

FOUR IMPORTANT FEATURES OF SQL DIAGNOSTIC MANAGER

INTRODUCTION

In many organizations today, SQL Server supports business critical applications where server downtime and poor performance has an immediate impact on business productivity. As a result, ensuring SQL Server performance and availability is arguably the most critical function for database administrators today. At the same time, SQL Server database administrators need to support with limited resources SQL Server deployments that are always growing. To effectively manage these growing environments, database administrators need reliable, real-time information on the status and health of the entire SQL Server environment, along with diagnostic tools to quickly pinpoint and resolve performance issues.

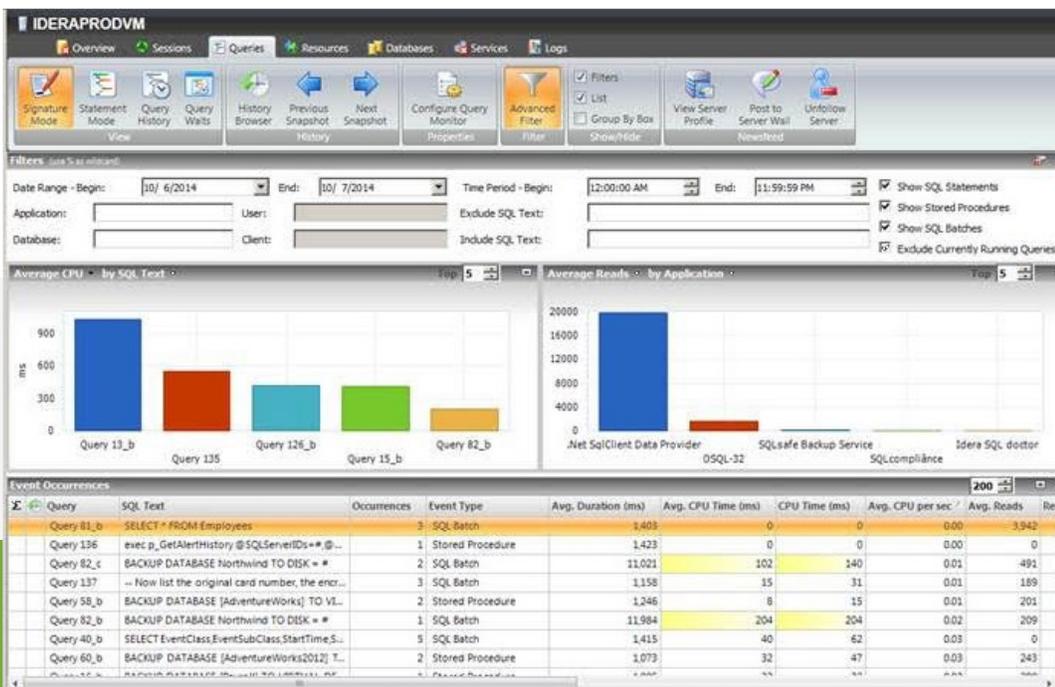
SQL Diagnostic Manager meets these needs by monitoring the performance of all SQL Servers and providing the most comprehensive diagnostics on the market. It is a robust performance monitoring, alerting and diagnostics solution for SQL Server. It proactively notifies of health, performance, and availability problems via a desktop console, a web console add-on, and mobile device. It minimizes costly server downtime with agent-less, real-time monitoring and customizable alerting for quick diagnosis and remediation. Four important features of SQL Diagnostic Manager are monitoring of the performance of SQL queries, planning of future capacity, monitoring of Always On availability groups, and monitoring of tempdb system databases.

1 SQL QUERY PERFORMANCE MONITORING

Executing resource-intensive SQL queries requires a significant amount of processor time, memory, and bandwidth, and storage. Resource-intensive SQL queries prevent other SQL queries from using these resources. This can eventually lead to blocking. Common causes of blocking are poor execution plans, lack of proper database indexes, poor application design, and misconfigured SQL Servers. Finding resource-intensive SQL queries is necessary for performance monitoring and tuning. Accurately identifying resource-intensive SQL queries is necessary to troubleshoot potential performance issues in early stages before they cause serious problems. Monitor and diagnose the performance of SQL queries for Microsoft SQL Server with SQL Diagnostic Manager several different ways.

Signature Mode View for General Performance

View individual SQL statements or view query signatures. Query signatures are groupings of SQL statements that match after stripping their literals. A query signature broadly defines queries and trends with a less overwhelming amount of data to diagnose a query in a general sense. After identifying a potential problem signature, drill into individual queries that make up the signature. Monitor average CPU, average reads, average writes, average duration, and the number of occurrences. Refer also to the documentation [View the query monitor signature mode](#) and [Advanced query signature view](#).



