Spotlight® on SQL Server Enterprise 11.7.1

**Getting Started Guide**

Spotlight on SQL Server Enterprise Getting Started Guide
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# Contents

# Use Spotlight on SQL Server

## Diagnose CPU

Spotlight continually monitors CPU usage on the target server and alarms if it crosses a threshold. The thresholds are:

| CPU Usage | Alarm severity |
| --- | --- |
| 0 – 67% | Normal |
| 67 – 80% | Low |
| 80 – 93% | Medium |
| 93 – 100% | High |

A CPU alarm indicates that a bottleneck on CPU is likely. This bottleneck could exist for a number of reasons – expensive queries could be running, excessive compilation or recompilation could be occurring, or a process on the server, not even related to SQL Server, is 'hogging' the CPU. With Spotlight, you can investigate the causes of a bottleneck both in real-time and in the immediate past.

When Spotlight detects that there is a bottleneck on the CPU, an alarm is raised. You can see alarms on the Spotlight home page, and in Spotlight Today.

Our first order of business is to find out what process is using all of the CPU.

| From the Spotlight Home Page | From Spotlight Today |
| --- | --- |
| Click **Workload Analysis**. | Select the alarm and click **Diagnose**. |

This opens the Workload Analysis drilldown. Select the CPU resource to see possible causes of high CPU usage.

- Why is CPU usage higher than usual?

- Is the SQL Server causing high CPU usage?

- If it is the SQL Server, is it optimizing queries or executing them?

# Diagnose IO

Sustained high I/O wait time rates are a good indicator of a disk subsystem bottleneck and that I/O device service times will be degraded. When Spotlight detects unusually high disk activity on the SQL Server machine it raises an alarm.

Spotlight looks at SQL Server I/O stall times to determine if there is an IO bottleneck. A value larger than 15 ms/IO indicates a possible bottleneck.

The thresholds for the I/O stall time alarm are:

| I/O Stall Time | Alarm severity |
| --- | --- |
| 0 - 15 | Normal |
| 15 - 50 | Medium |
| 50 - infinity | High |

After detecting a potential disk bottleneck, Spotlight displays an alarm on the home page and in Spotlight Today.
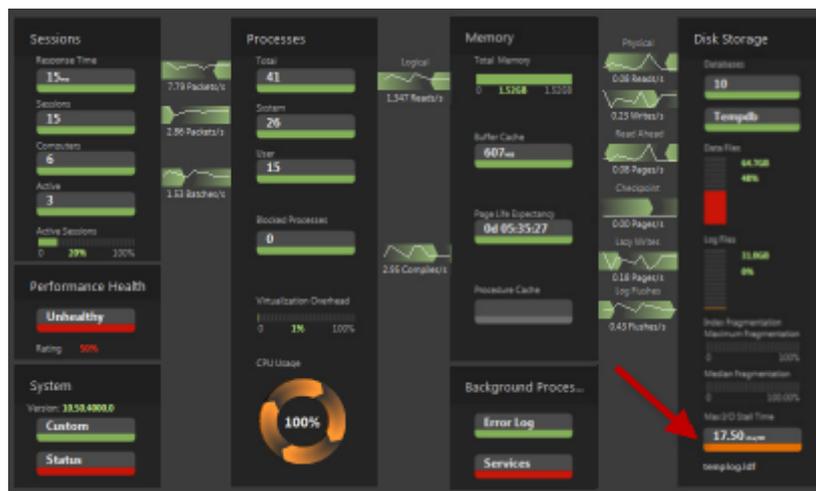


The first thing we need to do is identify the process that is generating high amounts of I/O activity.

| From the Spotlight Home Page | From Spotlight Today |
| --- | --- |
| Click **Wait Events**. | Select the alarm and click **Diagnose**. |

This opens the SQL Server Wait Events drilldown. Select the IO Category to see what is contributing to I/O consumption.

- Why is the I/O higher than usual?
- Is the high I/O due to paging activity?
- Is the SQL Server causing the high I/O?
- If the SQL Server is causing the high I/O, is it through query executions, scan operators, PAGE_IO_ LATCH or LOG waits?

# Diagnose blocking

Blocking in SQL Server occurs when a session that was performing some task is unable to progress because it must wait on a resource that is currently being used by another session. The resource that is being waited on can be either a physical structure like a lock on a table or an internal SQL Server resource such as a latch.

