SQL Workload Analysis

Version 1.0

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Welcome to SQL Workload Analysis

This wiki helps you understand IDERA SQL Workload Analysis characteristics and features.

Need help using SQL Workload Analysis? See the following topics:

- SQL Workload Analysis FAQ
- Monitoring EMC storage using SQL Workload Analysis

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Find answers

This documentation set includes a comprehensive online Help system as well as additional resources that support you as you install and use the product. You can also search the IDERA Solutions Knowledge Base, available at the IDERA Customer Service Portal (idera.force.com/).

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Additionally, IDERA helps you by providing:

- 24/7 technical support for critical issues.
- Availability to report cases and access a web-based customer portal for update status.
- Access to our Knowledge Center where you can find FAQs, How To's, Best Practices, and Webcasts.

This wiki includes the following Web browser minimum requirements:

- Internet Explorer 8.0
- Mozilla Firefox 4
- Google Chrome 6

You can access the IDERA Help system through the **Help** icon on the top right section of your window or by pressing F1 on the section where you need more information.

You can print a help topic from the wiki using the Print function in your browser.

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Frequently asked questions

Where is SQL Workload Analysis installed? Should I install anything on the database machine?

SQL Workload Analysis monitors SQL Server instances remotely (agent-less), from a dedicated framework machine. SQL Workload Analysis has a web-based interface that you can use, via a browser, from any machine that can access the framework machine.

How is SQL Workload Analysis different from the Precise for SQL Server Enterprise edition?

It is based on the same collection technology, but there's a completely new UI, and it is designed from the bottoms up to be extremely easy to install and to use. SQL Workload Analysis is focused on SQL Server performance tuning, stemming from 20 years' R&D and DB tuning experience - all packaged in a user-friendly and effortlessly-deployed application. Precise for SQL Server Enterprise Edition complements SQL tuning with full-blown enterprise functionality including alerts, reports, up-stream application context and network monitoring.

How can I pause monitoring an instance?

When adding monitoring for an instance, a dedicated Windows Service is created on the framework machine. Stopping/starting this Service will stop/start the monitoring for that instance.

I see a performance peak in one of the graphs. How do I zoom in to investigate it further?

SQL Workload Analysis has an easy zoom functionality. Simply drag your mouse with the left button click over the graph, drawing a rectangle to define the area you want to zoom in on. SQL Workload Analysis will zoom in quickly on this area. Note: zoom is enabled in all graphs besides in "Current" pane. Graphs displaying current information always show last 30 minutes of data in maximal granularity.

Data has stopped being collected. How do I troubleshoot this?

Troubleshoot data collection pauses with the following: Check whether the Windows Service of the Precise collector is up and running. If it is stopped, restart it. Check whether the monitored instance's credentials were changed. If this is the case, SQL Workload Analysis will not be able to connect to the monitored instance until the new credentials are provided. Rerun Setup.exe from the installation root folder to update credentials.

How to monitor in failover cluster configuration?

Install the SQL Workload Analysis framework on a dedicated server outside of the cluster. During setup, specify the logical (cluster) instance name as the SQL Server instance to be monitored. In case of failover, the collector will identify the failover in a second, and within moments will resume monitoring automatically without any manual intervention.

How do I upgrade from trial to standard version to continue monitoring beyond the trial's period?

Visit the IDERA Online Store to purchase a license.

How can I control the time frame of the displayed data?

SQL Workload Analysis provides simple shortcuts for setting desired time frame (e.g. last 8 hours) – these shortcuts are displayed on the top right part of the screen. Besides the shortcuts you can always zoom in from any graph (except for "Current" pane that always shows last 30 minutes).

What does "Total in DB" measure?

"Total in DB" is the total amount of time spent by the application/s inside the database over the selected time period. This measurement allows you to quickly identify the activities with the most significant contribution to DB resources usage. This time is divided into productive "Using CPU" time and non-productive waits for resources. This breakdown is clearly displayed along with the absolute time measurements.

What is the refresh rate of the SQL Workload Analysis views?

The main dashboard portlets are refreshed every 15 minutes. The "Current" pane's portlets are refreshed every minute. The rest of the screens are not automatically refreshed since they are designed for investigating performance bottlenecks and should not be refreshed without user's intention.

What are the units I see next to the time displays (including in the Y axis of the graphs)?

