

DBPLUS
Performance Monitor for SQL Server
description of changes in the version 2019.4

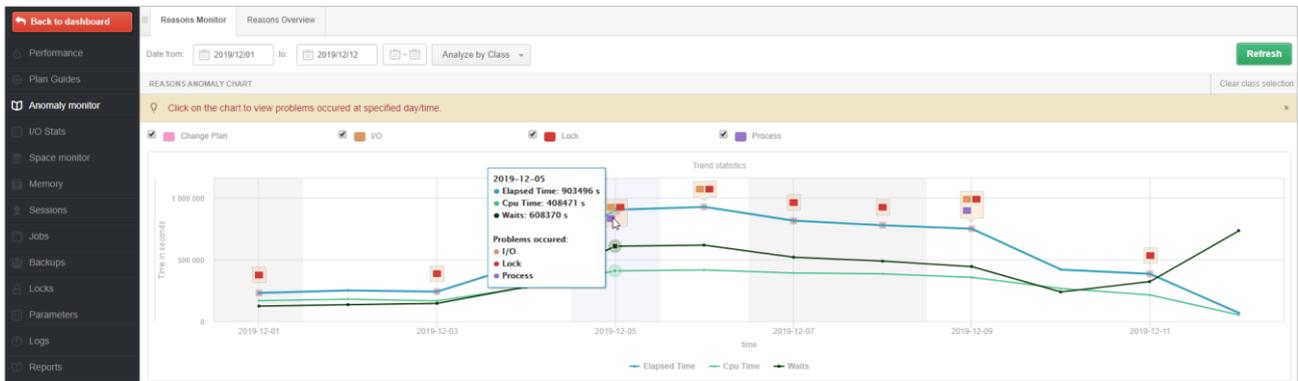
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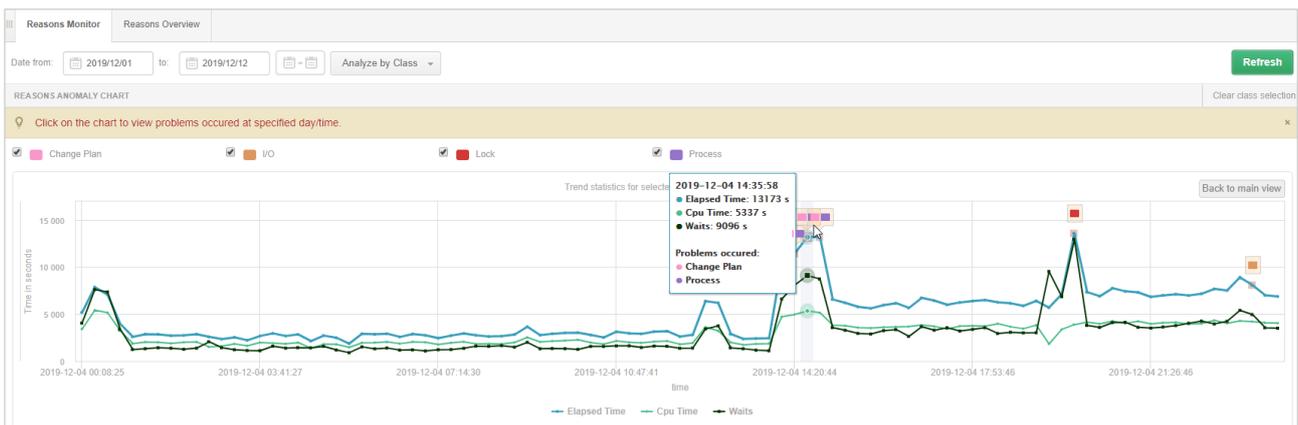
Below is a list of changes to the DBPLUS Performance Monitor system for monitoring Microsoft SQL Server instances.

1.1 Anomaly Monitor

The Anomaly Monitor module has been improved in the new version of the application. The method of alert detection and presentation has been modified. After enter the screen, a graph from the last 14 days is presented where a performance problem occurred. The date range can be freely modified. By default, the screen presents problems grouped by class (Analyze by Class), it is also possible to change the presentation and group them by reason of problems (Analyze Reason).



