IBM iDoctor for IBM i
Plan Cache Analyzer

IBM iDoctor for IBM i Development Team

25 February 2022

Abstract

Provides in-depth coverage of all major GUI functions for all components at 7.2 and higher. This document covers the Plan Cache Analyzer component.

Changes

25 Feb 2022 – updated for 2022. This is client 1530 or higher.

Table of Contents

1 Introduction

Plan Cache Analyzer provides the ability to collect and analyze snapshots of the system's SQL Plan Cache. It is designed to complement the features already available in IBM i Navigator for analyzing the Plan Cache by providing several graphs and drill-down options not available there.

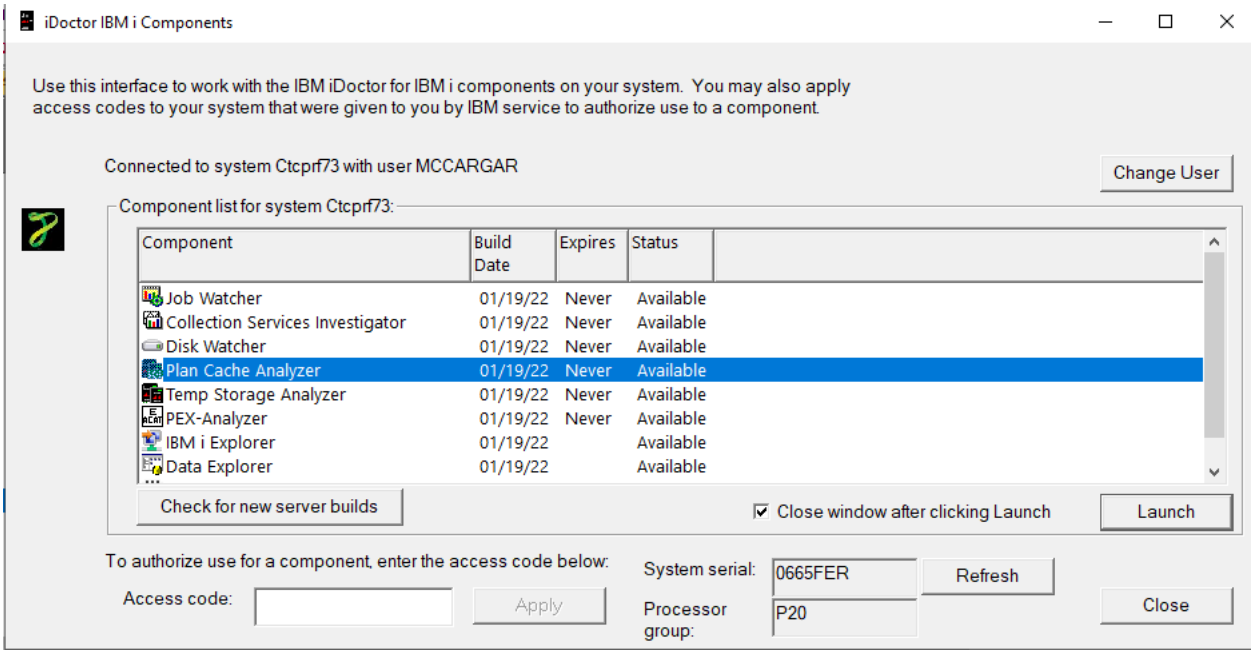
The plan cache is a repository that contains the access plans for queries that were optimized by SQE.

Note: Plan Cache Analyzer is included with a Job Watcher license.

2 Starting Plan Cache Analyzer

Plan Cache Analyzer is a component of the iDoctor suite of tools. After launching iDoctor, the Plan Cache Analyzer component is started from the IBM i Connections List View by double-clicking on the desired system.

A list of available components will appear on the next window. Double-click on the Plan Cache Analyzer component or select Plan Cache Analyzer and click the Launch button to continue

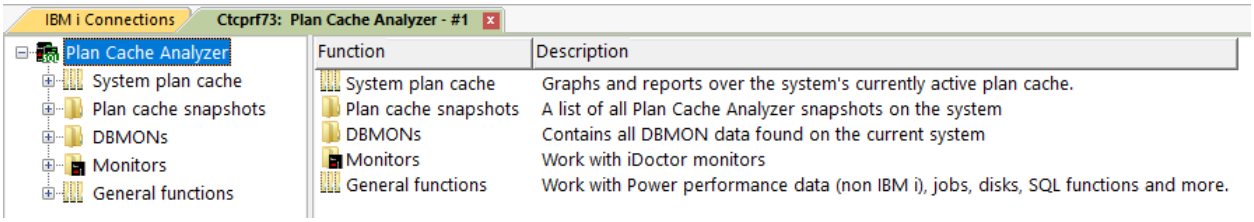


iDoctor IBM i Components Window

Note: Collection Services Investigator, Plan Cache Analyzer and Disk Watcher will only be available if Job Watcher is installed correctly and a valid access code for Job Watcher has been applied. These components are included with the Job Watcher license.

3 Plan Cache Analyzer Component View

The Plan Cache Analyzer view is the interface used to create SQL plan cache snapshots or work with and analyze existing data.



Plan Cache Analyzer Component View

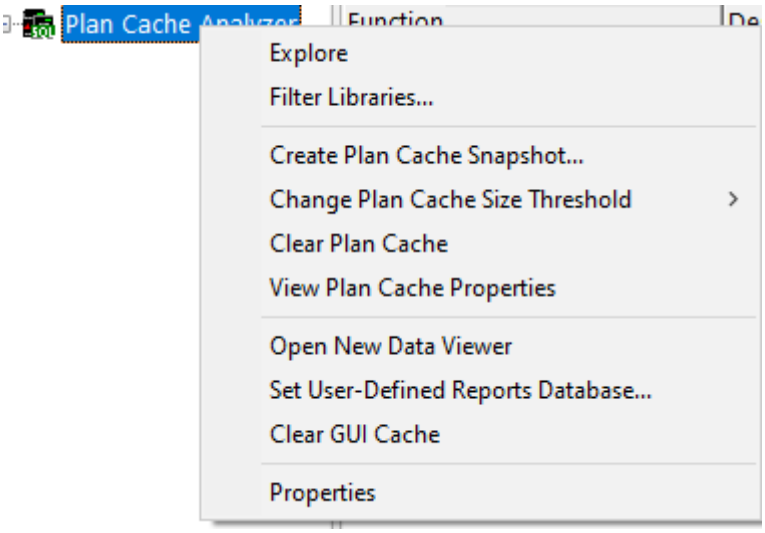
The 'Plan Cache Analyzer' folder contains a list of folders, each providing different features available.

Use the **System plan cache** folder to view reports over the system's active plan cache without taking a snapshot (if desired.)

The snapshots are displayed under the Plan cache snapshots folder.

3.1 Root Folder Menu Options

The following Plan Cache Analyzer specific menu options are available by right clicking on the **Plan Cache Analyzer** folder in the component view:



Plan Cache Analyzer popup-menu

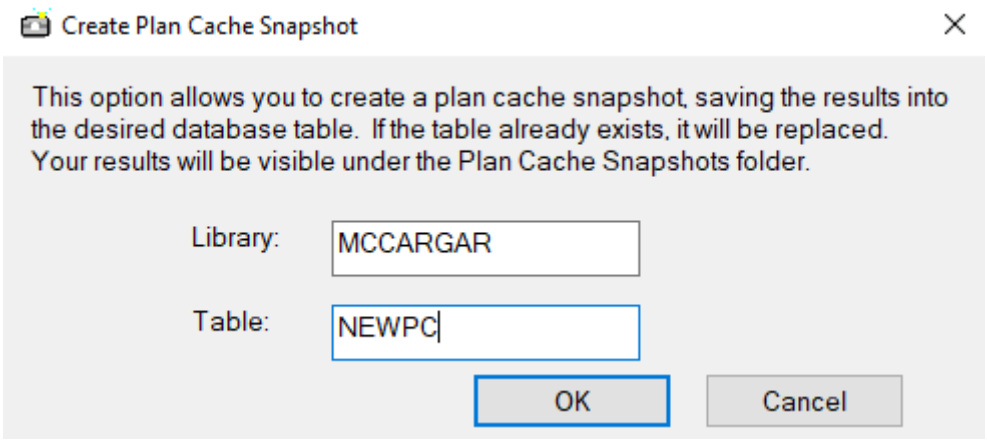
Menu Item	Description
Filter Libraries…	This option allows you to filter the libraries shown in the Plan cache snapshots folder by a generic library name or library owner. This is useful for speeding up the display of the list if the system contains many libraries containing performance data.
Create Plan Cache Snapshot	Use this option to create a new plan cache snapshot.
Change Plan Cache Size Threshold -> Default	This option changes the maximum amount of storage used by the plan cache to the default setting using the CHANGE_PLAN_CACHE_SIZE stored procedure.
Change Plan Cache Size Threshold -> Specific Value…	This option changes the maximum amount of storage used by the plan cache to value provided by the user with the CHANGE_PLAN_CACHE_SIZE stored procedure.
Clear Plan Cache	This option will clear all plans from the SQL plan cache on the system.
View Plan Cache Properties	Use this option to display details about the current state of the plan cache.

Open New Data Viewer	Opens a new Data Viewer window. This window is used to display tables and graphs on the system. You can open iDoctor-defined reports into this window or you can also open any database file or SQL table and display the results in graph or table form.
Set User-Defined Reports Database	This option allows the user to view/modify the currently used user-defined reports database. The database can either be an MS Access file or a library on an IBM i. The database stores the information needed to build the user-defined tables and graphs shown in iDoctor.
Clear GUI cache	This option clears everything loaded in the GUI's cache (like menus, graph definitions, query definitions, stored procedure versions installed, etc)
Properties	Use this menu to display version information for the current component installed on the system. The build level of the GUI is also displayed here.

3.2 Create Plan Cache Snapshot

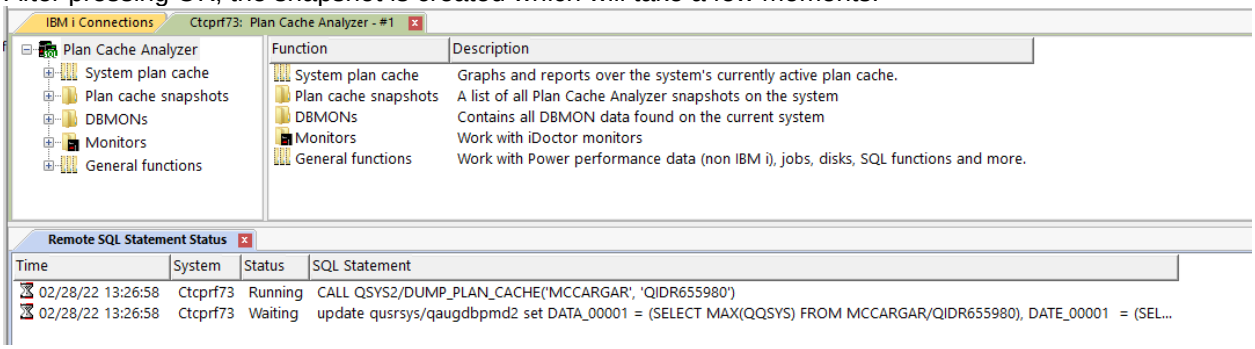
This option is used to create a new plan cache snapshot on the system using DUMP_PLAN_CACHE.