The units are: μs – microsecond, ms – millisecond, s – second, m – minute, h – hour, d – day w – week.

For some SQL statements, why don't I see summary values regarding physical reads, logical reads, etc.?

These values are not accessible whenever a statement is not kept in the SQL Server's procedure cache.

What are the "Top Accessed Objects" I see for a SQL statement?

Accessed objects are the tables and the indexes the statement is utilizing during its execution. This display allows you to understand object bottlenecks even without analyzing the execution plan.

How should I work with the Locking Sessions (Blockers) portlet to analyze locking situations?

The sessions appearing on the top of the hierarchy are the blocker sessions. They are also colored in red. To release the lock you may need to consider killing these blocker sessions. The number that you can see after the program's name is the client process ID, which should help you in locating the blocker. The sessions appearing beneath the blocker sessions are

the locked sessions. Each locked session can in its turn cause additional sessions to become locked – these locked sessions will appear further down in the hierarchy. When looking at the locked session this column presents the locked statement. When looking at the blocker session this column presents the last statement that was executed by the session. Many times it will represent the locking statement.

The main dashboard shows only top databases/statements. How can I see more in the list?

Drill down through the links provided inside the lists to get to the designated page showing much longer lists and the important details for each item.

What does the "Table Cardinality" column mean in the statement's execution plan's display?

This column shows the number of of rows in the access table. It may appear when the Operator name is: Table scan, Index seek, or Clustered index seek. Table cardinality should be used in conjunction with the value of Returned row column. Returned rows shows how many rows were returned after applying all the filter predicates for the selected operation. It allows calculating filtering ratio and assessing the potential of using an index. Let's assume: Operation name is Table scan, Table cardinality is 1000000, and Returned rows is 50. It means that SQL Server sequentially scans a 1000000-row table while only 50 rows were qualified after applying relevant filter predicates. Normally an index may help when the filter ratio (Returned rows / Table cardinality) is less than 1%. You may view filter predicates applied by an Operation by hovering on the Operation and then clicking the More properties link in the presented tool tip.

Locks trending graph shows lock types including "Md" prefix – what is it?

"MD" stands for METADATA. It means that the locked object is not user data such as table row or index key. The locked object is some dictionary object that describes user objects. In most cases METADATA locks are caused by DDL (create, alter, drop) rather than DML (insert, update, delete) statements. "MD Partition Lock" means that the partition function of a partitioned table is locked. It may happen when adding / removing partitions. During that time, any application trying to access that partitioned table will be locked. "MD Statistics Lock" means that the lock is due to trying to gather statistics on user objects and update the statistics in system tables. Updating stats in system tables may lock the optimizer when trying to generate an execution plan for queries that access objects on which statistics were gathered. "MD Other Lock" stands for any other METADATA lock (not one of the two mentioned above). The full list of METADATA sub types reported by SQL Server is documented as part of column `resource_subtype` of table `sys.dm_tran_locks`.

How can I extend SQL Workload Analysis' visibility into EMC storage?

Precise provides deep visibility past the database and into the EMC storage array, including the ability to detect contention on physical disks or virtual pools. In order to enable this extended visibility, some EMC software needs to be installed on the SQL Workload Analysis

server as well as the database hosts. Please consult the following document for the full details of how to extend SQL Workload Analysis' visibility into EMC Storage: SQL Workload Analysis – Installing and Verifying EMC Solution Enabler.

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Monitor EMC storage

This section describes how to extend SQL Workload Analysis to monitor EMC storage used by SQL Server. As part of this, it describes what EMC software needs to be installed and how it should be configured.

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Planning for EMC Solution Enabler installation

Which servers require Solutions Enabler installation?