Problems on the chart are marked by colored icons (a different color for each class / reason). For further analysis, select the indicated day on which the problems occurred. After select a specific day (point on the graph) a detailed graph for a given day will be presented with an indication of the point at which performance problems occurred. Each point on the graph represents a given snap (15 minutes). By select a point on the chart, the user will receive information on statistics that have been exceeded at the moment as well as information on the cause of the problem.



In the new version, the Anomaly monitor module has been extended with problem detection, which additionally analyzes database performance at a given time and presents the result of this analysis in the form of a problem. This module is embedded in the application code and is not user configurable. The current alert mechanism works all the time independently of the detection mechanism.

PROBLEMS REPORTED IN SPECIFIED TIME 2019-12-04 19:55:28	
Increase of query processing time caused by locks	
Class	Lock
Reason details & action	Following process was the main blocker session that generated locking. Logdate: 2019-12-04 19:55:32, SessionId: 398, Username: INTER!srvomsql, Status: running, OS User: srvomsql, Program: SQLAgent - TSQL JobStep (Job 0xB1C4134C2AF0E408BCE6B6F6FDA1C259 : Step 1), Transaction log record count: 1308317, Last Request Runtime: 1704 s, Transaction begin: 2019-12-04 19:33:33, Transaction log size: 8554.4 MB
Additional information	Please go to Locks=>Locks history module and analyze blocking cases at specified time.
Lock Time	Alert Type: Load Trends, The measured statistic value is 134 % higher than average , Last value : 8872 s, Reference history value: 3784 s
Elapsed Time	Alert Type: Load Trends, The measured statistic value is 90 % higher than average , Last value : 13564 s, Reference history value: 7140 s

As part of defining causes of the problem in the Alerts settings menu in the "Reasons & Problems definitions" tab for a given cause of the problem, user can specify and add a detailed description of the problem with an indication of the place for detailed analysis.

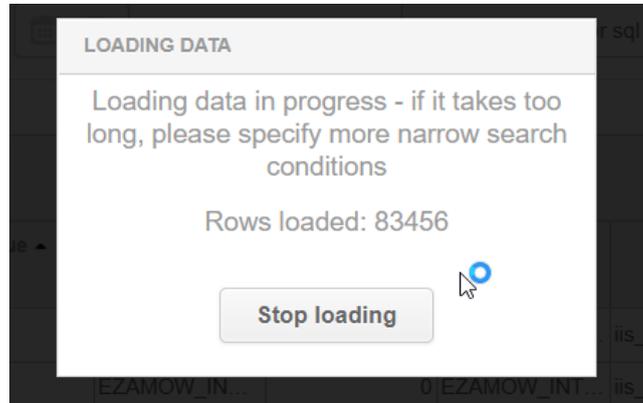
1.2 Improvements on the session history screen

1.2.3 Quick search of records in session history

In the new version, the way of viewing session history available in the Session menu in the Active Session / Tempdb sessions / Log usage history tab has been modified. After selecting the search filter, the result of the first 10,000 records is returned, sorted by date from the latest to the oldest. To download the remaining records, just move the slider to the last returned records, which will top up the remaining data.

