Sergio Govoni

#sqlsat871

PASS
SQLSATURDAY
SARDEGNA | 18 MAY 2019

SQL Server Execution Plans: From Zero to Hero!

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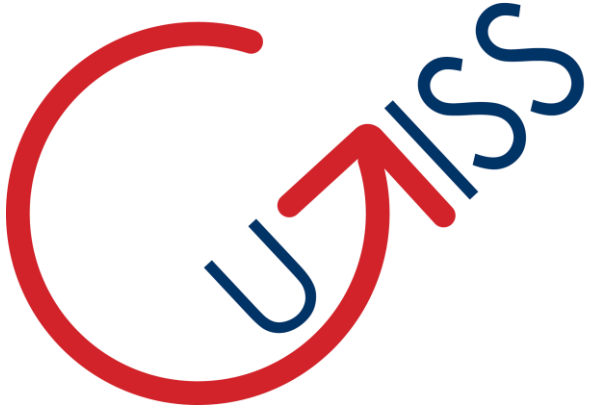

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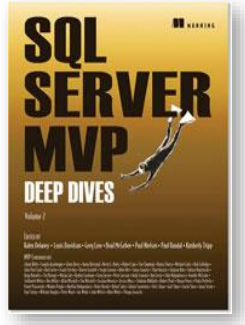


Goals

This session is just on guideposts, on mechanisms to try to move you in the right direction

Good starting point to

- Capture query execution plans
- Understand which are the most important pieces of an execution plan
- Learn where to go to see first!

Agenda

Execution Plan

- Fundamentals
- Behind the scenes of a query
- How to capture an execution plan
- Logical and physical operators
- The Execution Plan of an “Update” statement (I/U/D)
- Warnings
- Index Scan VS Index Seek

Test Environment

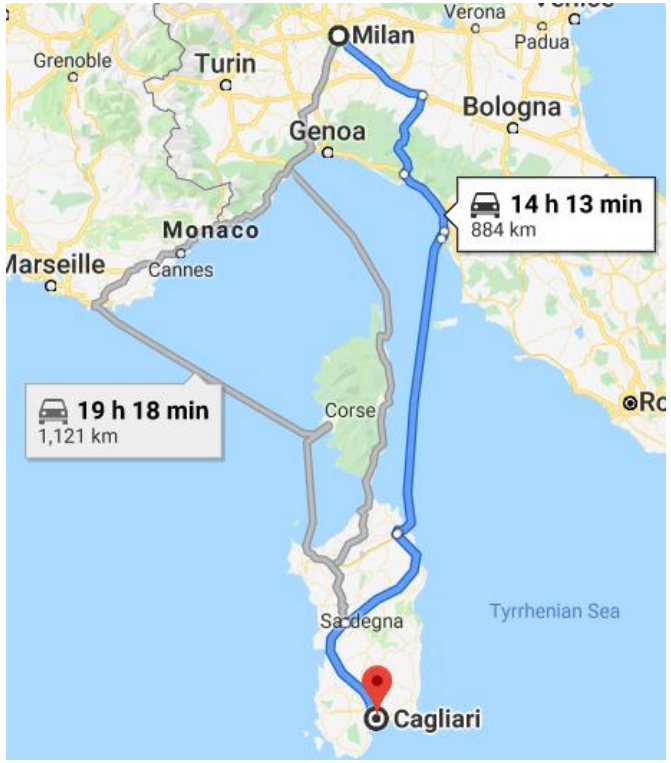
- Download and install the last version of SQL Server Management Studio
  - https://bit.ly/2K7Jzgu
- Connect to Azure SQL Database
  - **Server**: sqlsat871.database.windows.net
  - **User**: UserSqlSat871
  - **Password**: L9A5EKCyBbQ4BjT2NMWgfhVaZ
  - **Database**: AdventureWorks2017
- Enjoy ☺

