Query Store, The Good, Bad, and Ugly

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SQL Server Expert, Quest

SQL Server and DB2 domain expert with over 20 years of experience in a long list of IT related roles. Worked with SQL Server since version 6.5. has a broad and deep understanding of cloud computing, virtualization, database development and administration, performance management and storage. Currently employed as subject matter expert bringing Quest Database Performance Management solutions to life.

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Database Systems Consultant specializing in assisting customers monitor, manage, and protect their SQL Server environments. Worked with SQL Server since 2000, and has a broad understanding of SQL Server HADR, Performance Tuning, and infrastructure management.

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Agenda

- Introduction
  - Pre SQL Server 2016
  - Overview of Query Store
- The Good
  - What are the benefits of Query Store
  - How can the Query Store be used to solve real world problems
- The Bad
  - Are there any downsides to Query Store
- The Golden Solution
  - Best practices for managing the Query Store
  - Be a hero with the Query Store
- Spotlight Developer
  - FREE performance monitoring and tuning

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Available Scripts

- For a complete version of all scripts referenced in this presentation, please visit the link below:
  - https://www.quest.com/community/b/en/posts/sql-server-2016-query-store-the-good-the-bad-and-the-ugly

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Query Store Overview

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Before SQL Server 2016

How do we understand query performance?

- Traces:
  - Must be started and stopped
  - Can cause extremely high overhead
- Extended Events:
  - Considerably more events to track, but same limitations as trace
- DMV's: sys.dm_exec_query_stats, sys.dm_exec_cached_plans, etc…
  - Not organized by time
  - Most DMV's are either real time only, or since the last restart
  - Data is flushed when SQL is restarted
    - Cluster failover…

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Simplify Performance Tuning: Query Store

- New in SQL Server 2016

- Automatically captures a history of queries, plans, and runtime statistics
- Performance data is retained during a restart
- Information is aggregated over different time intervals
- Works for natively compiled procedures and in-memory OLTP queries

- Supported on all SQL Server editions
- Enabled at database level

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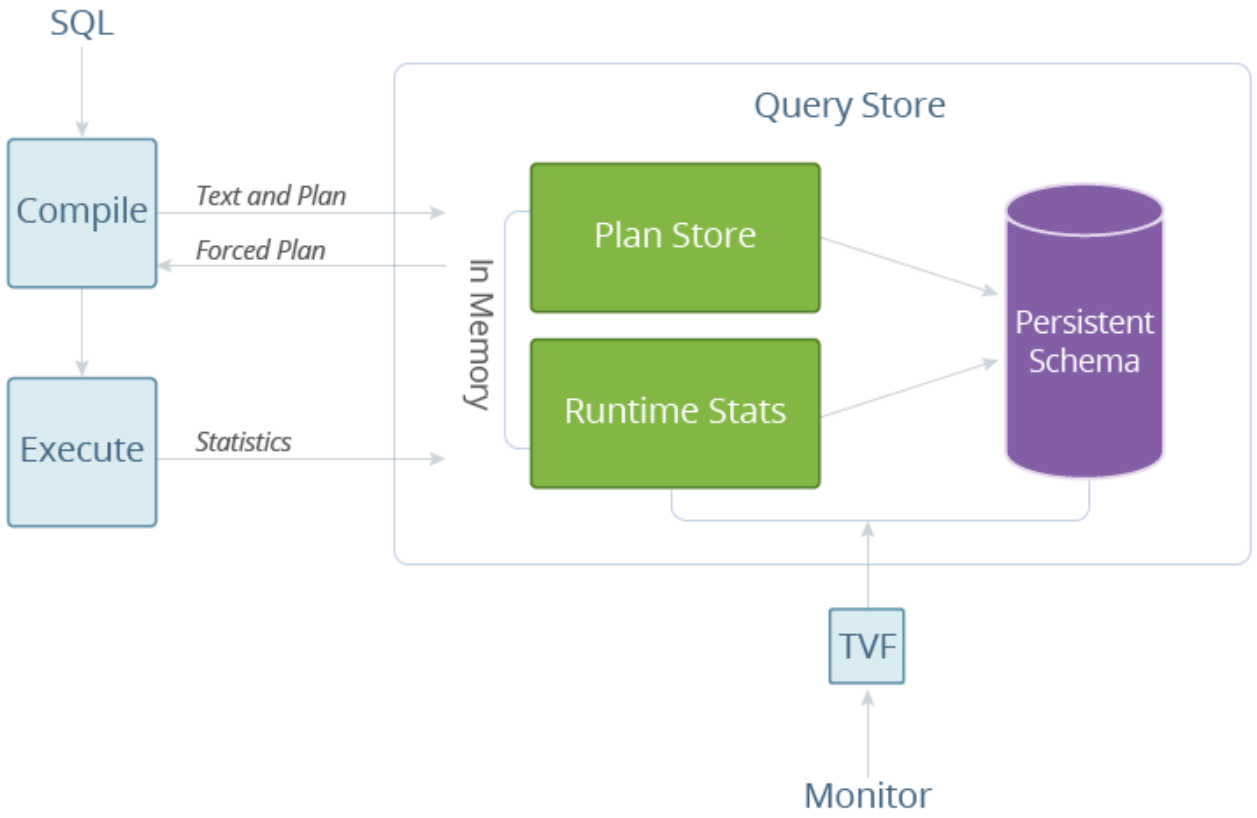
Query Store Architecture



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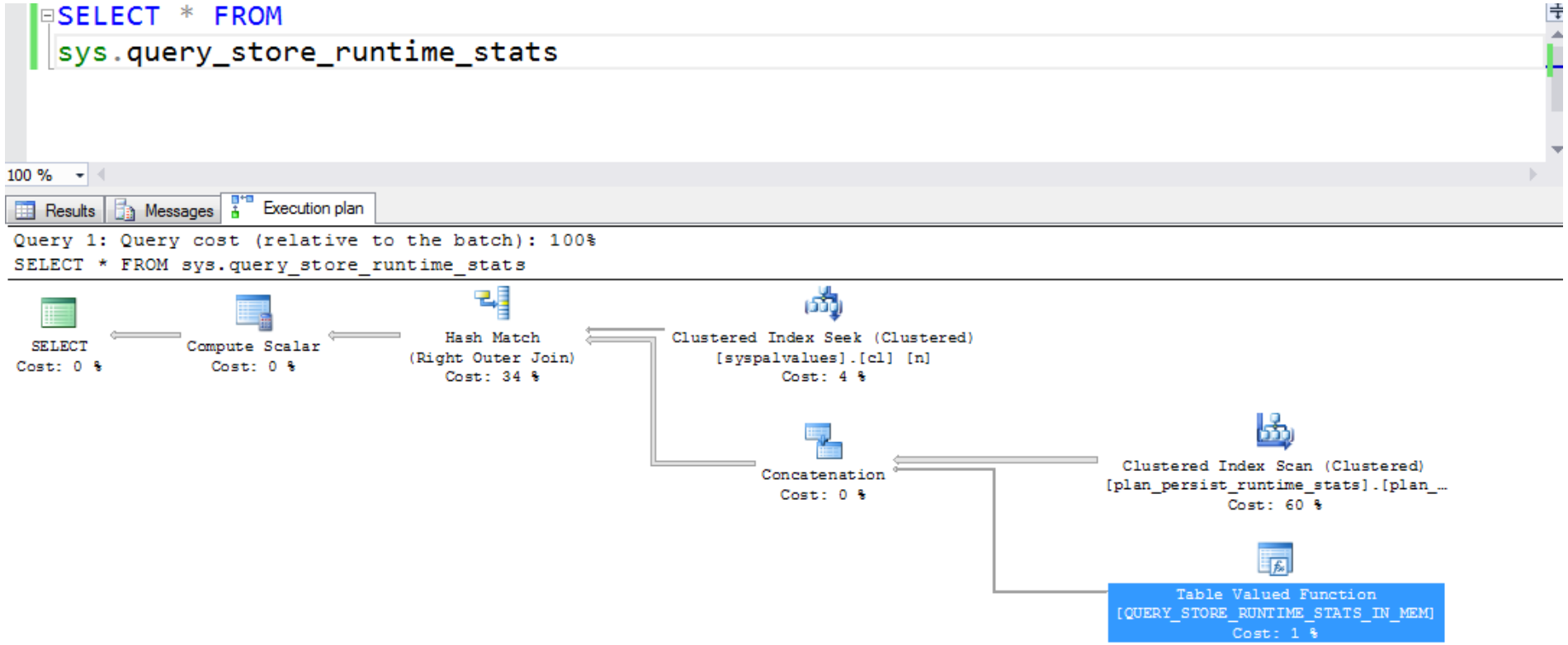
Simple Query Store Query



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Query Store (New) vs. Query Stats (Old)

Query Store	Query Stats
• Statement level • Query text given • Retain over time and restarts • Aggregate by time windows • Works for in-memory OLTP and disk-based workloads	• Batch level • Query text derived from batch text • Prune to memory shortage and restarts • No time window. Data is aggregated per batch, query and plan since it is logged and until it is evicted. • No information about in-memory OLTP without enabling sys.sp_xtp_control_query_exec_stats (Transact-SQL).