Sessions																
Logdate	Type	Sessi. id	Program	Nt user name	Host name	Login name	Context info	Query Hash	Plan Hash	Wait type	Wait time [Seconds]	Blocking session id	Command	Database	Elapsed Time [Seconds]	Cpu Time [Seconds]
2019-12-19 03:13:54	Session	59	Microsoft SQL ...	SqllaaSExtensi...	CRMSQL31	NT Service\SQ...		0xE3D5816866F48...	0x0C8ADC62D34...		0.0		INSERT	msdb	0	0.001
2019-12-17 04:30:37	Session	123	Microsoft SQL ...	SqllaaSExtensi...	CRMSQL31	NT Service\SQ...		0xC9301825DFE3A...	0x9E8E65A8D0F...		0.0		SELECT	msdb	0	0.001
2019-12-17 02:52:03	Session	126	Microsoft SQL ...	SYSTEM	CRMSQL31	NT AUTHORITY\...				BACKUPIO	1.50		BACKUP DATA...	master	7.643	1.108
2019-12-17 02:52:03	Session	128	Microsoft SQL ...	SYSTEM	CRMSQL31	NT AUTHORITY\...				BACKUPIO	0.60		BACKUP DATA...	model	7.643	0.951
2019-12-17 02:52:03	Session	164	Microsoft SQL ...	SYSTEM	CRMSQL31	NT AUTHORITY\...				BACKUPIO	2.00		BACKUP DATA...	ReportServer	7.640	1.216
2019-12-17 02:52:03	Session	194	Microsoft SQL ...	SYSTEM	CRMSQL31	NT AUTHORITY\...				BACKUPIO	1.50		BACKUP DATA...	ReportServerTe...	7.643	0.991
2019-12-17 02:52:03	Session	250	Microsoft SQL ...	SYSTEM	CRMSQL31	NT AUTHORITY\...				BACKUPIO	0.20		BACKUP DATA...	MSCRM_CON...	7.643	1.138

In addition, each click on the column heading in the table will download all rows for the selected range in the filter. When the given data in the filter is too general and the returned results contain many records, a message will be displayed with information about the number of records loaded. After loading the data, the message will close automatically. The user can stop loading at any time by clicking the [Stop loading] button.



1.2.3 Preview of query content in session history

In the session history tab, we have added options for previewing the content of a given query. The content of the query is visible after "hover over" the hash value of the query.

Sessions		Tempdb usage	Log usage												
Type	Session Id	Program	Nt user name	Host name	Login name	Context Info	Query Hash	Plan Hash	Wait type	Wait time [Seconds]	Blocking session id	Command	Database	Elapsed Time [Seconds]	Cpu Time [Seconds]
Session	84	Microsoft® Wind...	SYSTEM	SQL05	NT AUTHORITY\...		0x0000000000000000	0x0000000000000000	SP_SERVER_DI...	0.3		EXECUTE	master	1 908 501.630	0
Session	112	SQLAgent - TSQ...	dbreplic	SQL05	INTER\dbreplic		0xC4DA29F8476BEE14	0xE7868A4D55F57...		0		DELETE	Navision HU	1 908 461.747	1 668 420.818
Session	177	DBPLUS Perfor...		SQLMON	dbplus		0x0F0F4838477FE9...	0x7364D96101B919	XE_LIVE_TARG...	3.6		SELECT	master	2 814.987	0.236

1.2.3 Searching for blocking session in session history

In the Session> Active Session / Tempdb sessions / Log usage history tab the functionality of searching session history to find sessions blocking other sessions has been added. If there were blockades in a given snap, the Blocking sessions id column containing the session identifier blocking the given session is supplemented in such cases. In the latest version, a search blocking session mechanism has been added.

In the event of a blockade, click the "loupe" button that appears in the Blocking session id column, this will cause the table to be automatically scrolled and the row with the session which is a blocker will be highlighted.

