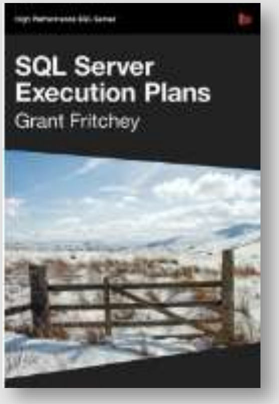
THE SCARY DBA

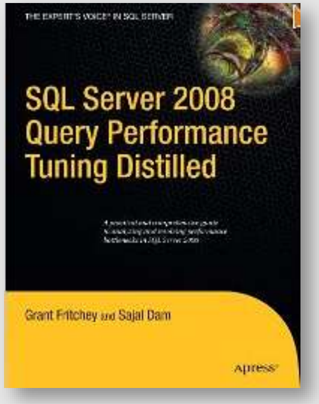
Query Performance Tuning: Start to Finish

Grant Fritchey

Who?

- Product Evangelist for Red Gate Software
- Microsoft SQL Server MVP
- PASS Chapter President
- Author:
  - SQL Server Execution Plans
  - SQL Server 2008 Query Performance Tuning Distilled




THE EXPERT'S VOICE® IN SQL SERVER
SQL Server 2008
Query Performance
Tuning Distilled
Grant Fritchey and Sajal Dam
Apress®

Why Tune Queries?

- Most volatile aspect of a database system
- Subject to changes in data
- Affected by changes in structure
- Impacted by poor coding choices
- Victim of resource contention

Finish Line

- The ability to collect performance metrics on their servers as part of an overall query tuning methodology
- An understanding of how the optimizer works in support of writing better TSQL code as well as troubleshooting poorly performing queries
- The ability to generate, read, and understand execution plans from multiple sources in support of troubleshooting poorly performing queries
- A working knowledge of DMVs that will help them identify and fix performance issues on their servers
- The ability to address common query performance problems

Query Performance Tuning: Start to Finish

OPTIMIZER, STATISTICS, INDEXES & CONSTRAINTS

Finish Line

- The ability to collect performance metrics on their servers as part of an overall query tuning methodology
- An understanding of how the optimizer works in support of writing better TSQL code as well as troubleshooting poorly performing queries
- The ability to generate, read, and understand execution plans from multiple sources in support of troubleshooting poorly performing queries
- A working knowledge of DMVs that will help them identify and fix performance issues on their servers
- The ability to address common query performance problems

Optimizer

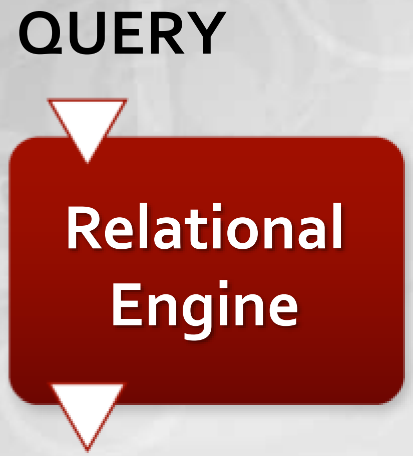
- Simply an Amazing piece of Software
- Cost-based
- Not Perfect
- Plan on Helping the Optimizer