Excessive blocking can be a major cause of poor application performance since it reduces the throughput of the system. Often a user of an application does not realize that they are waiting on a resource held by another user. From their point of view, it often seems like their application has stopped responding.

When diagnosing blocking, you want to start your investigation by answering the following questions:

- Who is waiting on what?
- How long have they been waiting?
- What SQL was running while they were waiting?

Spotlight not only alerts you to blocking issues in your database but also helps you answer the above questions so you can quickly resolve the problem causing the blocking.

When Spotlight detects a blocking issue, an alarm is displayed on the home page.
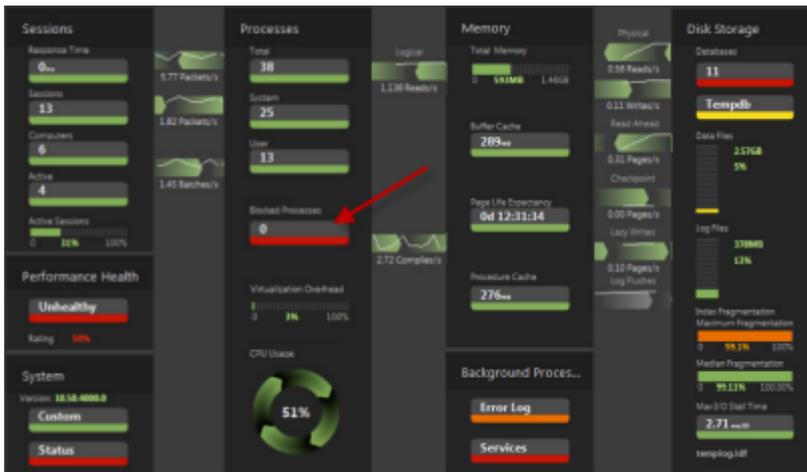


The first thing we want to do is look at the Blocking drilldown. The Blocking drilldown shows details about the current blocks and in particular, answers the questions stated above.

1. On the Spotlight homepage, click the Blocked Processes button.

2. If multiple alarms have been raised, select the alarm you want to investigate further. Note that some alarms remain raised until they are acknowledged.

3. Click Diagnose to open the **Blocking** drilldown.

The Blocking grid shows the sessions that are either blocked or are causing other sessions to be blocked. If the selected alarm was raised in the past the Blocking drilldown opens at the moment in time when the alarm was raised.

The hierarchy in the tree diagram makes it easy to see which session is causing the blocking. In addition, the resource on which the sessions are waiting is displayed. The time spent waiting and the SQL last executed are also displayed.
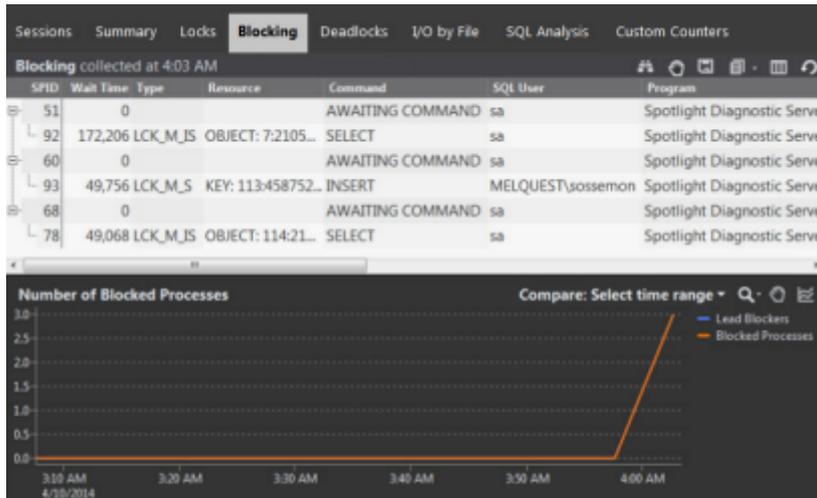


To view session details.

1. Select the entry in the grid.

2. Click **View Session Details**.

# Playback

View events and data collected in the recent past on Connection drilldowns or Spotlight today. Once a time is selected, the display of the Connection drilldown and Spotlight Today turns to that time.

