

SQLBits
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Kicking and Screaming: Replacing Profiler with Extended Events

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Trainer/Speaker

In addition to consulting, I teach content for our IE0: Accidental DBA course, and our IEPTO2: Performance Tuning and Optimization course

PASS Volunteer

I was a member of the PASS Nomination Committee this past year, have previously served on the board of my local user group (ONSSUG) and supported the Performance Virtual Chapter

Data Platform MVP

I have been fortunate to be recognized as an MVP by Microsoft since 2012



- Team of SQL Server consultants:
 - Kimberly Tripp (@KimberlyLTripp)
 - Jonathan Kehayias (@SQLPoolBoy)
 - Glenn Berry (@GlennAlanBerry)
 - Paul Randal (@PaulRandal)
 - Erin Stellato (@ErinStellato)
 - Tim Radney (@Tim Radney)
- Instructor-led training: Immersion Events and onsite
- Online training through Pluralsight (www.pluralsight.com)
- Consulting: Health checks, design, performance, upgrades, Azure
- Remote DBA: system monitoring and troubleshooting
- Conferences: PASS Summit, SQLintersection, SQLBits
- Get our newsletter: <https://www.sqlskills.com/Insider>



Scripts for this session can be downloaded from:

<https://www.sqlskills.com/sql-server-resources/sql-server-demos/>

Overview

- Transitioning from Profiler's UI to Extended Events
- Potential performance killers

Profiler to XE

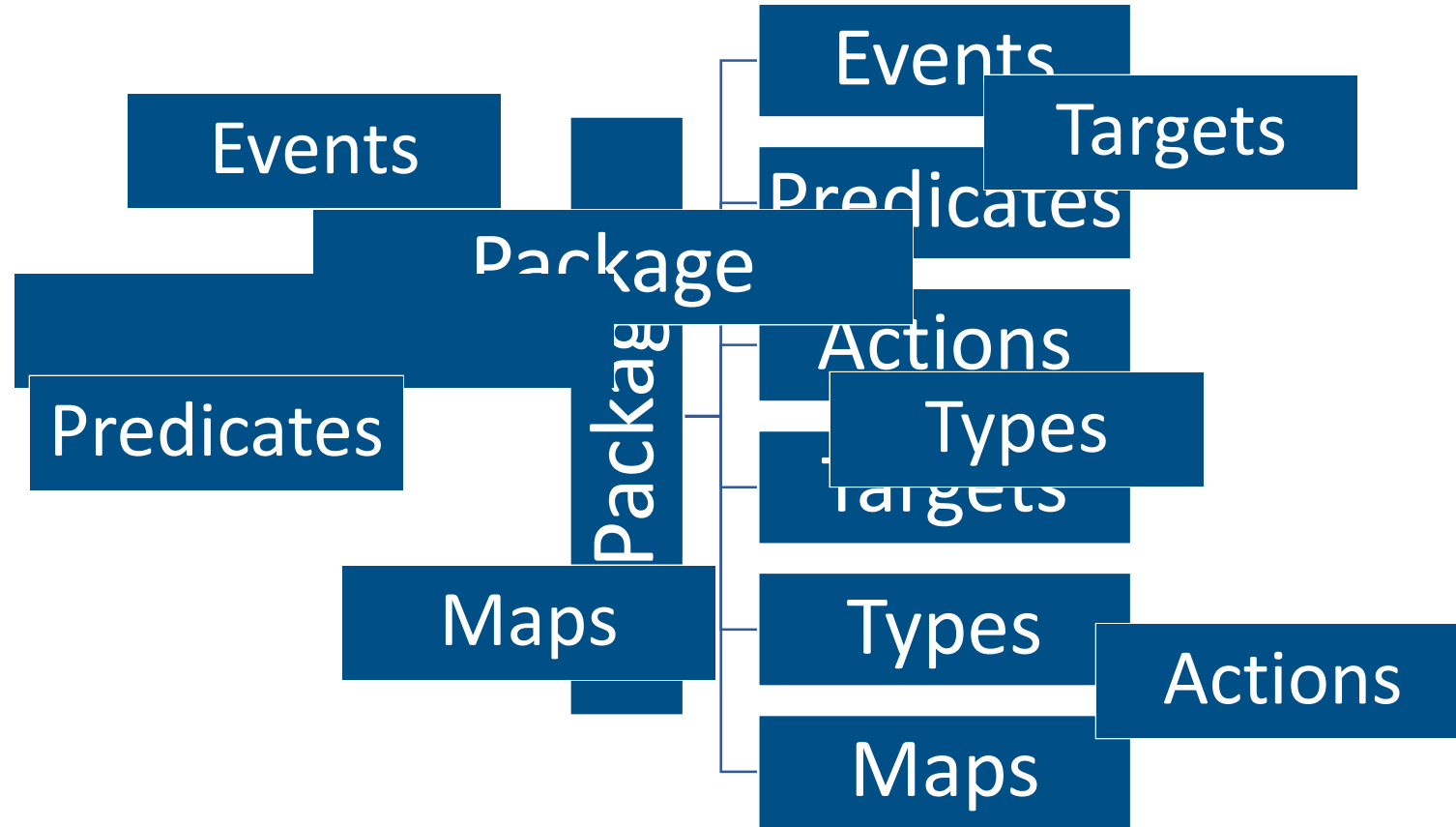
What is Extended Events, REALLY?