Query Waits View

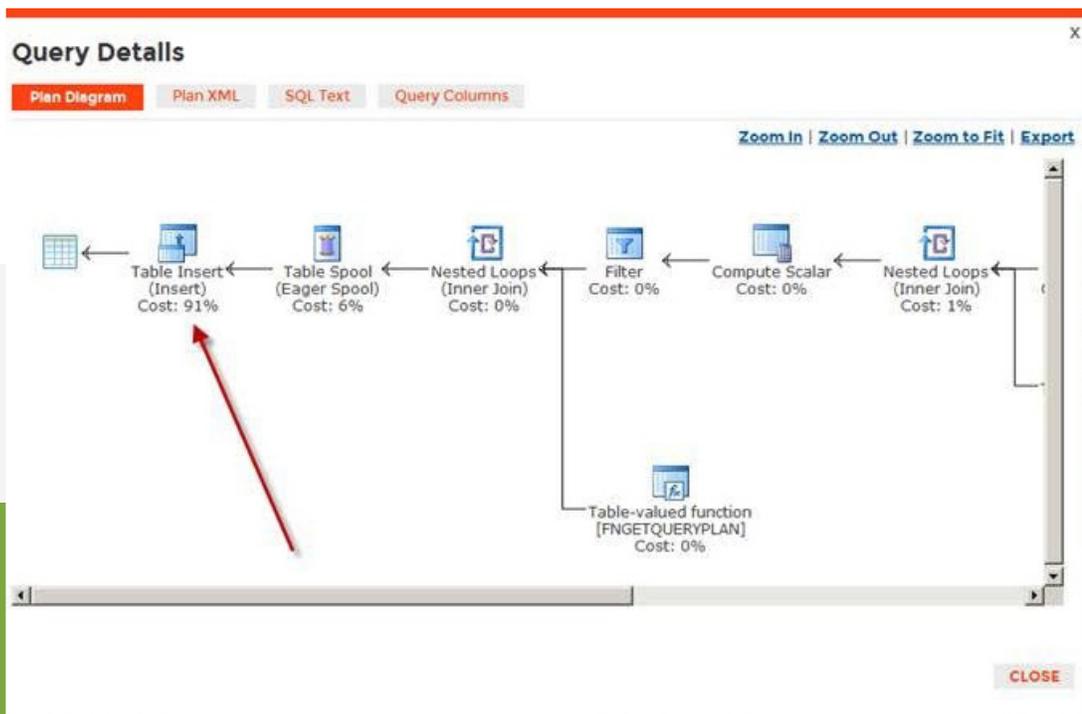
Analyze waits over time and by duration to locate the top bottlenecks and what changes may potentially have the biggest performance boost on the SQL Server instance. Display a dual graphical view of query wait statistics to see an impact analysis of waits historically and to perform a real-time assessment of existing query activity and associated waits. Use the history browser in conjunction with wait stats for a very granular level of root-cause analysis when identifying performance bottlenecks in the past.

Refer also to the documentation [View query waits](#) and [View your SQL Server query waits information](#).

Execution Plan

The execution plan assesses how queries perform and where to improve the code. The execution plan diagram displays the query execution plan (actual or estimated). The diagram shows the tree of operations that make up a query. This tree shows individual operation nodes and the pertaining graphical execution plan icon, along with basic information such as operator name and operation percentage of total cost.

The execution plan also shows the referenced tables and columns to understand where a potential index adjustment may improve performance. Refer also to the documentation [Query Details view](#).



Top Queries Report

The Top Queries report compiles a list of queries based on call frequency, duration of execution, CPU usage, and the number of reads and writes performed on the databases hosted by the specified SQL Server instance. Define minimum thresholds for each of these performance metrics and then see which queries match or exceed the selected values. Report on the worst queries within the report interface. Apply some report filters such as filtering by user, database, application, hostname, and by different performance criteria (such as CPU, memory, reads, and writes). Refer also to the documentation [Top Queries server analysis report](#).

The screenshot shows the Idera SQL diagnostic manager interface. The left sidebar contains a navigation menu with 'Reports' selected. The main window displays the 'Reports - Top Queries' configuration panel. The configuration includes fields for Server (IDERAPRODVM), Number of Queries (5), Period (Last 7 Days), Range (9/30/2014 - 10/7/2014), and various checkboxes for including batches, stored procedures, and SQL statements. Below the configuration is a summary table and a table of top queries by frequency.

Server Name:	IDERAPRODVM	Date Range:	9/30/2014 to 10/7/2014
Number of Queries:	5	Statement Type(s):	Stored Procedures, Statements, Batches
Application:		Client Computer:	
Database:		SQL Text:	
User:			

Statement	Statement Type	Latest End Time	Count	Avg Duration	CPU	Reads	Writes	Application
BACKUP DATABASE [InstanceRestore] TO VIRTUAL_DEVICE=# WITH BLOCKSIZE=#, MAXTRANSFERSIZE=#, BUFFERCOUNT=#, NOFORMAT, NAME=#, INT	Stored Procedure	10/6/2014 3:35:04 PM	46	4030	193	214	11	SQLsafe Backup Service
BACKUP DATABASE [Northwind] TO VIRTUAL_DEVICE=# WITH BLOCKSIZE=#, MAXTRANSFERSIZE=#, BUFFERCOUNT=#, SKP, NOFORMAT, NAME=#, INT	Stored Procedure	10/6/2014 3:35:09 PM	46	4768	334	203	11	SQLsafe Backup Service
SELECT	Batch	10/6/2014	28	1374	11	0	0	SQL console

Queries Tab Filtering

On each Query tab, the filtering capabilities provide an option for focus on specific queries relevant to the performance. Include and exclude specific applications, databases, users, clients, SQL text, and more via advanced filters. Refer also to the documentation [View your SQL Server queries information](#).