***To playback time***

1. Select a connection.

2. Select from the available options on the **Monitor | Playback** ribbon tab.

| Icon | Name | Description |
|---|---|---|
| | Playback | Select an alarm or moment in time in the past to return to. |
| | | Click **Real Time** to return to the present time. |

| Icon | Name | Description |
|------|------|-------------|

| Control | Description |
|---------|-------------|
| **Monday** ◄ 6/10/2014 ► | Select the date. Use the back and forward buttons to change the date. |
| 1:00 AM 2:00 AM 3:00 AM 4:00 AM 9:30 AM 9:35 AM 9:40 AM 9:45 AM 9:50 AM 9:55 AM 10:00 AM 10:05 AM 3:00 PM 4:00 PM 5:00 PM | Select the time of day. Press and hold to magnify the time scale. The time scale is colored according to the most severe alarm raised against the connection at that time. |
| ● 7/10/2014 9:25 AM Disk D: is full. ● 1/10/2014 4:24 PM Disk D: is full. ● 1/10/2014 4:19 PM Disk D: is full. | The alarms list shows alarms raised on the selected day. It scrolls to show those alarms raised at the given time. Select an alarm to playback to the time when the alarm was raised. |

| Icon | Name | Description |
|------|------|-------------|
| 🔄 | Real Time | Return to present time. |
| ◄◄ | Rewind | Go back in time. Click the associate arrow to define how far back in time to travel: 1 minute, 5 minutes, 10 minutes, 1 hour or 1 day. |
| ►► | Skip | Starting from the past, skip forward in time. Click the associate arrow to define how far forward to skip: 1 minute, 5 minutes, 10 minutes, 1 hour or 1 day. |
| ► | Play | Starting from the past, step forward in time through the alarms in sequence. Click the associate arrow to define the speed of play. |
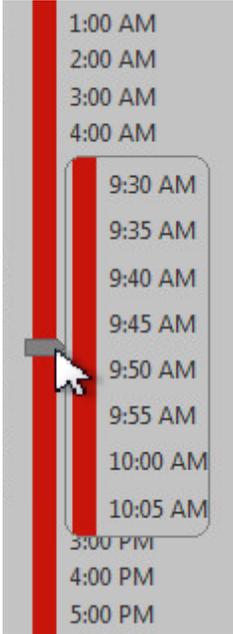
ℹ  Note: Playback data is not displayed for SQL Azure database connections.

ℹ  TIP: On the Spotlight Home Page you can view the recent history of a single component.

# Identify expensive SQL

Identifying expensive SQL can be a time consuming process. Use the SQL Analysis feature in Spotlight to identify SQL that is consuming resources on your server.

With SQL Analysis, you can quickly answer questions such as:

- What SQL has executed the most?
- What SQL consumed the most CPU or I/O in total?
- What SQL consumed the most Average CPU or I/O?
- What SQL took to longest time to execute?

Answering these questions will help you to direct your tuning efforts more productively.

SQL Analysis uses either ROWSET or sampling Server Side trace to collect raw data on SQL statement execution. It then aggregates this data by similar SQL statements so that potentially thousands or even millions of rows of raw data are distilled down into an aggregate picture of workload.

You can set filters at point of collection so that only the events that you are interested in are collected and when viewing the data, you can also filter the data to narrow the focus down even further.

## Turn on and configure SQL Analysis

1. Click **Configure | SQL Analysis**

   

