

# Performance Analysis Top SQL

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**Applies to:** SQL Server, SSAS, and Azure SQL Database target types.

**SQL Sentry Portal:** This feature is available in [SQL Sentry Portal](#). To learn more about configuring your environment to use the on-premises, browser-based option with your existing [SQL Sentry database](#), see the [SQL Sentry Portal](#) article.

🔗 See the [SQL Sentry Portal Top SQL](#) article for an example of the **Top SQL** feature in a browser.

## Introduction

Top SQL tab

The **Top SQL** tab lists all T-SQL batches, stored procedures (RPCs), and statement events collected for the current date range that exceeded the **Minimum Duration** specified in the **Settings** pane. The default filter is **Duration**, but filtering using **CPU** and **IO** is also available. The default minimum duration is five seconds, but this can be adjusted up or down as needed through the **Top SQL Source** settings.

To collect **Top SQL** metrics for Azure SQL database [targets](#) the **Allow SQL Sentry Monitoring Objects in Target** setting under the **Azure SQL Database Connection** settings must be set to **True**. This option creates a few objects within a SQL Sentry schema on the target database. See the [Watched Target Objects](#) article for details.

## Top Section Grid View

The Top section Grid View displays queries in your environment. View **Running Queries**, **Completed Queries**, **Procedure Stats**, or **Query Stats** by selecting the corresponding tab.

Open Plan Explorer for the expanded query by selecting **Open**.

## Statement Grid

The Statements Grid displays the statements that were collected with the associated completed query, procedure stats or query stats. It provides details on the key performance metrics that are associated with each component part of the larger query. This allows you to see which resources were consumed by which part of the batch.

## Execution Plan Diagram

The **Plan Diagram** displays a graphical plan preview of the desired query in your environment.

Select **Open with Plan Explorer** to view the query diagram in more detail. Hover over a plan diagram icon to display a tooltip with more detailed information.

Select **Open with Plan Explorer** to open the integrated Plan Explorer view for the selected execution plan. For more information about **Plan Explorer**, see the [Plan Explorer](#) topic.

## Query History

Query History displays a graphical representation of the selected query over a specified range of time. Query History provides information about the query execution plans, if and when they were changed, and how they impacted different resources. Each dot represents when the query was executed. Different colors on the dots indicate the different plans, and the plans are numbered. Adjust the time displayed on the graph with the Range slider.

**Note:** Hovering over any of the dots on the Query History graph provides you with additional information.

**Note:** Right click any dot on the **Query History** graph, and select **Open Plan** from the context menu to open the **Plan Explorer** diagram.

Open Plan

Additionally, adjust the graph to identify historical procedure and statement executions through CPU, IO, or Duration metrics.

### Query History Graph visualization options

Grouping	Metric	Mode
Hour	Duration	Statement
Day	CPU	Procedure
Week	IO	

## Display Tabs

## Filter

The **Filter** tab provides the following filters for controlling which records display:

- SQL Servers
- Applications
- Databases
- Hosts

Select any combination of items to set the filters. To select more than one item, use **Shift-Click** or **CTRL-Click**. View the filtered results by selecting **Refresh** or **F5**.

**Show Top Control** Controls how many rows are retrieved.

**Note:** The **Filter** tab isn't displayed on an Azure SQL Database target.

## Running Queries

The **Running Queries** tab shows all running queries matching the current filters and is independent of the time range setting. The **View** button in the **Plan** column opens a **Plan Explorer** session for the associated query. The **Text Data** column shows the original text the client sent to the server and the **Active Statement** column shows the currently running statement.

Running Queries

**Note:** Running queries isn't supported for SQL Server 2000 or Azure SQL Database.

**Note:** The text data for the active statement is displayed in the **Text Data** pane when the **Active Statement** cell is selected.

## Completed Queries

The **Completed Queries** tab lists all records matching the current filters. The **View** button in the **Plan** column opens a **Plan Explorer** session for the associated query. The default filter displays all records. There are two modes for this pane: **Default** and **Totals**.

**Default** mode lists all events for the active date range in a standard list format, sorted descending by **End Time** by default. **Default** mode is activated whenever auto-refresh is enabled by selecting **Play** on the toolbar, which shows the events for the last 10 minutes with new events coming in automatically at the top of the list.

**Totals** mode is enabled by selecting **Show Totals** (the sigma  $\Sigma$  button). This groups all like events together using a normalized version of the T-SQL with all variable parameters replaced, and it shows aggregates for each

group. This enables you to quickly determine which events are responsible for the most CPU or IO activity for the active date range.