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Enable Query Store With TSQL

```
-- Enable Query Store on the database
ALTER DATABASE <database name>
SET QUERY_STORE = ON
GO

-- Configure the Query Store
ALTER DATABASE <database name> SET QUERY_STORE
(
OPERATION_MODE = READ_WRITE,
CLEANUP_POLICY = (STALE_QUERY_THRESHOLD_DAYS = 30), --number of days to retain data in the query store
DATA_FLUSH_INTERVAL_SECONDS = 900,                  --frequency at which data is persisted to disk
INTERVAL_LENGTH_MINUTES = 60,                       --interval to aggregate runtime execution statistics
MAX_STORAGE_SIZE_MB = 1024,                         --maximum size of the query store
QUERY_CAPTURE_MODE = ALL,                           --type of queries Query Store captures (all, relevant, tracked)
MAX_PLANS_PER_QUERY=5,                              --maximum number of plans maintained for each query.
SIZE_BASED_CLEANUP_MODE = AUTO                      --Controls the cleanup process
)
GO
```


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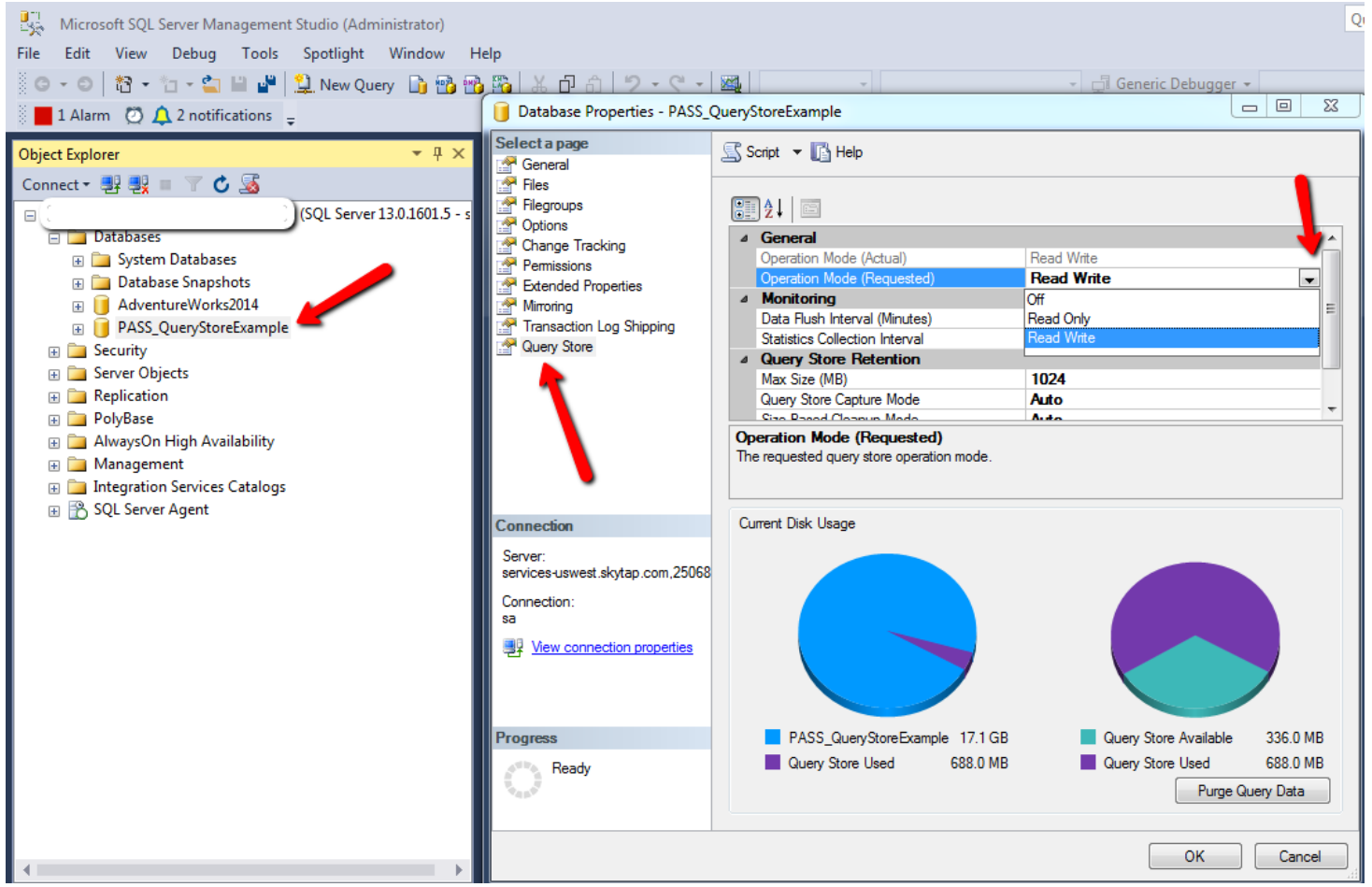
Enable Query Store with SSMS



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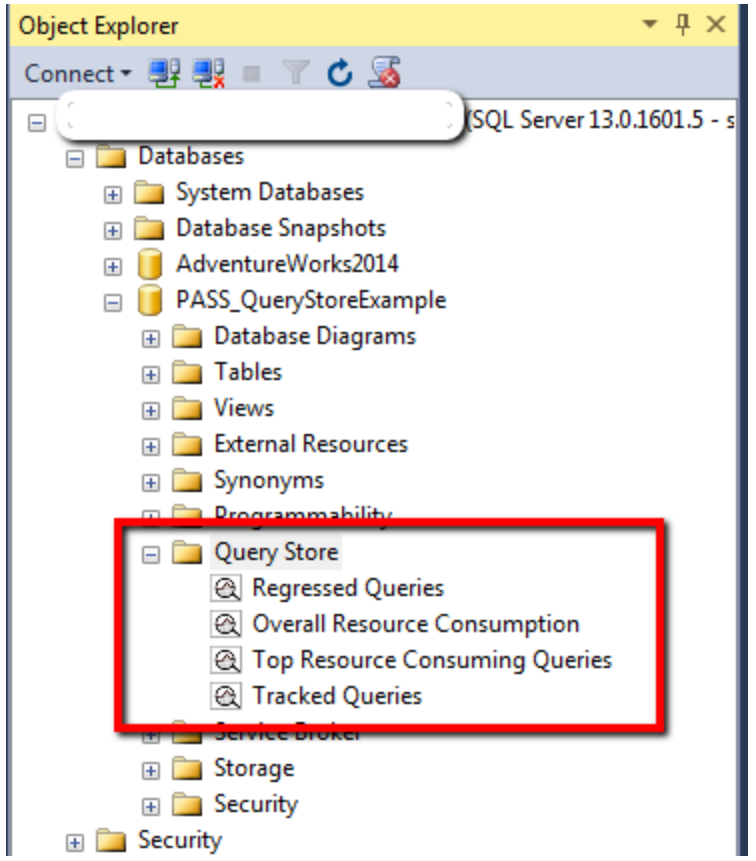
Out of the Box Reports



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Query Store Configuration Parameters

- OPERATION_MODE
  - Read only or Read/Write
- MAX_STORAGE_SIZE_MB
  - Maximum amount of space the Query Store will consume
  - When this is hit, turns read only
- INTERVAL_LENGTH_MINUTES
  - Metrics will be aggregated on this interval (default 60)
- DATA_FLUSH_INTERVAL_SECONDS
  - How often data is written to disk
- QUERY_CAPTURE MODE
  - What queries to capture (ALL, AUTO, NONE)

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The Good
Benefits of Query Store

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Query Store Use Cases

- View performance metrics broken down by time at query, plan and database level
- Audit history of query plans. Capture ALL changes to query plans.
- If a query is using a bad plan, can force it to use a better one
- Provide pre-customized views geared to support the following scenarios:
  - Find Regressed Queries
  - Show overall resource consumption during certain period
  - Find top queries by their execution time or resource consumption
  - Track specific query overtime performance

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Query Store Demo

```
-- Create table and index
CREATE TABLE Quotations
(
ID INT NOT NULL IDENTITY PRIMARY KEY CLUSTERED,
Name VARCHAR(100) NOT NULL,
Quote VARCHAR(5000) NOT NULL,
Extra VARCHAR(100),
Iteration INT  NOT NULL
)
GO
CREATE NONCLUSTERED INDEX idx_Iteration ON Quotations(Iteration)

-- Create a procedure to query data based on parameter
CREATE PROCEDURE RetrieveQuotes
(
@Value INT
)
AS
BEGIN
SELECT * FROM Quotations
WHERE Iteration <  @Value
END
GO
```


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Query Store Demo

```
-- Enable live query statistics
set statistics io on
GO
-- Query the data based on parameter that will return many rows
exec RetrieveQuotes 30000
-- now simulate restart
DBCC FREEPROCCACHE
GO
exec RetrieveQuotes 2
-- read 163 pages using index
-- now we go back to use 30000 again
exec RetrieveQuotes 30000
-- now instead of 15000 pages, there are almost 3M logical reads!
```