Click here to check out the Advanced Query Views in the SQLdm Web Console.

Filters (use % as wildcard)

Date Range - Begin:	9/ 1/2010	End:	9/ 1/2010	Time Period - Begin:	12:00:00 AM	End:	12:00:00 AM	<input type="checkbox"/> Show SQL Statements
Application:		User:		Exclude SQL Text:		<input type="checkbox"/> Show Stored Procedures		<input type="checkbox"/> Show SQL Batches
Database:		Client:		Include SQL Text:		<input checked="" type="checkbox"/> Exclude Currently Running Queries		

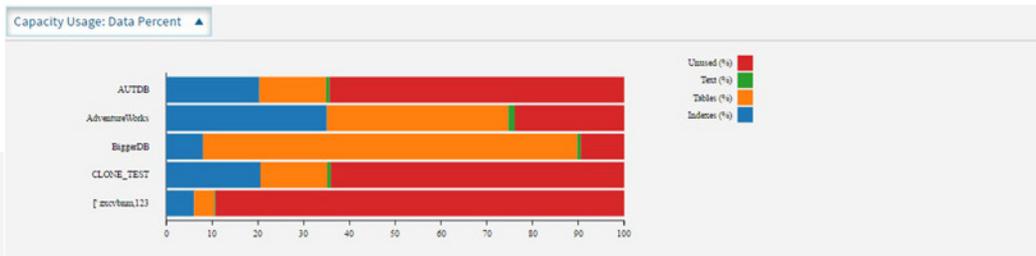
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CAPACITY PLANNING

Capacity planning, especially when done for Microsoft SQL Server, is not for the faint of heart. Storage and disk capacity are apparent, but to right-size databases for a new SQL Server implementation or migration, there is a lot more than space to consider. Of course, sizing and future growth need to be considered. Also, it is critical to review the design, configuration, and other essential resources to ensure that the new SQL Server is performing optimally. Plan for future capacity for SQL Server with SQL Diagnostic Manager.

Capacity Usage Chart

The Capacity Usage chart in the Summary view of the Database tab displays the usage of data and logs in the databases. This chart provides information on the text, tables, and indexes space, as well as the unused space of the databases. Refer also to the documentation [View your SQL Server Databases Information](#).



Analysis Reports

Analysis reports provide information to analyze the current effectiveness of SQL Server systems. Analysis reports are instrumental when performing a consolidation or moving to another environment (such as the cloud). Refer also to the documentation [Analysis Reports](#).

IDERA SQL DIAGNOSTIC MANAGER
Top Servers

The Top Servers report identifies your worst performing SQL Server instances based on the number of active alerts for the current monitored instances, response time, CPU usage, memory usage, and disk activity. Use this report to compile a list of instances that need immediate attention.

Tag: All Tags

Number of Servers: 5

Date Range: 4/18/2017 to 4/18/2017

Instance Name	Total Alerts	Critical	Warning	Informational
bmanaleit7	7	4	3	0
evalsql1	5	3	2	0

Instance Name	Response Time	CPU (SQL)	Memory (OS)	Disk Activity
evalsql1	1ms	0%	N/A	0%
webprod	1ms	6%	42%	3%
bmanaleit7	0ms	6%	42%	3%
denver	0ms	6%	42%	3%
houston	0ms	6%	42%	3%

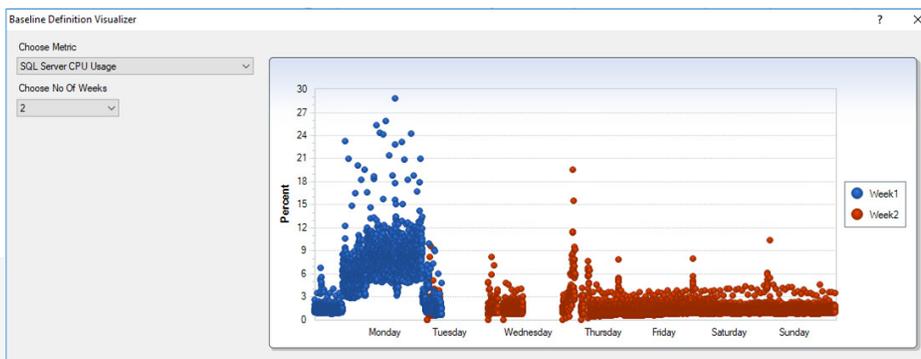
Instance Name	Response Time	CPU (SQL)	Memory (OS)	Disk Activity
houston	0ms	6%	42%	3%
webprod	1ms	6%	42%	3%
webdev-staging	0ms	6%	42%	3%

Server Analysis Reports

- **Top Servers:** Identify the worst performing SQL Servers.
- **Server Statistics:** Analyze and compare performance trends across two SQL Servers.
- **Server Inventory:** Find SQL Servers that share the same properties.
- **Query Overview:** Identify the worst performing queries.
- **Top Queries:** Find queries that are performing poorly or executing too frequently.
- **Alert History:** Analyze the alert history for a SQL Server.
- **Baseline Statistics:** Review and compare metric and baseline values across two SQL Server instances.