A window is displayed where the user can specify the library and table to create the new plan cache snapshot into.



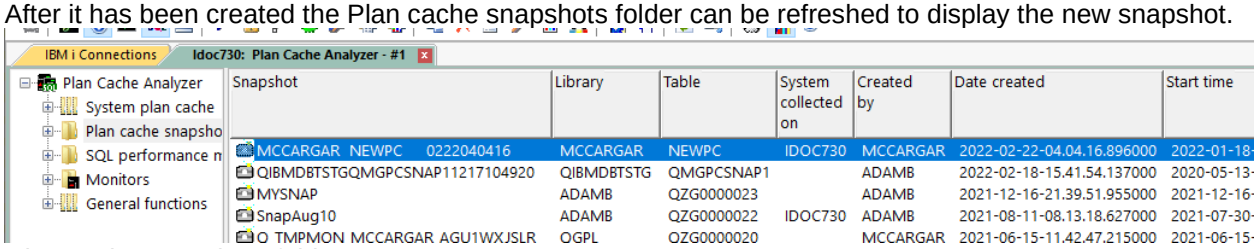
Create Plan Cache Snapshot Window

After pressing OK, the snapshot is created which will take a few moments.



DUMP_PLAN_CACHE in progress in the Remote SQL Statement Status View

After it has been created the Plan cache snapshots folder can be refreshed to display the new snapshot.



Plan cache snapshots folder

3.3 View Plan Cache Properties

This option runs a stored procedure DUMP_PLAN_CACHE_PROPERTIES that displays information about the system's plan cache.

/Plan Cache Properties for system Idoc730 - #1

Heading (HEADING)	Value (VALUE)
Time Of Summary	2022-02-22-04.07.51.767530
Plan Cache Creation Time	2021-12-20-20.15.22.971265
Active Query Summary	
Number of Currently Active Queries	50
Number of Queries Run Since Start	1387332
Number of Query Full Opens Since Start	649113
Plan Usage Summary	
Current Number of Plans in Cache	1239
Total Number of Plans Built Since Start	162675
Total Number of SMP Plans Built Since Start	0
Total Number of Unique Queries Since Start	123490
Current Plan Cache Size	501 MB
Current Plan Cache Size Threshold	*AUTO MB
Maximum Plan Cache Size For AutoSizing	*DEFAULT (16024) MB
Current Plan Cache Hit Ratio	72 %
Target Plan Cache AutoSize Hit Ratio	*DEFAULT (90) %
Total Number of Plan Cache Autosizing Adjustments	44
Last Plan Cache AutoSizing Adjustment	2022-02-22-03.56.18.754715
Last Autosizing Limited Due to Temporary Storage	2022-02-22-03.00.00.123162
Current Number of Job Scoped (QTEMP) Plans	5
Total Number of Job Scoped (QTEMP) Plans Built Since Start	253
Total Number of Unique Queries With Job Scoped (QTEMP) References Since Start	63
Total Times Plans Used from Cache	353705
Total Plans Removed	31790
Total Plans Pruned	96724
Number of Times Plan Cache Pruned	88
Time Plan Cache was Last Pruned	2022-02-22-03.00.00.123157

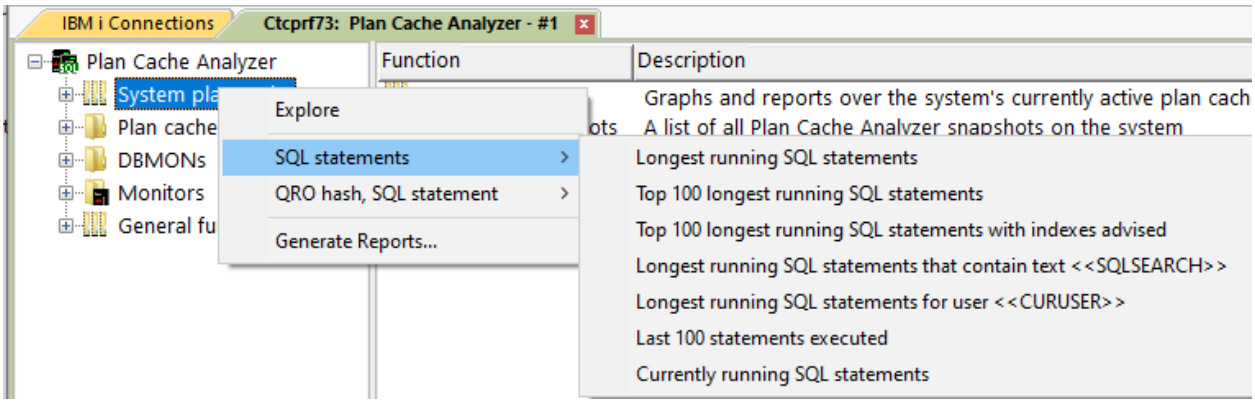
Plan Cache Properties Report

4 System plan cache

This folder contains reports and graphs over the SQL plan cache. These options allow you to view the current plan cache without needing to create a snapshot.

Note: All options within this folder utilize the ANALYZE_PLAN_CACHE (undocumented) stored procedure.

These options can be accessed by either expanding the subfolders or right-click the System plan cache folder.

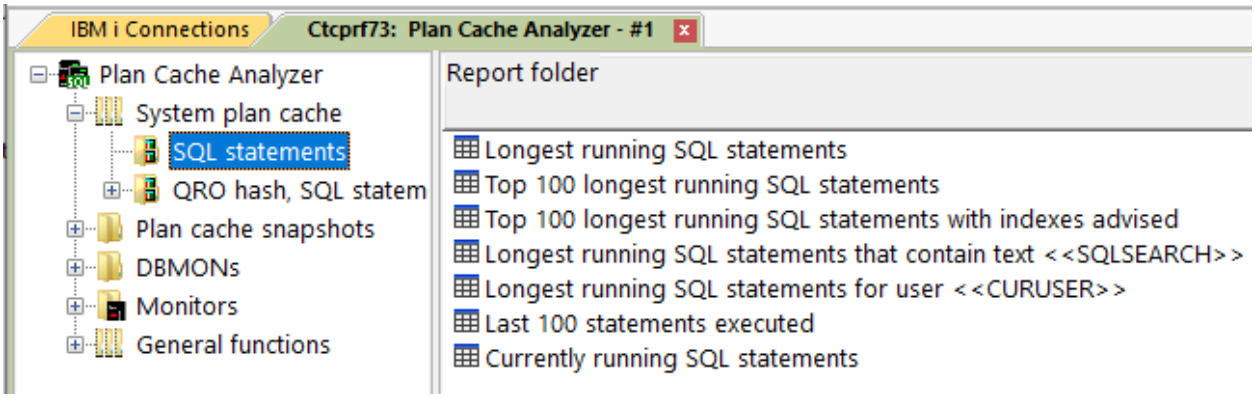


System plan cache popup-menu

4.1 SQL statements

This folder contains a set of reports that return information about the SQL statements found in the SQL plan cache.

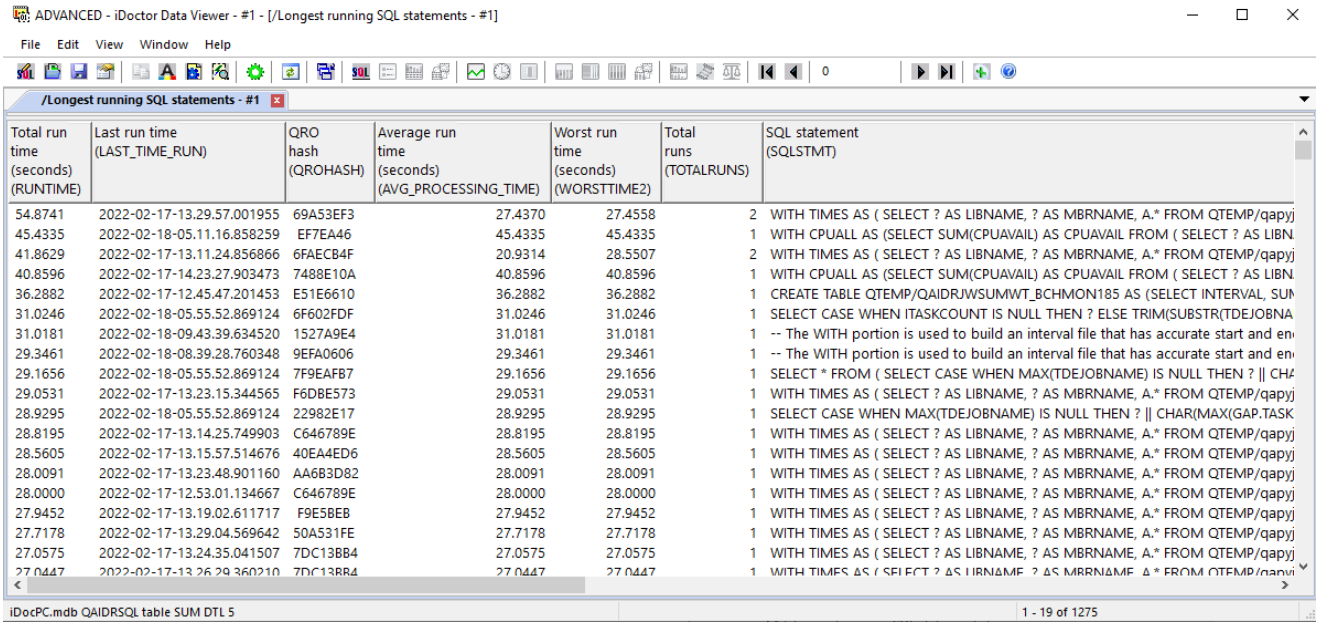
Tip: These reports are rebuilt on each refresh. Different results may appear over time.



System plan cache -> SQL statements folder

4.1.1 Longest running SQL statements

This report returns the SQL statements found in the plan cache showing the worst performing ones first.



Longest running SQL statements

4.1.2 Top 100 longest running SQL statements

This report is the same as the previous except limits the result to the top 100 statements.

4.1.3 Top 100 longest running SQL statements with indexes advised

This report is the same as the previous except limits the result to the top 100 statements with indexes advised.