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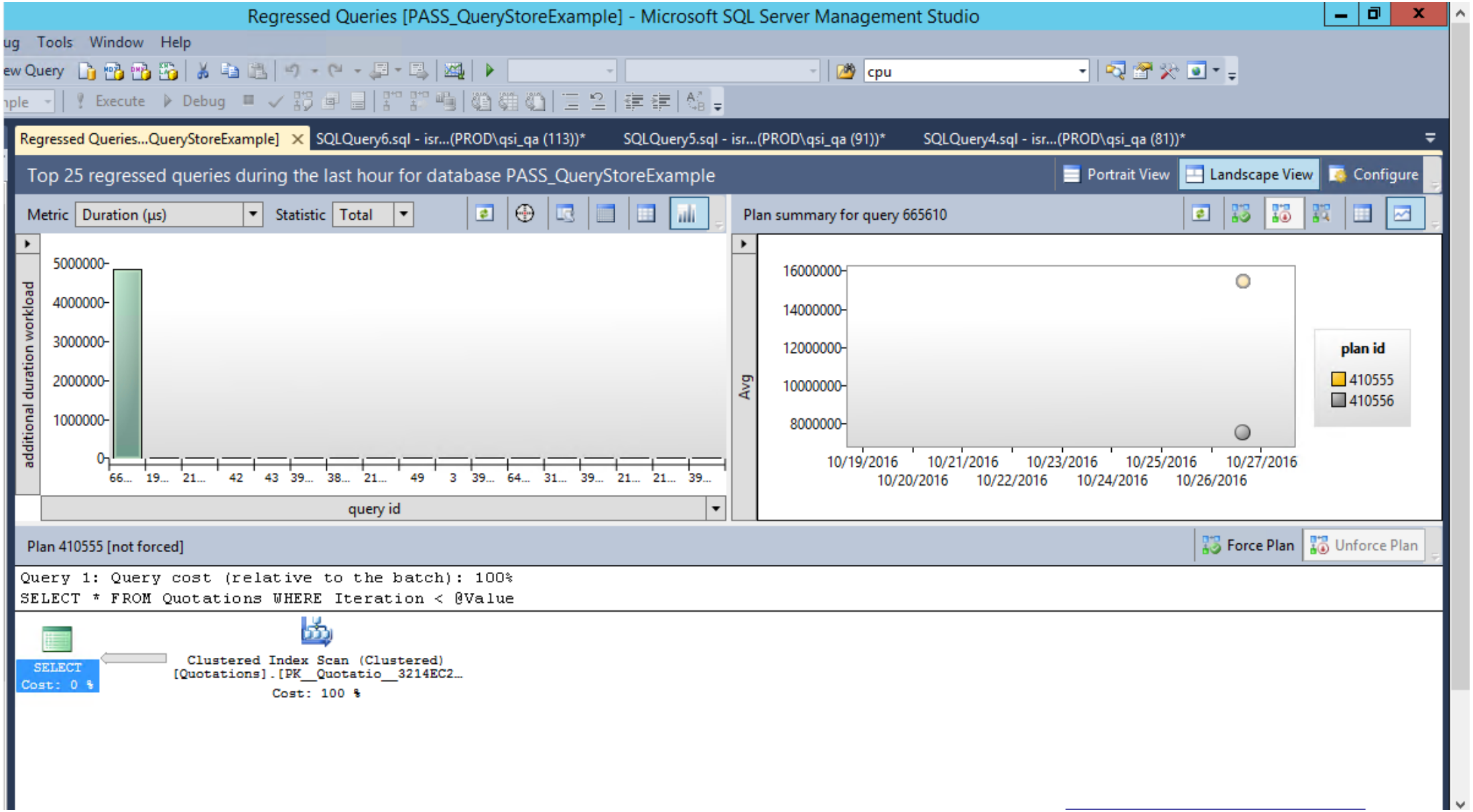
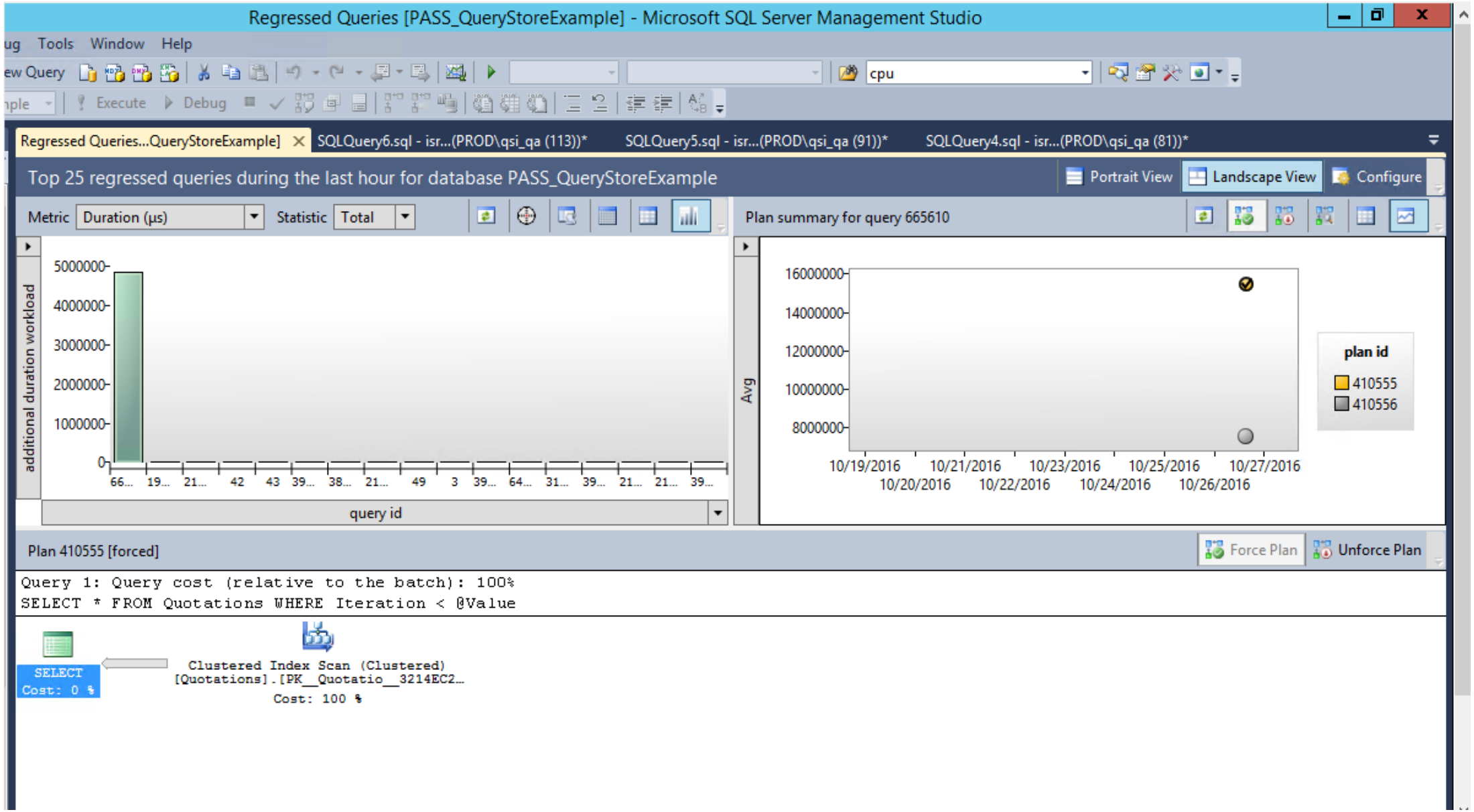

Regressed Queries [PASS_QueryStoreExample] - Microsoft SQL Server Management Studio
Tools
Window
Help
cpu
Execute
Debug
Regressed Queries...QueryStoreExample]
SQLQuery6.sql - isr...(PROD\qsi_qa (113))*
SQLQuery5.sql - isr...(PROD\qsi_qa (91))*
SQLQuery4.sql - isr...(PROD\qsi_qa (81))*
Top 25 regressed queries during the last hour for database PASS_QueryStoreExample
Portrait View
Landscape View
Configure
Metric
Duration (µs)
Statistic
Total
Plan summary for query 665610
additional duration workload
5000000
4000000
3000000
2000000
1000000
0
66...
19...
21...
42
43
39...
38...
21...
49
3
39...
64...
31...
39...
21...
21...
39...
query id
Avg
16000000
14000000
12000000
10000000
8000000
10/19/2016
10/20/2016
10/21/2016
10/22/2016
10/23/2016
10/24/2016
10/25/2016
10/26/2016
10/27/2016
plan id
410555
410556
Plan 410555 [not forced]
Force Plan
Unforce Plan
Query 1: Query cost (relative to the batch): 100%
SELECT * FROM Quotations WHERE Iteration < @Value
SELECT
Cost: 0 %
Clustered Index Scan (Clustered)
[Quotations].[PK__Quotatio__3214EC2...
Cost: 100 %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5000000
4000000
3000000
2000000
1000000
0
66...
19...
21...
42
43
39...
38...
21...
49
3
39...
64...
31...
39...
21...
21...
39...
query id
Plan summary for query 665610
Avg
16000000
14000000
12000000
10000000
8000000
10/19/2016
10/20/2016
10/21/2016
10/22/2016
10/23/2016
10/24/2016
10/25/2016
10/26/2016
10/27/2016
plan id
410555
410556
Plan 410555 [forced]
Force Plan
Unforce Plan
Query 1: Query cost (relative to the batch): 100%
SELECT * FROM Quotations WHERE Iteration < @Value
SELECT
Cost: 0 %
Clustered Index Scan (Clustered)
[Quotations].[PK__Quotatio__3214EC2…
Cost: 100 %

Query Store Benefits

- Easy to use
- Highly customizable to support various use cases and workloads
- Granular customization at database level
- Easy to manage at query level
- Automatic storage management
- Rich set of statistics and easy access enables track of many types of problems
- Embedded within the database engine ensure nothing is missed. Including SQL texts!
- Support natively compiled procedures and in-memory OLTP workload

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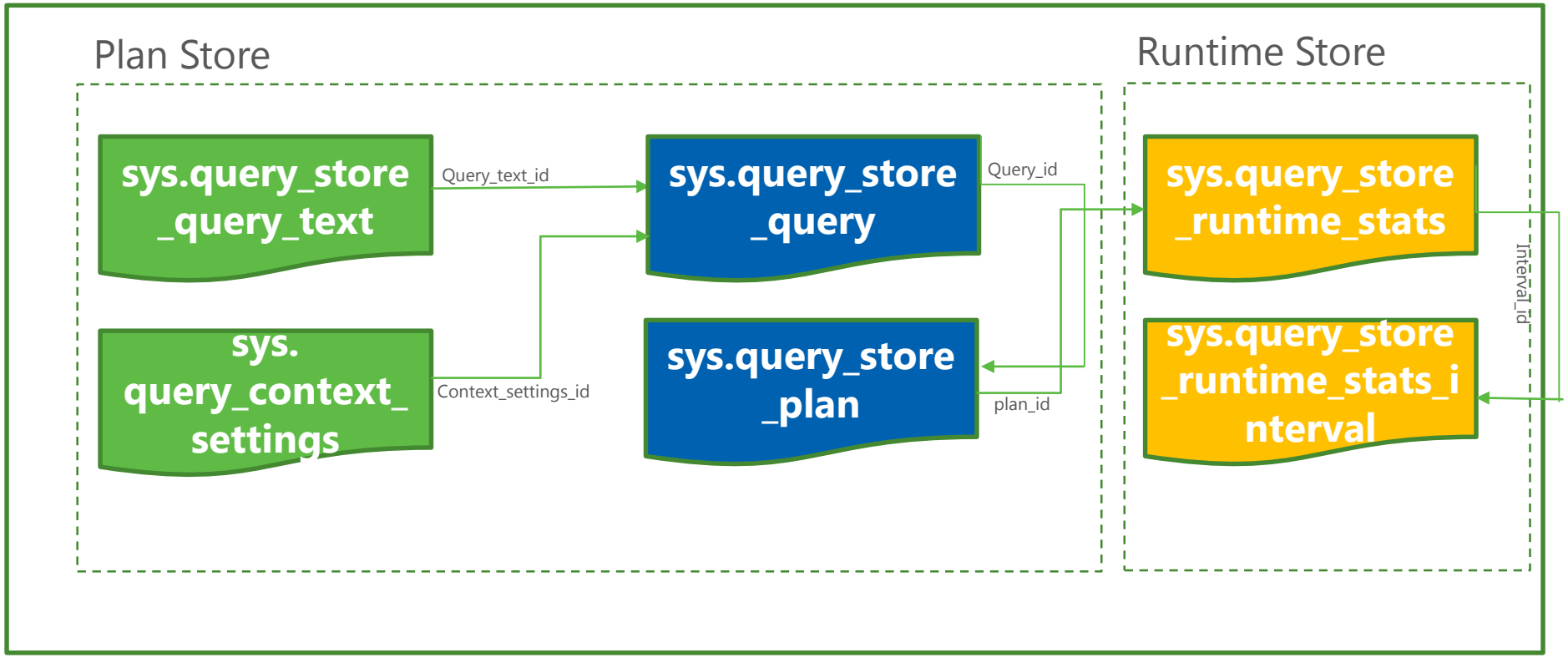
Query Store Schema



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Query Store Schema Data

Text	Query	Plan	Runtime stats
• Text id • Query text	• Query_id • Query_hash • Compile stats • Batch_sql handle • Execution Time	• plan_id • Plan xml • Compile statistics	• Resource consumption stats: CPU, memory, reads • Executions count • Status • Duration • CLR Time • Degree of Parallelism

Type of stats: avg, min, max, std, last.
For sum : avg * executions_count

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Query Store Additional Use Cases

Using Custom Queries

- Compare activity between different time frames
- Find queries that exceeds certain duration threshold
- Find frequently failed queries
- Identify queries that suffer plan instability
- Find top compile resources consumers
- Find queries that needs to be parameterized
- Find top regressed queries
- And more..

