

Find and Fix those Troublesome Queries

Allen White
Owner, DataPerf Professionals
@SQLRunr



About Me



- Owner, Consultant, DataPerf Professionals
- 40+ years in IT
- Career covered multiple disciplines – operations, development, telecommunications, network design/administration and database design and administration
- Started using Sybase in 1992, MS SQL Server in 1995
- Microsoft Certified IT Professional: Database Administrator and Database Developer, Microsoft Certified Trainer (MCT)
- Awarded Microsoft MVP Award for SQL Server for last 12 years
- PASS Director



Abstract

- Every expert has their own set of tools they use to find and fix the problem areas of queries, but SQL Server provides the necessary information to both diagnose and troubleshoot where those problems actually are, and help you fix those issues, right in the box. In this session we will examine a variety of tools to analyze and solve query performance problems.
- “No magic will fix crap code.” – Grant Fritchey



Troubleshooting Process

- Observe Behavior
- Capture Performance Metrics
 - I/O counts
 - Runtime Stats
 - Memory Grants
- Adjust Query to reduce resource usage
- Observe Behavior
- Repeat



Tools to Observe Behavior

- Vendor (3rd party) tools (outside the scope of this talk)
- Perfmon and Profiler
- SSMS Activity Monitor
- SSMS Performance Dashboard Report (version 17.2+)
- Dynamic Management Objects (Views and Functions)
- Extended Events
- Graphical Query Plan
- Query Store



Perfmon and Profiler

- Perfmon allows you to capture performance counters
- View the results live in graphic or text format
- Capture the results to a file in various formats
- Profiler allows you to view SQL Server activity
- Never Ever use Profiler to capture live activity
 - It has a dramatic affect on performance
 - Use a server-side trace to a file, then view in Profiler
- Together you can tie perfmon data with trace data



Perfmon and Profiler

- Demo



SSMS Activity Monitor

- Significant improvements have been made
- Filter Process by SessionID, User/System processes, Login, Database, etc.
- View Resource Waits, with similar filters
- View Data File I/O showing reads, writes and latency
- View Recent Expensive Queries
- View Active Expensive Queries



SSMS Activity Monitor

- Demo



SSMS Performance Dashboard Report

- Shows graphs on CPU Utilization and Waiting Requests
- Shows Current Activity by User Requests and User Sessions
- Provides links to drill down on Waits, Latches, IO Stats
- Drill into details on Expensive Queries by various criteria



SSMS Performance Dashboard Report

- Demo



Dynamic Management Objects

- Transactional

sys.dm_tran_locks
sys.dm_tran_active_transactions
sys.dm_tran_database_transactions

- Index

sys.dm_db_index_usage_stats
sys.dm_db_index_operational_stats
sys.dm_db_index_physical_stats

- Missing Indexes

sys.dm_db_missing_index_details
sys.dm_db_missing_index_columns
sys.dm_db_missing_index_groups

- Query Stats and Plans

sys.dm_exec_query_stats
sys.dm_exec_query_plan
sys.dm_exec_sql_text



Dynamic Management Objects

- Demo



Extended Events

- Allow you to track events in SQL Server
- Supersedes Trace
 - Trace remains fixed at 180 events, SQL 2017 supports over 1500
 - Trace filters after the event is captured, EE filters before capture
- Far more lightweight than Trace



Extended Events

- Packages: Containers that define available objects and their definitions
- Events: Correspond to well-known points in SQL Server code
 - i.e. SP:StmtCompleted, Deadlock Graph, Sort Warning
- Predicates: Filter that defines whether or not the event fires
- Actions: An additional operation when the event fires
- Targets: Event consumers
 - i.e. Event File or Ring Buffer
- Types and Maps:
 - Types define data type for an event column
 - Maps provide lookup for values returned.



Extended Events

- Demo



Graphical Query Plan

- Provides details of the steps the Query Processor takes
- Provides estimates of amount of data at each step
- Actual plans are the Estimated Plan with runtime statistics



Graphical Query Plan

- Demo



Query Store

- “Flight Data Recorder” for your queries
- Available in all editions of SQL Server from 2016 SP1 on
- Enabled in each database
 - Data is persisted in internal tables in each database
 - Data and state backed up with database backup
- Data viewable via SSMS or in catalog views
- Data captured includes Plan Store and Runtime Stats Store



Query Store Reports

- Demo



References

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Thank You