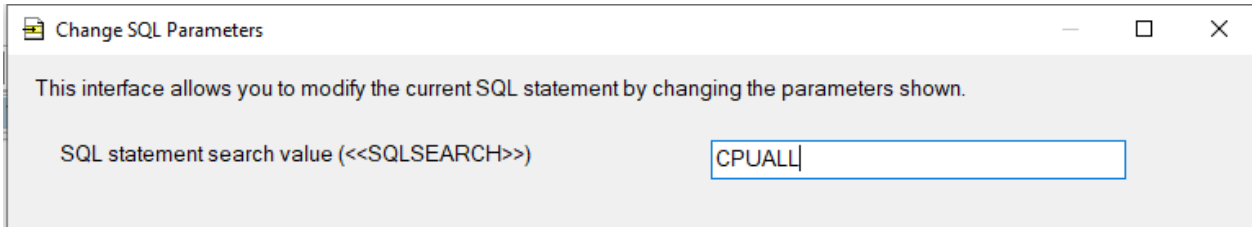
Tip: The specific indexes advised are not available here. Dump the plan cache using Create Plan Cache snapshot to see more information about indexes advised.

4.1.4 Longest running SQL statements that contain text <<SQLSEARCH>>

This option will search the SQL statements text looking for a specific value provided by the user.

Note: This is a case-sensitive search.

When this option is taken the Change SQL Parameters window is shown:



Change SQL Parameters

After pressing OK, the results are shown:

/Longest running SQL statements that contain text <<SQLSEARCH>> - #1

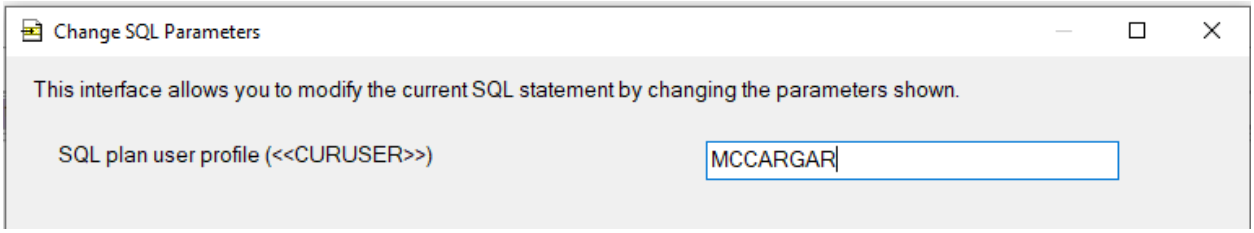
Total run time (seconds) (RUNTIME)	Last run time (LAST_TIME_RUN)	QRO hash (QROHASH)	Average run time (seconds) (AVG_PROCESSING_TIME)	Worst run time (seconds) (WORSTTIME2)	Total runs (TOTALRUNS)	SQL statement (SQLSTMT)
45.4335	2022-02-18-05.11.16.858259	EF7EA46	45.4335	45.4335	1	WITH CPUALL AS (SELECT SUM(CPUAVAIL) AS CPUAVAIL FROM (SELECT ? AS LIBN
40.8596	2022-02-17-14.23.27.903473	7488E10A	40.8596	40.8596	1	WITH CPUALL AS (SELECT SUM(CPUAVAIL) AS CPUAVAIL FROM (SELECT ? AS LIBN
16.0904	2022-02-18-06.10.30.604647	8E8689A8	16.0904	16.0904	1	WITH CPUALL AS (SELECT SUM(CPUAVAIL) AS CPUAVAIL FROM (SELECT ? AS LIBN
15.8071	2022-02-18-06.11.25.134524	232D9FA7	15.8071	15.8071	1	WITH CPUALL AS (SELECT SUM(CPUAVAIL) AS CPUAVAIL FROM (SELECT ? AS LIBN
15.7009	2022-02-18-06.06.31.513477	370F6293	15.7009	15.7009	1	WITH CPUALL AS (SELECT SUM(CPUAVAIL) AS CPUAVAIL FROM (SELECT ? AS LIBN
15.3563	2022-02-18-05.17.05.778281	D65604DC	15.3563	15.3563	1	WITH CPUALL AS (SELECT SUM(CPUAVAIL) AS CPUAVAIL FROM (SELECT ? AS LIBN
13.7688	2022-02-18-06.08.59.372473	8E8689A8	13.7688	13.7688	1	WITH CPUALL AS (SELECT SUM(CPUAVAIL) AS CPUAVAIL FROM (SELECT ? AS LIBN

Longest running SQL statements that contain text <<SQLSEARCH>>

4.1.5 Longest running SQL statements for user <<CURUSER>>

This option is used to filter the results by a specific user ID.

Note: An exact match must be used and should be provided in upper-case.



Change SQL Parameters

4.1.6 Last 100 statements executed

This option shows the last 100 SQL Statements executed regardless of how they performed.

/Last 100 statements executed - #1

Total run time (seconds) (RUNTIME)	Last run time (LAST_TIME_RUN)	QRO hash (QROHASH)	Average run time (seconds) (AVG_PROCESSING_TIME)	Worst run time (seconds) (WORSTTIME2)	Total runs (TOTALRUNS)	SQL statement (SQLSTMT)
0	2022-02-22-04.34.55.835350	C20F6A50	.0001	0	1	CALL QSYS2/ANALYZE_PLAN_CACHE('0200000000011','QTEMP','T103954106', VARB
.9864	2022-02-22-04.34.50.592123	220EC389	.0001	.0020	24,184	DELETE FROM QUSRBRM.QA1ANET2 WHERE RMTSYS NOT IN (SELECT R1MSYS FI
.7072	2022-02-22-04.34.50.592123	6EA4707B	.0001	0	24,190	INSERT INTO QUSRBRM.QA1A2NET SELECT DISTINCT RMTSYS AS N2RMT , RMTR
1.6615	2022-02-22-04.34.50.592123	39464313	.0001	0	24,185	SELECT RDNAME, RSSYSNAME, RSNETID, RSNODEPCY, RDRPTPCY, RDSNDERR, R
.5096	2022-02-22-04.34.50.592123	92565B44	.0001	0	19,521	DELETE FROM QUSRBRM.QA1A2NET WITH NC
.5967	2022-02-22-04.34.50.592123	D83CAC2	.0001	0	19,519	SELECT * FROM QUSRBRM.QA1ANET2 WHERE (OBJ = ?) FOR READ ONLY
.0007	2022-02-22-04.34.26.473265	E53A1FEE	.0007	.0007	1	SELECT TOTAL_PROCESSING_TIME AS RUNTIME, LAST_TIME_RUN, QROHASH, AVG
0	2022-02-22-04.34.26.473265	F5F9685	.0001	0	1	SELECT TOTAL_PROCESSING_TIME AS RUNTIME, LAST_TIME_RUN, QROHASH, AVG
0	2022-02-22-04.34.18.084097	C30DB064	.0001	0	2	SELECT CURRENT TIMESTAMP FROM SYSIBM.SYSDUMMY1
.0029	2022-02-22-04.33.59.732583	39D3D154	.0029	.0029	1	Non SQL Query QPFRDATA/QAPMJOBL.R052180002
.3423	2022-02-22-04.33.50.819099	39464313	.0001	0	4,916	SELECT RDNAME, RSSYSNAME, RSNETID, RSNODEPCY, RDRPTPCY, RDSNDERR, R
.2024	2022-02-22-04.33.50.294773	220EC389	.0001	0	4,921	DELETE FROM QUSRBRM.QA1ANET2 WHERE RMTSYS NOT IN (SELECT R1MSYS FI
.1451	2022-02-22-04.33.50.294773	6EA4707B	.0001	0	4,919	INSERT INTO QUSRBRM.QA1A2NET SELECT DISTINCT RMTSYS AS N2RMT , RMTR
0	2022-02-22-04.33.41.905623	AEA1DC4A	.0001	0	1	CALL QSYS2/ANALYZE_PLAN_CACHE('0200000000011','QTEMP','T103837862', VARB
0	2022-02-22-04.33.41.905623	372B181C	.0001	0	1	select count(*) FROM (SELECT TOTAL_PROCESSING_TIME AS RUNTIME, LAST_TIME
0	2022-02-22-04.33.36.662396	755C3B57	.0001	0	1	CALL QSYS2/ANALYZE_PLAN_CACHE('0200000000011','QTEMP','T210383888', VARB
0	2022-02-22-04.33.36.662396	981C6057	.0001	0	1	select count(*) FROM (SELECT TOTAL_PROCESSING_TIME AS RUNTIME, LAST_TIME
.0028	2022-02-22-04.32.59.959797	8E3A30C6	.0028	.0028	1	Non SQL Query QPFRDATA/QAPMJOBL.R052180002
0	2022-02-22-04.32.58.911157	1B3C5D10	.0001	0	1	CALL QSYS2/ANALYZE_PLAN_CACHE('0200000000011','QTEMP','T103727959', VARB

iDocPC.mdb QAIDRSQL table SUM DTL 10 1 - 19 of 100

Last 100 statements executed

4.1.7 Currently running SQL statements

This option may be used to show the SQL statements currently executing at the time this option was taken.

/Currently running SQL statements - #1

Total run time (seconds) (RUNTIME)	Last run time (LAST_TIME_RUN)	QRO hash (QROHASH)	Average run time (seconds) (AVG_PROCESSING_TIME)	Worst run time (seconds) (WORSTTIME2)	Total runs (TOTALRUNS)	SQL statement (SQLSTMT)
.0053	2022-02-22-04.13.10.266485	654FA752	.0026	.0046	2	SELECT COUNT(*) FROM (SELECT LIB, OBJTEXT AS DESC, OBJOWNER
.0015	2022-02-22-04.13.10.266485	CF51957	.0007	.0007	2	SELECT LIB, OBJTEXT AS DESC, OBJOWNER AS OWNER, OBJDEFINER
.0012	2022-02-22-04.22.43.352484	FFC37EDE	.0012	.0012	1	SELECT TOTAL_PROCESSING_TIME AS RUNTIME, LAST_TIME_RUN, Q
.0006	2022-02-22-04.13.10.266485	EDC0733F	.0003	.0005	2	SELECT MAX(SNAPSHOT) AS SNAPSHOT, MAX(LONG_COMMENT) AS
.0003	2022-02-22-04.13.10.266485	609B011B	.0001	.0003	2	SELECT COUNT(*) FROM (SELECT MAX(SNAPSHOT) AS SNAPSHOT, M
0	2022-02-22-04.18.11.752997	4085A416	.0001	0	2	select count(*) FROM (SELECT TOTAL_PROCESSING_TIME AS RUNTIM

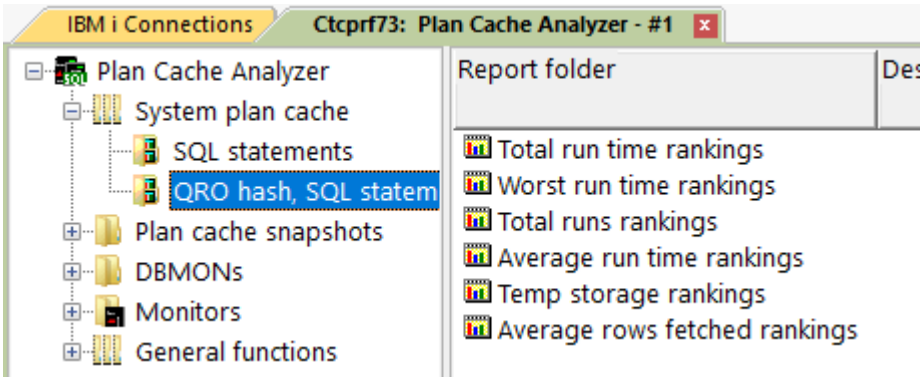
Currently running SQL statements

4.2 QRO hash, SQL statement

This folder contains a set of graphs that provide performance information about the QRO hash, SQL statements found in the SQL plan cache.