EMC Solutions Enabler must be installed on the server on which the SQL Workload Analysis framework is installed. In addition, it must be installed on any server that hosts an instance of SQL Server to be monitored.
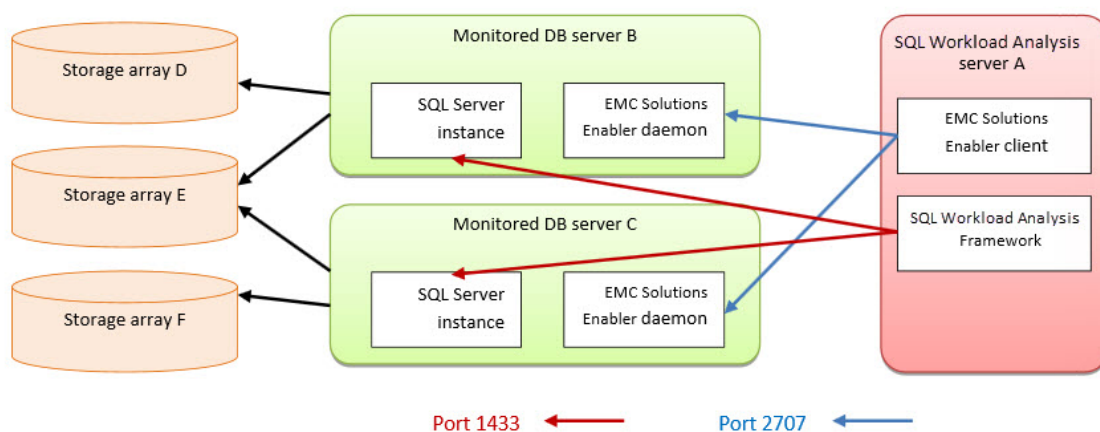
For example, if the Precise framework is installed on Server A, and it is being used to monitor SQL Server instances residing on Server B and Server C, then Solutions Enabler needs to be installed on Server A, Server B, and Server C.

Network and security requirements

EMC Solutions Enabler client (running on SQL Workload Analysis server) should be able to send commands to Solutions Enabler daemon installed on each DB server. By default, Solutions Enabler daemon listens on port 2707. Port 2707 on each DB server must be open in the firewall for requests from the SQL Workload Analysis server.

Solutions Enabler ACL-based security is supported. If ACL is configured, the only authorization needed is BASE.

Installation diagram

About obtaining Solutions Enabler

EMC Solutions Enabler can be obtained from EMC. The EMC source for the Solutions Enabler is the EMC Extranet site – PowerLink: https://support.emc.com/downloads/2071_Solutions-Enabler .

> ⓘ
> # Note
> You will need an account (login and password) to access this site, which is provided by EMC.

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Note

Be sure to download the correct version of the Solutions Enabler for your platform. If you are using a 32-bit platform, download the x86 version. If you are using a 64-bit platform, download the x64 version.

ⓘ
Note

SQL Workload Analysis supports Solutions Enabler 7.2 and above. It is highly recommended to use the highest version available (currently, Solutions Enabler 7.5).

Virtualization considerations

SQL Workload Analysis supports any configuration supported by EMC Solutions Enabler.

Typically, hypervisors abstract the physical layers from the virtual machines. Thus, special handling is required, otherwise EMC Solutions Enabler, running on a virtual machine, will not be able to interact with the Storage array.

Microsoft Hyper-V exposes attached EMC devices using pass-through or VHD configuration. If the monitored SQL Server instance runs on a Microsoft Hyper-V guest server, only pass-through devices are supported.

VMware virtualization is fully supported by EMC Solutions Enabler, both for pass-through and VHD configuration.

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Installing Solutions Enabler