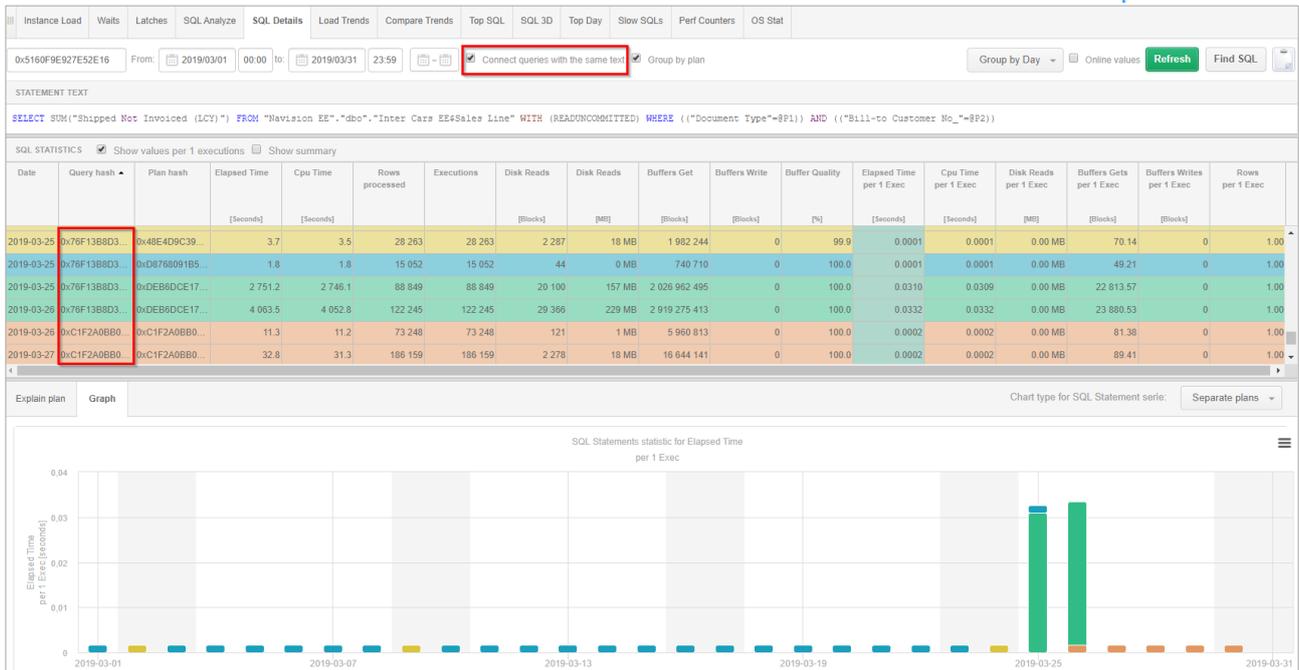
Sessions		Tempdb usage	Log usage												
Type	Session Id	Program	Nt user name	Host name	Login name	Context Info	Query Hash	Plan Hash	Wait type	Wait time [Seconds]	Blocking session id	Command	Database	Elapsed Time [Seconds]	Cpu Time [Seconds]
Session	641	MSCRMw3wp	crm_isinter	CRMIS31.w3wp...	crm_isinter		0xBEACCC764964964C	0xA98B3757E25D3...	LCK_M_JU	2 600.9	651	UPDATE	MSCRM	2 600.940	0.015
Session	645	MSCRMw3wp	crm_isinter	CRMIS31.w3wp...	crm_isinter		0x3D3F535832D885...	0x37066871CD2B2...	LCK_M_JU	1 965.1	651	UPDATE	MSCRM	1 965.123	0
Session	650	MSCRMw3wp	crm_isinter	CRMIS32.w3wp...	crm_isinter		0x4E1B0038E254A8...	0x4E1B0038E254A8...	LCK_M_JU	688.9	651	UPDATE	MSCRM	688.860	0
Session	651	SQLAgent - TSQ...	crm	CRMISQL31	(C)crm		0xFF8B08BF700B3965	0xC1B03FEB9638...	LCK_M_U CXPA...	3 486.0		UPDATE	IT	3 472.513	7.051
Session	653	MSCRMw3wp	crm_isinter	CRMIS31.w3wp...	crm_isinter				LCK_M_U	2 055.9	691	EXECUTE	MSCRM	2 055.910	0
Session	655	MSCRMw3wp	crm_isinter	CRMIS31.w3wp...	crm_isinter				LCK_M_U	1 635.0	562	EXECUTE	MSCRM	1 634.953	0
Session	658	MSCRMw3wp	crm_isinter	CRMIS31.w3wp...	crm_isinter		0xD6B1D04D381DFD53	0x753AC7D7F3E89...	LCK_M_X	1 425.2	684	INSERT	MSCRM	1 425.146	0
Session	659	MSCRMw3wp	crm_isinter	CRMIS32.w3wp...	crm_isinter		0x034C24B421F42DBC	0x37066871CD2B2...	LCK_M_JU	2 926.2	651	UPDATE	MSCRM	2 926.150	0
Session	660	Microsoft SQL S...	crm	CRMISQL31	crm_isinter		0x52B9331F8E392EE2	0x2ADE3782128F3...	ASYNC_NETW...	0.2		SELECT	IT	9 800.136	3.365