- It's a "general event-handling system for server systems"
- "The Extended Events infrastructure supports the correlation of data from SQL Server"
- An infrastructure which provides the ability to create complex sessions to collect event information
- Introduced in SQL Server 2008, provided by SQLOS

Extended Events Engine

- Database Engine
 - SQLOS
 - Extended Events Engine
- The XE engine is a collection of services and objects that it manages, and is an interaction point for other SQL Server processes

Extended Events Objects



Demo: Migrating a Trace Definition to an XE Session

Events

- An event corresponds to a well-known point in the code
 - Data File Auto Grow
 - Sort Warning
 - Object: Created
 - SP: StmtCompleted
 - Lock: Acquired
 - SQL: StmtRecompile
 - Deadlock graph
- Events have a default payload – a set of data elements that are always returned by an event and cannot be altered

Event Comparison

Trace	Extended Events
SP: StmtCompleted	sp_statement_completed
SQL: StmtRecompile	sql_statement_recompile
Data File Auto Grow	database_file_size_changed
Deadlock graph	xml_deadlock_report
Audit: Login	login

- Event names between Trace and XE are similar
- All events from Trace have a comparable event in XE as of SQL Server 2012 (Audit events are an exception)
- Use the trace_xe_event_map DMV for mapping

Event Comparison

Version	XE	Notes
2008 SP3	253	
2008 R2 SP2	262	
2012 SP1	625	Includes all events available in Trace
2014 SP2 CU1	889	
2016 SP1	1326	
2017 CU3	1400+	

- There are only 180 Trace events in each of the versions listed above

Predicates: Filtering out the fluff

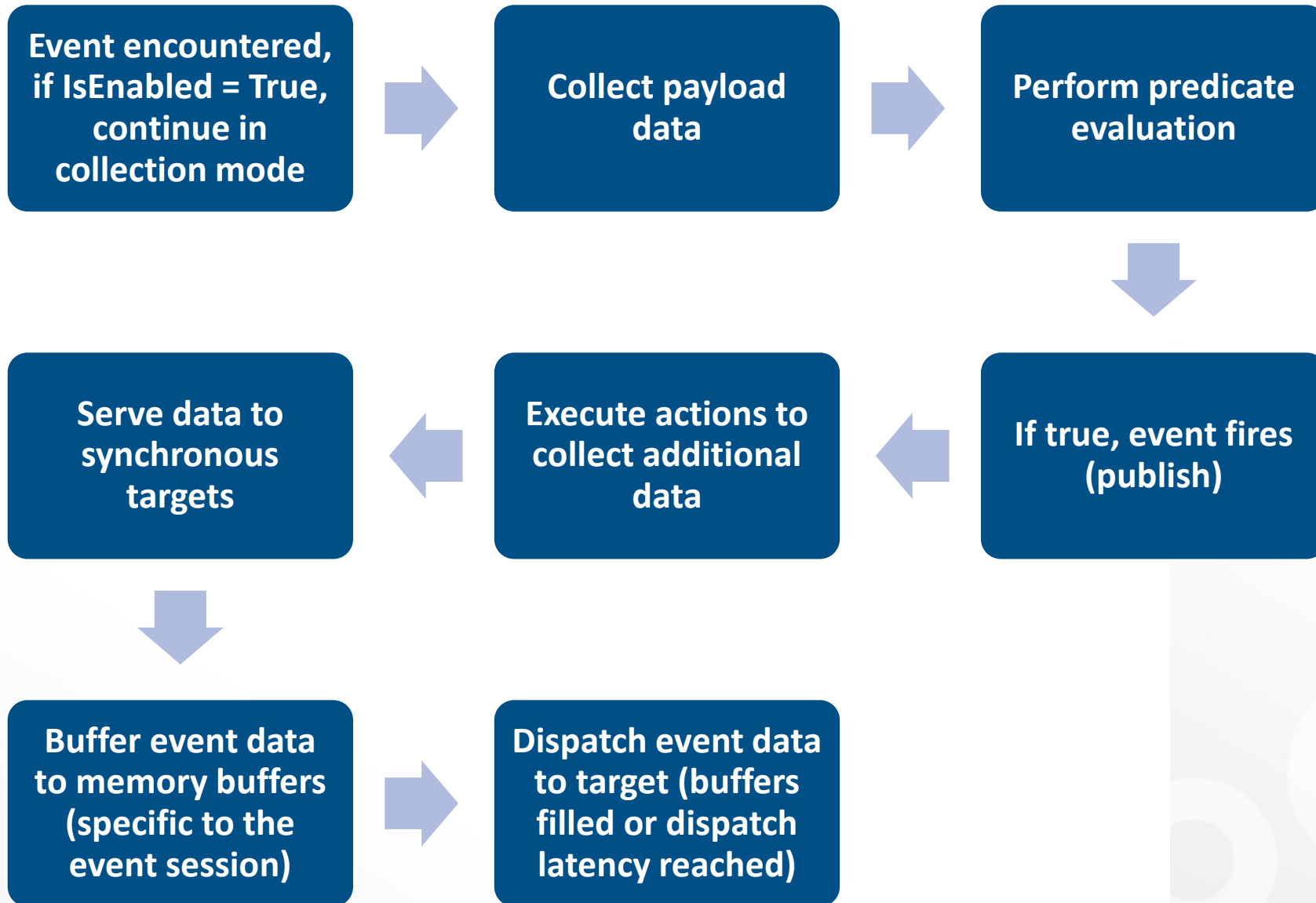
- The predicate is a filter that defines whether or not the event will fire
- These are extremely powerful as they support short-circuit evaluation
- They can operate on event payload data or global predicate source fields
 - The global predicate source fields that can be used for predicates are *not* the same as Actions, even though the same names *might* be used

