

SQL Server Execution Plans From Zero to Hero

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Sponsors

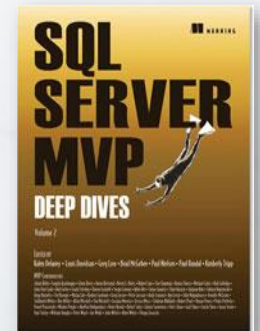


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- Vice President @ UGISS
- Co-Author
 - MVP Deep Dives Volume 2
 - <http://www.manning.com/delaney/>



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



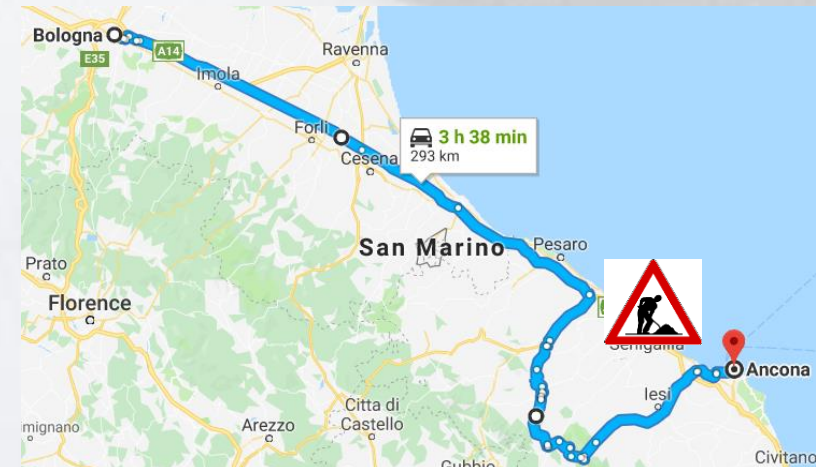
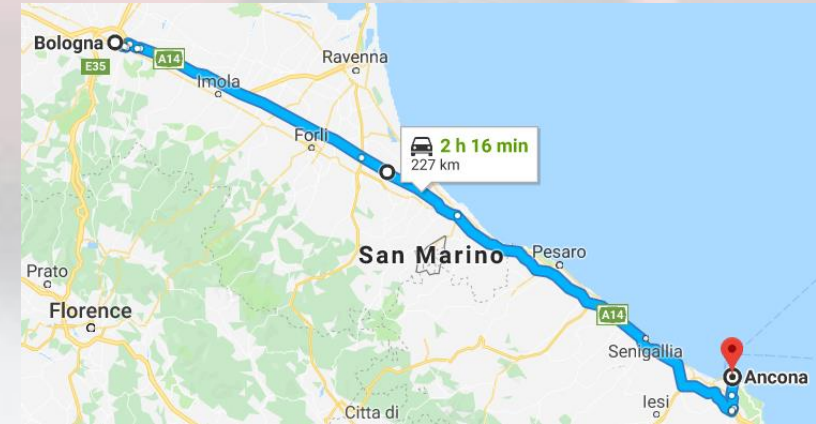
- Execution Plan
 - Fundamentals
 - Behind the scenes of a query
 - How to capture an execution plan
 - Logical and physical operators
 - The Execution Plan of an “Update” statement (I/U/D)
 - Warnings
 - Index Scan VS Index Seek

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

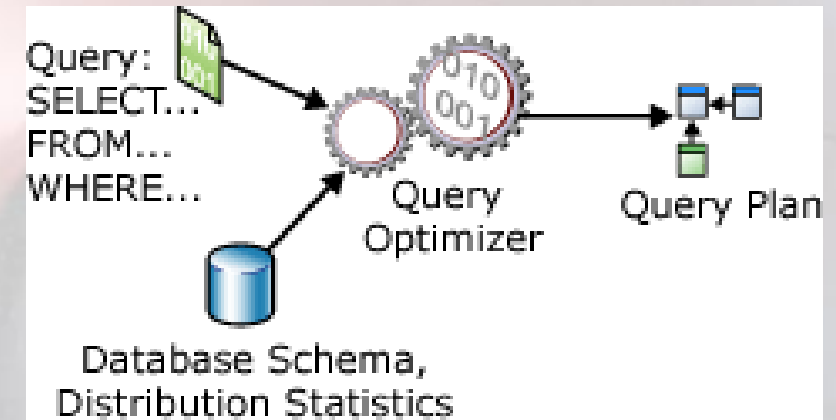
Execution Plans: Fundamentals

- 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
 - Because T-SQL is a declarative language, developers are used to declare **what they want** and the SQL Server 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
 - DMV
 - 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 (logical and physical)
 - We will learn the most common/used ones
 - The complete list is available on docs <https://bit.ly/2Jrnde1>
- Displayed operators can be
 - Logical and physical (blue icons)
 - Parallelism physical (blue icons)
 - Cursor (yellow icons)
 - Language elements (green icons)

The icon-based language

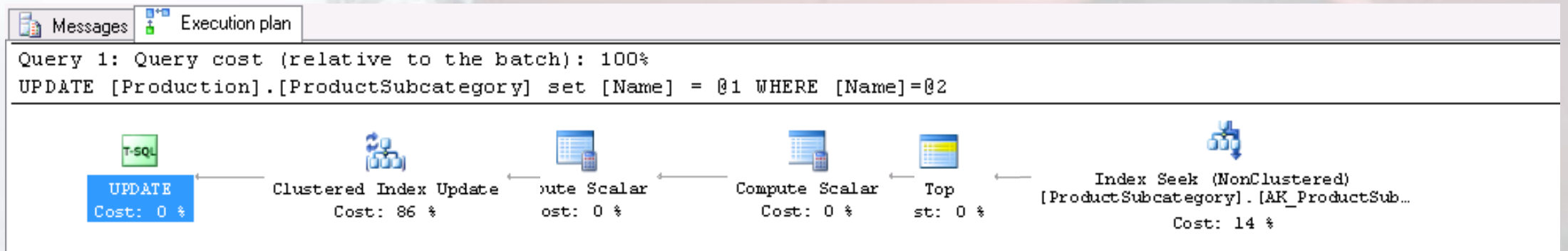
Icon							
$\frac{A}{(B+C)}$							



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+



Q&A



Thank you very for attending this
session!