Baseline Statistics Report

The Baseline Statistics report analyzes and compares baselines within a single SQL Server instance and across two instances. When viewing baseline statistics for a monitored SQL Server instance, compare the baseline metric values at two different times or two different metrics at the same time. Include another instance and compare baselines values occurring at the same time or different times. View trends in the average value of a metric for a SQL Server instance and how this value changes over time for capacity planning. Baselines can be calculated related to past performance. Additionally, multiple baselines can be set up to provide a better understanding of what is “not normal” taking into consideration the time of day (for example, production hours versus maintenance hours). Refer also to the documentation [Baseline Statistics server analysis report](#).



Database Analysis Reports

- **Top Databases:** Identify the worst performing databases.
- **Database Statistics:** Analyze and compare performance trends across two databases.
- **Top Database Applications:** Find database applications that consume system resources.
- **Mirroring History:** Analyze the event history for a mirrored database.
- **Top Tables by Growth:** Identify the fastest growing tables.
- **Top Tables by Fragmentation:** Identify the most fragmented tables.
- **Tempdb Statistics:** Analyze performance statistics for the tempdb database.
- **Transaction Log Statistics:** Analyze the use of the log files.
- **Availability Group Statistics:** View the historical health of the availability groups, availability replicas, and availability databases.

Resource Analysis Reports

- **Session Statistics:** Track key session and network performance metrics over time.
- **CPU Statistics:** Track key CPU performance metrics.
- **Disk Details:** Track key disk metrics.
- **Disk Space Usage:** Obtain an overview of the available disk space across the SQL Server environment.
- **Disk Space History:** View the history of activity for a specific disk.
- **Disk Statistics:** Track key metrics for disk performance.
- **Replication Statistics:** Track key metrics for replication performance.
- **Memory Statistics:** Track key metrics for memory performance.

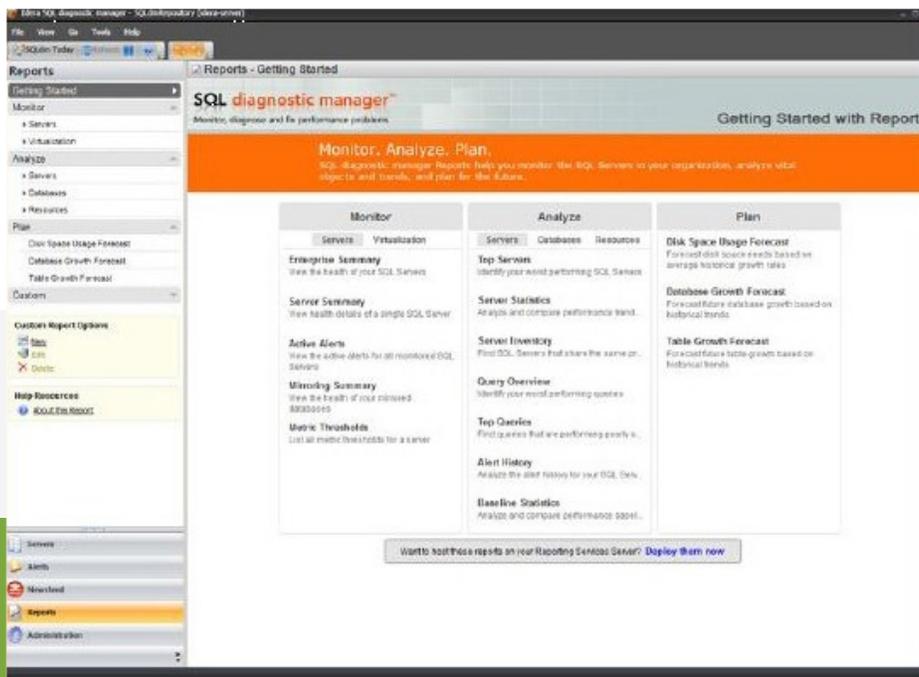
Plan Reports

Use the Plan reports to forecast for future needs based on historical growth trends. Exploit the history of the collected data to predict the amount of space consumption required at the table, database and volume levels for a point in time in the future.

Choose linear or exponential (aggressive) forecasting types when running Plan reports.

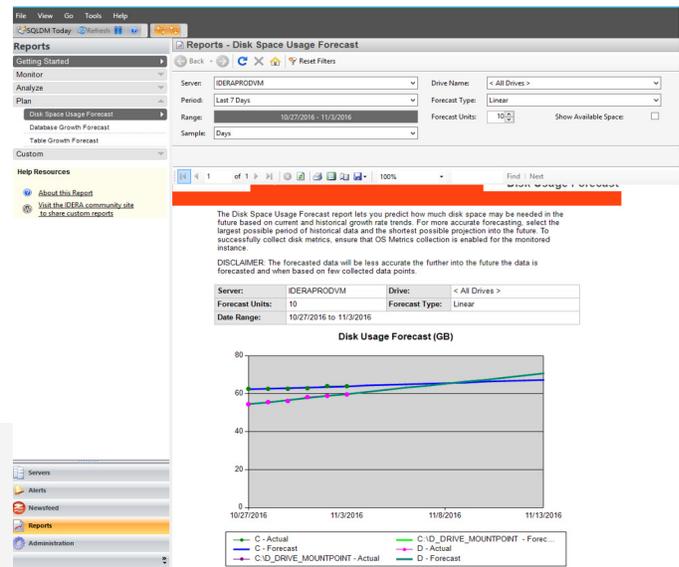
- **Linear forecasting** follows the trend of the available data and extends the forecast out in a straight line by the number of forecast units.
- **Exponential forecasting** tends to exaggerate the trend that exists in the data to more easily see if data is trending toward or away from a critical threshold. If the rate of growth is not constant, the exponential forecast type gives a more accurate forecast of future growth.