#### Completed Queries

**Note:** SQL Sentry 8.2 introduces enhanced SQL text data normalization. If upgrading from a build prior to 8.2, enhanced normalization must be activated in the **Monitoring Service Settings > Performance Monitor** tab.

## Procedure Stats

The **Procedure Stats** tab provides aggregate information for all procedures matching the current filters. The **View Plan** button in the **Plan** column opens a **Plan Explorer** session for the associated procedure. Additional historical information may be available in the **Runtime Stats**. Open **Runtime Stats** by right clicking on a procedure and selecting **Jump To > Runtime Stats**.

#### Procedure Stats

**Note:** SQL Sentry installations upgraded from a version older than 8.2 need to enable the **Collect Query Stats** option in the **Top SQL Source** setting.

**Note:** **Procedure Stats** isn't available for SQL Server 2000 or SQL Server 2005.

## Query Stats

The **Query Stats** tab provides aggregate information for queries matching the current filter. This area also provides insight into queries that run very quickly and in high volume.

#### Query Stats

**Note:** SQL Sentry installations upgraded from a version older than 8.2 need to enable the **Collect Query Stats** option in the **Top SQL Source setting**.

**Note:** **Query Stats** isn't available for SQL Server 2000 or SQL Server 2005.

## Command Text

The **Command Text** tab shows the T-SQL text data for the currently highlighted **Top SQL** record with syntax highlighting.

## Top SQL Runtime Stats

The **Top SQL Runtime Stats** option provides insight into the frequency and duration of the queries and procedures that are captured by **Top SQL**.

[Additional Information](#): See the [Top SQL Runtime Stats](#) article.

## Top SQL Metrics

### Default Metrics

Name	Description
<b>Plan</b>	Select <b>Open</b> to open a new <b>Plan Explorer</b> session for the captured query plan.
<b>Host</b>	Name of the <u>target</u> where the associated captured query originated.
<b>Event Class</b>	The event class of the associated captured query. <a href="#">Additional Information</a> : For more information, see the <a href="#">SQL Server Event Class Reference MSDN</a> article.
<b>Text Data</b>	Associated text data captured for the query.
<b>Login</b>	The Windows or SQL Server account associated with the captured query.
<b>Duration</b>	The amount of time taken by the captured query.
<b>CPU</b>	The amount of CPU time (in milliseconds) used by the captured query.
<b>CPU %</b>	The percentage of CPU time used by the captured query, in relation to any other <b>Top SQL</b> events that are shown in the grid.
<b>Reads</b>	The number of logical reads from the cache performed by the server on behalf of the captured query.
<b>Reads %</b>	The percentage of bytes read by the captured query, in relation to any other events that are shown in the <b>Top SQL Grid view</b> .
<b>Writes</b>	The number of physical disk writes performed by the server on behalf of the captured query.
<b>Writes %</b>	The percentage of bytes written by the captured query, in relation to any other events that are shown in the <b>Top SQL Grid view</b> .

Name	Description
<b>Start Time</b>	Time the captured query started.
<b>End Time</b>	Time the captured query ended.
<b>Information</b>	Additional data captured about the query.
<b>Error</b>	Error number of a given captured query.
<b>SPID</b>	The server process ID (SPID) that is assigned to the process.
<b>Host Process ID</b>	The ID assigned by the host computer to the process where the client application is running.
<b>Server</b>	The SQL Server <u>instance</u> where the associated captured query took place.

### Additional Metrics

The following metrics do not appear by default, but can be added through the **column chooser**. See the [Data Grids](#) article for additional information on choosing columns.

Name	Description
<b>Application</b>	Name of the client application that created the connection.
<b>Database</b>	Name of the database for the associated captured query.
<b>Granted Memory (KB)</b>	The amount of memory in KB granted to the captured query.
<b>Granted Query Memory (KB)</b>	The amount of memory in KB granted to the query.
<b>Has Plan</b>	<b>True</b> if the associated query has a captured plan.
<b>Has Statements</b>	<b>True</b> if the associated query has captured statements.
<b>Ideal Memory (KB)</b>	
<b>Is incomplete</b>	<b>True</b> if the associated query is incomplete.
<b>Parent ID</b>	The ID assigned to the Parent query.
<b>Requested Memory (KB)</b>	The amount of memory in KB requested by the captured query.
<b>Session Memory (KB)</b>	The amount of memory in KB used during the session.
<b>Tempdb Internal (KB)</b>	The amount of memory in KB used by tempdb internal objects.