This section contains a brief walk through for Solutions enabler deployment, for the purpose of monitoring by SQL Workload Analysis. for the full procedure and options of Solutions Enabler deployment, see also the *Solutions enabler Installation Guide* document, which can be found in the document set on the EMC web site.
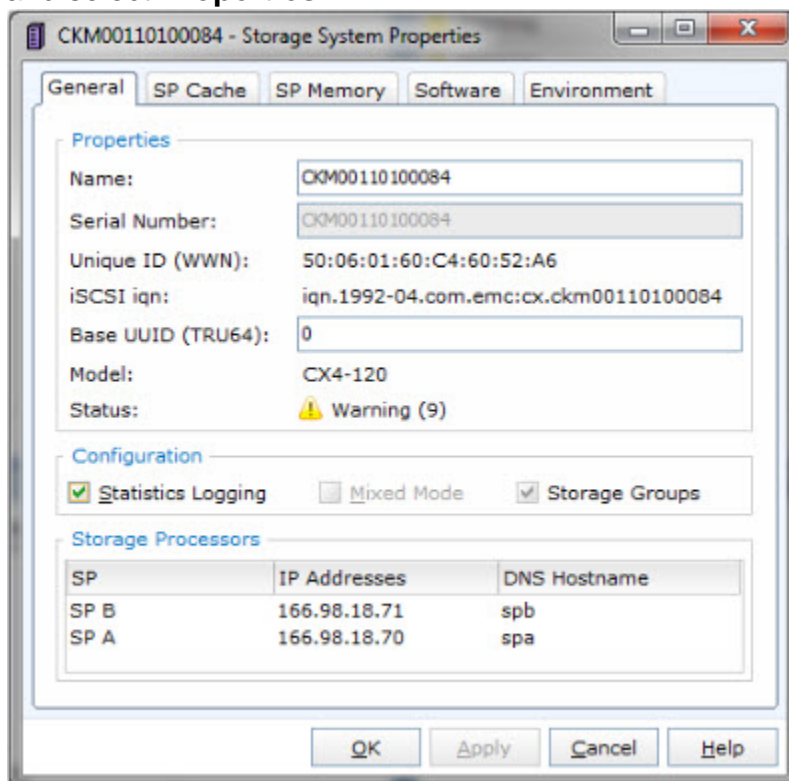
> ⓘ
> # Note
> A user with the administrator role is needed to complete the following procedure.

On the SQL Workload Analysis server

1. Install Solutions Enabler.
   a. Select the destination folder.
   b. Select the **Setup Type** (use: **Complete**)
   c. On the **Services List**, leave the default settings for the Stordeamon Services.
   d. Click **Next**.
   e. Click **Install**.
2. ***If your SQL Server instance stores its data on CLARiiON or VNX storage arrays***, **Statistics Logging** should be enabled. The following procedure should be done per storage array:
   a. Open Navisphere GUI or Unisphere web GUI. Typically, this will require a user with Storage Administrator rights and the URL of the Navisphere software.
   b. Right-click on the APM storage System (or on CLARiiON unit ID in Unisphere GUI) and select **Properties**.

    c. On the General tab, select **Statistics Logging**.
    d. Click **Apply**.
    e. Click **OK**.
    f. Click **File > Save** and **Exit**.
3. Initialize Solutions Enabler (building the `symapi\db\symapi_db.bin` file).
    a. Open a Windows command prompt.
    b. Navigate to the directory in which the EMC Solutions Enabler is installed.
    c. Execute: `SYMCLI\BIN\symcfg.exe discover -all`
       The "No devices were found" message is expected and does not indicate an error.

On each monitored server

1. Install Solutions Enabler.
    a. Select the destination folder.
    b. Select he **Setup Type** (use: **Complete**)
    c. On the **Service List**, use the defaults and also check the **SYMAPI daemon** checkbox
     .
    d. Click **Next**.
    e. Click **Install**.
2. ***If your SQL Server instance stores its data on CLARiiON or VNX storage arrays*** , the monitored server should be authorized using a SYMCLI command as follows:
    a. Make sure you have the array's Storage Processors (SP) hostname or IP address, and the array's administrator username and password.
    b. Open the command prompt.
    c. Navigate to the directory in which EMC Solutions Enabler is installed.
    d. Execute: `SYMCLI\BIN\symcfg.exe authorization add -host {VNX-SP} -username {VNX Administrator} -password {VNX Administrator Password}`
3. ***If your SQL Server instance stores its data on Symmetrix (DMX or VMAX) storage arrays***, gatekeeper devices must be installed.
    a. Gatekeeper device is a small device (less than 3 MB) used by Solutions Enabler to improve the communication with the storage array. The assistance of a storage administrator is required.
    b. To verify which storage units and devices are attached to a monitored server, execute: `SYMCLI\BIN\syminq.exe`
       The following table shows an example of the command's output.

Device		Product			Device	
Name	**Type**	**Vendor**	**ID**	**Rev**	**Ser Num**	**Cap (KB)**
\\.\PHYSICALDRIVE0		SEAGATE	ST15150W	HP12	02994239	4194157
\\.\PHYSICALDRIVE1		EMC	SYMMETRIX	5265	93052361	4224000

\\.\PHYSICALDRIVE2		EMC	SYMMETRIX	5265	93052461	4224000
\\.\PHYSICALDRIVE3		EMC	SYMMETRIX	5265	93052561	4224000
\\.\PHYSICALDRIVE4	GK	EMC	SYMMETRIX	5265	93050161	2880
\\.\PHYSICALDRIVE5	GK	EMC	SYMMETRIX	5265	93051161	2880

    c. Gatekeeper devices are marked with **GK** in the **Type** column. The two most left digits (**93** in this example) are the suffix of unit ID.

    d. If gatekeeper devices are missing, ask the storage administrator to define them. To verify, execute `SYMCLI\BIN\syminq.exe` and check its output once again.