Relational Engine

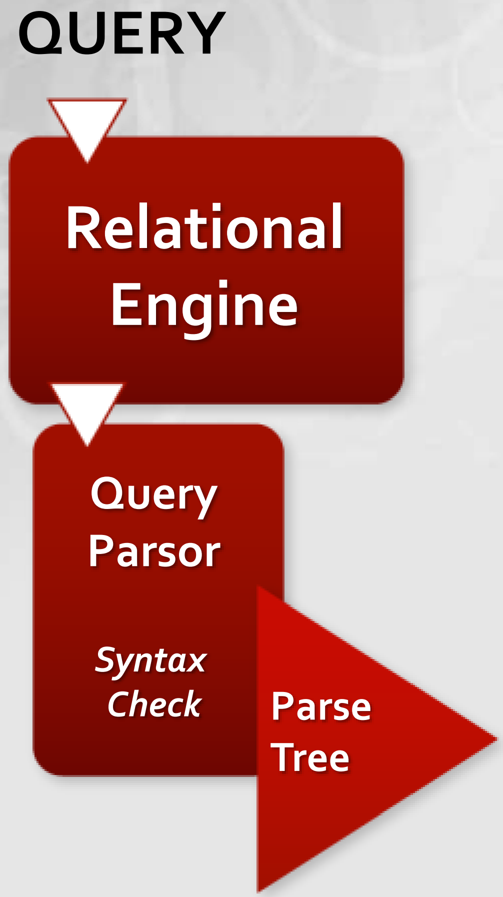
QUERY

▽

Relational Engine



Relational Engine


QUERY

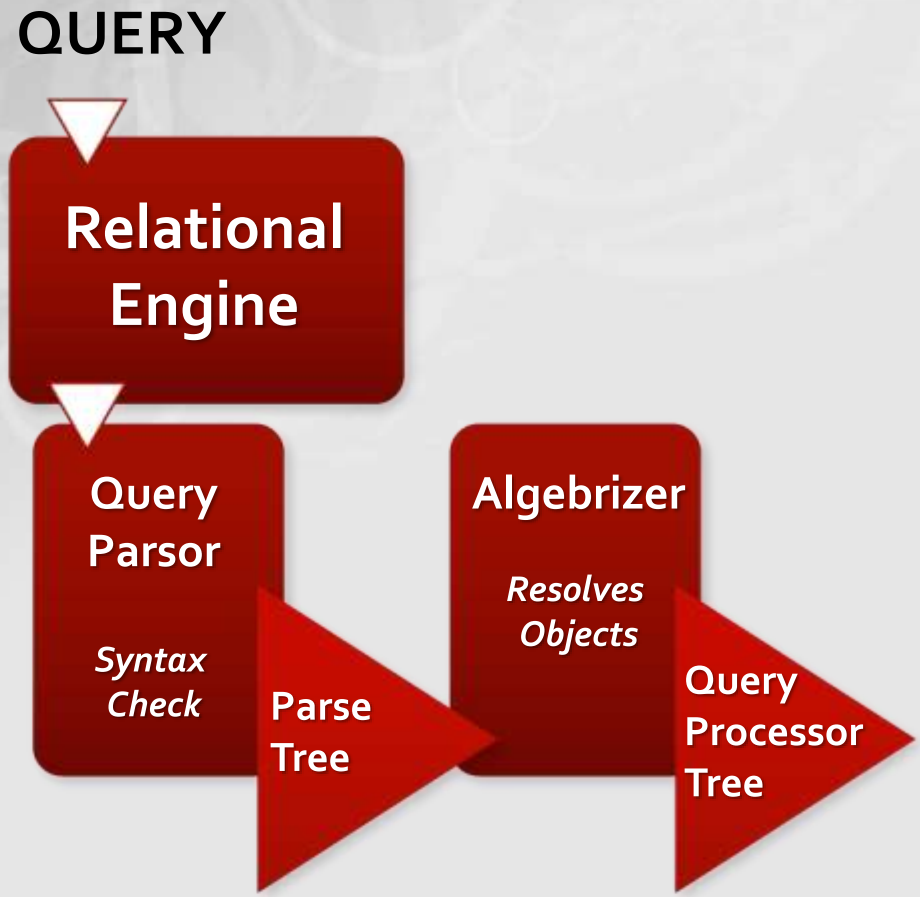
Relational Engine

Query Parsor

Syntax Check

Parse Tree

Relational Engine


QUERY

Relational Engine

Query Parsor

Syntax Check

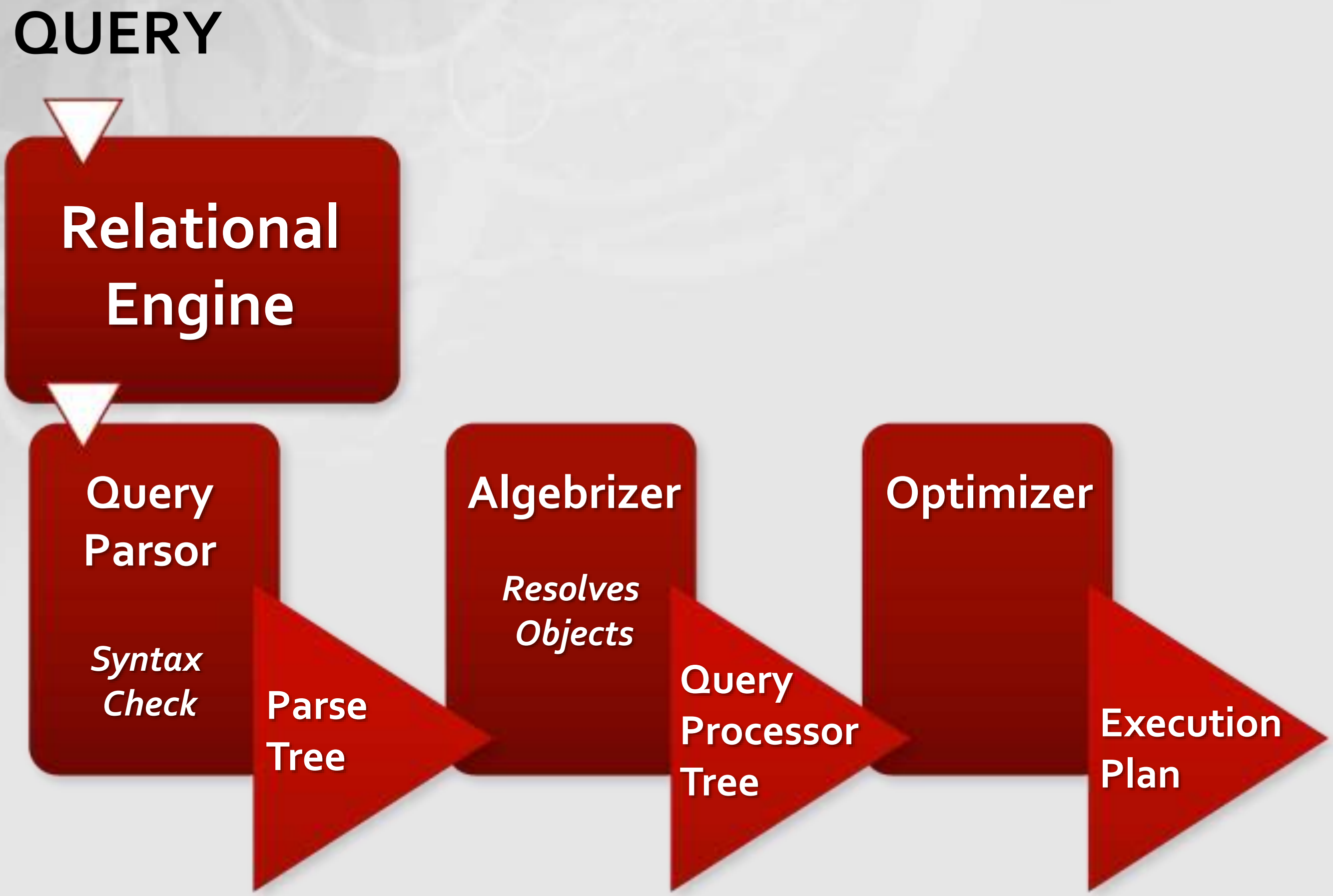
Parse Tree

Algebrizer

Resolves Objects

Query Processor Tree

Relational Engine



QUERY

Relational Engine

Query Parsor