Name	Description
<b>Tempdb Internal (KB) Dealloc</b>	The amount of memory in KB that is deallocated for tempdb internal objects.
<b>Tempdb User (KB)</b>	The amount of memory in KB that is used by User objects.
<b>Tempdb User (KB) Dealloc</b>	The amount of memory in KB that is deallocated for User objects.
<b>Visible</b>	Specifies the default visibility for the select row. Queries may be hidden in <b>Top SQL</b> .

## Changing What's Collected for Top SQL

Change the **Top SQL** that's collected by SQL Sentry through the **Top SQL Source settings**. Change the **Top SQL** events collected by SQL Sentry through the **Top SQL Source** settings at these levels: **All Targets (Global)**, **site**, **target group**, **target**, and **instance**.

Collection Settings

**Note:** As a reminder, all settings have a hierarchical configuration, and work through the principle of inheritance. Any changes you make at one level is automatically inherited by all objects below it. For more information about inheritance within SQL Sentry, see the [Alerting and Response System](#) topic.

### Example One

To configure the **Top SQL Minimum Duration Collection** setting globally complete the following steps:

1. Select the **All Targets** node in the **Navigator** pane (**View > Navigator**).
2. In the **Settings** pane (**View > Settings**), select **SQL Server** from the top drop-down list.
3. Select **Top SQL Source** from the second drop down list to open the **Top SQL Source** settings that are being applied globally.
4. Change the **Minimum Duration** to the desired value; it saves automatically.

### Example Two

To configure the **Top SQL Minimum Duration Collection** setting for an individual instance complete the following steps:

1. Select the desired instance node in the **Navigator** pane (**View > Navigator**).
2. In the **Settings** pane (**View > Settings**), select **SQL Server** from the top drop-down list.
3. Select **Top SQL Source** from the bottom drop-down list to open the **Top SQL Source** settings that are configured for the instance.
4. Within the **Collection Settings** section change the **Inherit From Parent** setting to **False**.

5. Change the **Minimum Duration** to the desired value; it saves automatically.

There are a few additional things you should know regarding the **Top SQL Source** settings.

There is an **AND** relationship that exists between the **Minimum Duration**, **Minimum CPU**, **Minimum Reads**, and the **Minimum Writes Collection Settings**, meaning that to be collected as **Top SQL**, the event needs to satisfy each individual **Collection Setting**. For example, if you set the **Minimum Duration** at 10 seconds and the **Minimum Reads** at 25, an event needs to meet both a **Minimum Duration** of 10 seconds **AND** a **Minimum Reads** of 25 to be captured in **Top SQL**.

**Minimum Duration** can't be set below 100ms unless **Minimum CPU**, **Minimum Reads**, or **Minimum Writes** is greater than zero. This lower limit is enforced because setting this threshold below 100ms for an extended period of time dramatically increases the volume of data collected and stored by SQL Sentry, and has a negative impact on the monitored server.

**Note:** SQL Sentry's [QuickTrace](#) functionality is better suited to analyze extremely short duration events.

## Adjusting Captured TextData Length

By default textdata for captured **Top SQL** and **Top Command** events is truncated at 10,000 characters. Change this maximum length in **Global Settings** (**Navigator** pane > **Configuration** > **Global Settings** > **Advanced** tab > **Query Collection Maximum Text Length**).

**Note:** You may adjust the **Query Collection Maximum Text Length** setting up to 50,000 characters. The default setting of 10,000 characters is adequate for most SQL Server environments.

## Hiding Queries and Stopping Alerts

**Note:** Hiding a query in Top SQL also hides it from the calendar view.

Hide individual queries or groups of queries with the right-click context menu **Hide** command.

- To hide a single query, select the desired row, then right-click and select **Hide**.
- To hide a group of queries, drag a column header to the top of the **Grid View** to group like items. Select the group header in the **Grid View** and use the right-click context menu **Hide** command.



**⚠ Important:** Once a query is hidden in **Top SQL**, you're no longer alerted about it for any of the **Top SQL related conditions**. Unhide all hidden queries by selecting **Show Hidden** on the toolbar. To unhide an individual query permanently, select the **Visible** checkbox from the **Column Chooser** that toggles the effect of **Hide/Hide Group**.

It's important to note that this will impact everyone using this particular SQL Sentry environment, not just your individual SQL Sentry client view.

## Top SQL Source Settings

There are three settings that can be adjusted to change how long a query runs to be collected. These settings are in the **Top SQL Source** area in the **Settings** pane.