4. ***If the monitored SQL Server instance runs on a VMware guest server***, the monitored server should be authorized using a SYMCLI command as follows:

    a. Make sure you have the ESX server hostname or IP address, and the ESX server's administrator username and password.

    b. Open a command prompt.

    c. Navigate to the directory in which EMC Solutions Enabler is installed.

    d. Execute: `SYMCLI\BIN\symcfg.exe authorization add –host {ESX server} -username {ESX server Administrator} -password {ESX server Administrator Password} -vmware`

5. ***If the monitored SQL Server instance runs on a Microsoft Hyper-V guest server***, the monitored server should be authorized using a SYMCLI command as follows:

ⓘ

Note

Only pass-through devices are supported. Devices configured as VHD are not supported.

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    a. Make sure you have the Hyper-V hostname or IP address, and Hyper-V's administrator username and password.

    b. Open a command prompt.

    c. Navigate to the directory in which EMC Solutions Enabler is installed.

    d. Execute: `SYMCLI\BIN\symcli.exe authorization add –host {Hyper-V hostname} -username {Hyper-V Administrator} -password {Hyper-V Administrator Password} -hyperv`

6. Initialize Solutions Enabler (building the `symapi\db\symapi_db.bin` file}.

    a. Open a Windows command prompt.

    b. Change to the directory in which the EMC Solutions Enabler is installed.

    c. Execute the discover command:

```
SYMCLI\BIN\symcfg.exe discover -all
```
This time, "No devices were found" message should be considered an error. If no devices were found, retry carefully steps 1 to 6. If still not found, open a support case using the Precise community portal.

d. ***If your SQL Server instance stores its data on Symmetrix (DMX or VMAX) storage arrays***, execute `SYMCLI\BIN\symcfg.exe list`

Its output should list all attached Symmetrix storage units. Each of the units that are actually used to store SQL Server DB files should be marked as local in the **Attachment** column. See example:

Symmetrix	Attachment	Model	Version
000190103692	Remote	DMX3-24	5773
000190765393	Local	VMAX-1	5875

e. ***If your SQL Server instance stores its data on VNX or CLARiiON storage arrays***, execute `SYMCLI\BIN\symcfg.exe list -clariion`

Its output should list all attached VNX and CLARiiON storage units.

Verifying Solutions Enabler's Deployment and Configuration

The last verification step should be done on each monitored serer. It should be verified regardless of the storage array series (SYMMETRIX or CLARiiON).

To manually verify that Solutions Enabler was successfully deployed and configured:

1. Select a database file that is stored on an EMC sorage array (file size must be > 0).
2. Open a Windows command prompt.
3. Navigate to the directory in which the EMC Solutions Enabler is installed.
4. Execute: `SYMCLI\BIN\symrslv.exe file <full path and name of the selected DB file>`
5. The output should contain a table with the following column titles:
   `Size`, `Array`, `Dev`, `Offset`, `PPdevName`, `Offset`, and `Attr`.
   `Array` and `Dev` should present EMC unit and EMC device. If "`N/A`" is presented instead, then EMC Solutions Enabler failed to map the file. In this case, open a support case using the Precise community portal.

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Finalizing SQL Workload Analysis Storage configuration

To finalize SQL Workload Analysis configuration:

1. Login to the server on which SQL Workload Analyzer is installed.
2. Navigate to SQL Workload Analyzer installation folder.
3. Execute: `setup.exe`.
    a. Select an SQL Server instance and click the **Configure** button.
    b. Click **Next** button until getting to the EMC Storage tab.
    c. Check the **Enable EMC storage visibility** checkbox.
    d. Click the **Next** button.
4. You should start seeing EMC storage statistics in SQL Workload Analyzer GUI in 45 minutes.

SQL Workload Analysis makes SQL Server performance tuning easy.

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