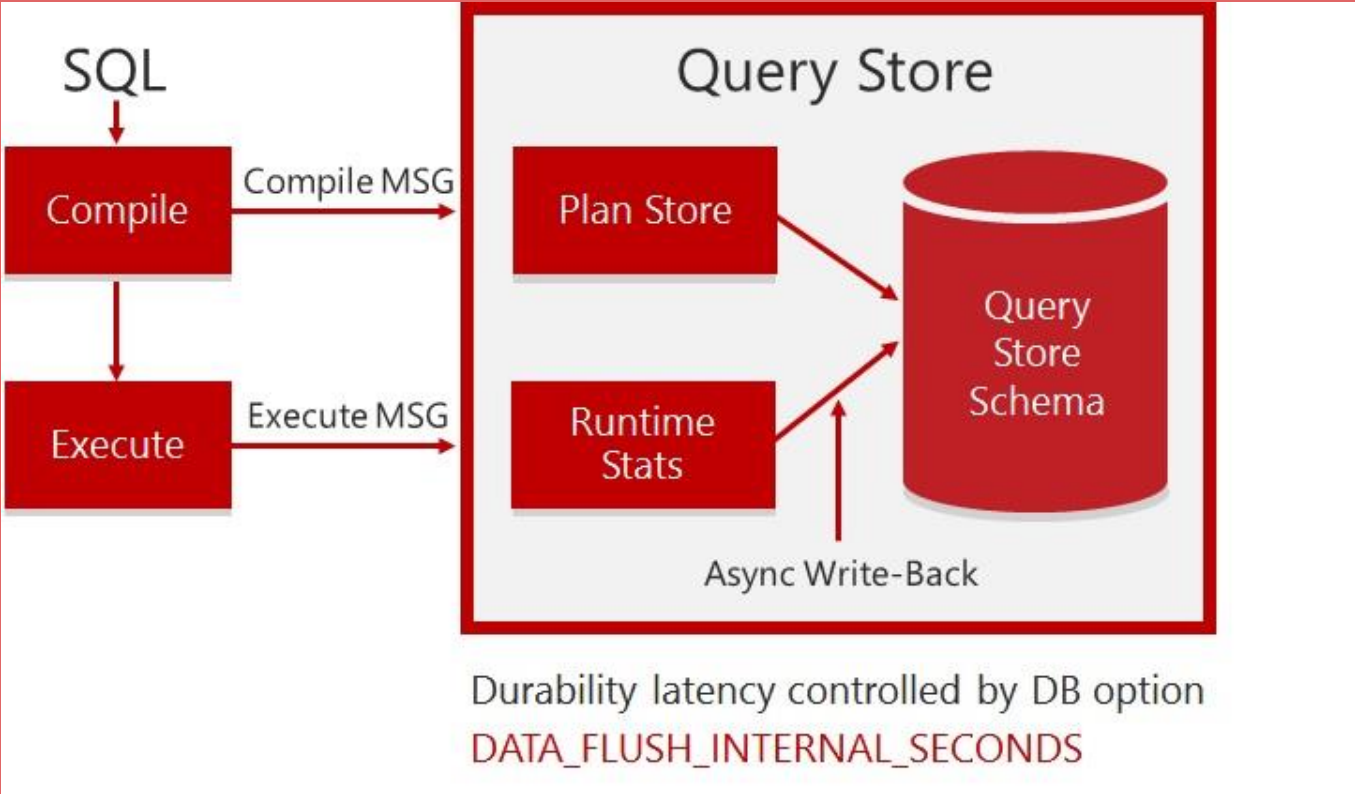
Fixing Query Plan regression is Hard

- ➔ Problems you face for slow running queries
  - ➔ Time of the day and compiled parameters
  - ➔ Plan cache may not be suitable for troubleshooting
- ➔ You have to find out why it is show
- ➔ When you have the issue on you hands
  - ➔ Can you modify the query text?
  - ➔ Do you know the SP to create the Plan Guide?

What does the Query Store do for you?