Syntax Check

Parse Tree

Algebrizer

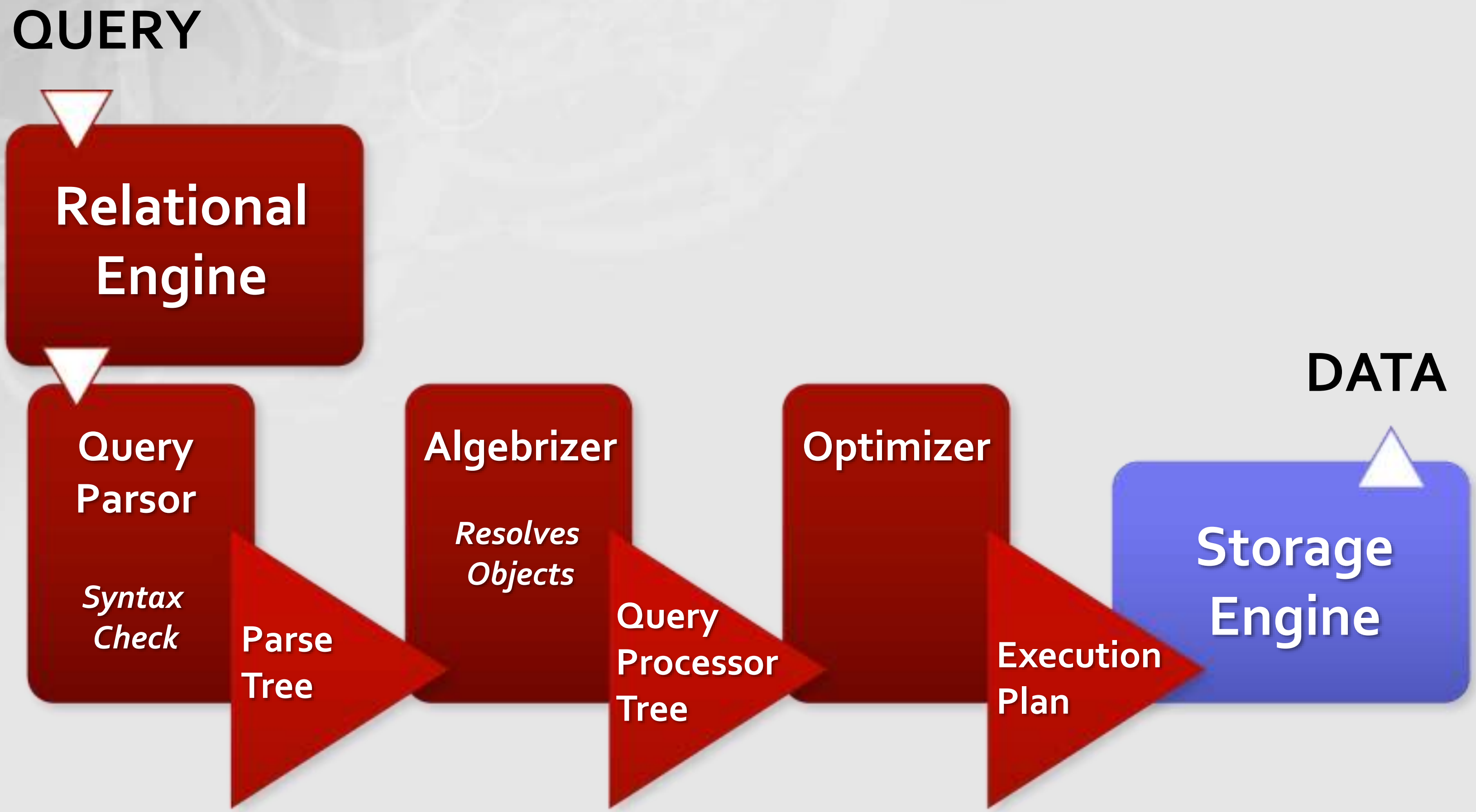
Resolves Objects

Query Processor Tree

Optimizer

Execution Plan

Relational Engine



Observing the Optimizer

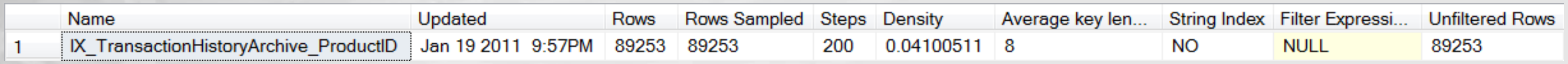
- Sys.dm_exec_query_optimizer_info
- Execution Plans

Statistics

- Information about the Distribution of the Data
  - Created on Index Keys
  - Created on columns
  - Created manually
- Cardinality
- By Default, Created Automatically
