

# **SQL Server: Introduction to Extended Events**

## **Module 4: SQL Server 2012 UI Integration**

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# Introduction

- New UI integration in SQL Server 2012 simplifies working with Extended Events and has made it a more accessible feature
- The 2012 UI integration only works when connected to a SQL Server 2012 instance, it is not backwards compatible with SQL Server 2008 or 2008R2
- The UI replaces the need to write complex XQuery expressions to process the data collected by Extended Events and allows advanced analysis of the data collected
- In this module we'll cover:
  - SQL Server 2012 UI integration
  - Creating event sessions
  - Using templates
  - Viewing and saving target data

# New Session Wizard

- **The New Session Wizard is the simplest way to create an event session**
- **The Wizard exposes a limited subset of the available Extended Events functionality**
  - Limited to the ring\_buffer and event\_file targets only
  - Any actions are applied to all of the events in the event session
  - Predicates can only be defined on columns common to all events or global predicate columns
  - Does not expose advanced options for memory buffer configuration or causality tracking
- **Event sessions can be created manually or using an existing template**

# **New Session/Session Properties Dialogs**

- **The New Session and Session Properties dialogs (actually the same dialog) are used for creating and editing event sessions, respectively**
- **Exposes all of the functionality available in Extended Events**
  - Actions can be added to a single event or to multiple events through the multi-select functionality in the grid
  - Predicates can be defined on a single event or on multiple events that share the same columns
  - All of the targets are available for configuration
  - All of the event session options are available
- **Event sessions can be created manually or through an existing template**

# Using Templates

- **Templates store the entire configuration of an event session to simplify recreating the event session on a server**
  - Includes events along with all of the configured actions and predicates, the target configuration, and any event session options that have been configured
- **SQL Server 2012 ships with nine predefined templates that cover common diagnostic scenarios for SQL Server**
- **Custom templates can be created based on event sessions created manually**

# Default Templates (1)

## ■ Count Query Locks

- Counts occurrences of the sqlserver.lock\_acquired event using the histogram target based on the query\_hash action
- This template can be used to identify the most lock-intensive queries for investigation and tuning

## ■ Query Batch Sampling

- Collects SQL batch and RPC level statements as well as error information
- This template can be used to understand the flow of queries that are executing on a server and track errors back to the queries that caused them
- Events are only collected from 20% of the active sessions on the server at any given time
- The sampling rate can be changed by modifying the filter for the event session

# Default Templates (2)

## ■ Query Batch Tracking

- Collects all batch and RPC level statements as well as error information
- This template can be used to understand the flow of queries that are executing on your system and track errors back to the queries that caused them

## ■ Query Detail Sampling

- Collects detailed statement and error information
- This template can be used to track each statement that has executed on your system as a result of query batches or stored procedures and track errors back to the specific statement that caused them
- Also collects the query hash and query plan hash for every statement
- Events are only collected from 20% of the active sessions on the server at any given time
- The sampling rate can be changed by modifying the filter for the event session

# Default Templates (3)

## ■ Query Detail Tracking

- Collects detailed statement and error information
- This template can be used to track each statement that has executed on your system as a result of query batches or stored procedures and track errors back to the specific statement that caused them
- Also collects the query hash and query plan hash for every statement

## ■ Query Wait Statistic

- Collects internal and external wait statistics for individual query statements, batches and RPCs
- Collects the query hash and query plan hash for every statement it tracks.
- Events are only collected from 20% of the active sessions on the server at any given time
- The sampling rate can be changed by modifying the filter for the event session



# Default Templates (4)

## ■ Activity Tracking

- Similar to the Default Trace that exists in the SQL Trace system
- Does not include security audit events that are in the Default Trace, which are exposed by the SQL Server Audit feature instead
- Has a bug in the RTM release of SQL Server 2012

## ■ Connection Tracking

- Tracks connection activity for a server using the login and logout events
- Includes the connectivity\_ring\_buffer\_recorded event to diagnose any connection problems on the server