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Querying the Query Store

- Note the aggregation level and time of aggregation
- Statistics that are not yet aggregated may cause duplicates values

SQLQuery4.sql - isr...(PROD\qsi_qa (277))* | SQLQuery3.sql - isr...(PROD\qsi_qa (272))* | Regressed Queries...QueryStoreExample]

```
select plan_id,runtime_stats_interval_id,execution_type,max(first_execution_time),max(last_execution_time),count(*)
from sys.query_store_runtime_stats
group by plan_id,runtime_stats_interval_id,execution_type
having count(*) > 1
```

100 %

Results | Messages

	plan_id	runtime_stats_interval_id	execution_type	(No column name)	(No column name)	(No column name)
1	151	102	0	2016-10-22 15:01:09.1600000 +00:00	2016-10-22 15:28:46.8600000 +00:00	15
2	238	102	0	2016-10-22 15:02:25.8770000 +00:00	2016-10-22 15:28:44.4970000 +00:00	1290
3	2088	102	0	2016-10-22 15:01:40.6730000 +00:00	2016-10-22 15:22:18.3900000 +00:00	2
4	322946	102	0	2016-10-22 15:03:53.5770000 +00:00	2016-10-22 15:20:44.9300000 +00:00	2
5	1522	102	0	2016-10-22 15:03:44.8030000 +00:00	2016-10-22 15:26:43.4230000 +00:00	7
6	3478	102	0	2016-10-22 15:03:53.5270000 +00:00	2016-10-22 15:25:58.8500000 +00:00	3
7	526	102	0	2016-10-22 15:01:13.3330000 +00:00	2016-10-22 15:28:12.8330000 +00:00	7
8	952	102	0	2016-10-22 15:01:26.1130000 +00:00	2016-10-22 15:28:18.1970000 +00:00	7
9	429	102	0	2016-10-22 15:01:14.9370000 +00:00	2016-10-22 15:28:27.0000000 +00:00	11
10	2366	102	0	2016-10-22 15:01:20.5700000 +00:00	2016-10-22 15:24:13.3870000 +00:00	8

Query executed successfully. | isrvmn805\x64_2016_yr (13.0... | PROD\qsi_qa (277) | PASS_QueryStoreExample | 00:00:34 | 757 rows

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The Bad
Limitations of Query Store

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Query Store Enabled at Database Level

- Cannot be enabled for master and tempdb
- Does not work on Read Only databases
  - No read only AG replicas
- No way to set an instance default
  - Must be enabled for new instances
- Multiple DBA’s could change capture mode, hard to track
- No way to globally control configuration
  - Without manual scripting

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Space Consumption Must be Managed

- When Query Store reaches capacity, turns read only
  - May not have it when you need it most
- Balancing act between space consumed and history required
- Data is stored to primary filegroup
  - IO contention with user data
  - Longer database restores

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How Much Disk Space is Required

- **Configuration Parameters**
  - INTERVAL_LENGTH_MINUTES (60) - 1, 5, 10, 15, 30, 60, 1440
  - MAX_STORAGE_SIZE_MB (100) - Maximum size of the query store
  - QUERY_CAPTURE_MODE (ALL) - ALL/AUTO/NONE
  - MAX_PLANS_PER_QUERY (200) - 0 is no limit
  - CLEANUP_POLICY (367) - 0 to disable
  - SIZE_BASED_CLEANUP_POLICY - AUTO or OFF

- **Database Workload**
  - Number of different query texts
  - Using non-parameterized queries can cause excessive “similar” queries

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Little Context: How Was Query Run?

- Query Store provides detailed metrics about query performance
- Little information is provided about context
  - Who ran a particular query
  - Which programs and/or servers did the queries execute from
- Useful for general performance tuning, not for finger pointing

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Execution Plan “Pinning”, Good or Bad

- “Pinning” an execution plan may provide a quick fix
  - Fix may be temporary
- What if the schema changed?
- What if your query changes slightly?
- What if the data volumes change?
- What if significant time has passed?
- Worry about overly “pinned” systems degrading over time

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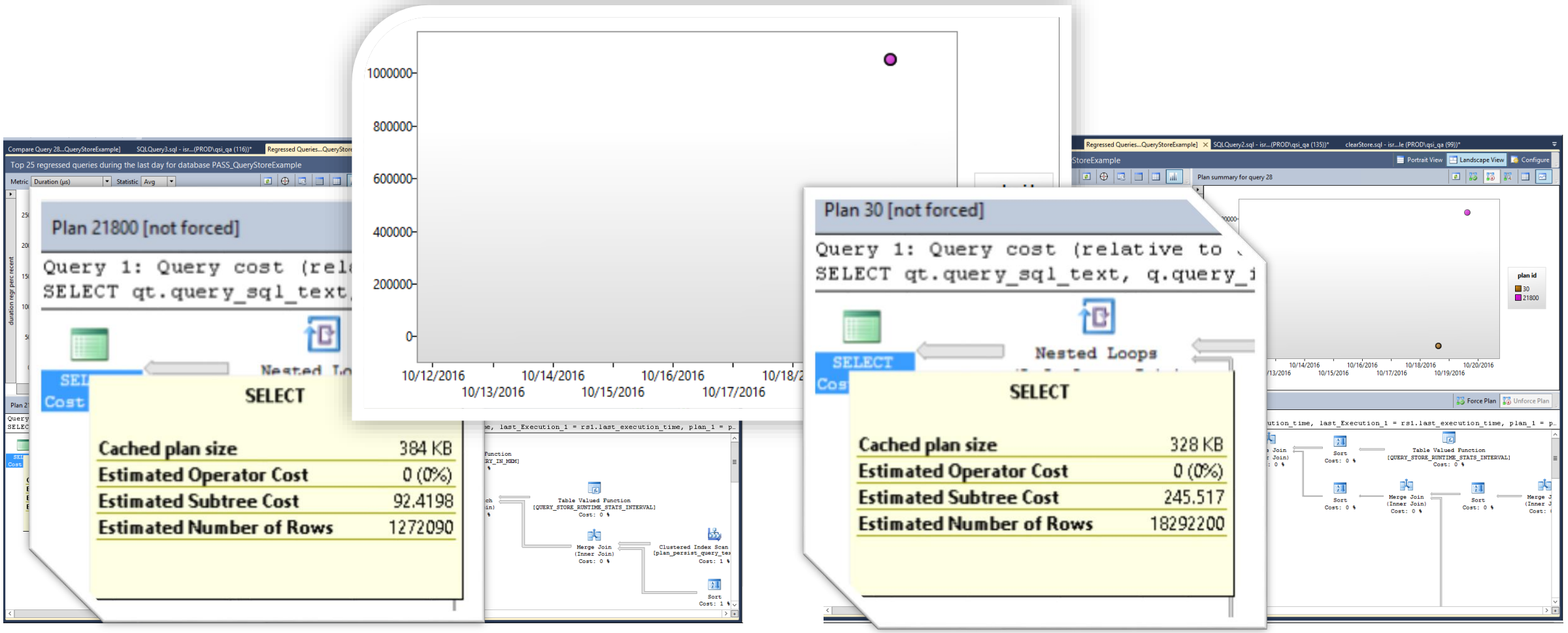
Plan Forcing – A Good Thing?



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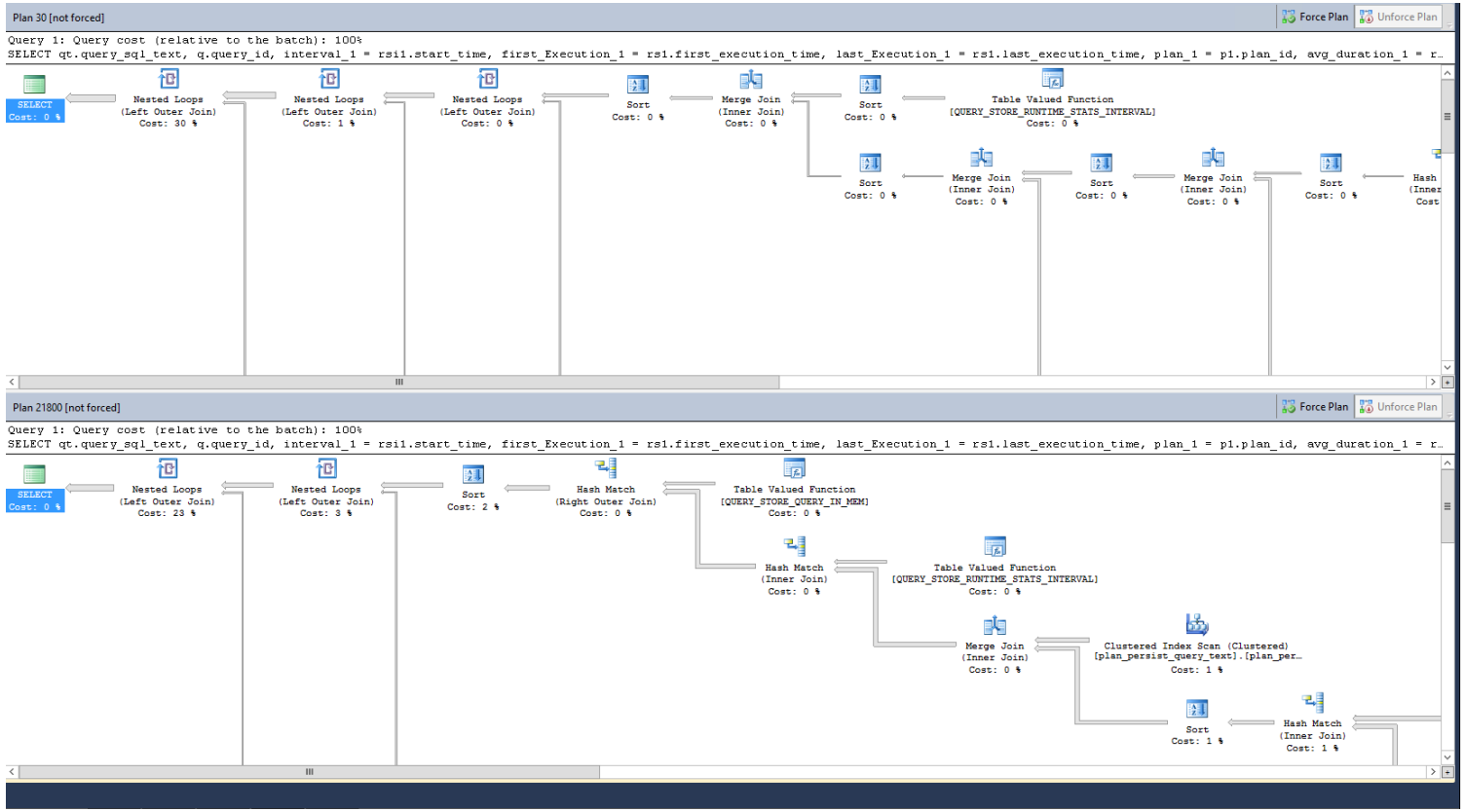
Plan Compare



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Overhead?