Refer also to the documentation [Plan reports](#).



Disk Space Usage Forecast Report

The Disk Space Usage Forecast report forecasts disk space needs. This report predicts how much disk space is needed in the future based on current and historical growth rate trends. Run this report to help anticipate the needs and plan for future acquisition of disk space.



Database Growth Forecast Report

The Database Growth Forecast report forecasts future database growth. This report predicts how large selected databases may grow based on current and historical growth rate trends. Run this report to help anticipate the needs and plan for future database expansion.

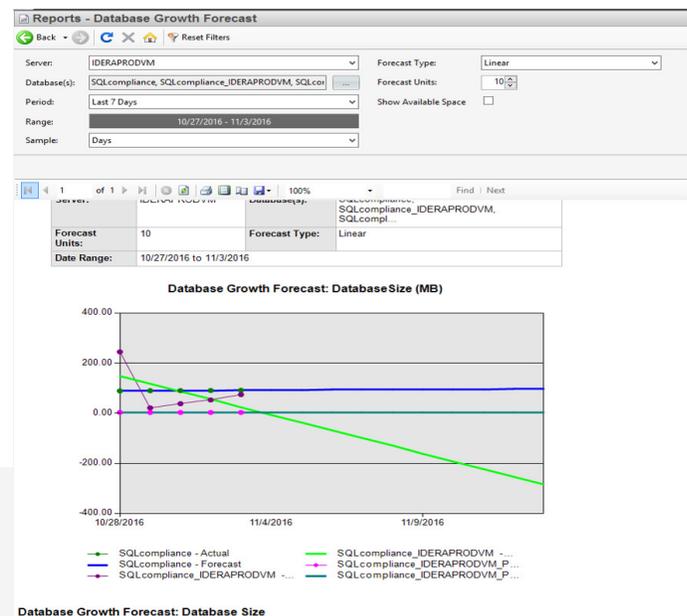


Table Growth Forecast Report

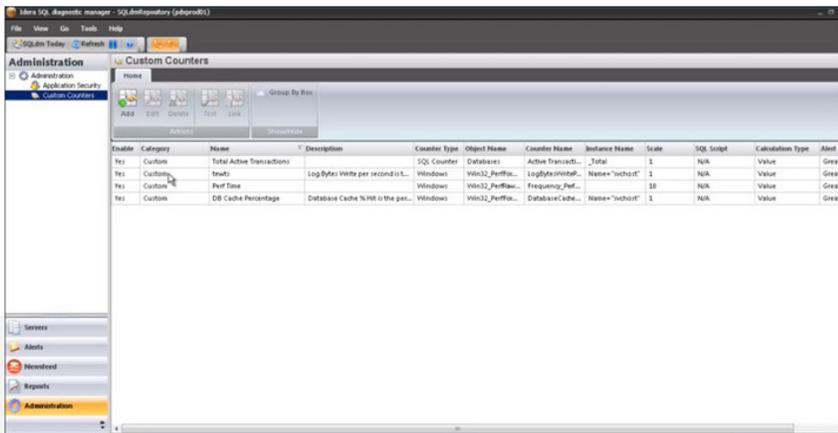
The Table Growth Forecast report forecasts future table growth. This report predicts how large selected tables may grow based on current and historical growth rate trends. Run this report to help anticipate the needs and plan for the future creation of additional tables.

Custom Counters and Reports

Every environment is different. SQL Diagnostic Manager has canned metrics that are monitored and collected historically for review, and canned reports. Having the ability to extend this monitoring footprint is paramount. Obscure monitoring requirements will be necessary. Having a tool that adapts to the environment is crucial.

