

XE: say goodbye to SQL profiler

Who am I?

Database Specialist @Capitec Bank

Programming background

Converted to a DBA 9 years ago

High volume OLTP systems

Optimisation and troubleshooting

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Agenda

- A look at SQL Profiler
- Demo SQL Profiler
- Extended events Concepts
- Demo

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SQL Profiler

- SQL Trace introduced in SQL 6.5
- Graphical tool external to SQL architecture
 - Saved output to trace or script
 - Very limited
- SQL Profiler introduced in SQL 7.0
- Now old enough to legally drink in SA

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Basic uses of SQL Trace

Realtime insight into SQL Server activity

Performance issues

Baseline performance, or replay workload

Deep dive troubleshooting

Audit user activity

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How it works

- Trace controller within engine that maintains bitmap of events being captured
- Event providers check to see if their event is active in the bitmap, if so, copy the event data to controller
- Controller **queues event data** and provides event data to trace

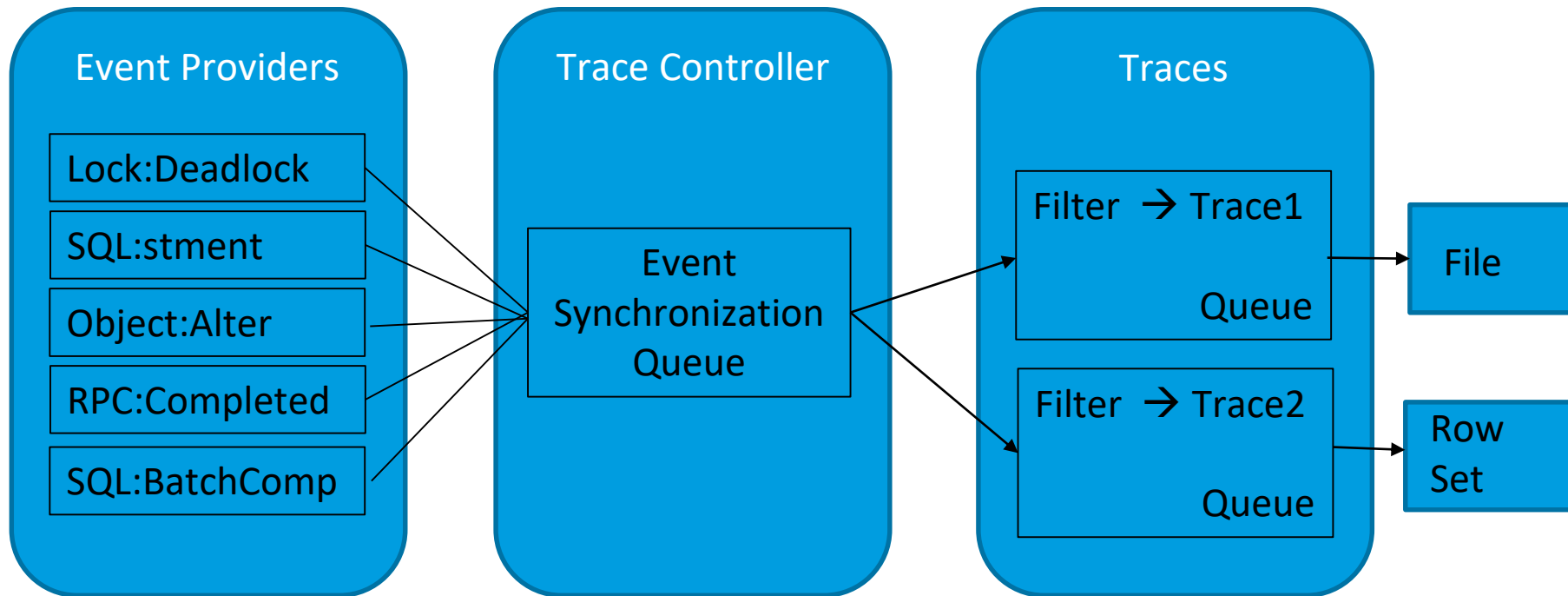
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How it works

- Individual traces filter the event and remove any column not needed
- Remaining event is written locally to file or buffered to row-set provider for consumption by external applications like SMO or SQL profiler
- Designed that no data will be lost
 - IO pressure causes buffers to be filled
 - Threads can't write data and wait for buffer space

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SQL Profiler



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Time to Say goodbye

- Extended events replacement for Profiler
- Trace depreciated as of SQL 2012
- XE has same functionality as trace
 - Capture what is happening in SQL
 - Choose what fields to capture
 - Filtering
 - Automatic capturing

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Time to Say goodbye

- UI added with SQL 2012
- Lightweight
- Can do more than SQL Profiler
 - Column store
 - AG
 - In-memory OLTP
 - Tabular cubes

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Time to Say goodbye

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What are Extended events

- Advanced event collection infrastructure – 2008 provided by SQLOS
- Uses Event Tracing for Windows (ETW)
- Highly flexible, complex configurations
- Performance and troubleshooting – not possible any other way

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Changes in XE by version

SQL Version	Number of Events	Notes
2008	253	
2008 R2	262	
2012	625	Includes all events in available in Trace
2014	889	v.12.0.5540
2016	1328	v.13.0.4422

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Extended Event Architecture

- Efficient kernel-level tracing facility
- Events – similar to Profiler events – just more
- Predicates (think of this as the where clause)
 - Condition for an event to fire
 - Short circuit evaluation – first false evaluate prevents event from firing
 - Basic arithmetic operators or text comparisons
 - Can store state (number of times an event has fired)
 - Inverse statements (e.g. not)

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Extended Event Architecture

- Actions
 - Perform additional operations when event fires
 - Collect additional state info, perform memory dump...
 - Only execute after predicate evaluation
 - Executes synchronously to event
- Targets
 - Consumes events
 - Synchronous and asynchronous targets
 - Raw data (event file, ring buffer)
 - Aggregate targets (Histogram, event counter, pair matching)

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Extended Event Architecture

- Types and maps
 - Data types of a column, action etc
 - Maps convert value to readable format
- Sessions
 - Collection of events, actions, predicates and targets
 - Per session memory buffers

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Final Thoughts

- Why haven't people moved to xe?
 - Profiler is known
 - Map events on Profiler to Perfmon
 - Distributed replay
 - RML utilities

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Reference material

- [SQLSkills.com](#)
 - Erin Stellato
 - Jonathan Kehayias
- [MichaelJSwart.com](#)
 - Michael J Swart