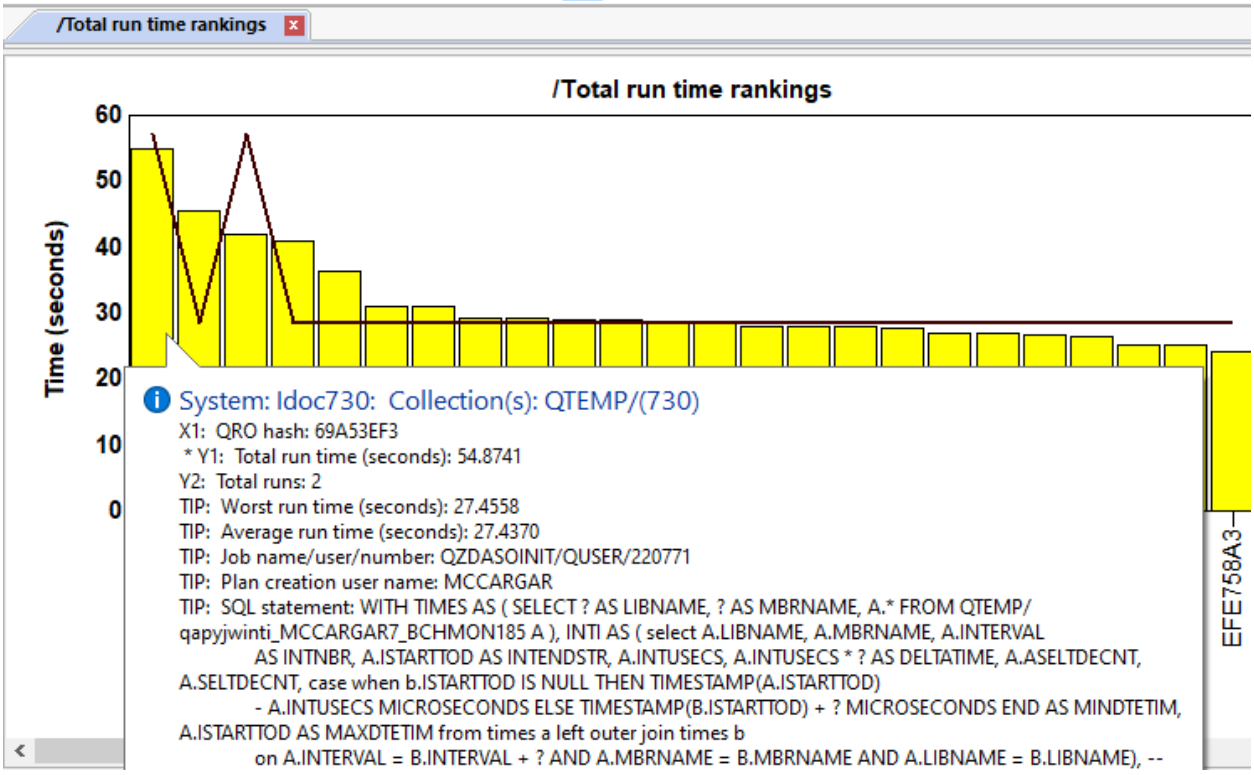
Dumping the plan cache using the Create Plan Cache snapshot option will provide additional details about the data shown in these graphs.

Tip: These reports are rebuilt on each refresh. Different results may appear over time.



System plan cache -> QRO hash, SQL statement folder

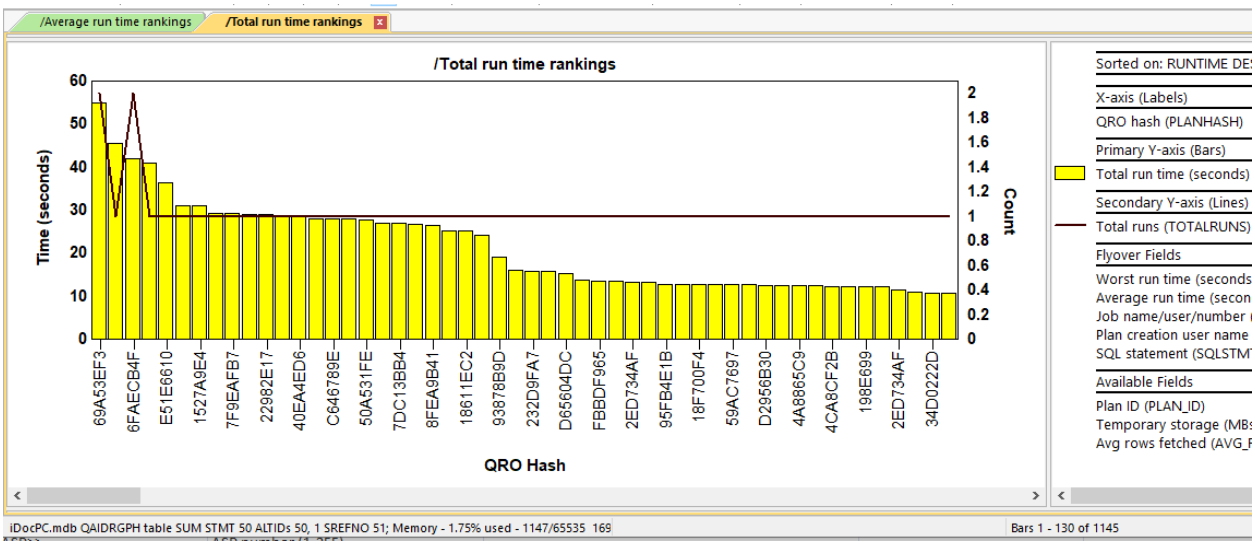
Note: The SQL statement can be viewed in the graph flyover for any of these graphs by placing the mouse over the desired bar.



Graph flyover example

4.2.1 Total run time rankings

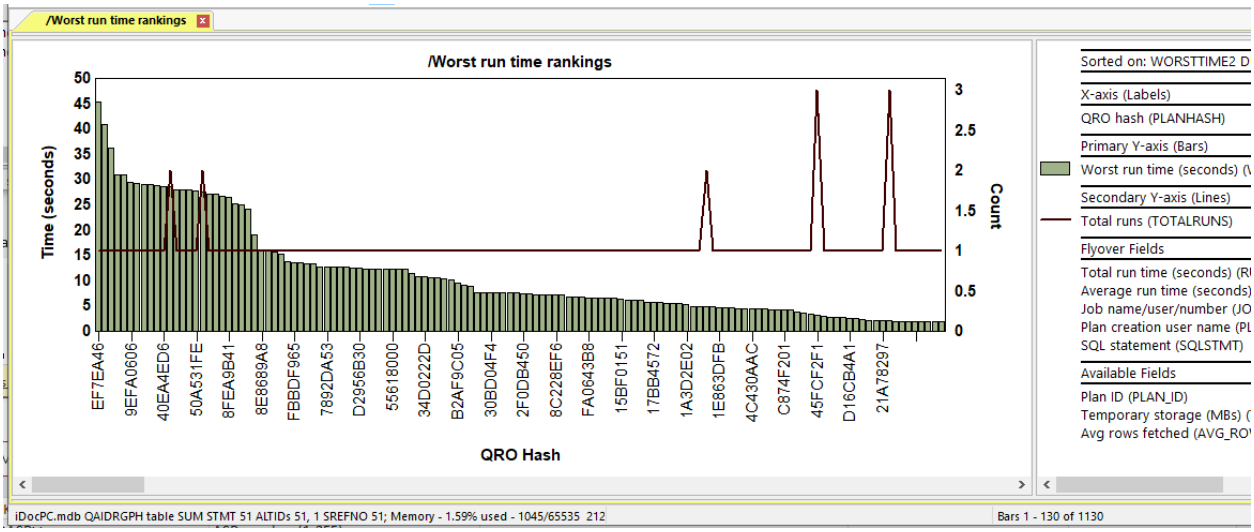
This graph shows the QRO hash, SQL statement combinations that had the **worst total run times (in seconds**.)