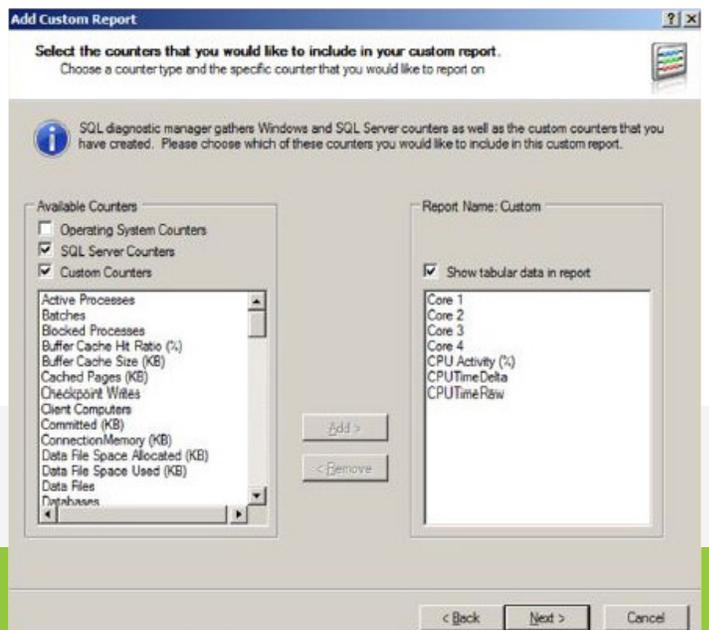
Custom Counters

In addition to monitoring a wide variety of the most common SQL Server and operating system performance metrics, add additional performance metrics via custom counters. Add any Windows system counters including any Performance Monitor and Windows Management Instrumentation (WMI) counters. Also, add any SQL Server system counter stored in the “sysperfinfo” system table, and any numerical value that custom SQL scripts return. Also, add and any performance counters accessible through the virtual machine and host server. Refer also to the documentation [Use custom counters to track metrics.](#)



Custom Reports

Create or edit custom reports. Include in custom reports any collected metric, including custom counters. Choose the counters to include in a report, order the way the metrics appear, and specify the aggregation method used on each of the metrics. Refer also to the documentation [Custom reports.](#)



Availability Groups Charts

The Always On Availability Groups view includes charts that display the queue size and transfer rates of different availability groups. The Queue Size chart is a stacked bar chart for the log send queue size and redo queue size that provides users with graphical details about queues in the Always On Availability Groups feature. The Transfer Rates chart is a line chart for the log send rate and redo rate that provides users with graphical details about data transfer rates for redo and logs.

Availability Groups Alerts

SQL Diagnostic Manager offers metric alerts to monitor and warn you about Always On Availability Groups.

Enable alerts when the following metrics are outside their established baseline thresholds: availability group estimated data loss (sec), availability group estimated recovery time (sec), availability group log send queue size (KB), availability group preferred replica, availability group redo queue size (KB), availability group redo rate (KB/sec), availability group role change, availability group synchronization health, and availability group synchronization performance (s).

Refer also to the product documentation [Metric alerts](#) and [Enable baseline thresholds](#).

Availability Group Alert Response Bundles

Create alert response bundles for related alerts. The alert response bundle contains individual alert information for several alerts, summarized and delivered through only a single message. Alerts for availability group databases that are compatible with the alert response bundles feature are: availability group estimated data loss (sec), availability group estimated recovery time (sec), availability group log send queue size (KB), availability group preferred replica, availability group redo queue size (KB), availability group redo rate (KB/sec), availability group role change, availability group synchronization health, and availability group synchronization performance (sec). Refer also to the product documentation [Create alert response bundles](#).

Alert Configuration - SIDROCID01

Group by metric category

Enabled Metric

- Category: Backup (1 item)
 - Days since last backup
- Category: Databases (34 items)
 - Availability Group Estimated Data Loss (Seconds)
 - Availability Group Estimated Recovery Time (Seconds)
 - Availability Group Log Send Queue Size (KB)
 - Availability Group Preferred Replica
 - Availability Group Redo Queue Size (KB)
 - Availability Group Redo Rate (KB/s)
 - Availability Group Role Change
 - Availability Group Synchronization Health
 - Availability Group Synchronization Performance (s)
 - Data File Autogrow
 - Database Full (Percent)
 - Database Full (Size)
 - Database Read/Write Error Occurrences
 - Database Status
 - Filegroup Space Full (Percent)
 - Filegroup Space Full (Size)

Configuration | Comments

Metric: Availability Group Estimated Data Loss (Seconds)

Category: Databases

Description: The time period in seconds that data is not synchronized to the secondary replica. Value reflects the time difference of the last commit between the primary and secondary replicas.

0 50 100 120 144

State	Start	End
OK	0	50
<input checked="" type="checkbox"/> Informational	50	100
<input checked="" type="checkbox"/> Warning	100	120
<input checked="" type="checkbox"/> Critical	120	300

Baseline Thresholds Enabled (as percentage of baseline)

Advanced

Apply Template | Create Template | Configure Baseline... | OK | Apply | Cancel

Days Since Last Backup Alert For Availability Groups

The Days Since Last Backup alerts indicate the number of days that databases (per-database or at the instance level) have not been backed up.

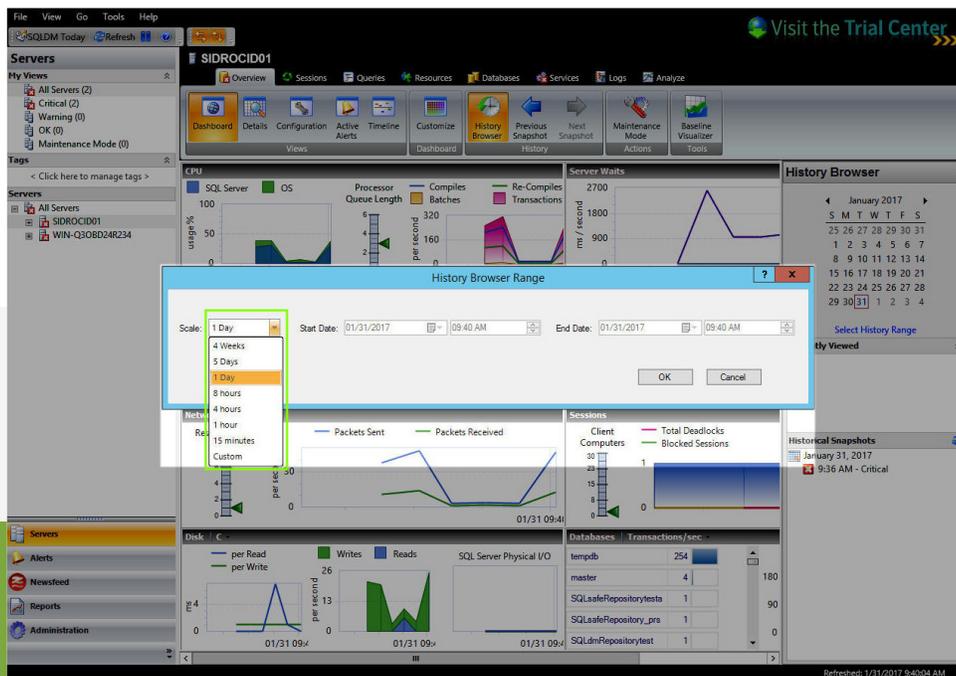
Here are some scenarios applied to Availability Groups:

- When monitoring the primary and any or all other secondary servers: The primary server displays the last backup date alert by checking all other secondary servers for the latest backup date of that database. If the latest backup date across that Availability Groups justifies the alert, it displays. The secondary monitored databases also display the same alert, as the latest backup date for an Availability Group across all replicas will be the same.
- When monitoring only the primary replica of a database: The alert displays after SQL Diagnostic Manager checks the latest backup date across all replicas and if that date justifies the displayed alert.
- When monitoring some secondary replica but not the primary replica: The alert displays after SQL Diagnostic Manager checks the latest backup date across all replicas and if that date justifies the displayed alert.

Refer also to the product documentation [Days since last backup alerts for availability groups](#).

History Browser

When users report SQL Server problems that occurred in the past, use the History Browser to go back to a point in time and view the state of the system and compare system states at different points in time. Use this information to diagnose and resolve issues to keep the issue from reoccurring. Simply select a historical snapshot collected by the standard refresh and view the collected data. The Databases > Availability Group view supports historical snapshots. Refer also to the product documentation [View past performance](#).



Reports

Availability Group Topology Server Monitor Report

The Availability Group Topology report displays the current topology of the configuration of an Always On availability group. The report displays all of the availability groups on the server, replicas that participate in the group, and the databases within the group. The report lists detailed information for availability replicas and corresponding databases.

The Availability replica table provides information on availability replica roles assigned, failover and availability modes selected, and the connection mode type selected in secondaries. The Availability databases table provides information on the database failover readiness and synchronization state of the availability databases contained within the selected availability replica.

Run the report to keep track of modifications made to the current Always On availability groups and avoid any potential setbacks to your high-availability and disaster recovery strategies.

Refer also to the product documentation [Availability Group Topology](#) server monitor report.

Availability Group Statistics Database Analysis Report

The Availability Group Statistics report displays the health of their availability groups, availability replicas, and availability databases over a specific time range. The report compiles crucial health metrics that include the redo rate (KB/s), redo queue size (KB), log send rate (KB/s), and log send queue size (KB). The report also provides database administrators with a graphical representation of a selected metric and a statistics table with weighted averages for relevant metrics.

Run the report to analyze the historical health of the availability groups and corresponding components. This report ensures the highest level of availability by identifying and tracking critical health metrics.

Refer also to the product documentation [Availability Group Statistics](#) database analysis report.

The screenshot displays the 'Reports - Getting Started' window in the SQL Diagnostic Manager. The interface is divided into three main columns: Monitor, Analyze, and Plan. The Monitor column includes sections for Enterprise Summary, Server Summary, Active Alerts, Mirroring Summary, Metric Thresholds, and Availability Group Topology. The Analyze column includes Top Servers, Server Statistics, Server Inventory, Query Overview, Top Queries, Alert History, and Baseline Statistics. The Plan column includes Disk Space Usage Forecast, Database Growth Forecast, and Table Growth Forecast. A navigation menu on the left shows 'Reports' as the selected option. At the bottom, a button prompts the user to 'Deploy them now'.

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TEMPDB SYSTEM DATABASE MONITORING

The tempdb system database is a workspace used to hold temporary user objects, results created through queries and sorts, and other objects created by the SQL Server Database Engine. Because of the significant amount of data stored in tempdb, users can run out of disk space, which causes the entire server and all of its databases to become unresponsive. Resolve some of these issues by providing a monitoring solution that features a series of charts, views, and alerts specifically for tempdb.

The tempdb system database, along with the master, model, and msdb databases, is provided by default with SQL Server and is a shared resource available to all users connected to a single SQL Server instance. Each time you start SQL Server, it recreates tempdb based on the model database. Tempdb can fill up quickly when you are low on disk space or have a low maximum size for database growth. Specific workloads may cause excessive space usage or create contention in tempdb, which can affect performance on the entire server.

Tempdb Version Store

The tempdb version store collects the data necessary to support row versioning. Each time a data value changes, a new version of the row is created and stored for as long as the oldest active transaction needs to access it. Once the row version is no longer needed it is removed from tempdb by a cleanup job which runs once per minute. As a result, long-running transactions prevent cleanup of older entries into the tempdb version store, causing growth which can affect performance and cause tempdb to run out of space.

