Understanding the Behavior of the Query Optimiser

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Agenda

Overview of query execution process

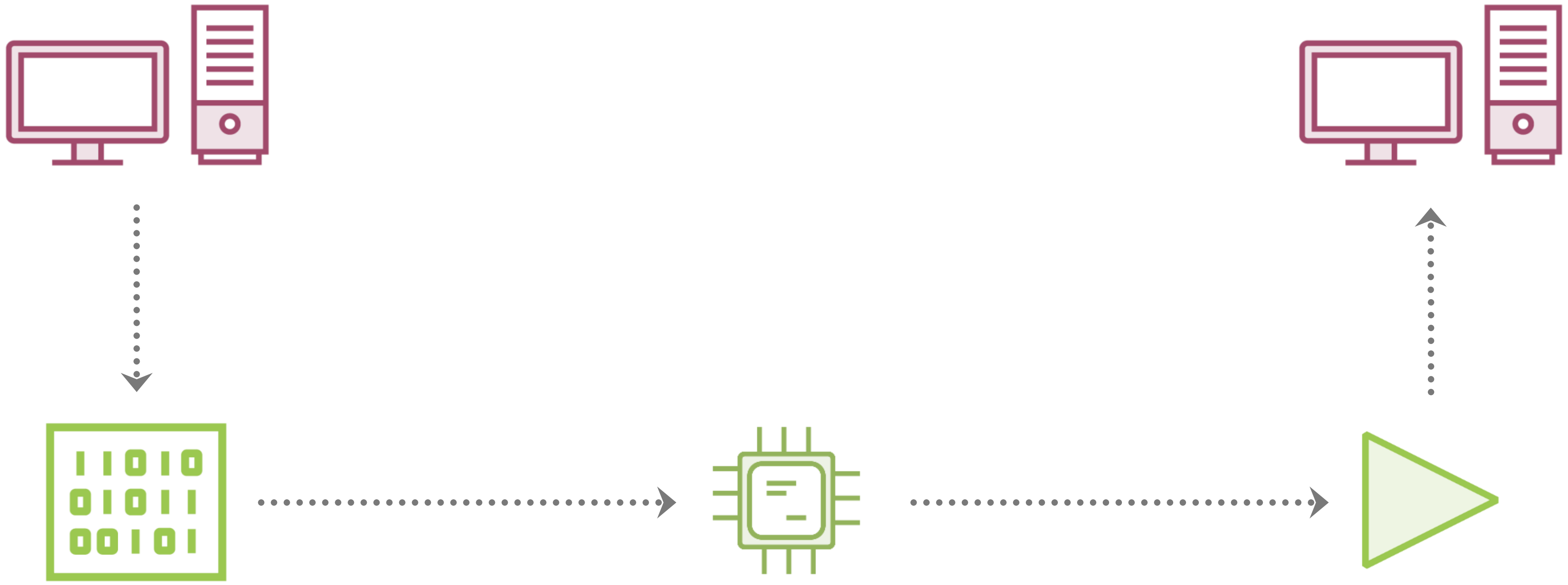
How does the optimizer choose a plan?