Setting	Description	Image
<b>Query Stats Sample Interval</b>	Specifies how often to sample query stats.	
<b>Filter Time Span</b>	Specifies the base length of time over which the collection filters are applied to <b>Query Stats</b> .	
<b>Minimum Duration</b>	Specifies the minimum duration for a statement to be logged.	
<b>Filter Factor</b>	The <b>Filter Factor</b> is calculated by dividing the <b>Query Stats Sample Interval</b> by the <b>Filter Time Span</b> . The collection filters such as <b>Minimum Duration</b> are multiplied by this value when applied to <b>Query Stats</b> collection.	

**ⓘ Note:** Each of these settings play a part in what's captured for **Query Stats** in your environment. As an example, using the following default settings:

- Query Stats Sample Interval = 60 seconds
- Filter Time Span = 30 seconds
- Minimum Duration = five seconds

The total cumulative duration of all executions of a query over the 60 second sample interval must be greater than 10 seconds.

# Controls

## Top Pane

Control	Description	Image
<b>Filter button</b>	<p>Add a filter to any column by selecting the filter button. After changing any of the filters, it's necessary to select <b>Refresh</b>, or press <b>F5</b> to apply the filter.</p> <ul style="list-style-type: none"><li>• Select on a combination of items in any of the lists to set the filters. The default filter displays all records.</li><li>• To select more than one item in a list, use <b>Shift-Click</b> or <b>CTRL-Click</b>.</li></ul>	

## Toolbar Options

Control	Description	Image
<b>Show Hidden Rows</b>	Hide individual lines or groups of rows. This toggles the display of those lines.	
<b>Show Totals</b>	Groups like queries together by normalizing the result set.	

## Context Menu Options

Option	Description	Context Menu Image	Option Applied
<b>Sort Ascending</b>	Organizes the selected column in Ascending order.		
<b>Sort Descending</b>	Organizes the selected column in Descending order.		
<b>Clear Sorting</b>	Clears the sorting options applied to the column.		
<b>Group By This Column</b>	Groups the queries by the selected column.		
<b>Show Group By Box/</b>	Displays or Hides the		

Hide Group By Box Option	Group by box. <b>Description</b>	Context Menu Image	Option Applied
Hide This Column	Hides the selected column.		
Column Chooser	Opens the <b>Column Chooser</b> . The <b>Column Chooser</b> provides additional columns to sort information.		
Best Fit	Resizes the information for the selected column.		
Best Fit All Columns	Resizes the information for all of the columns.		
Filter Editor	Opens the <b>Filter Editor</b> .  Use the <b>Filter Editor</b> to add and remove filters, and apply Boolean logic for a more complex filter. To adjust the Boolean logic, simply select the red <b>And</b> to bring up the context window.		
Show Find Panel	Displays the <b>Find Panel</b> . Use the <b>Find Panel</b> to search for specific strings in the queries.		
Show Auto Filter Row	Displays the <b>Auto Filter Row</b> . Use the <b>Auto Filter Row</b> to		
Reset Grid	Resets the data on the grid to the default setting.		

**⚠ Important: Hide/Hide Group** disables any alerts for the events, and prevents them from being displayed on the **Event Calendar**.

## Jump to

Jump To context menu option	Description	Top SQL Jump To option	Corresponding data
<b>Jump to Dashboard</b>	When <b>Show Totals</b> mode is enabled all events belonging to the selected group are overlaid on the <b>Dashboard</b> . When the <b>Default</b> mode is enabled only the selected event is overlaid on the <b>Dashboard</b> .		
<b>Jump to Calendar</b>	Goes to the selected event on the <b>Event Calendar</b> (requires the server to be watched with EM).		
<b>Jump to Runtime Stats</b>	Opens a tab showing the <a href="#">Runtime Stats</a> for the event.		

## Additional Options

Option	Description	Image
<b>Kill Process</b>	Kills the running process ( <b>Running Queries</b> tab).	
<b>Trace Procedure</b>	Opens the <b>Run QuickTrace</b> dialog box for the selected event ( <b>Query Stats</b> tab).	

## Database Mapper Environment Map

The SolarWinds **Database Mapper Environment Map** shows data collected from the SQL Sentry database to map connections between applications, users, clients and targets (sourced from **Top SQL** and **Windows processes**). This information complements the [lineage analysis](#) feature by showing the dynamic usage of targets in the lineage diagram and shedding light on the processes that are using the database.

[Additional Information](#): To learn more about using Top SQL data with SolarWinds Database Mapper, see the [Environment Map](#) article.