Total run time rankings

4.2.2 Worst run time rankings

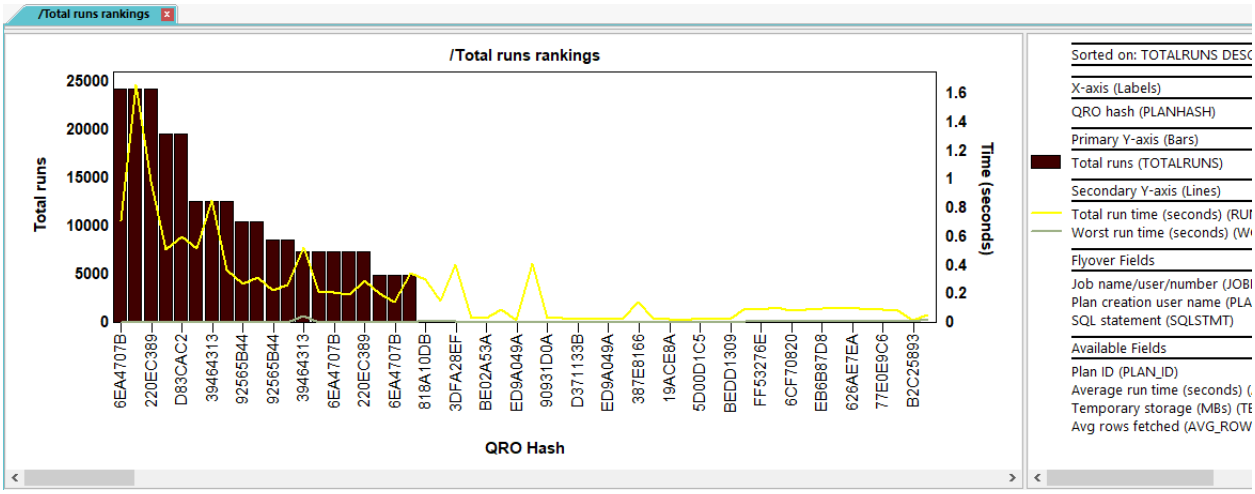
This graph shows the QRO hash, SQL statement combinations that had the **worst single run times (in seconds.)**



Worst run time rankings

4.2.3 Total runs rankings

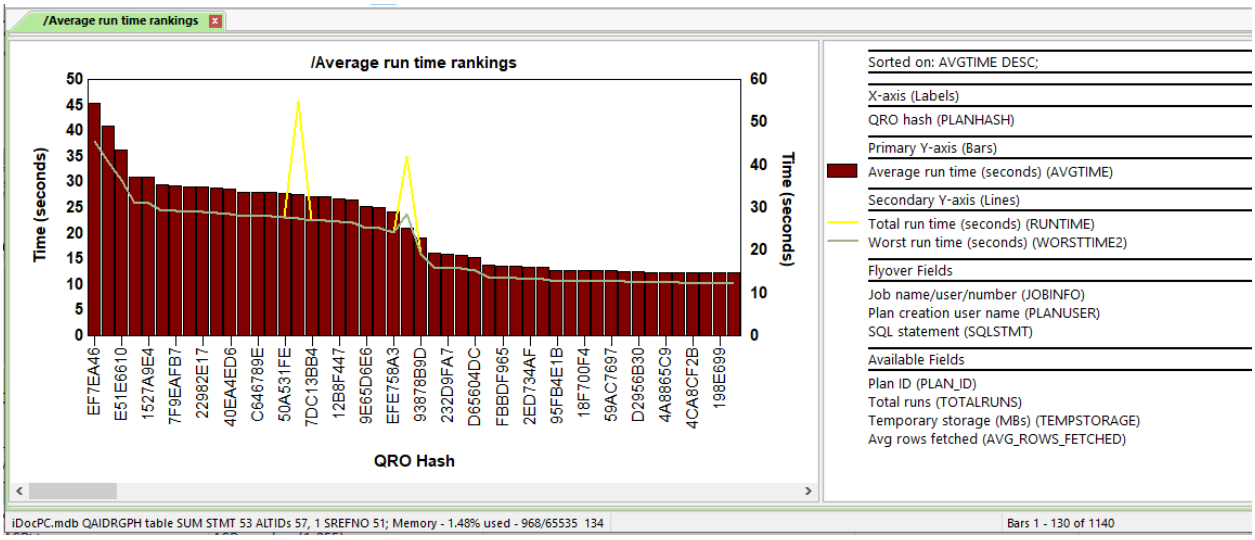
This graph shows the QRO hash, SQL statement combinations that had the **most runs**.



Total runs rankings

4.2.4 Average run time rankings

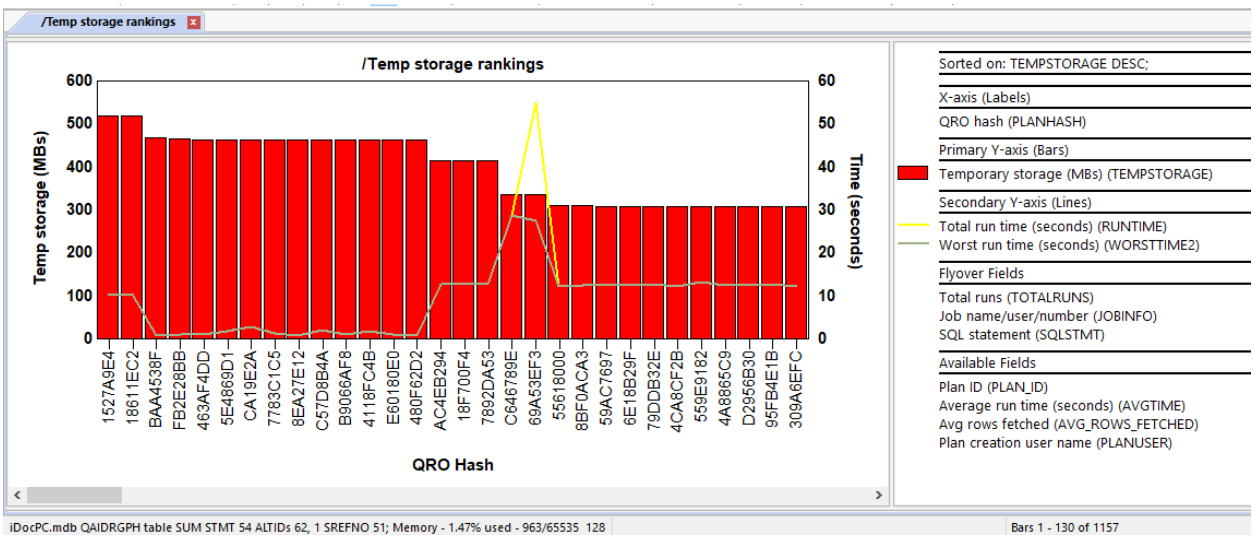
This graph shows the QRO hash, SQL statement combinations that had the **worst average run times (in seconds**.)



Average run time rankings

4.2.5 Temp storage rankings

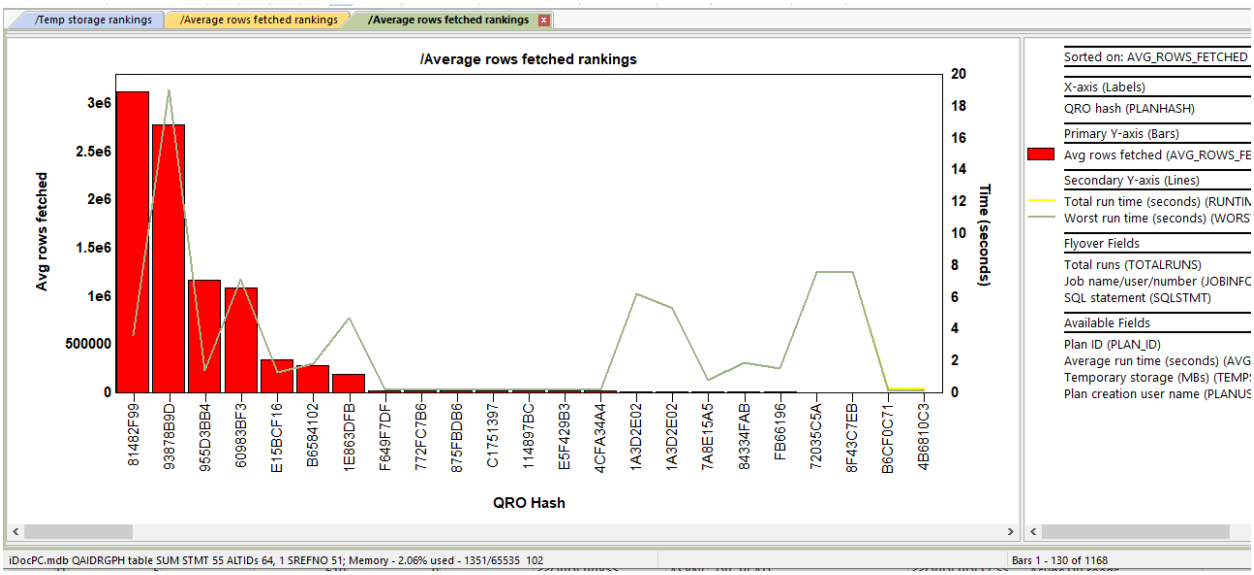
This graph shows the QRO hash, SQL statement combinations that had the **highest temp storage usage in megabytes**.



Temp storage rankings

4.2.6 Average rows fetched rankings

This graph shows the QRO hash, SQL statement combinations that had the **highest average rows fetched**.

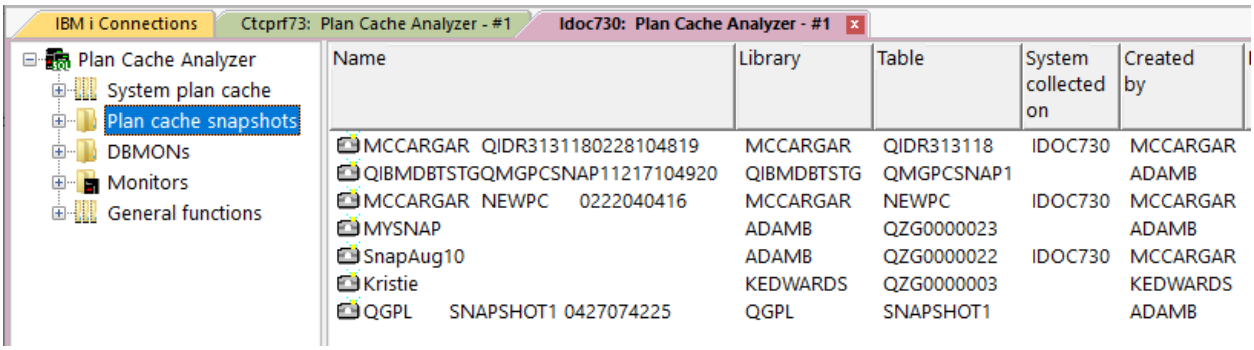


Average rows fetched rankings

5 Plan Cache Snapshots

This folder contains the list of Plan Cache Snapshots found on the system. A similar list can also be found in the IBM i Navigator interface. Both lists are built from the same repository.

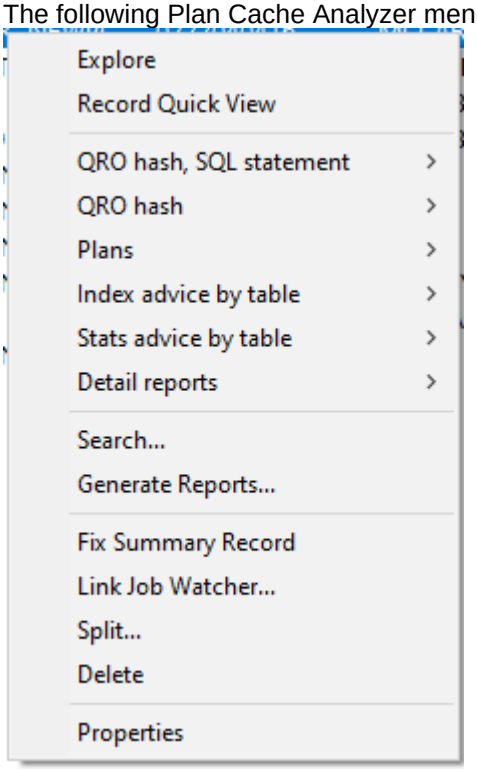
Each snapshot contains a detailed set of reports.