- Configuration Parameters
  - Length of interval controls frequency of aggregations and amount of rows in table
  - Frequency of cleans
  - Capture mode control amount of queries to capture
  - Flush interval control amount of memory used
- Database Workload
  - Amount of different query texts and use of parameterization
- Query Store usage
  - Amount of queries run against the store and their type

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Monitor – Perfmon Counters

Host and DB

```
Memory\% Committed Bytes In Use
MSSQL$X64_2016_YR:Buffer Manager\Page life expectancy
MSSQL$X64_2016_YR:Buffer Manager\Page lookups/sec
MSSQL$X64_2016_YR:Buffer Manager\Page reads/sec
MSSQL$X64_2016_YR:Buffer Manager\Page writes/sec
MSSQL$X64_2016_YR:Transactions\Transactions
PhysicalDisk(_Total)\Disk Transfers/sec
Processor(_Total)\% Processor Time
```

Query Store

```
:Query Store(_Total)\Query Store CPU usage
:Query Store(_Total)\Query Store logical reads
:Query Store(_Total)\Query Store logical writes
:Query Store(_Total)\Query Store physical reads
```


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Informal Performance Benchmark

- Use Benchmark factory to run TPC-E like workload.
- 150 Users. Database scale 1 (around 10GB)
- Same machine – windows 2012, 4 CPUs , 8GB RAM, VM
- Duration – 30 minutes
- With Query Store and without
- Capture mode is ALL
- Use perfmon data set collector to monitor
- SQL Server version is CTP3.2

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Performance Benchmark Summary

Type	%ProcessorTime	Query Store CPU Usage	Disk Transfer/s	Query Store Physical Reads	%Comitted Bytes in Use	Page Writes/s	Query Store logical Writes
Without QS	64.22%	-	489.811	-	81%	128.6 (max 737)	-
With QS	81.2%	20.752	683.478	13.705 (max 211)	85%	142.7 (max 629)	34.6

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Monitor Waits and Extended Events

Extended Events

name	description
query_store_failed_to_capture_query	Fired if the Query Store failed to capture query. The Query Store will not track statistics for this query
query_store_failed_to_load_forced_plan	Fired if the query failed to load forced plan from Query Store. Forcing policy will not be applied
query_store_failed_to_find_resource_group	Fired when Query Store resource group is not initialized
query_store_persist_on_shutdown_failed	Occurs when SQL Server fails to store dirty entries in Query Store on database shutdown.
query_store_begin_persist_runtime_stat	Fired immediately before current runtime statistics for a query plan is persisted to the database.
query_store_execution_runtime_info	Fired when runtime information is sent to the Query Store.
query_store_execution_runtime_info_discarded	Fired when runtime information sent to the Query Store is discarded.
query_store_execution_runtime_info_evicted	Fired when runtime information sent to the Query Store is evicted.
query_store_statement_not_found	Fired in case when statement couldn't be found due to race condition or ambiguous user request.
query_store_plan_forcing_failed	Occurs when forcing of plan from Query Store fail
query_store_background_task_creation_failed	Fired if the background processing task for Query Store could not be created
query_store_background_task_initialization_failed	Fired if the background processing task for Query Store could not be initialized
query_store_background_task_persist_started	Fired if the background task for Query Store data persistence started execution
query_store_background_task_persist_finished	Fired if the background task for Query Store data persistence is completed successfully
query_store_background_task_persist_failed	Fired if the background task for Query Store data persistence is not completed successfully
query_store_disk_size_info	Fired when a check against Query Store on-disk size is performed
query_store_disk_size_check_failed	Fired when a check against Query Store on-disk size limit fails
query_store_stmt_hash_map_over_memory_limit	Fired when Query Store statement hash map memory size grows over allowed memory limit

Waits

wait_type	wait_time_ms
QDS_DYN_VECTOR	0
QDS_STMT	0
QDS_CTXS	0
QDS_BCKG_TASK	0
QDS_DB_DISK	0
QDS_STMT_DISK	0
QDS_ASYNC_PERSIST_TASK	0
QDS_LOADDB	0
QDS_ASYNC_PERSIST_TASK_START	0
QDS_ASYNC_CHECK_CONSISTENCY_TASK	0
QDS_TASK_START	3
QDS_PERSIST_TASK_MAIN_LOOP_SLEEP	621810742
QDS_TASK_SHUTDOWN	0
QDS_SHUTDOWN_QUEUE	0
QDS_EXCLUSIVE_ACCESS	0
QDS_CLEANUP_STALE_QUERIES_TASK_MAIN_LOOP_SLEEP	0
QDS_ASYNC_QUEUE	0
QDS_BLOOM_FILTER	0
QDS_QDS_CAPTURE_INIT	0

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Other Limitations

- Queries with multiple literal values, multiple entries
- Queries that access multiple databases
- Linked server queries, only logged in source
- No information provided related to waits
- One time interval – difficult to see information for large time frames
- Cumbersome to write queries against the store

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Be A Hero
The Query Store Sweet Spot

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Know the Sweet Spot

- Before rolling a major change to production
  - Ensure no errors
  - Tune high resource usage queries
- Before and After a major change to hardware or software versions
  - To compare performance trend and resource usage
  - To ensure no query has regressed
- Keep performance stability during the upgrade to SQL Server 2016
  - Upgrade to 2016 but set compatibility level to version before upgrade
  - Enable query store to capture baseline
  - Change compatibility level to 130
  - Examine changes and find regressed queries

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Share Results Gathered by Query Store

```
-- Compare top statements by duration over period of 2 days
Declare @history_end_time datetimeoffset(7),
@history_start_time datetimeoffset(7),
@results_row_count int = 1000;

set @history_end_time = GETUTCDATE();
set @history_start_time = DATEADD(day, -2, GETUTCDATE());

with stats as(
    SELECT         p.query_id query_id,
                rs.runtime_stats_interval_id,
                CONVERT(float, SUM(rs.avg_cpu_time*rs.count_executions)) total_cpu_time,
                 CONVERT(float, SUM(rs.avg_duration*rs.count_executions)) total_duration,
                 CONVERT(float, SUM(rs.avg_logical_io_writes*rs.count_executions)) total_logical_io_writes,
                 CONVERT(float, SUM(rs.avg_logical_io_reads*rs.count_executions)) total_logical_io_reads,
                 CONVERT(float, SUM(rs.avg_query_max_used_memory*rs.count_executions)) total_query_max_used_memory,
                 CONVERT(float, SUM(rs.avg_physical_io_reads*rs.count_executions)) total_physical_io_reads,
                 SUM(rs.count_executions) count_executions,
                AVG(rs.avg_duration) avg_duration,
                row_number() over (partition by runtime_stats_interval_id order by SUM(rs.avg_duration*rs.count_executions) desc) as row#
    FROM sys.query_store_runtime_stats rs
        JOIN sys.query_store_plan p ON p.plan_id = rs.plan_id
    WHERE NOT (rs.first_execution_time > @history_end_time OR rs.last_execution_time < @history_start_time) and execution_type = 0
    GROUP BY rs.runtime_stats_interval_id,p.query_id
)
select *
from stats
where row# <= 10
```


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Results | Messages

	query_id	runtime_stats_interval_id	total_cpu_time	total_duration	total_logical_io_writes	total_logical_io_reads	total_query_max_used_memory	total_physical_io_reads	count_executions	avg_duration	row#
1	7	319	115019	141012	7	3919	0	0	86	1639.67441860465	1
2	10	319	6936	6936	0	189	0	0	7	990.857142857143	2
3	7	320	109958	148964	4	3660	0	0	83	1794.74698795181	1
4	665659	320	15982	94005	0	966	792	97	3	31335	2
5	10	320	7999	7999	0	189	0	0	7	1142.71428571429	3
6	12	320	999	999	0	44	0	0	1	999	4
7	11	320	0	0	0	0	0	0	1	0	5
8	7	321	116955	147946	4	3748	0	0	85	1740.54117647059	1
9	665659	321	13999	22003	0	849	792	36	3	7334.33333333333	2
10	10	321	7996	9997	0	189	0	0	7	1428.14285714286	3
11	12	321	1999	1999	0	44	0	0	1	1999	4
12	11	321	0	0	0	0	0	0	1	0	5
13	7	322	113905	140903	5	3840	0	0	87	1619.57471264368	1
14	665659	322	20013	100007	0	849	792	34	3	33335.6666666667	2
15	10	322	7989	7989	0	189	0	0	7	1141.28571428571	3
16	12	322	3999	3999	0	132	0	0	3	1333	4
17	11	322	0	0	0	0	0	0	3	0	5
18	665659	323	22995	504026	0	849	792	95	3	168008.666666667	1
19	7	323	112947	123948	1	3786	0	0	86	1441.25581395349	2
20	10	323	6985	7984	0	189	0	0	7	1140.57142857143	3
21	12	323	4000	4000	0	88	0	0	2	2000	4
22	11	323	1000	1000	0	0	0	0	2	500	5
23	7	324	124982	141984	5	3867	0	0	85	1670.4	1
24	665659	324	17999	35998	0	849	792	18	3	11999.3333333333	2
25	10	324	5986	10987	1	191	0	0	7	1569.57142857143	3
26	12	324	1000	1000	0	44	0	0	1	1000	4
27	11	324	0	0	0	0	0	0	1	0	5
28	665659	325	22988	274016	0	849	792	36	3	91338.6666666667	1
29	7	325	127952	146956	14	3761	0	0	85	1728.89411764706	2
30	10	325	8990	8990	0	189	0	0	7	1284.28571428571	3
31	12	325	1999	1999	0	44	0	0	1	1999	4
32	11	325	0	0	0	0	0	0	1	0	5
33	665659	326	16000	180018	0	849	792	36	3	60006	1
34	7	326	127980	145982	7	3838	0	0	87	1677.95402298851	2
35	39	326	0	23996	0	20	128	2	1	23996	3
36	10	326	7995	8996	0	189	0	0	7	1285.14285714286	4
37	38	326	4999	4999	0	35	128	31	1	4999	5
38	12	326	3993	3993	1	134	0	0	3	1331	6
39	11	326	0	0	0	0	0	0	3	0	7