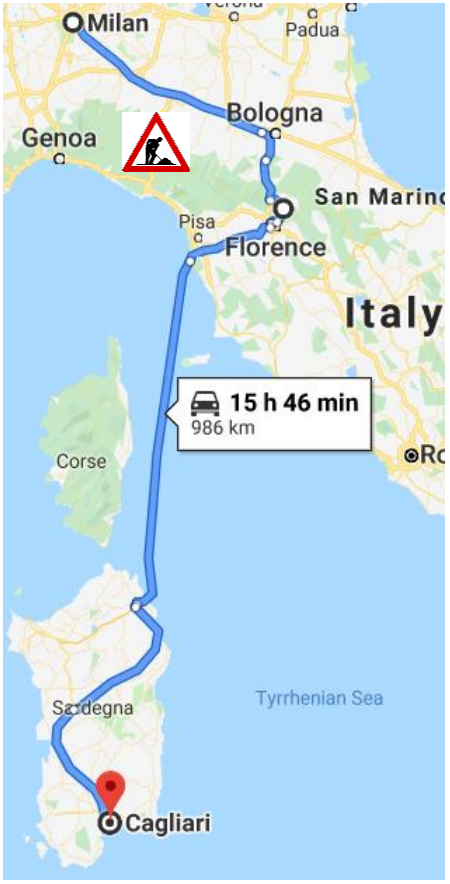
Execution Plans: Fundamentals

- Execution plan is generated by Query Optimizer
  - It helps us to answer the question: Why this query is so slow?
- It contains the instructions to execute a query
  - Table access order
  - Join operator
  - Indexes
- It defines the most efficient way to access data
- SQL Server stores the execution plans for reuse

Execution Plans: Fundamentals

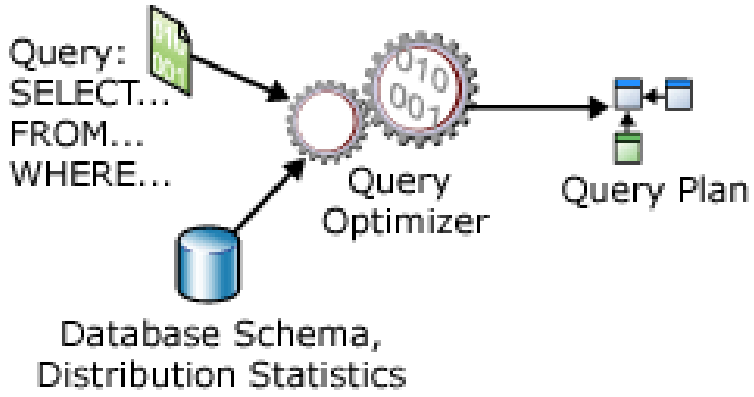
- Two types
  - Estimated Execution Plan
  - Actual Execution Plan
- Three formats
  - Graphical Plans
  - Text Plans (deprecated)
  - XML Plans
- Where you can find them?
  - SSMS, SQL Profiler, DMV
  - Extended Events, Query Store





Behind the scenes of a query

- Query Parsing
  - Logical operator tree
- Query Optimizer
  - It turns a query into an execution plan. T-SQL is a declarative language, developers are used to declare **what they want**, the Query Optimizer finds **how to implement** the request, physically
- Query Execution



How to capture an execution plan

- Estimated plan
  - SET SHOWPLAN_TEXT (deprecated)
  - SET SHOWPLAN_ALL (deprecated)
  - SET SHOWPLAN XML
  - Display Estimated Execution Plan in SSMS
  - DMVs
    - sys.dm_exec_query_plan
    - sys.dm_exec_text_query_plan
  - SQL Server Query Store

How to capture an execution plan

- Actual plan
  - SET STATISTICS PROFILE (deprecated)
  - SET STATISTICS XML
  - Include Actual Execution Plan in SSMS