- By Default, Maintained Automatically
- Automatic Maintenance Is Not Enough

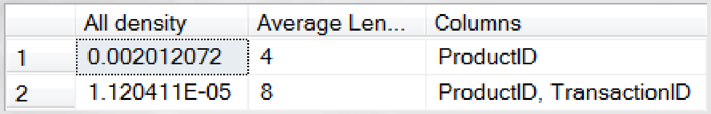
Investigating Statistics

- DBCC SHOW_STATISTICS(*table, target*)
  - » Header



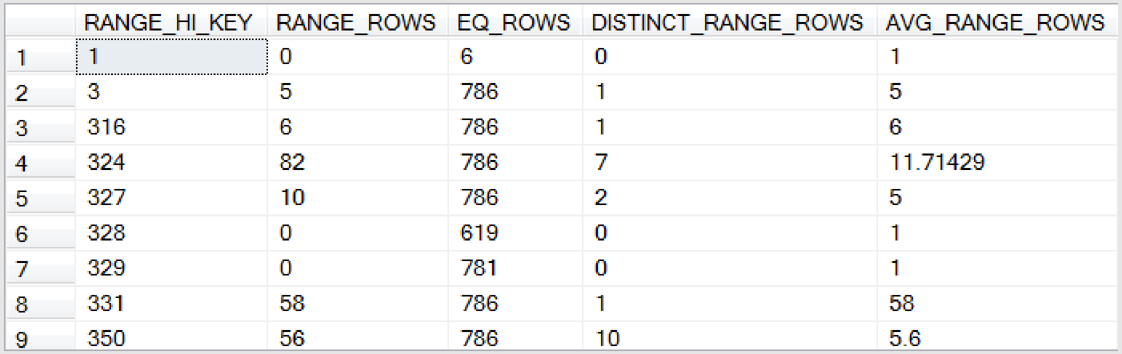
	Name	Updated	Rows	Rows Sampled	Steps	Density	Average key len...	String Index	Filter Expressi...	Unfiltered Rows
1	IX_TransactionHistoryArchive_ProductID	Jan 19 2011 9:57PM	89253	89253	200	0.04100511	8	NO	NULL	89253