Actions: When Event data isn't enough

- An action is an additional operation performed when the event fires
 - *Collect* the database ID
 - *Collect* the session ID
 - *Create* a mini dump for the current thread
- An action executes *only* when the event fires, therefore the predicate must evaluate to true first

Targets

- Targets consume the events, they can store the data (temporarily or permanently) in either raw or aggregate format
 - Event file
 - Ring buffer
 - Event counter
 - Histogram
 - Event pairing



Demo: Creating Event Sessions in the UI

Potential Performance Killers

Performance must still be considered

- Specific events are still expensive, such as `query_post_execution_showplan`
- Filtering on global state data adds overhead
- Adding actions adds overhead
 - Select actions have serious side effects (perform a memory dump, insert a debug break)
 - Other actions (e.g. `tsql_stack` vs. `tsql_frame`) can have high overhead based on the event and how frequently it fires

Performance must still be considered

- Even if you have a lot of memory on the server, you still need set limits when using the ring_buffer target

What you're going to grumble about

- It will feel like it takes longer to create an Event Session than it does to setup a Trace
 - It does...initially
 - It will take you longer to do everything...initially
- With the histogram target you can only bucket on one field
- You cannot integrate PerfMon data with XE data in the UI
- Distributed Replay requires .trc files

My favorite things about XE

- Create multiple sessions and start and stop them as needed (and they persist through restarts)
- Search capability in the list of events
- Track causality
- Write to multiple targets
- Work with the data in the UI

When you're back in the office...

- Every time you go to open Trace, set aside 15 minutes to try what you want in XE (or just use Jon's script to convert it and then take 15 minutes!)
- Use the resources referenced here – and ask for help!
- If you're struggling, let me know:
 - <https://www.sqlskills.com/blogs/erin/why-do-you-avoid-extended-events/>

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Resources

- Pluralsight Course
 - SQL Server: Introduction to Extended Events, Jonathan Kehayias
 - <http://bit.ly/1uhYXv4>
 - SQL Server: Replacing Profiler with Extended Events, Erin Stellato
 - <http://bit.ly/2e5fByz>
- SQL Server Central Stairway
 - <http://www.sqlservercentral.com/stairway/134867/>

Resources

- Blog Posts
 - 31 Days of Extended Events, Jonathan Kehayias
 - <http://www.sqlskills.com/blogs/jonathan/category/xevent-a-day-series/>
 - Introducing the Extended Events User Interface
 - http://blogs.msdn.com/b/extended_events/archive/2011/07/13/introducing-the-extended-events-user-interface.aspx

Resources

- TechNet

- Using the system_health Session
 - <http://technet.microsoft.com/en-us/library/ff877955.aspx>
- Extended Events
 - <http://technet.microsoft.com/en-us/library/bb630282.aspx>

- Utilities

- SQL Server 2008/2008R2 Extended Events Add-In for SSMS
 - <http://extendedeventmanager.codeplex.com/>
- SQL Server 2012 Extended Events Add-in
 - <http://www.sqlskills.com/free-tools/sql-server-2012-extended-events-add-in/>

Thank you!