1.3 Changes to the SQL Details page

The latest version introduces a number of corrections and improvements on the SQL Details page. The main changes are described below.

1.3.1 Search queries with PlanGuide

In the latest version of the application in the SQL Details tab we have added the ability to combine queries with the same query content. This functionality is useful when the Plan Guide for a query is implemented. In this case, the query receives a new identifier and it is not easy to verify and assess whether the implementation of PlanGuide brought the expected result. In the new version, by selecting the **Connect queries with the same text** option in the tab, the user searches for queries that have the same query text. Thanks to this, the chart can combine several queries at the same time and assess whether the change related to the implementation of Plan Guide has brought the expected stability and improved query performance.



1.3.2 Improving PlanGuide mechanism

In the latest version of the application mechanism for generating PlanGuide has been improved.

The problem with generating PlanGuide:

- cases where the content of the query was excessive spaces,
- contained special characters such as <,>,
- the content of the query has been written in brackets ().

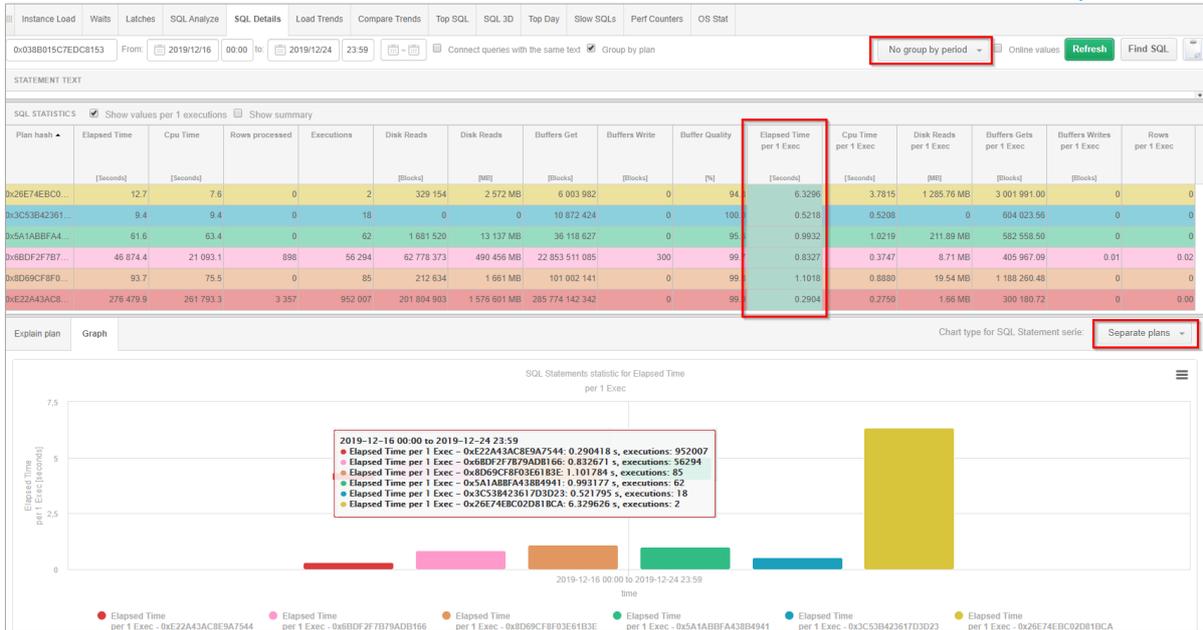
Each of these scenarios caused in some cases a problem with generating PlanGuide or after the implementation of PlanGuide the query did not use it. The problem has been fixed.