Plan cache snapshots folder

5.1 Menu Options

The following Plan Cache Analyzer menu options are available by right clicking on a snapshot.



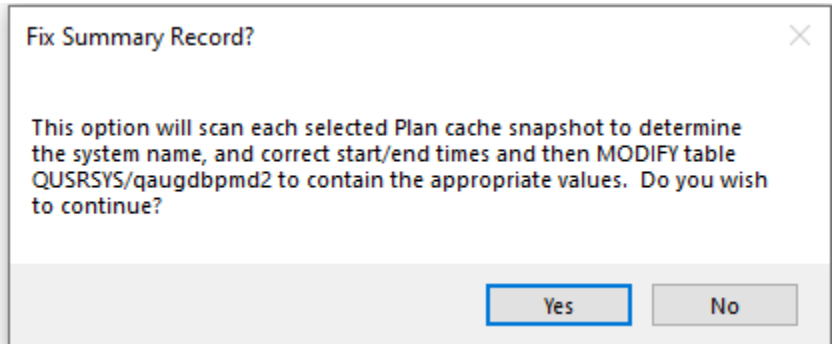
Snapshot popup-menu

Menu Item	Description
Explore	Show the contents of the collection.
Record Quick View	Displays the columns in the selected row(s) vertically.
QRO hash, SQL statement	Graphs over the snapshot data with 1 bar for each QRO hash and SQL statement combination.
QRO hash	Graphs over the snapshot data with 1 bar for each QRO hash.
Plans	Graphs over the snapshot data with 1 bar for each Plan ID.
Index advice by table	These graphs summarize the data only where indexes have been advised by table.
Stats advice by table	Graphs summarizing statistics only where stats are advised. See the QDBFSTCCOL system value for more information.
Detail reports	These are various table views over the plan cache snapshot data intended for advanced users.
Search…	Use this option to search the snapshot for something specific.
Generate Reports…	This option can be used to build a report of the desired set of tables and graphs. The report consists of a screenshot of each graph along with its title and collection information. The reports are built into a HTML page and displayed in the web browser when completed.
Fix Summary Record	This menu option is used to set the system name and timestamps properly within the repository that identifies the snapshots on the IBM i.
Link Job Watcher…	This option will link a Job Watcher collection to the selected snapshot to allow the Job Watcher graphs to be visible within Plan Cache Analyzer.
Split…	This opens the Split function which allows a plan cache snapshot to be divided into a smaller one by QRO hash, or other possible filters.
Delete	Removes the selected plan cache snapshots from the system.
Properties	Displays more information about the plan cache snapshot.

5.2 Fix Summary Record

This menu option is used to set the system name and timestamps properly within the repository that identifies the snapshots on the IBM i.

When this option is taken, the following window is shown to prompt the user:



Fix Summary Record? Prompt

If accepted then an SQL update query is issued for each snapshot selected to update the table in QUSRSYS/QAUGDBPMD2.

Tip: This is a required step if linking the snapshot to Job Watcher is desired.

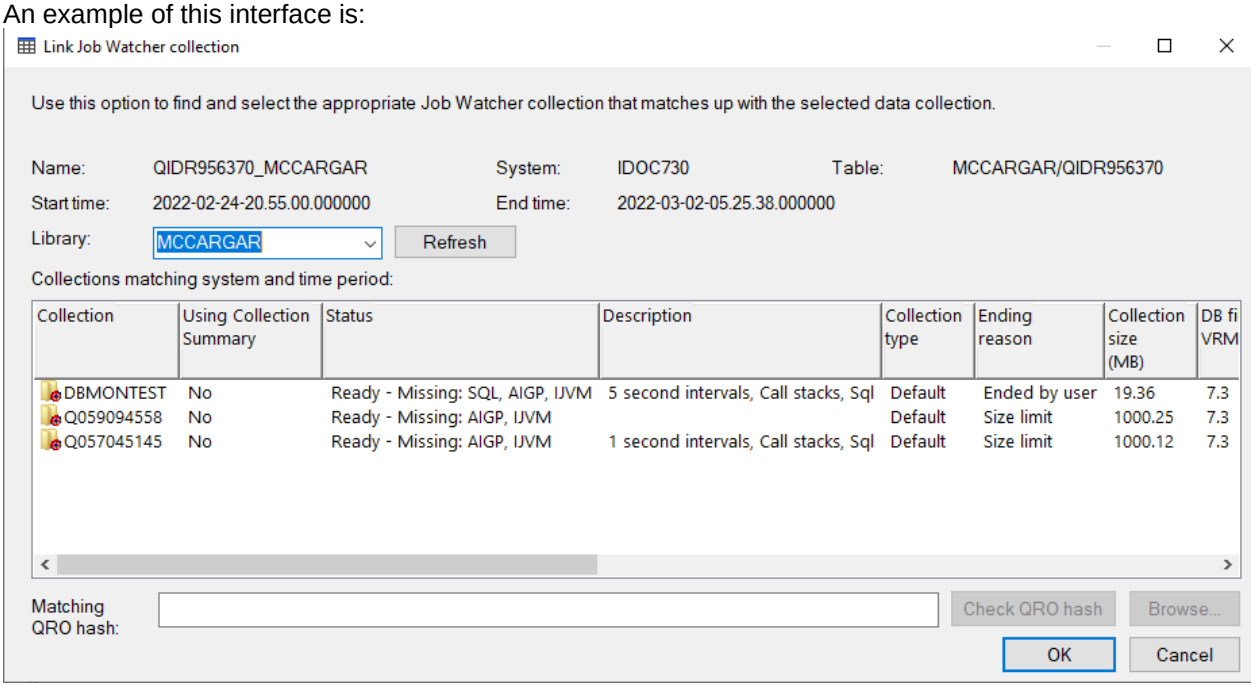
5.3 Link Job Watcher

This option will link a Job Watcher collection to the selected snapshot to allow the Job Watcher graphs to be visible within Plan Cache Analyzer.

Note: This requires the following are all true:

1) The system names are the same
2) The time periods overlap

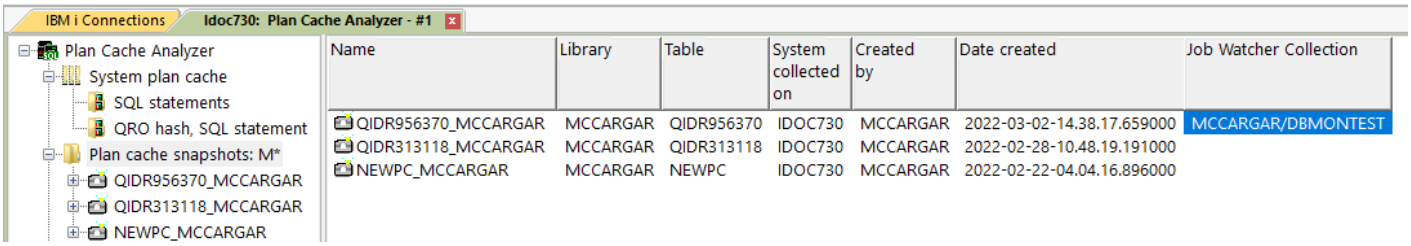
An example of this interface is:



Link Job Watcher collection window

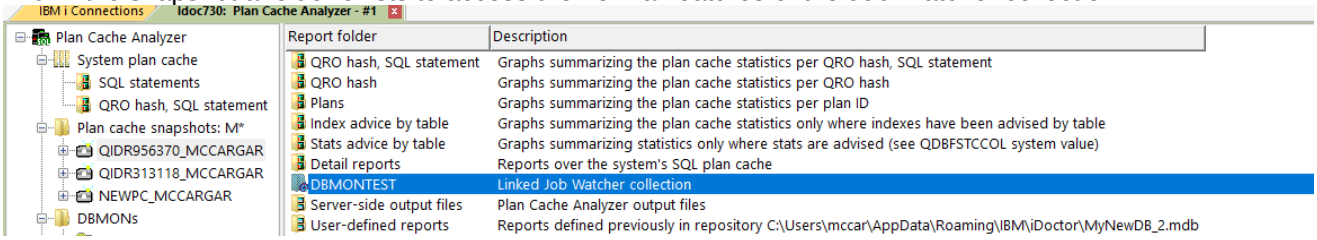
Note: The options to check QRO hash match between the snapshot and JW collection is recommended, but **optional.**

After using this option the list of snapshots will now identify the linked Job Watcher collection for the snapshot picked.



Snapshot with a linked Job Watcher collection

Within the snapshot a folder exists to access the normal features of the Job Watcher collection.



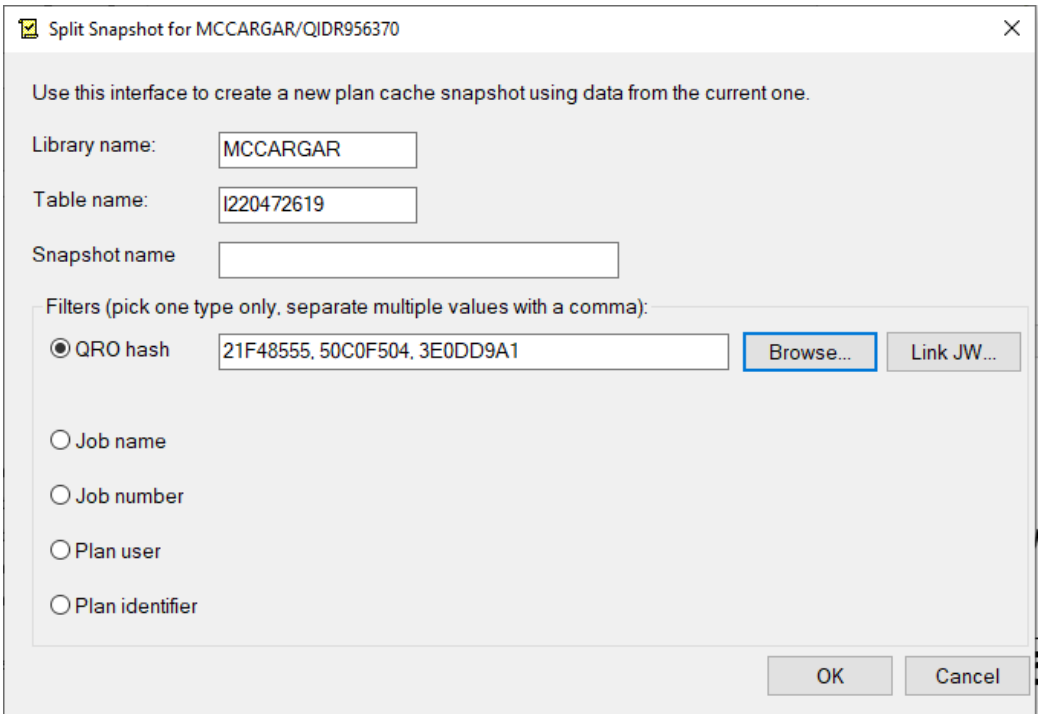
Job Watcher collection subfolder within a Plan Cache snapshot.