  - » Density



	All density	Average Len...	Columns
1	0.002012072	4	ProductID
2	1.120411E-05	8	ProductID, TransactionID

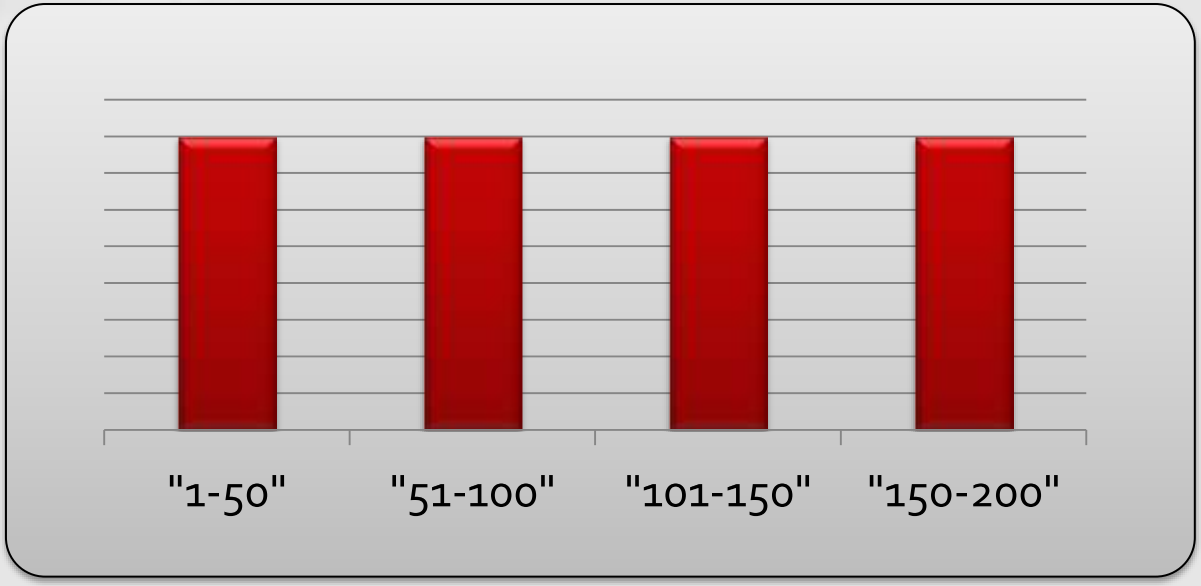
  - » Histogram



	RANGE_HI_KEY	RANGE_ROWS	EQ_ROWS	DISTINCT_RANGE_ROWS	AVG_RANGE_ROWS
1	1	0	6	0	1
2	3	5	786	1	5
3	316	6	786	1	6
4	324	82	786	7	11.71429
5	327	10	786	2	5
6	328	0	619	0	1
7	329	0	781	0	1
8	331	58	786	1	58
9	350	56	786	10	5.6

Histogram

- 200 steps across the data
- An equal distribution of rows
- Leads to best possible sampling of data
  - But it's not perfect



Updating Statistics

- sp_updatestats
  - Can resample
  - Won't run everywhere
- UPDATE STATISTICS X
  - WITH FULLSCAN

Indexes

- Clustered Index
  - Primary Key Default (but not necessary)
  - Data is stored at the leaf level
  - Data is ordered by the key
- Non-clustered Index
  - Uses cluster key or RID of a heap
  - INCLUDE stored at leaf
- And the rest – outside the scope of this session