1.3.3 Support for multiple execution plans

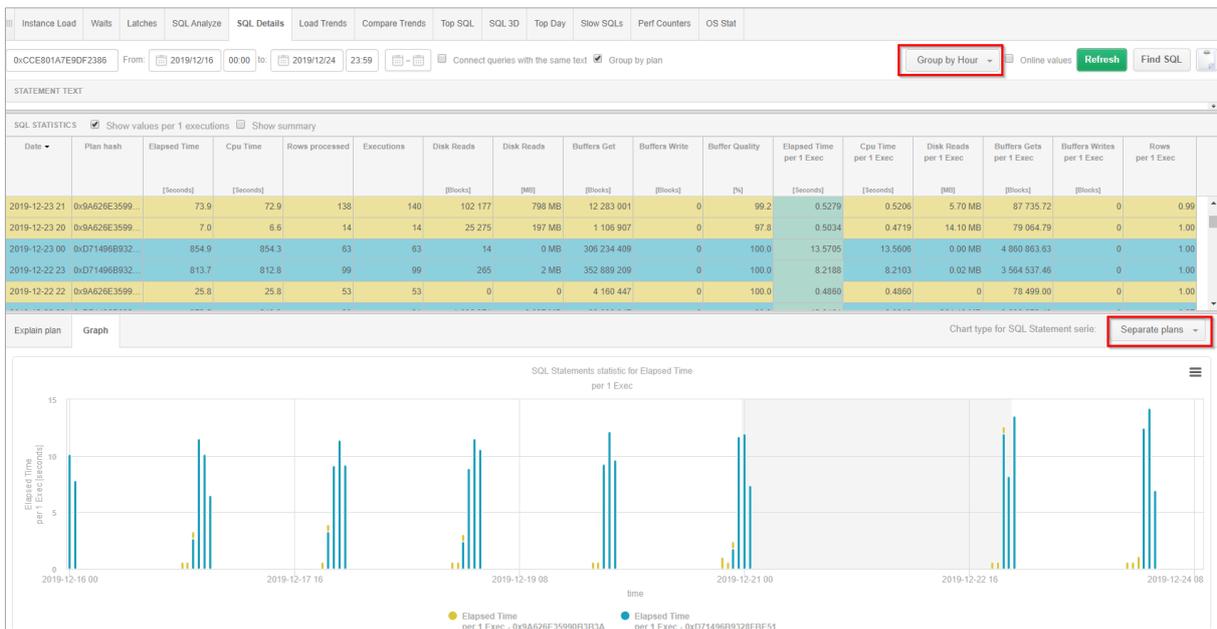
On the SQL Details screen, we've added special support for queries for which we have many execution plans. On the Graph tab, a new type of Separate plans chart has been added. This function allows you to view query statistics separately for each of the execution plans. By choosing this option, the data on the graph is presented separately for each of the plans.

Below is the Elapsed time per 1 exec chart - sorted with the No Group by period option. On this chart, the user can easily assess which of the implementation plans is the fastest for a given query in the analyzed period of time. Additionally, the columns are sorted based on the number of executions of a given query with a given plan (most often performed from the left).

In the Separate Plans mode, the rows in the grid are colored in accordance with the color assigned in the chart for the given query plan.



In the case of sorting by hour or snap (15 minutes), the user will easily obtain information when and at what times the query uses a slower plan.



1.4 General improvements

1.4.1 Improve collection of query statistics

The DBPLUS Performance Monitor application retrieves query statistics using, among others, the Extended Events mechanism.

In the latest version, the duration threshold has been modified for which queries saved in the Event queue are taken into monitoring process. In the case of collecting information based on the Event queue, the duration of a **single query** that was taken into monitoring was so far 1 second and was not configurable. In the latest version we have added a parameter by which the user sets the value from which the monitoring of the Event queue is to collect information about queries.