5.4 Split function

From a snapshot's popup menu, or any of the QRO hash or plan graphs you can select a desired QRO hash or plan ID and right-click and use the Split… menu option to extract just the data for that selection into a new snapshot.

This new snapshot can be used within IBM i Navigator's Visual Explain for performance tuning and optimization of the query. **Tip:** These snapshots can also be linked to Job Watcher for the same system and time period.

An example of the Split Snapshot window is as follows:



Split Snapshot Window

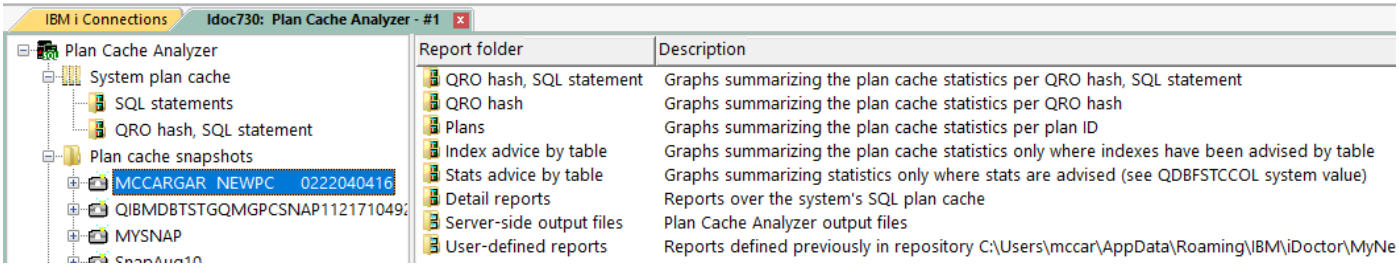
Tip: Use the Browse… button to see the possible values for each filter type. All filter types all multiple selections.

Option	Description
Library name	The name of the library to store the snapshot data
Table name	The table name that will contain the new snapshot data.
Snapshot name	This is the snapshot name or description for the new snapshot to be created.
Filters -> QRO hash	This can contain 1 or more QRO hash to filter the results by. **Tip:** Use the **Link JW** button to tie this new snapshot with a Job Watcher collection that exists in the same time period and system. This allows the JW collection to be visible under the Plan Cache Analyzer's snaphot.
Filters -> Job name	This should be an exact job name match (1 or more) to filter results by.
Filters -> Job number	This should be an exact job number match (1 or more) to filter results by.
Filters -> Current user	This should be an exact current user name match (1 or more) to filter results by.
Filters -> Plan Identifier	This should be an exact plan identifier match (1 or more) to filter results by.

5.5 Report Folders

The **Plan cache snapshots** folder contains a series of subfolders containing graphs and reports.

Tip: You can also access these reports by right clicking the collection and picking the appropriate menu.



Snapshot Report Folders

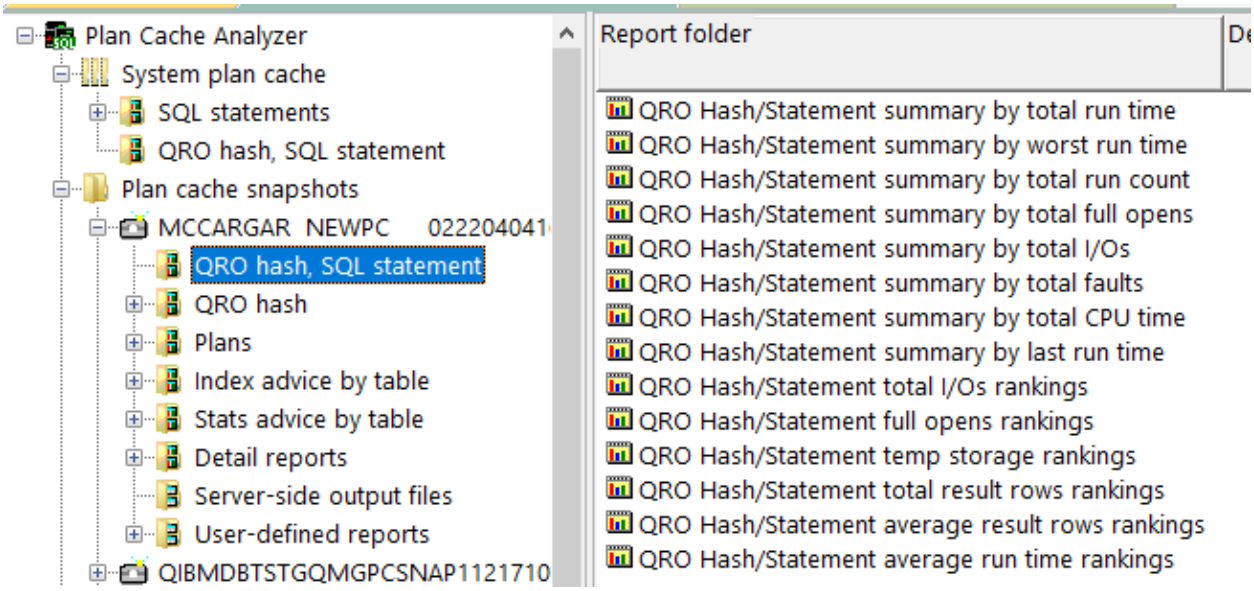
Most of these graphs in these folders will have several alternate views available. This allows you to quickly toggle between one graph and a different one.

Note: Unlike the other components, Plan Cache Analyzer does not contain time interval graphs.

5.6 QRO hash, SQL statement

These graphs show various metrics in the snapshot sorted in several different ways. These graphs show 1 bar for each QRO hash and SQL statement combination.

Note: Although the grouping is on both QRO hash and SQL statement, only the QRO hash is listed on the X-axis label. Use the graph flyover to see the SQL statement.

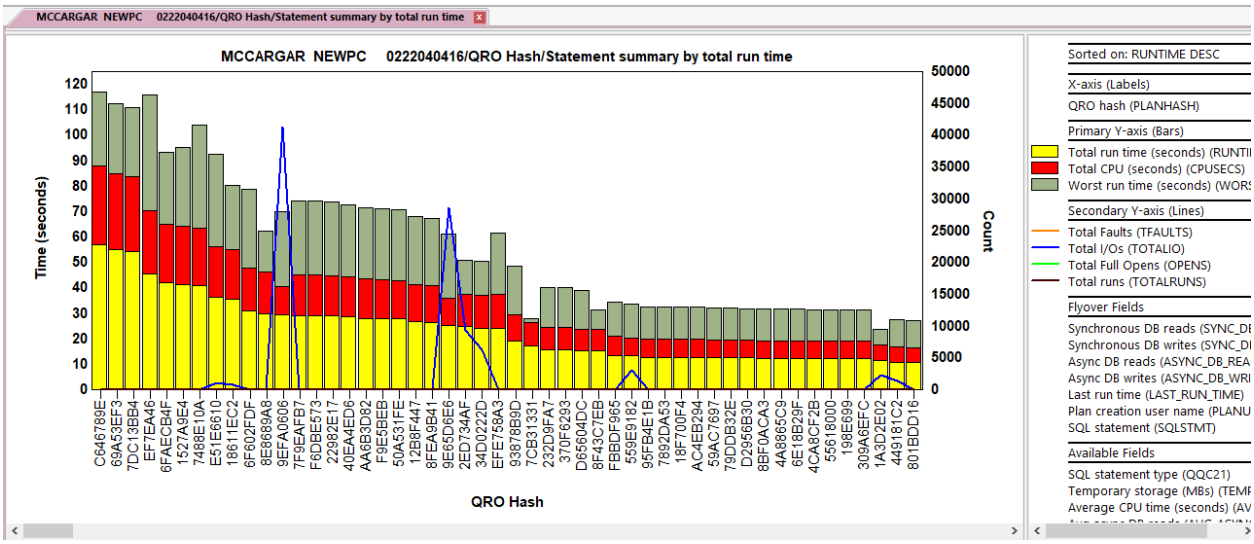


QRO hash, SQL statement folder

5.6.1 QRO Hash/Statement summary by total run time

For each QRO hash, SQL statement, this graph shows the total run time, total CPU time, worst run time on the Y1-axis. The secondary (Y2) axis includes total faults, total I/Os, total full opens and total runs.

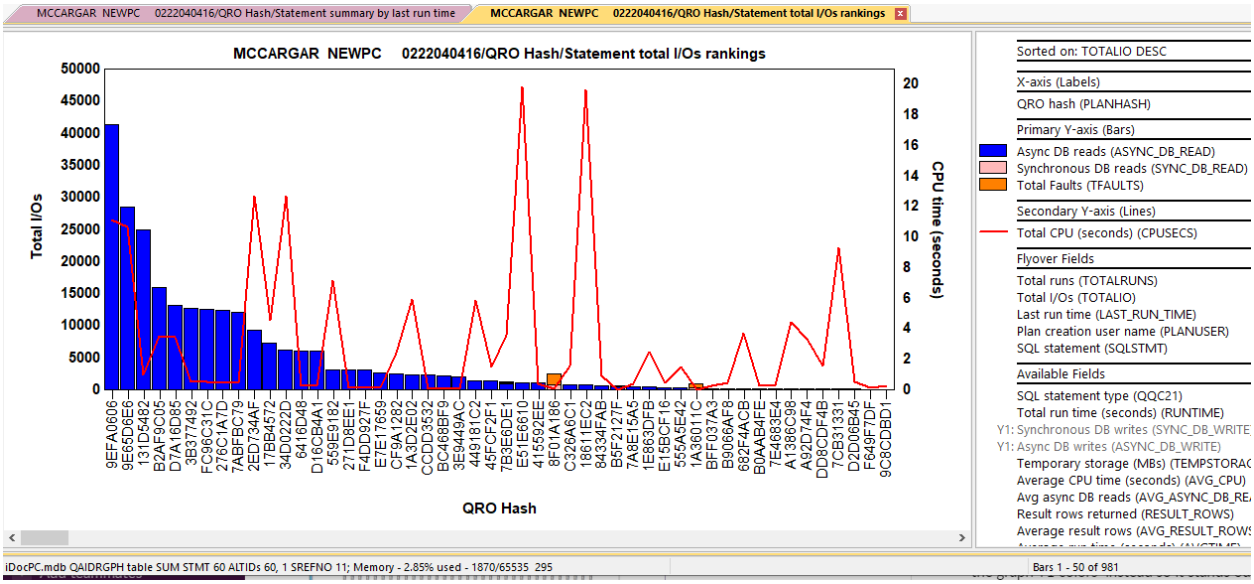
Note: The next 7 graphs are identical to this one and only vary in how the data is sorted which is indicated in the graph's title.