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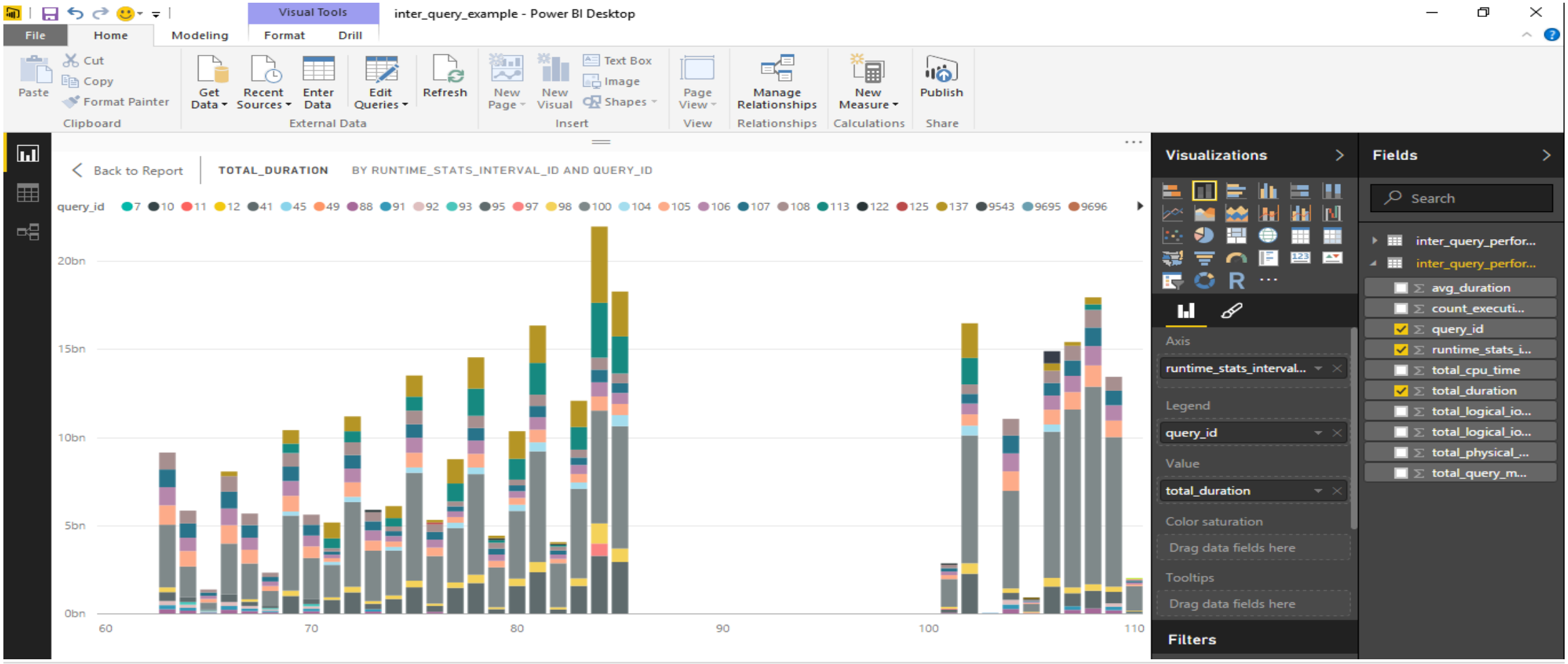
View Results with Power BI



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Best Practices

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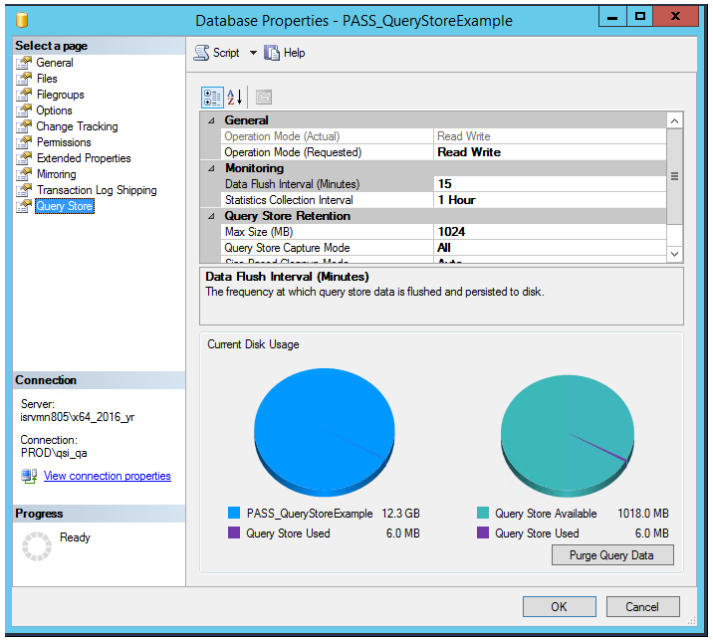
Monitor Query Store Size

T-SQL

```
SELECT
current_storage_size_mb,
max_storage_size_mb ,
current_storage_size_mb*100
/max_storage_size_mb as
query_store_utilization

FROM
sys.database_query_store_op
tions;
```

SSMS



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Monitor Query Store Collection State

```
Select desired_state_desc,actual_state_desc,readonly_reason
FROM sys.database_query_store_options;
```

1 – database is in read-only mode

2 – database is in single-user mode

4 – database is in emergency mode

8 – database is secondary replica

65536 – the Query Store has reached the size limit set by the MAX_STORAGE_SIZE_MB option.

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Pay Attention to Capture Mode

- CAPTURE_MODE control the type and amount of queries Query Store will monitor
  - All
  - Auto – only capture information about top queries in term of resource usage. Ignore infrequent queries
  - None – will not gather information about new queries.
- Change Capture Mode according to scenario
- Can monitor via the sys.database_query_store_options

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Avoid Using Non-Parameterized Queries

- Non parameterized queries waste compile resources and cause more resources to be consumed by query store
- Use query provided above to track such queries
- Possible fixes
  - Replace ad-hoc queries with stored procedure if possible
  - Use forced parameterization

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Verify Status of Forced Plans

```
select plan_id,
   query_id,
   force_failure_count,
   last_force_failure_reason_desc
from sys.query_store_plan
where is_forced_plan > 0 and force_failure_count > 0
```


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Avoid DROP and CREATE for Database Objects

- Query id is calculated based on text and containing object id
- When containing object is recreated, a new query will be generated for the same text
- Limits the ability to track query performance over time
- Use more space
- Use ALTER instead

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Summary

- Query Store is a great resource for performance tuning
- Use it with care
- Share the use cases!

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References

- https://msdn.microsoft.com/en-us/library/dn817826.aspx
- https://msdn.microsoft.com/en-us/library/mt668803.aspx
- http://www.sqlpassion.at/archive/2016/01/18/performance-troubleshooting-with-the-query-store-in-sql-server-2016/
- https://www.simple-talk.com/sql/database-administration/the-sql-server-2016-query-store-analyzing-query-store-performance/

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Thank You
Q&A???

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Database Performance Management Tools

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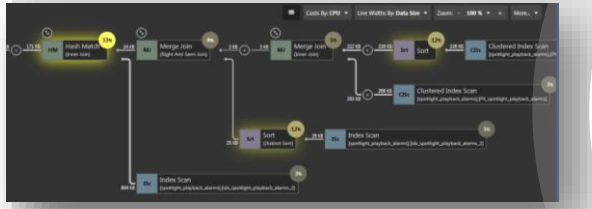
Database Performance Management