The new parameter is called **MINIMAL_XEVENT_ELAPSED_TIME** and is set in the Configuration> Settings menu. The default value has been set to 0.5 seconds. This means that a **single execution** of a query that has saved into the Event queue will be taken into monitoring after exceeding the set threshold. This will allow more accurate retrieval of query information using the Event mechanism.

After making this change, the user has two parameters in DBPLUS Performance Monitor for setting the duration of queries:

- **MINIMAL_QUERY_ELAPSED_TIME** - parameter used to retrieve information about queries from system views. **All query executions** in the system view are checked.
- **MINIMAL_XEVENT_ELAPSED_TIME** - parameter checking the duration of a **single query execution** from the Extended Events queue.

The user has the option of changing the values (in the Configuration> Settings menu) of the parameters to lower than 0.1 seconds at the global level for all SQL instances and at the level of a single instance to the value of 0.001 seconds.

1.4.2 Update of non-performance wait dictionary

As part of the latest version, the wait dictionary has been updated that does not affect performance. The **SOS_WORK_DISPATCHER** wait in Azure SQL Database and SQL Server 2019 versions has been added to the dictionary. The item %DISPATCHER% has been added to the dictionary. This entry causes that any wait with the name 'DISPATCHER' in the name will be considered a wait that does not affect performance.

1.4.3 Updating charts

The new version has updated the charts available in the application. The charts have become more readable for the user. A marking has been added to the weekend charts, they are now displayed with a gray background. The improvement also applies updating the series on charts and descriptions for legends. The functionality of saving charts to files has also been improved, in the new version the charts are more readable.

1.4.4 Changes in lock history

In the latest version of the application we have added additional information on the lock screen. If a given session blocks or is blocked by other sessions and has made changes to the open transaction - information about the number of stored records as well as data about the size it occupies in the log will be presented on the lock screen.

Online Locks	Locks History	Online Locked Objects
List of locked sessions at snapshot time: 2019-12-18 10:21:04		
Session Id: 712 Session status: sleeping Last Request Runtime: 4 s Last Start Time: 12/18/2019 10:21:00 AM Username: crm_srsinter Program: Report Server Hostname: CRMSQL31 Session Id: 641 Session status: running Command: SELECT Wait: LCK_M_S Last Request Runtime: 4 s Last Start Time: 12/18/2019 10:21:00 AM Username: crm_srsinter Program: Report Server Hostname: CRMSQL31 Session Id: 57 Session status: running Command: UPDATE Last Request Runtime: 2258 s Last Start Time: 12/18/2019 9:43:26 AM Username: ICicrm Program: SQLAgent - TSQL JobStep (Job 0x0AB3A6029E0E714C9E17705452EF664C : Step 47) Hostname: CRMSQL31 Session Id: 657 Session status: running Command: UPDATE Wait: LCK_M_IX Last Request Runtime: 225 s Last Start Time: 12/18/2019 10:17:19 AM Username: crm_lisinter Program: MSCRMw3wp Hostname: CRMIS31.w3wp.12796.443 Session Id: 664 Session status: running Command: UPDATE Wait: LCK_M_U Last Request Runtime: 168 s Last Start Time: 12/18/2019 10:18:16 AM Username: crm_lisinter Program: MSCRMw3wp Hostname: CRMIS31.w3wp.12796.443 Session Id: 94 Session status: running Command: UPDATE Wait: LCK_M_U Last Request Runtime: 116 s Last Start Time: 12/18/2019 10:19:08 AM Username: crm_lisinter Program: MSCRMASyncService Hostname: CRMIS31.CrmAsyncService Session Id: 177 Session status: running Command: EXECUTE Wait: LCK_M_X Last Request Runtime: 116 s Last Start Time: 12/18/2019 10:19:08 AM Username: crm_lisinter Program: MSCRMASyncService Hostname: CRMIS31.CrmAsyncService		
SQL STATEMENT FOR SESSION SID: 57		
<pre> UPDATE MSCRM.dbo.ic_rs_platnik SET ic_akumulatory_plan = wew.gr_akum_plan, ic_amortyzatory_plan = wew.gr_amort_plan, ic_filtroy_plan = wew.gr_filtroy_plan, ic_oleje_plan = wew.gr_olej_plan, ic_klocki_okladziny_plan = wew.gr_klocki_plan, </pre>		
SESSION DETAILS		
Session Id	57	
Is blocker for others	Yes	
Transaction Isolation Level	ReadCommitted	
Transaction Type	Read/write transaction	
Transaction State	The transaction is active	
Transaction start time	2019-12-18 10:04:27	
Transaction log size	1522.9 MB	
Transaction log record count	5093677	
User name	ICicrm	
Command	UPDATE	