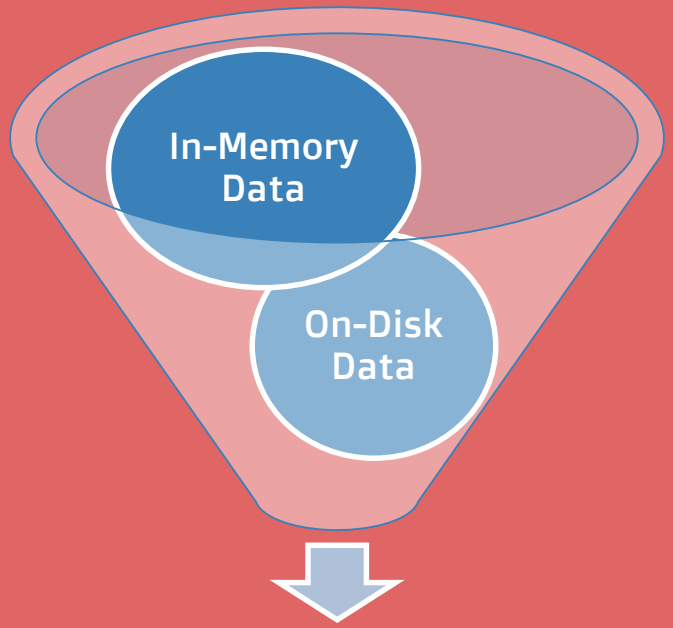
- ➔ It stores all the plan choices and related performance metrics for each query
- ➔ It identifies queries that have become slower recently
- ➔ It allows you to force an execution plan easily
- ➔ It makes sure your changes work across server restart, upgrades, failover and query recompiles

How the Query Store captures data



How the Query Store exposes data

- → DMVs
- → Query Store reports
- → When memory pressure occurs, some data In-Memory will be flushed to the disk



sys.query_store_runtime_stats

How the Query Store interprets the query text

- Query text starts from the first character of the first token and it ends at the last character of the last token
  - Comments and spaces, before or after, **don't change anything**
  - Comments and spaces inside **count**
  - Each unique query text is stored just once in the DMV sys.query_store_query_text

Demo environment

- A console application executes this query in a loop on a database where Query Store is enabled

```
SELECT * FROM dbo.Tab_A WHERE (col1= @Parameter1) AND (col2= @Parameter2)
```

  - Parameters are generated by a randomized function, values are between 0 and 100
  - Plan cache is cleaned when parameters values are less than 2

Demo

Query Store Options

Query Store options

- ➔ Because collecting data has always a cost, you can tune the Query Store with these options
  - ➔ INTERVAL_LENGTH_MINUTES
  - ➔ MAX_STORAGE_SIZE_MB
  - ➔ MAX_PLANS_PER_QUERY (200 by default)
  - ➔ QUERY_CAPTURE_MODE (ALL, AUTO, NONE)
  - ➔ DATA_FLUSH_INTERVAL_SECONDS

server upgrades

server upgrades

- Are you worried about SQL Server upgrades? This is the way out
  - Restore a copy of the production DB on a test server
  - Run a significative workload
  - Look at the Query Store for performance regressions
- Plan forced works across
  - Recompilation
  - Server reboots and failover

Automatic tuning

Automatic tuning

- Automatic tuning is a database feature that provides insight into potential query performance problems, recommend solutions, and automatically fix identified problems
- There are two automatic tuning features that are available
  - Automatic plan correction
  - Automatic index management