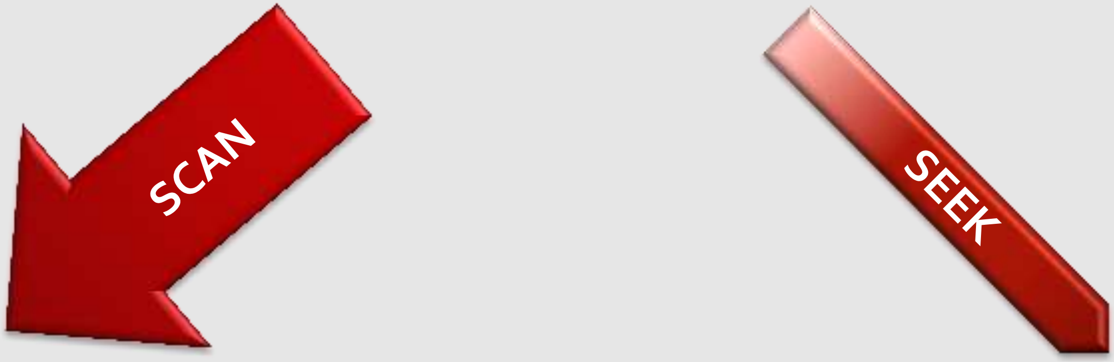
Constraints

- Primary Key
  - Cluster by default, but doesn’t have to be
  - Always an index
- Foreign Key
  - No indexes are created with this constraint
- Unique Constraint
  - This constraint is an index

What's All This Mean?

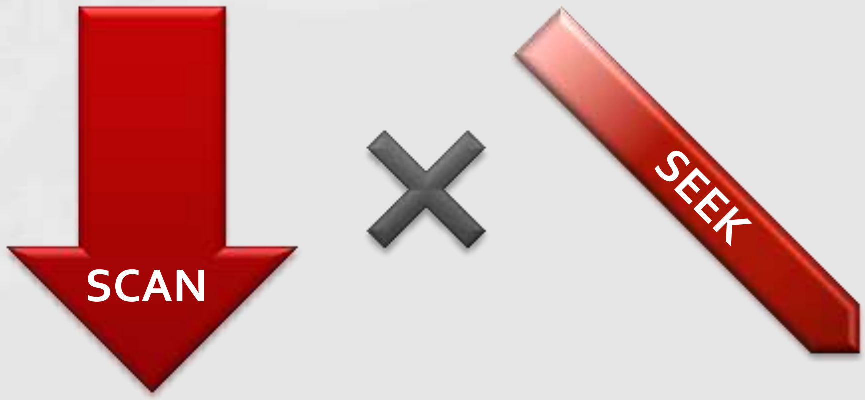
SELECT ID FROM TableA WHERE ID = 42

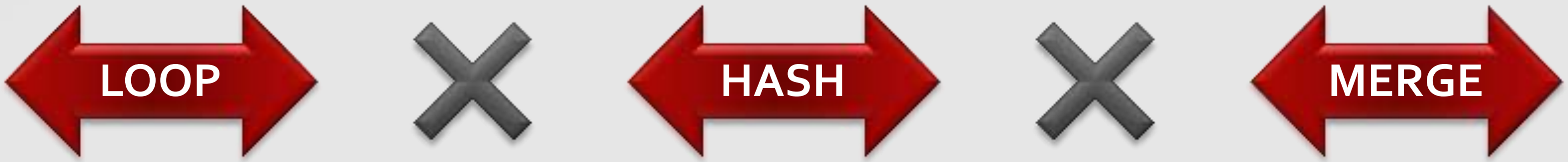
Table A			



What's All This Mean?

```
SELECT a.ID, b.Name, c.Value
FROM TableA as a
        JOIN TableB as b
            On a.ID = B.ID
        JOIN TableC as c
            ON b.OtherID = c.OtherID
WHERE a.ID = 42
```





324 Possible Plans

Finish Line

- The ability to collect performance metrics on their servers as part of an overall query tuning methodology
- An understanding of how the optimizer works in support of writing better TSQL code as well as troubleshooting poorly performing queries
- The ability to generate, read, and understand execution plans from multiple sources in support of troubleshooting poorly performing queries
- A working knowledge of DMVs that will help them identify and fix performance issues on their servers
- The ability to address common query performance problems

Optimizer Resources

- Dr. Dewitt's Key Note, PASS Summit 2010 http://www.facebook.com/l.php?u=http%3A%2F%2Fwww.slideshare.net%2FGraySystemsLab%2Fpass-summit-2010-keynote-david-dewitt&h=306f5
- "Inside SQL Server 2008 T-SQL Querying" Itzik Ben-Gan
- "SQL Server 2008 Internals" Kalen Delaney
- "Inside The Query Optimizer" Benjamin Nevarez

Speaker Rate

- http://tinyurl.com/24fgjq9