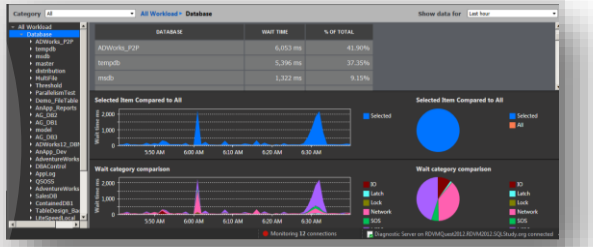
Any Time …… Any where

SQL Tuning



Faster Code

Workload Tuning



Optimized workload

On Premise … Cross Platform … Hybrid … Cloud

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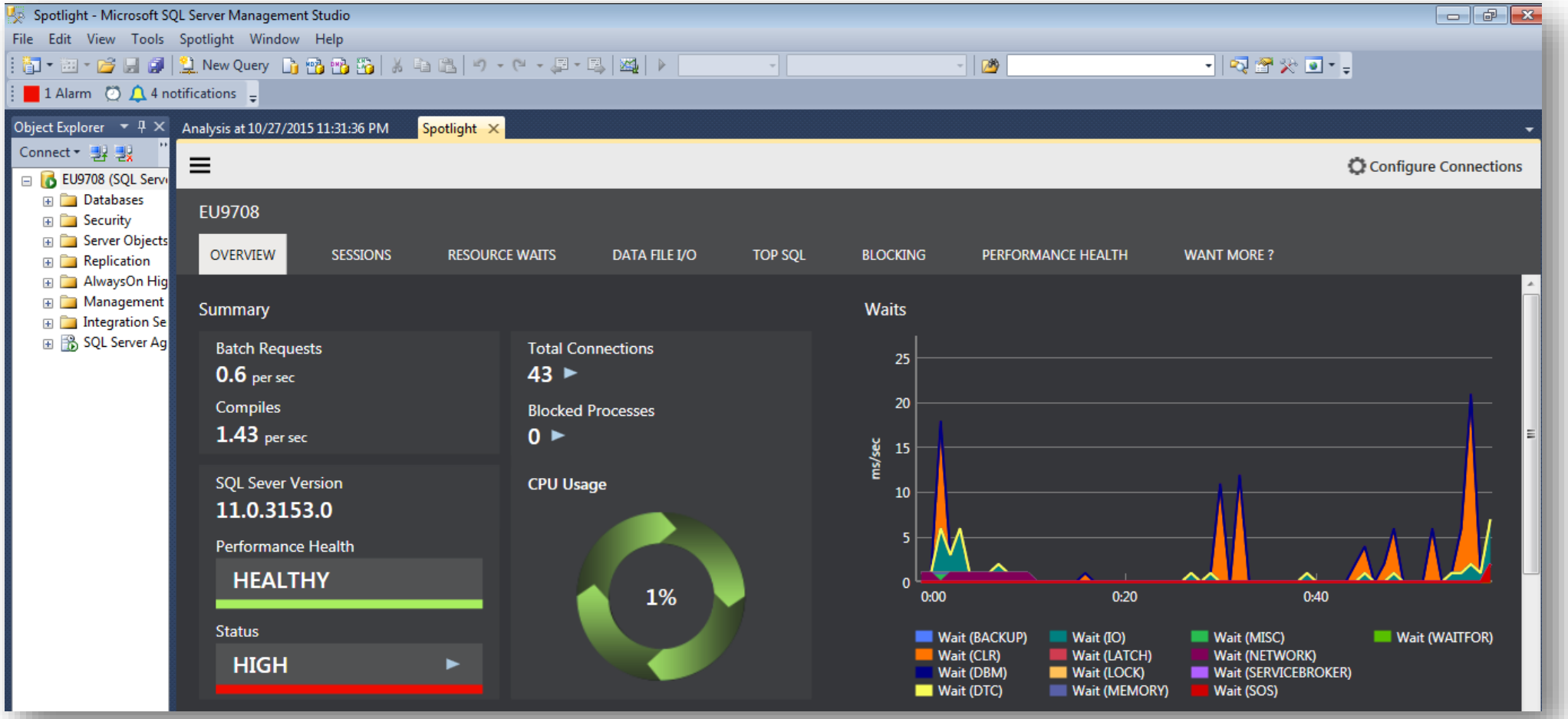
Free Diagnostics



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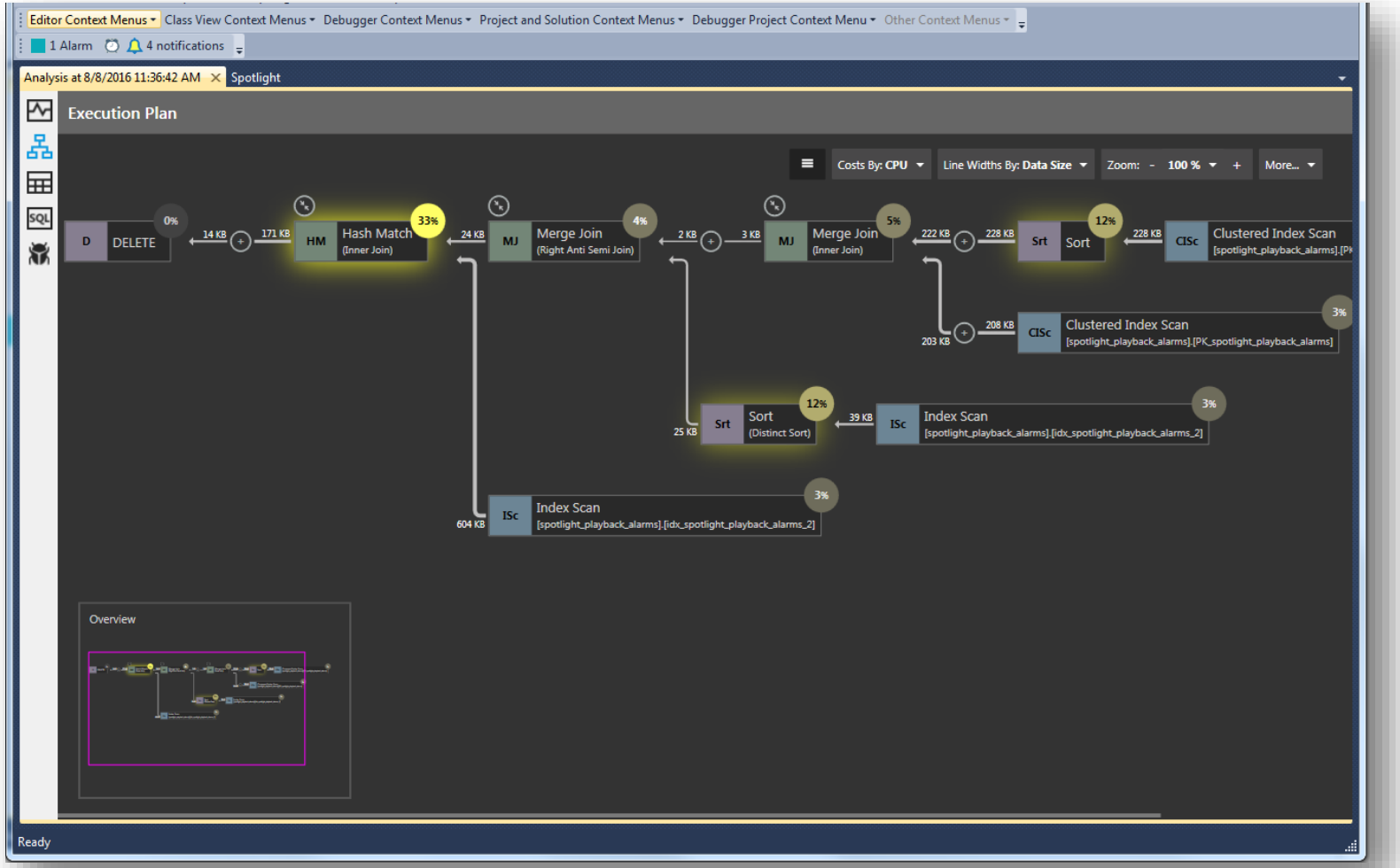
Free Plan Viewer



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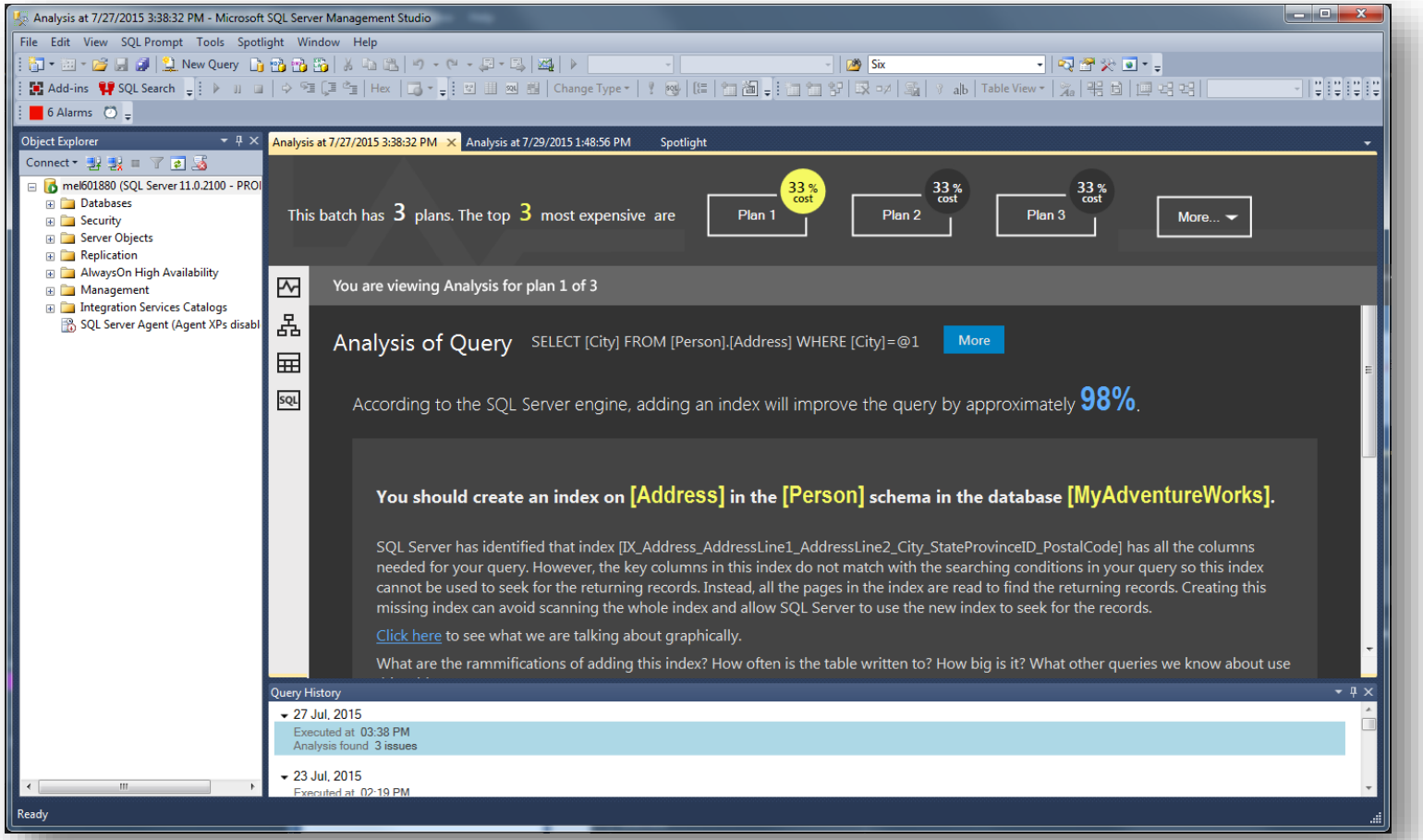
Free Plan Analysis