## ■ Database Log File IO Tracking

- Monitors the I/O for database log files, file\_id = 2, on the server
- Tracks asynchronous I/O, database log flushes, file writes, spinlock backoffs of type LOGFLUSHQ and waits of type WRITELOG
- Collects raw data in a ring buffer and aggregates spinlock backoff information based on the input buffer (sql\_text) in a histogram

# Custom Templates

- **Exporting an existing event session to a template allows the event session definition to be transferred to multiple servers easily**
- **The event session template can be further customized by adding additional information to the XML definition to customize the template for distribution**
  - Manually adding the templateCategory node will provide a specific category
  - Manually adding the templateName node will provide a specific name
  - Manually adding the templateDescription node will provide a detailed description for the template in the UI

# Viewing Target Data

- The Extended Events UI provides the ability to read the current contents of many of the targets, removing the need to build XQuery statements to process the captured data
- The way the UI handles the target data is based on the target being viewed
  - The etw\_classic\_sync\_target cannot be read using the UI since the data is intended for use with ETW data from other applications or the Windows kernel
  - The ring\_buffer target returns the raw XML to the UI whenever the View Target Data menu option is selected from its context menu
  - The histogram target shows a two-column table with value and count for the buckets defined in the event session
  - The event\_counter target displays the package\_name, event\_name, and count of times the event has been fired
  - The remaining targets only display the event\_name and timestamp by default and require grid customization to view remaining columns

# Customizing the Data View

- **The default view only has two columns because it is impossible to provide a general column set to display in the UI**
  - There are 1174 distinct column names available across the events in SQL Server 2012
  - There are also 50 possible actions that can be added to the events in a session
  - Since the only two columns that are guaranteed to exist for every event are the event name and timestamp, they are the only default columns in the grid
- **Two methods exist to add columns to the grid layout**
  - The right-click context menu item “Show Column in Table” on the Details pane
  - The Choose Columns dialog can be opened from the right-click context menu on the grid column names, through the Extended Events menu, or the Choose Columns toolbar button

# Customizing the Data View (2)

- **The Choose Columns dialog can be used to:**
  - Add multiple columns to the grid
  - Change the column order in the grid
  - Create a Merged Column to display the data from multiple columns in a single customized column
- **Once the Data View has been customized, the display can be exported to allow the customization to be reused for future event sessions**
- **The data in the grid can be searched, filtered, and sorted**
  - Affects only the local display of the data, not what is actually being captured by the event session

# Live Data Viewer

- The Live Data view attaches a streaming target to the event session in SQL Server and reads the “live” event stream as the memory buffers are dispatched by the server
- Reads the raw event data for the session, even when the defined targets for the session do not maintain the raw event data
- Will be disconnected by SQL Server if the number of events being generated exceeds what can be buffered without performance impact to the UI
- Limited to displaying one million rows of data in the grid view, other data is cached in files on the local client
- Default display only shows the event name and timestamp and requires customization

# Exporting the Event Data

- **Any data captured by the live data stream, or read into the data grid from an event file, can be exported from the grid**
  - If the data is filtered, only the data displayed in the grid meeting the filtering criteria is exported
- **Data can be exported to three different formats using the Export To menu item under the Extended Events menu**
  - Event file in the file system
  - Table in a database
  - CSV file
- **The UI also provides the ability to merge event files using the Merge Extended Event Files menu item under the File and Open menu**
  - Can be very useful when diagnosing problems for the new Availability Group feature in SQL Server 2012

# Summary

- The New Session Wizard simplifies event session creation but only offers a limited subset of the options available in Extended Events
- The New Session Dialog provides all of the options available in Extended Events and is the same dialog used for modifying event sessions on the server
- Target data can be viewed in the UI but the grid view requires customization of the visible columns to view meaningful data
- The next module will look at:
  - SQL Server 2008 SSMS Add-in