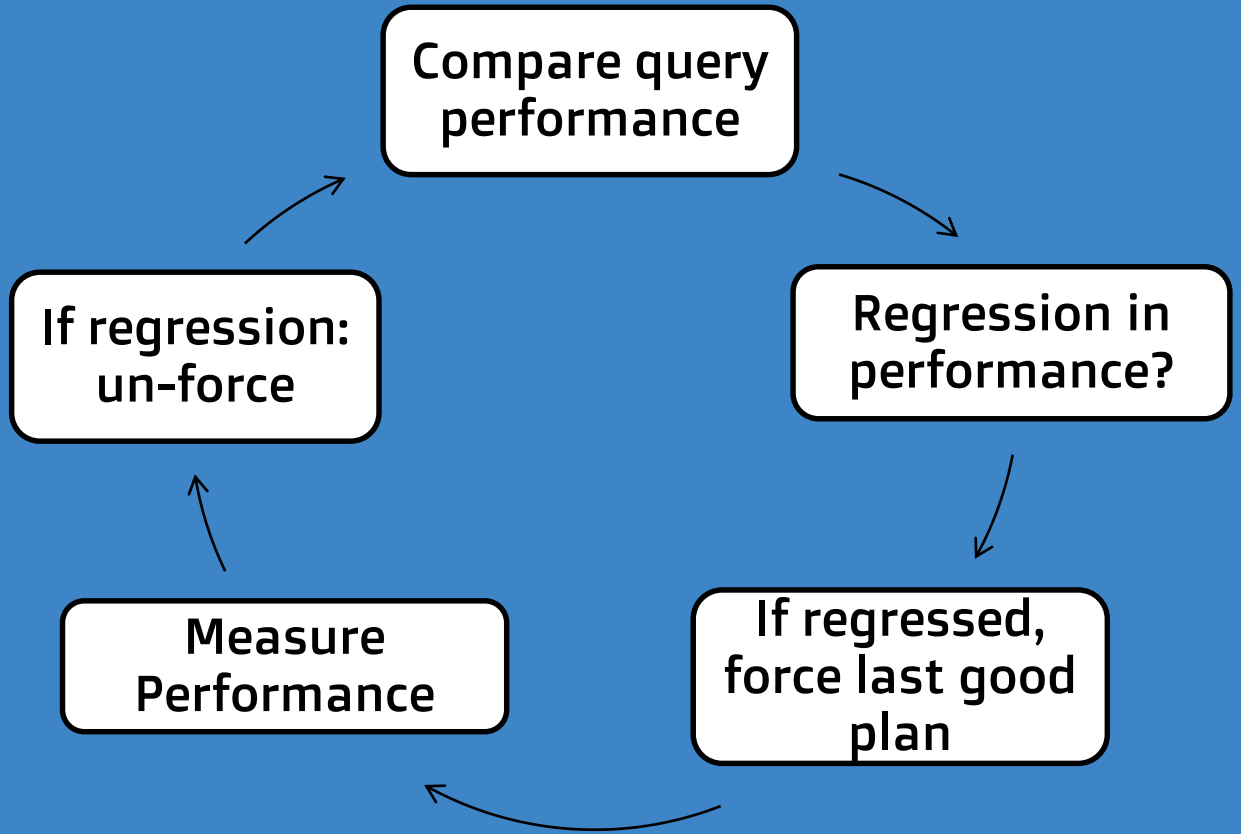
Automatic plan correction

- ➔ Identifies execution plans choice regression
- ➔ Automatically fix the issue by forcing the last known good plan
- ➔ Available on SQL Server 2017 Enterprise Edition and Azure SQL Database

Automatic Plan Correction

- ➔ Automatic Plan Correction takes plan forcing one step further
- ➔ It is a plan forcing, but it is done automatically for you by SQL Server
- ➔ It uses Query Store, so Query Store must be enabled in order to use it

Automatic plan correction



Automatic Index Management

- ➔ It can help you optimize your indexes
  - ➔ Identifies indexes that could improve performance of your queries that read data from the tables
  - ➔ Identifies the redundant indexes or indexes that were not used in longer period of time that could be removed
- ➔ Available on Azure SQL Database

Demo

Query Store in SQL Server 2019 (CTP 3.0)

Query Store in SQL Server 2019 (CTP 3.0)

- ➔ Query Store has a new option for QUERY_CAPTURE_MODE
- ➔ The “CUSTOM” option allows you to define what queries are captured based on
  - ➔ EXECUTION_COUNT
  - ➔ TOTAL_COMPILE_CPU_TIME_MS
  - ➔ TOTAL_EXECUTION_CPU_TIME_MS

Defaults changed in SQL server 2019

- → MAX_STORAGE_SIZE_MB
  - → from 100MB to 1000MB
- → QUERY_STORE_CAPTURE_MODE
  - → from ALL to AUTO
    - → It doesn't capture insignificant queries based on some thresholds that are not documented
    - → The default value in Azure SQL Database is already AUTO

Resources

- A good starting point
  - https://bit.ly/2VSwjlf
- UGISS channel on Vimeo
  - SQL Server 2016 Query Store un nuovo modo di ottimizzare le query https://vimeo.com/149648363
  - Troubleshooting delle prestazioni delle query con SQL Server 2016 Query Store https://vimeo.com/200794871

Q&A


That's all Folks!