1.4.5 Copying data from the table

We have introduced a facility where it is possible to quickly copy the data contained in the presented tables available in the application. Each time the user wants to copy the value stored in each cell, just double-click, the cell will be selected, and the data will be copied to the Windows Clipboard.

Pasting data from the clipboard is done using the "Ctrl + v" shortcut.

Sql Statements	Waits	Alerts							
SNAPSHOT OF SQL STATEMENTS EXECUTED WITHIN 15 MINUTES AT 2019-11-06 12:57:43									
<input type="text" value="Search statistic by sql text, query identifier in below snapshot table"/>									
Database	Query text	Query Id	Plan Id	Elapsed Time	IO time	Time per 1 exec	Executions	Rows processed	Number of users
				[Seconds]	[Seconds]	[Seconds]		[Rows]	
dbplus_rep	select \$1 as datid, \$2 as datna...	789581816...	3873484...	1.95	0	0.0326	60	60	1
dbplus_rep	select pg_database_size(curr...	31179396 +	3285534...	0.11	0	0.0530	2	2	1
dbplus_rep	COPY "dbplus_tab_sessions" ...	265652298...	1248023...	0.08	0	0.0007	120	120	1
dbplus_rep	COPY "dbplus_tab_waits" ("d...	546820037...	1248023...	0.05	0	0.0004	120	120	1
dbplus_rep	select userid::varchar \$2 dbid...	588279013...	747250426	0.04	0	0.0360	1	71	1
dbplus_rep	SELECT num9, num10, logdat...	600617432...	2647289...	0.03	0	0.0047	7	1 143	1
dbplus_rep	SELECT num9, num10, sum(...	-85227562...	2824021...	0.02	0	0.0210	1	10	1

1.4.6 Changing the way database parameters are presented

In the latest version we have changed the way of presenting information about parameters for a given instance. The changes are visible in the Parameters tab at the database details level. The change concerns the presentation of parameter history for the instance and database.

The screenshot shows the DBPLUS Performance Monitor interface. The top navigation bar includes 'Performance Monitor', 'DEMO Instance on PERUN server', and 'Version: 11.0.2105.85, Startup time: 2019-12-04 18:41:58'. The main content area is titled 'Databases Parameters Overview' and 'Databases Parameters History'. It features a search filter for 'adv_works' and a date range from '2019/12/11' to '2019/12/18'. A 'Refresh' button is present. Below the search filters is a table titled 'PARAMETERS LISTS' with the following data:

Instance type	Instance	Database	Param name	Before param value	After param value	Date change
PRODUCTION SERVER	DEMO	adv_works	Status	ONLINE	RECOVERING	2019-12-15 02:19:37
PRODUCTION SERVER	DEMO	adv_works	Status	RECOVERING	ONLINE	2019-12-15 02:34:50
PRODUCTION SERVER	DEMO	adv_works	Status	ONLINE	RECOVERING	2019-12-15 22:07:10
PRODUCTION SERVER	DEMO	adv_works	Status	RECOVERING	ONLINE	2019-12-15 22:22:23

1.4.7 Adding support for a new system view

In the new version, we've added support for the new `sys.database_scoped_configurations` system view. The view is visible in the Parameters tab at the database details level. The view is available for versions of SQL Server 2016 and higher, contains information about parameters at the database level that affect the behavior of the application code. The parameters in the view are configurable independently at the level of each database.