2. Select a connection from the list of connections.

3. Select the **Override the factory settings** option to modify the settings for the connection.

4. Select to **Enable SQL Analysis**. SQL Analysis is disabled by default.

5. Click **Data Collection**.

6. Configure the following fields on the Data Collection page:

| Option | Description |
| --- | --- |
| SQL Analysis is scheduled to collect every *n* minutes | How often Spotlight collects SQL Analysis data. The default is six hours.<br><br>***To change how often Spotlight collects SQL Analysis data***<br><br>a. Click the link.<br><br>b. Select **Override the default settings for the collection 'SQL Analysis'**.<br><br>c. Under 'Store reporting data in the Spotlight Statistics Repository', click the **Store data** link.<br><br>d. Set the collection schedule. Data can be collected at regular intervals or at a specific time on one or more days. |
| Use continuous Rowset trace | Select to use Rowset trace to collect SQL Analysis data.<br><br>Rowset trace is convenient though may affect throughput on busy servers. It should be used with care. |
| Use sampling Server Side trace | Select to use sampling Server Side trace to collect SQL Analysis data.<br><br>Server Side trace is more suitable for busy servers than Rowset trace. Server Side trace requires additional configuration. |
| Run trace for or until trace file reaches | Server Side trace will run until one of these conditions is met.<br><br>Specify the maximum amount of time Server Side trace should run for.<br><br>Specify the maximum size of the trace file. |
| Server trace file location (on the SQL Server host) | Type a location for the server trace file. The path is relative to the SQL Server instance.<br><br>For example, **C:\Trace Files**. |
| Retrieve data through SQL Server | Select to process trace files on the SQL Server instance. This option has the potential to affect throughput on busy servers.<br><br>Use this option when there are permission or firewall settings preventing the Spotlight Diagnostic Server host from retrieving files from the SQL Server machine.<br><br>This is the default option. |
| Retrieve data from the file system | Select to process trace files on the Spotlight Diagnostic Server. The Spotlight Diagnostic Server host must have the appropriate permissions required to connect to the SQL Server instance.<br><br>This option is not available when configuring default settings. |
| Trace file location (from Diagnostic Server host) | Type the location of the server trace files on the SQL Server instance. The location should be a shared folder the Spotlight Diagnostic Server can connect to. |

| Option | Description |
|---|---|
| | For example, **\\computername\Trace Files**. |
| | This option is not available when configuring default settings. |

# Real-time data and expensive SQL

You can use the SQL Analysis grid when load testing in a testing environment. It shows SQL Analysis data in real time.

If you are trying to answer the question "I am simulating application workload in my test environment and I want to look at a breakdown of SQL statements in real-time. I am interested in what SQL statements are consuming the most average CPU right now.", you would want to look at an aggregate of SQL statement executions (workload) in real-time. The SQL Analysis grid in the SQL Activity drilldown allows you to do exactly that.

1. Select a SQL Server connection.

2. Click **Monitor | SQL Activity**.

3. Select **SQL Analysis**.

4. Do the following:

| To identify | Sort the grid by |
|---|---|
| SQL that consumed the most CPU | Total CPU |
| The average CPU consumed by a particular statement | Average CPU |
| SQL that was executed the most | Execution Count |
| SQL with the highest logical I/O | Average Reads |

i TIP:

- Use filters to refine the data shown in the grid. For more information, see

- Some columns are hidden by default. To view hidden columns, right-click the grid header row and select **Organize Columns**.

- Results are cleared when you leave the SQL Analysis grid. Click **Clear Grid** to clear the grid manually.

- To wrap a column onto multiple lines, right-click the data content of the grid and select **Properties | Options**.

  i Note: Word wrap may degrade the performance of Spotlight.

- If SQL Optimizer is installed, you can use it to tune the non-conforming SQL that has been identified. To do this, click **Optimize SQL**.

# Filter displayed and collected data

## *To filter the data displayed*

Start from the data displayed in the SQL Analysis grid.

1. Click **Change Filter**.

2. Select **Filter results**.

## *To add a filter to the list*

1. Click **Add**.

2. From the **Column** list, select the column you want to base your filter on.

3. From the **Condition** list, select a condition to apply to the column.

4. In the **Value** field, type a value to filter events by. You can use the percent sign (%) wildcard with the **is like/is not like** condition.

**i** | TIP:

- You cannot use wildcard characters for the Database name when connected to a SQL Server 2000 instance.

- To turn off filtering, clear the **Filter results** checkbox.

- To edit or delete a filter select it in the filter list and click the appropriate button.

## *To filter the data collected*

1. Click **Configure | SQL Analysis**.

2. Select the connection.

3. Select **Override the factory settings**.

4. Select to **Enable SQL Analysis**.

5.  Ensure the **Filters** page is selected.

    -  Click **Add**.

        **i** | TIP:

        -  You can use the percent sign (%) and underscore (_) as wildcards.

        -  You cannot use wildcard characters in the Database name field when connected to a SQL Server 2000 instance.