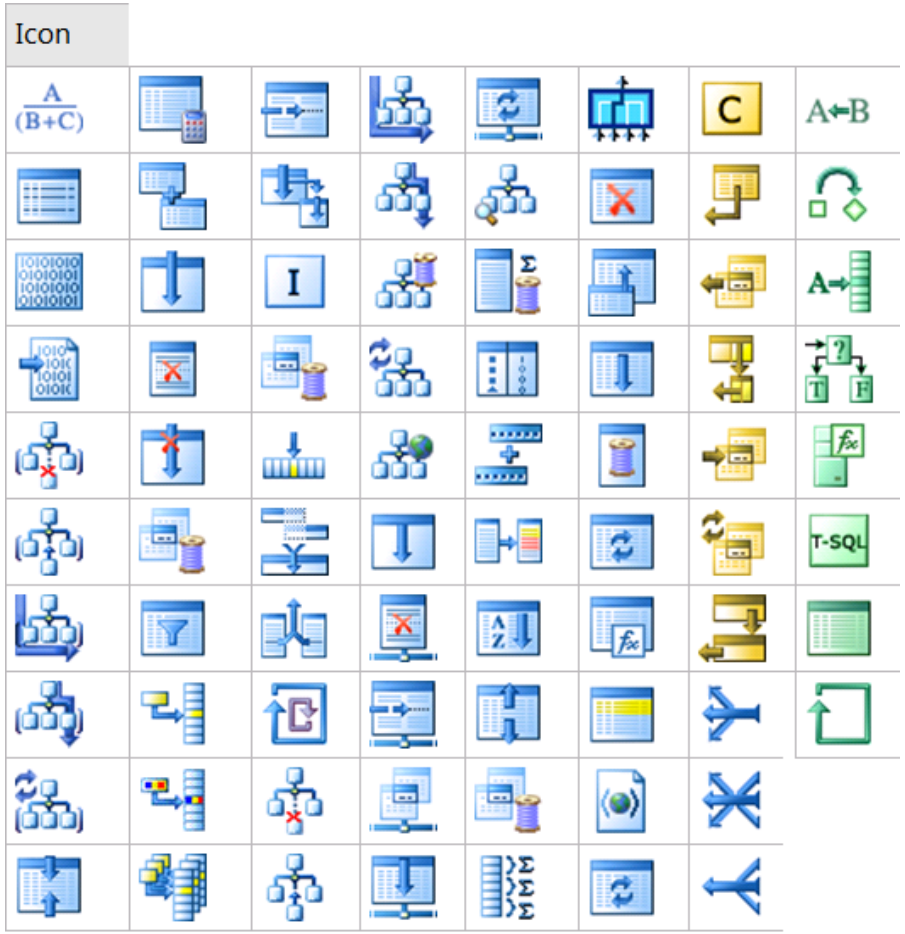
Demo

How to capture an execution plan

The icon-based language

- Learning how to read execution plans is like learning a new icon-based language ☺
- More than 120 operators in SQL Server 2017
  - We will learn the most common/used ones
  - The complete list is available on docs https://bit.ly/2Jrndei

The icon-based language

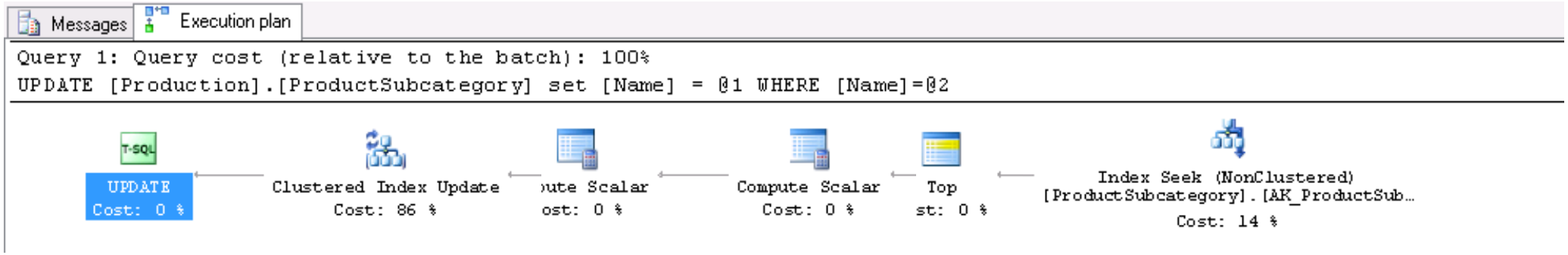


Icon-overlay when an operator is executed in parallel mode

Demo

Logical and physical operators

The Execution Plan of an “Update”



Update (I/U/D/M) execution plan

- Find rows to be update, check all constraints

Some calculations

Perform the update

Demo

The Execution Plan of an “Update”

Warnings

- No statistics (ColumnsWithNoStatistics)
- No join predicate (NoJoinPredicate)
- Implicit conversions (PlanAffectingConvert)
- Sort on tempdb (SpillToTempDb)
- No matched indexes (UnmatchedIndexes)
- Wait (WaitWarningType)

- Check the showplanxml.xsd

DEMO

Warnings

Index Scan VS Index Seek

- Index scans are not necessarily bad
- Index seeks are not necessarily good
- It depends!!
- Pay attention to
  - Scans
  - Estimated number of executions
  - Number of executions

DEMO

Index Scan VS Index Seek

Tools

- SentryOne Plan Explorer
  - Download: https://bit.ly/2oBSbVY
  - Post on UGISS: https://bit.ly/2UcYq27
  - Add-in available for SQL Server Management Studio

Resources

- eBook
  - SQL Server Execution Plans – by Grant Fritchey https://bit.ly/2OCMWPZ
- Videos
  - SQL Server Execution Plans
  - SQL Server Query Optimizer end-to-end

Topics not covered in this session

- Optimization process
  - Search 0, Search 1, Search 2
  - Transformation rules
  - Trace Flags
- Parallelism
- How to force Query Optimizer
- Plan cache
- New Cardinality Estimator in SQL 2014+

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Ask your Questions

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Thank you very much for attending SQL Saturday Sardegna 2019!