Role of row estimations

Plan caching and reuse

Cause of bad parameter sniffing

Query Execution Process



Parse/Bind

Optimize

Execute

Query Optimization

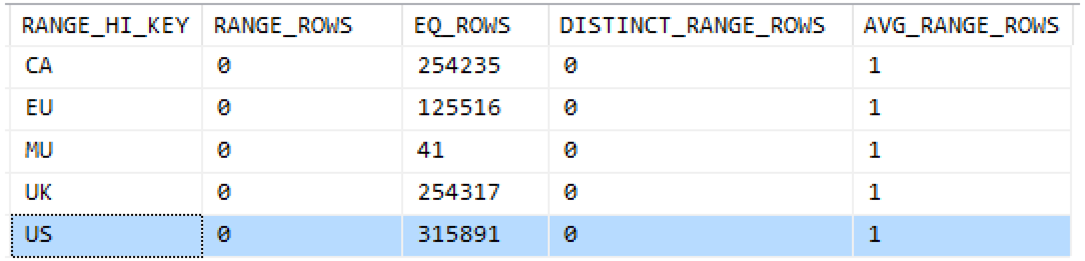
Cost-based optimizer

Goal to find the lowest-cost plan in the time available

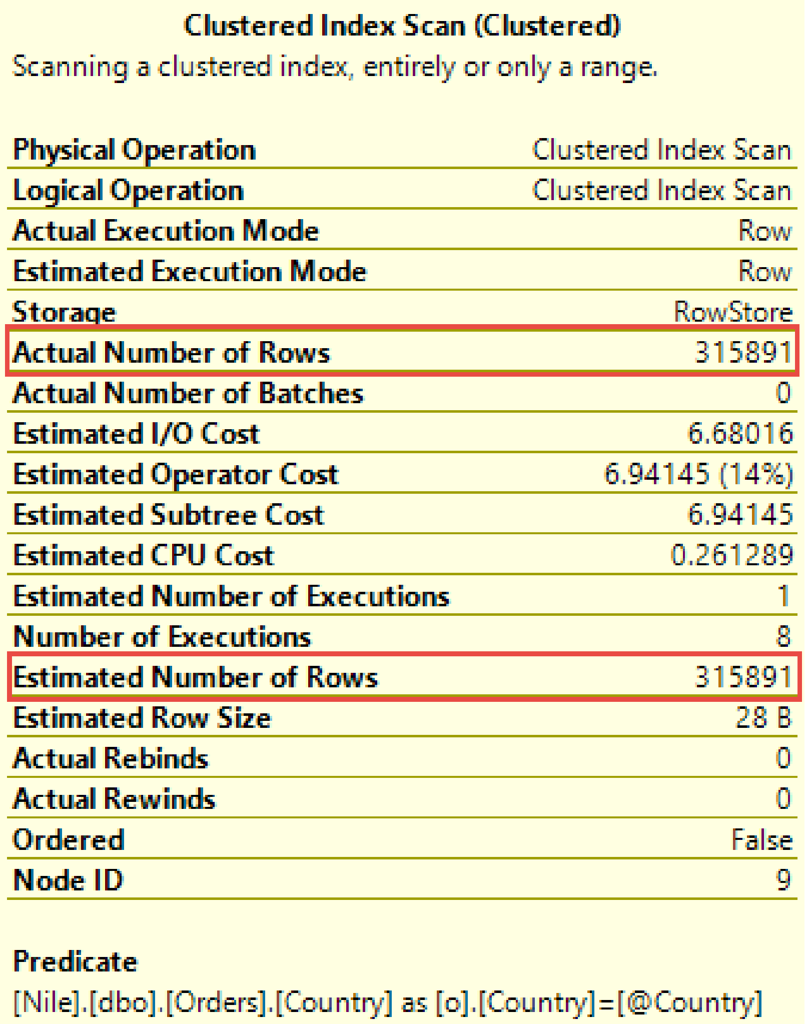
Costs based on row estimations

Row estimations from column statistics

How row estimations are calculated



RANGE_HI_KEY	RANGE_ROWS	EQ_ROWS	DISTINCT_RANGE_ROWS	AVG_RANGE_ROWS
CA	0	254235	0	1
EU	0	125516	0	1
MU	0	41	0	1
UK	0	254317	0	1
US	0	315891	0	1



Clustered Index Scan (Clustered)

Scanning a clustered index, entirely or only a range.