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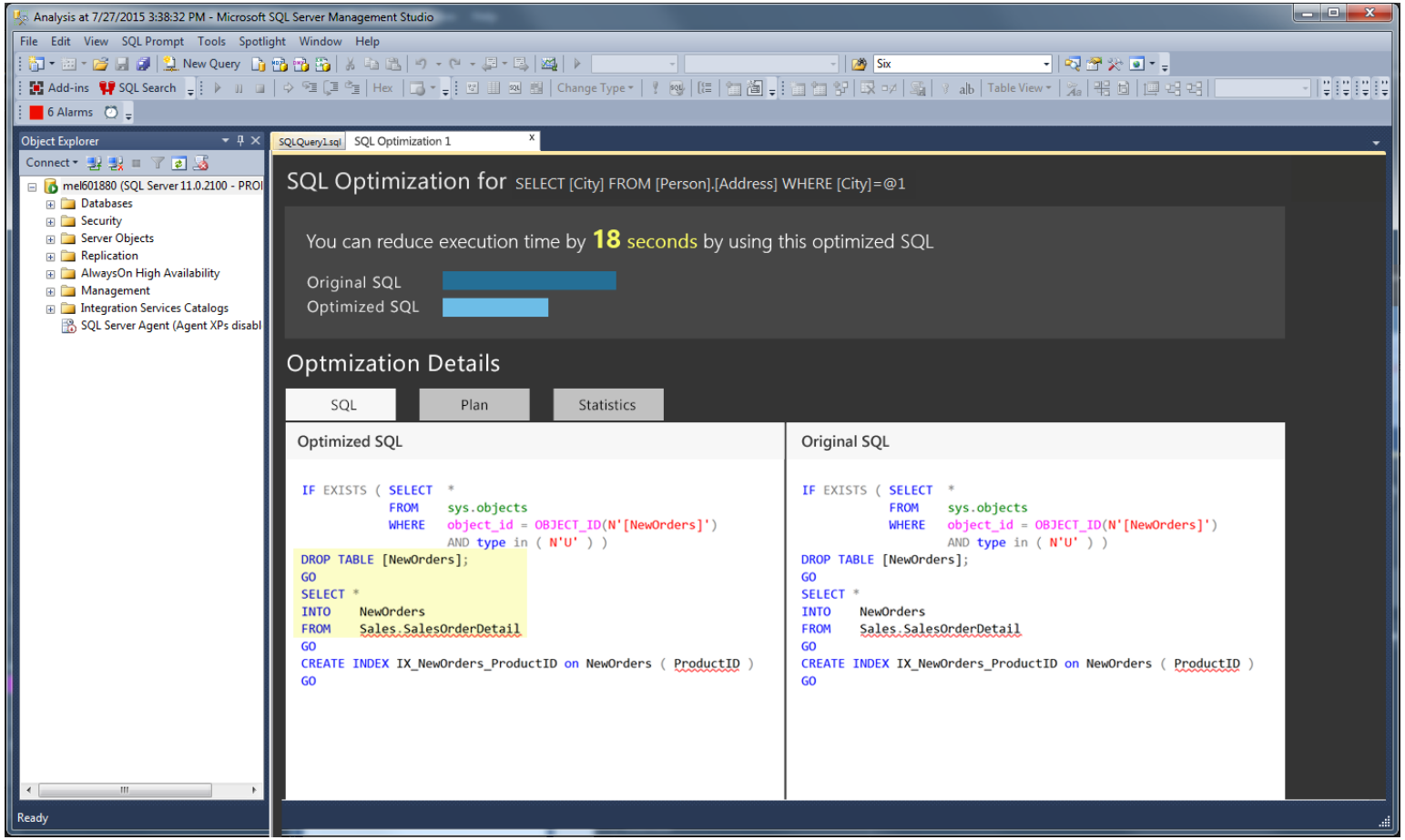
SQL Optimization



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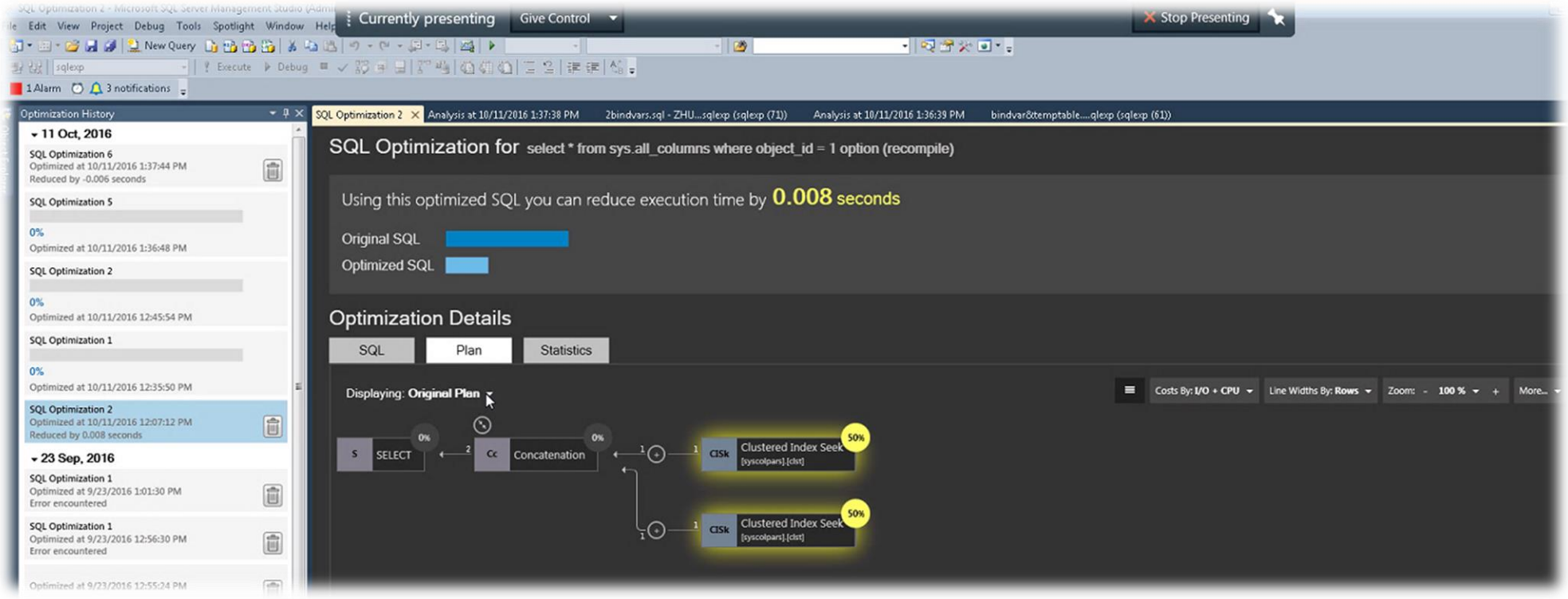
SQL Optimization



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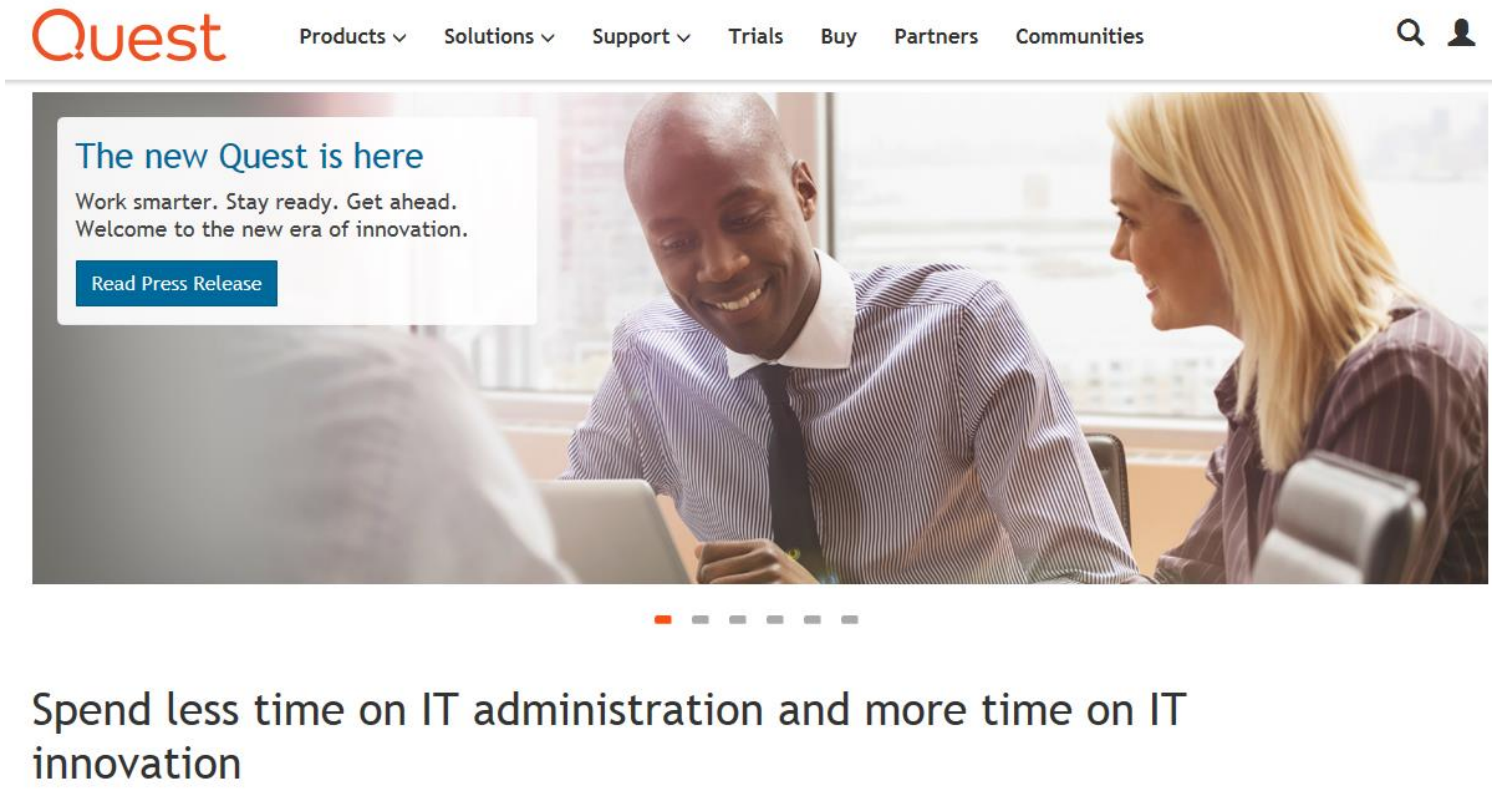
Full range of Tools on 30 day trial at : Quest.com



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