        -  When filtering on a string field such as DatabaseName or ApplicationName, use only the "LIKE" and "NOT LIKE" operators. The other operators apply only to numeric values.

    **i** | TIP:

    -  Use the Arrow buttons to change the order of the filters.

    -  Edit or delete a filter by selecting it in the filter list and clicking the appropriate button.

    -  Filtering affects the average, minimum, maximum, and last values displayed in the grid, as calculations are performed only on data retrieved from the SQL Server instance.

    -  To turn off filtering, on the Filters page, click **Clear**. This removes all filters.

6.  You can specify the number and type of SQL Executions retrieved from the SQL Server instance

    a.  Select the **Advanced** page.

    b.  In the **Aggregate the top n SQL statements** field, enter the maximum number of SQL executions to be retrieved from the SQL Server instance.

    c.  From the **Sorting by** list, specify the criterion you want Spotlight to use to determine what the "top" SQL statements are. Choose from Average Duration, Average CPU, or Average IO.

    Spotlight aggregates the data collected and then stores only the aggregated data.

# Report on database growth

To report on database growth across multiple SQL servers, use the Large Databases Report in Spotlight Reporting and Trending. The Large Databases Report shows the largest databases on the selected SQL Servers. With Spotlight, you can view this data in a number of different ways.

1.  Select **Reports | SQL Server Large Databases**.

By default, the data is shown as a bar chart, listing each database on the selected servers in order of size. You can change the way the data is displayed.

For example, if you wanted to view the growth of your largest databases over time you can change the chart to a line graph. To do this, right click on the chart and select **Properties**. With the **Chart** tab to the front, select **Line** from the list.
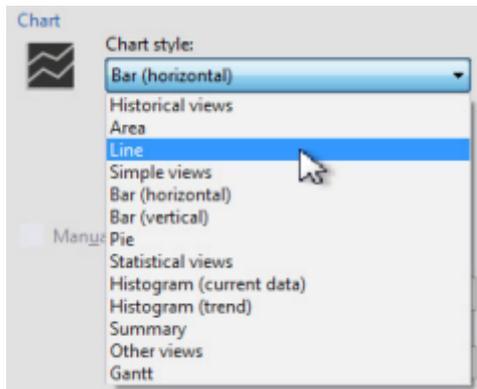
To look at the space consumption proportionally you could use a pie chart.

You can use the data and chart from the view in your own reports by exporting the view. To do this, right click the chart and select **Export**. Choose a location to save the file. Spotlight saves the chart as a JPG file and the grid as a CSV file.

# Analyze wait statistics

When troubleshooting SQL Server performance issues, one area you can focus your investigation on is waits. Long wait times can be an indicator of performance bottlenecks so identifying where waits are occurring may assist you in your tuning efforts.

Spotlight not only provides an easy way to see if your SQL server has a problem with waits but also identifies on which particular resource waits are occurring. Spotlight takes the raw data from SQL Server and automatically calculates the rate of wait over time so you have a more current perspective.

To start your investigation into waits, go to the Wait Statistics drilldown.
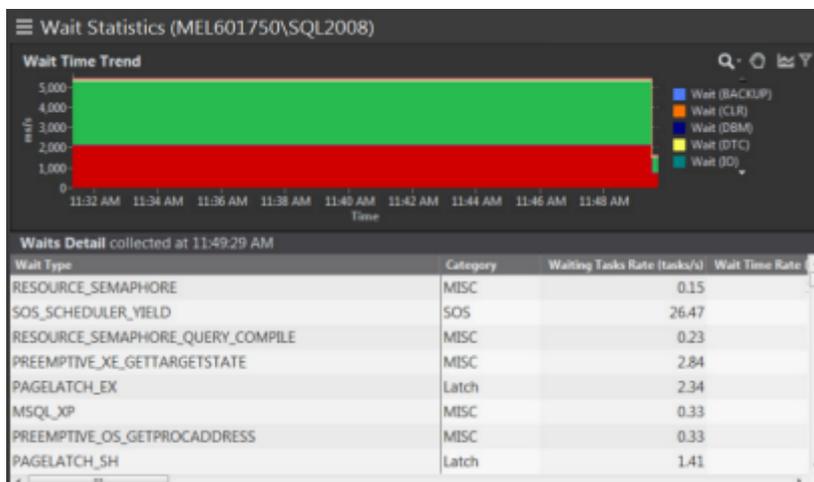


The Waits Detail grid shows detailed waits statistics for the SQL Server instance being monitored. It shows all wait types in SQL Server and breaks down the statistics into signal time and resource wait time. (SQL Server provides only wait time and signal wait time.) By default, the Waits Detail grid is sorted by Wait Time Rate (ms/s) which allows you to immediately see which wait types are being waited on right now.