Physical Operation	Clustered Index Scan
Logical Operation	Clustered Index Scan
Actual Execution Mode	Row
Estimated Execution Mode	Row
Storage	RowStore
Actual Number of Rows	315891
Actual Number of Batches	0
Estimated I/O Cost	6.68016
Estimated Operator Cost	6.94145 (14%)
Estimated Subtree Cost	6.94145
Estimated CPU Cost	0.261289
Estimated Number of Executions	1
Number of Executions	8
Estimated Number of Rows	315891
Estimated Row Size	28 B
Actual Rebinds	0
Actual Rewinds	0
Ordered	False
Node ID	9

Predicate

[Nile].[dbo].[Orders].[Country] as [o].[Country]=[@Country]

Demo

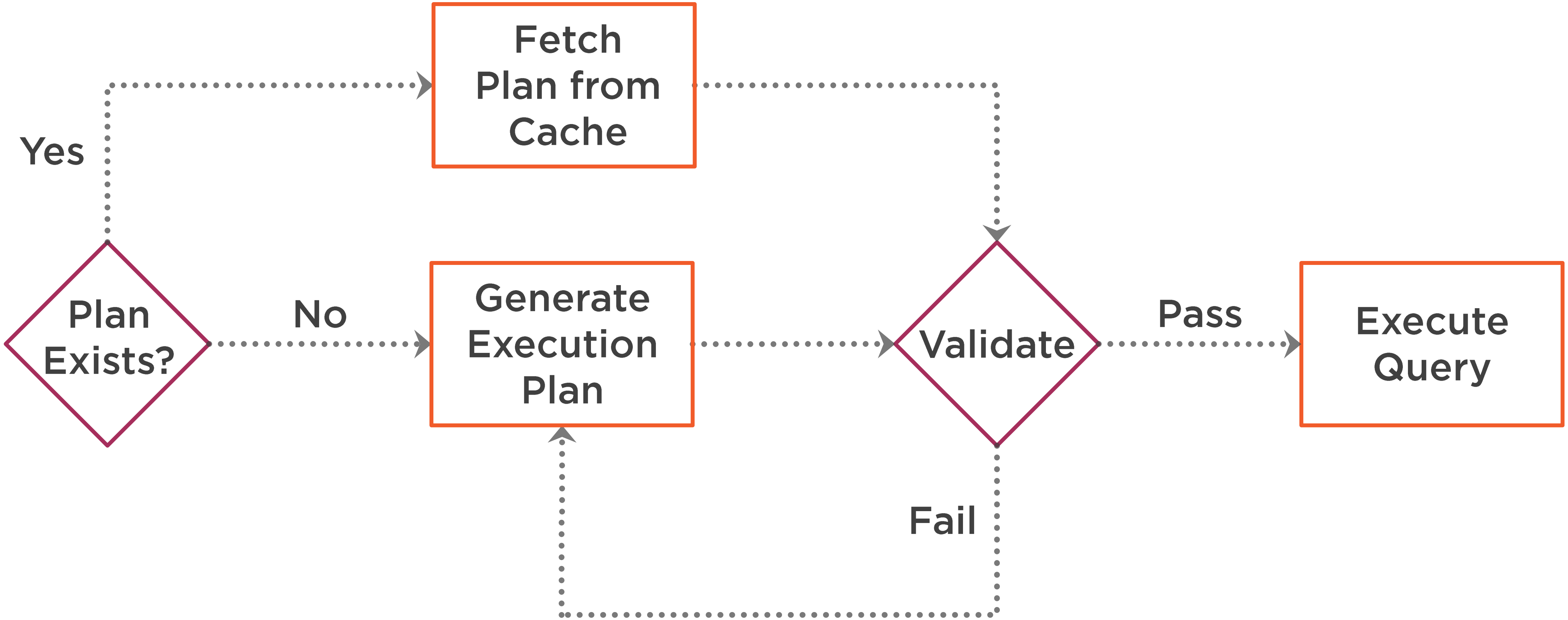
How row estimations change based on the parameter/constant/variable value

Plan Caching

Query Optimization is expensive

SQL Server caches execution plans to avoid unnecessary optimizations

Plan caching and reuse



Demo

Plan compilation, caching and reuse

Bad parameter sniffing is caused by inappropriate reuse of cached plans.

Summary

High-level look at query optimization

How row estimations affect plan choices

Caching and reuse of query plans