Tempdb Contention

Tempdb resource contention or waits is usually the result of heavy use on too few tempdb files and occurs when the system attempts to allocate pages. The tempdb contention chart displays latch wait time (in milliseconds) for the allocation pages of tempdb. The three tracked allocation page types are page free space, global allocation map, and shared global allocation map.

Monitor Tempdb

Monitor tempdb databases with various charts and alerts to avoid costly performance issues caused by a full tempdb with SQL Diagnostic Manager.

Available Alerts

Tempdb includes the seven specific alerts Data File Autogrow, Log File Autogrow, Longest Running Version Store Transaction (Minutes), Session Tempdb Space Usage (MB), Tempdb Contention (ms), Version Store Generation Ratio, and Version Store Size (MB). Refer also to the documentation [Monitor your tempdb database](#).

Tempdb Summary Tab

The Tempdb Summary tab allows you to view the status of your tempdb database on the selected SQL Server instance. These charts include options for viewing your current capacity usage and recent trends of your files over time. These statistics appear in the Database Statistics report. This tab displays a list of sessions currently using tempdb along with their cumulative usage and tempdb space. These statistics help you get an overview of the health of your tempdb database and gives you a good indication whether you have enough space allocated or whether tempdb issues are causing a performance problem on your server.

Charts

The Tempdb Summary tab includes charts that display capacity usage and recent trend information for your tempdb database.

- **Tempdb Space Used by File:** You can choose to view how each file is using space on your tempdb database, displayed in megabytes.
- **Tempdb Space Used Over Time:** You can choose to view how your database is used over time based on object type by comparing charts that offer metrics for the Space Used and Space Allocated.
- **Version Store Cleanup Rate:** The tempdb database version store collects data rows necessary to support snapshot isolation. This chart helps you see the current cleanup rate to avoid filling up tempdb.
- **Tempdb Contention:** The Tempdb Contention chart displays latch wait time (in milliseconds) for the allocation pages of tempdb. The three tracked allocation page types are page free space, global allocation map, and shared global allocation map.

Refer also to the documentation [Get the tempdb status summary](#).

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SQL Diagnostic Manager is quick to set up and start using right away. It gives easy insight to SQL Servers and databases. The console allows for quick access to view the entire environment at a glance while allowing for drill down to get deeper views and understanding when needed.

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Tempdb Panel

The Tempdb panel tracks the status of the tempdb database on your monitored SQL Server instance. Unexpected spikes in the use of tempdb usage and space may warn you to allocate additional space to prevent tempdb issues from causing a performance issue on your server. Problems with tempdb can cause an entire SQL Server instance to become inoperable.

Tempdb Space Used Chart

The Tempdb Space Used chart provides different views of how your database is used over time based on the object type. Tempdb can fill up quickly when you are low on disk space and or have a small maximum size for database growth. In environments where read committed snapshot isolation is in use, long-running transactions may also cause rapid growth in tempdb.

Tempdb Contention Chart

The Tempdb Contention chart provides the latch wait time for the allocation pages of your tempdb. These latch waits are associated with performance degradation for the related queries. Latch contention is usually an indication that you should create additional tempdb data files or if you already have multiple files, make adjustments so that they are equally sized.

Version Store Cleanup Rate Gauge

The Version Store Cleanup Rate gauge displays the current version store cleanup rate and the version generation rate of the data rows necessary to support snapshot isolation. Maintaining a cleanup rate above or equal to the generation rate helps you avoid filling up tempdb. Note that long-running snapshot isolation transactions prevent cleanup of older entries in the tempdb version store, causing growth which can affect performance and cause tempdb to run out of space. When interpreting this gauge, note that version store cleanup occurs only once per minute while generation may be ongoing.

Available Alerts

The three specific alerts are Tempdb Contention Alert, Version Store Generation Ratio Alert, and Version Store Size Alert. Refer also to the documentation [Tempdb panel](#).

Tempdb Statistics report

The Tempdb Statistics report lets you view space utilization and data throughput statistics over time for your tempdb database. You can focus on a single chart type, such as data file growth, and track its value increase over a specified period of time. Run this report to view different space utilization and data throughput statistics currently occurring on your monitored SQL Server instances. This report allows you to obtain statistics through different metrics or chart types. The nine possible metrics are Data File Size MB, Data File Growth, Reads Per Second, Writes Per Second, Transactions Per Second, User Objects MB, Internal Objects MB, Version Store MB, and Mixed Extents MB. Refer also to the documentation [Tempdb Statistics](#).

With **SQL Diagnostic Manager**, unscheduled downtime on SQL Server has been cut by a third.

Neil Leslie **IT Architect** for General Electric Company

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ACHIEVE 24/7 SQL MONITORING WITH SQL DIAGNOSTIC MANAGER

- Monitor performance for physical, virtual, and cloud environments.
- Monitor queries and query plans to see the causes of blocks and deadlocks.
- Monitor application transactions with SQL Workload Analysis add-on.
- View expert recommendations from SQL Doctor to optimize performance.
- Alert predictively with settings to avoid false alerts.
- View summary of top issues and alerts with the web console add-on.

Start for **FREE**