# SQL - Long Running SQL alarm

The **SQL - Long Running SQL** alarm is raised when SQL has been running longer than a configured time. Because the (configured time) is unique to each environment, the SQL - Long Running SQL alarm, by default, is not configured.

Scenario

You work in an OLTP environment and often get complaints about delays in server processing. You want to be notified when SQL on a particular server is running longer than expected so you can investigate what is causing the delay. You configure Spotlight to raise a medium severity alarm when it detects SQL running for longer than five minutes. When the SQL - Long Running SQL alarm is raised, you use the Sessions page to view the long running SQL.

### *When the alarm is raised*

- Open the SQL Server | SQL Activity Drilldown | **Sessions** page. View the long running SQL.

### *Configuration*

1. Click **Configure | Alarms**.

   

2. To apply the alarm configuration to a connection, select the connection from the drop down list. The templates you have created are also selectable from the drop down list. Select a template to modify. Note that the Spotlight Factory Settings Template cannot be modified. To create a template, select an existing template or connection from the list to form the basis of the new template and click **Save as Template**.

3. Locate the alarm **SQL - Long Running SQL**. Double click on the alarm to configure the settings.

   a. Clear the **Factory Settings** control for the SQL - Long Running SQL alarm and so you can modify the settings for this alarm.

   b. Click **Add Severity** and select a severity.

      **Scenario:** Click **Add Severity** and select **Medium**.

   c. Select the check box of the new severity.

   d. Copy and paste the text in the Description cell from the Normal severity to the new severity.

   e. In the Start cell, type the duration in seconds, of how long the SQL should run for before the alarm is raised.

      **Scenario:** In the Start cell, type 300 .

      **i** | TIP: You can also configure alarm severities using keys. In the SQL - Long Running SQL alarm, the key is the SPID. See "Configure an alarm" in the online help for more information.

   f. Click OK to close the dialog for the SQL - Long Running SQL alarm.

4. From the dialog to Configure Alarms, you can continue to configure more alarms for the selected connection / template. When you have finished you may choose to apply the configuration(s) to other

connections or save the configuration(s) to a template.

5. Click OK to save the alarm configuration(s) for the selected connection or template.

# About us

## We are more than just a name

We are on a quest to make your information technology work harder for you. That is why we build community-driven software solutions that help you spend less time on IT administration and more time on business innovation. We help you modernize your data center, get you to the cloud quicker and provide the expertise, security and accessibility you need to grow your data-driven business. Combined with Quest's invitation to the global community to be a part of its innovation, and our firm commitment to ensuring customer satisfaction, we continue to deliver solutions that have a real impact on our customers today and leave a legacy we are proud of. We are challenging the status quo by transforming into a new software company. And as your partner, we work tirelessly to make sure your information technology is designed for you and by you. This is our mission, and we are in this together. Welcome to a new Quest. You are invited to Join the Innovation.

## Our brand, our vision. Together.

Our logo reflects our story: innovation, community and support. An important part of this story begins with the letter Q. It is a perfect circle, representing our commitment to technological precision and strength. The space in the Q itself symbolizes our need to add the missing piece — you — to the community, to the new Quest.

## Contacting Quest

For sales or other inquiries, visit www.quest.com/company/contact-us.aspx or call +1 949 754-8000.

## Technical support resources

Technical support is available to Quest customers with a valid maintenance contract and customers who have trial versions. You can access the Quest Support Portal at https://support.quest.com.

The Support Portal provides self-help tools you can use to solve problems quickly and independently, 24 hours a day, 365 days a year. The Support Portal enables you to:

- Submit and manage a Service Request
- View Knowledge Base articles
- Sign up for product notifications
- Download software and technical documentation
- View how-to-videos
- Engage in community discussions
- Chat with support engineers online
- View services to assist you with your product