QRO hash/statement summary by total run time

5.6.2 QRO Hash/Statement total I/Os rankings

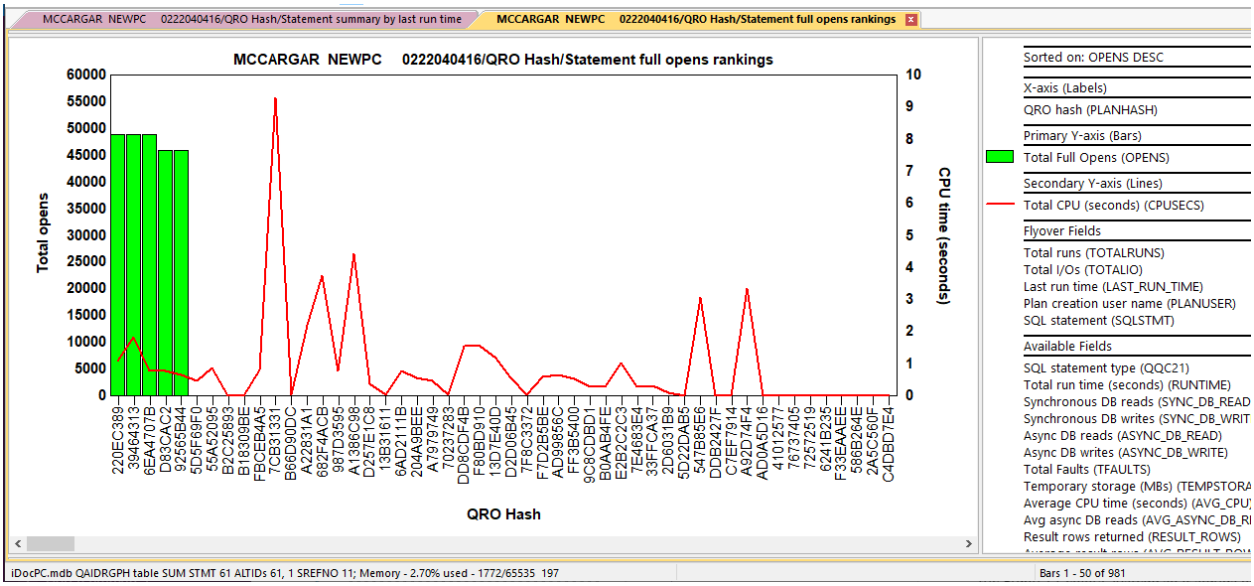
For each QRO hash, SQL statement, this graph shows the **asynchronous database reads, synchronous database reads, and total page faults** on the Y1-axis. The secondary (Y2) axis show the total CPU time.



QRO hash/Statement total I/Os rankings

5.6.3 QRO Hash/Statement full opens rankings

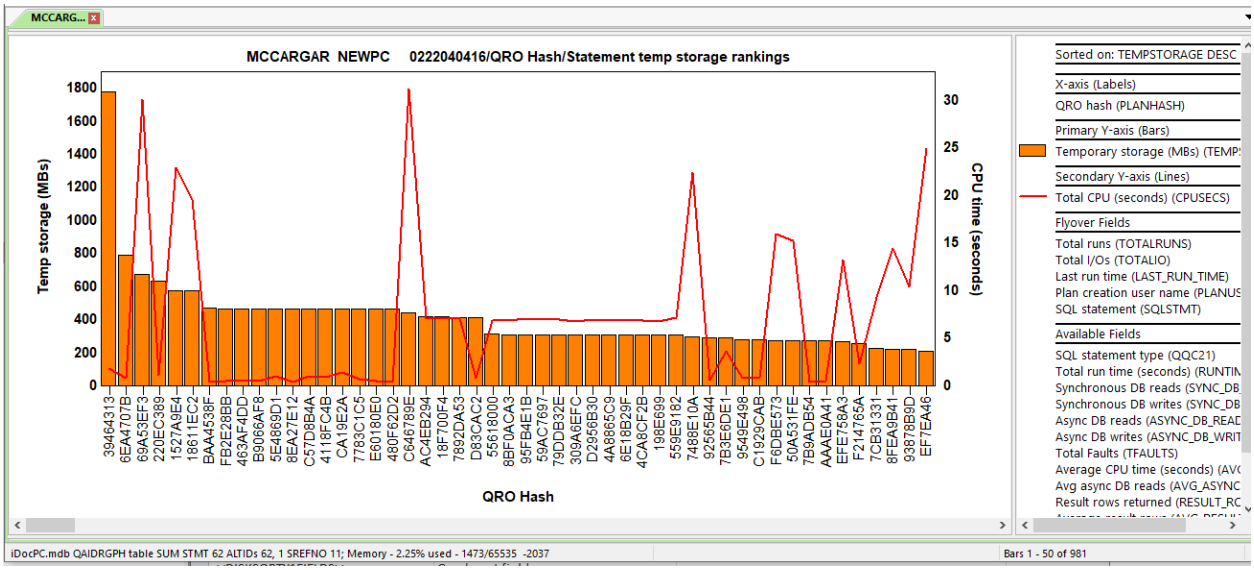
This graph indicates which QRO hash, SQL statement combinations caused the **most full opens**.



QRO hash/Statement full opens rankings

5.6.4 QRO Hash/Statement temp storage rankings

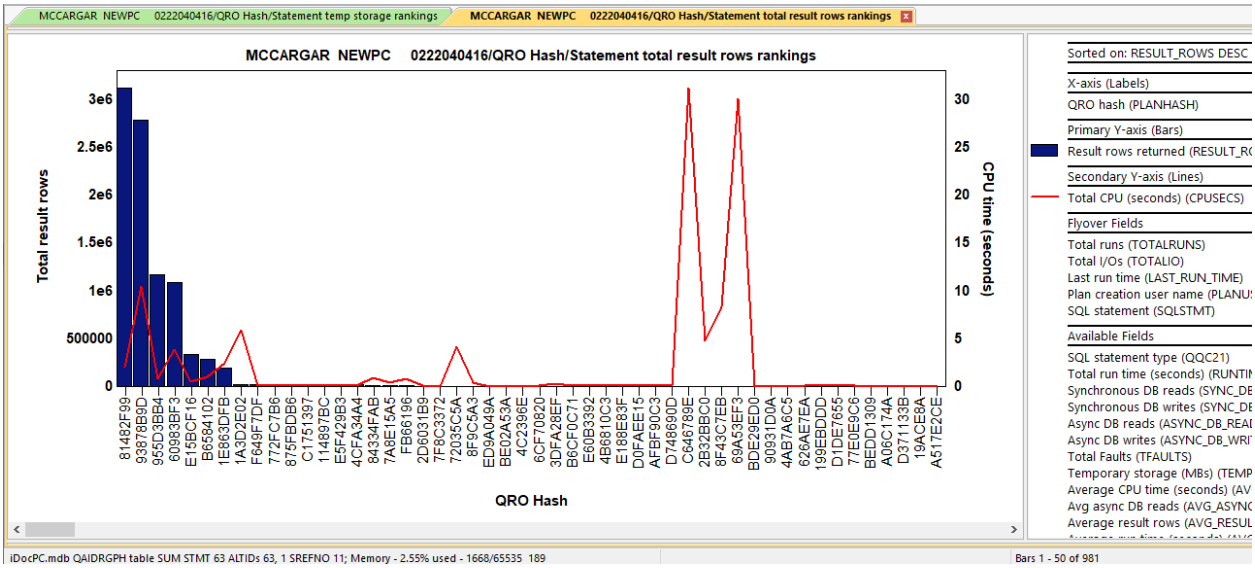
This graph indicates which QRO hash, SQL statement combinations used the most **temporary storage** (in megabytes.)



QRO hash/Statement temp storage rankings

5.6.5 QRO Hash/Statement total result rows rankings

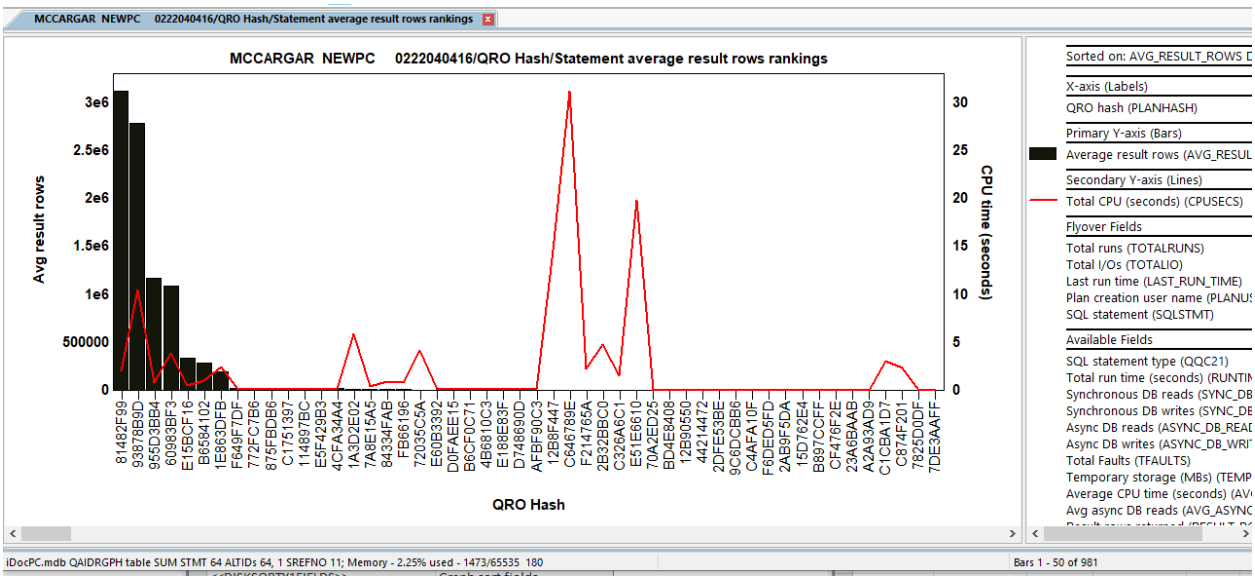
This graph indicates which QRO hash, SQL statement combinations caused the most **result rows**.



QRO hash/Statement result rows rankings

5.6.6 QRO Hash/Statement average result rows rankings

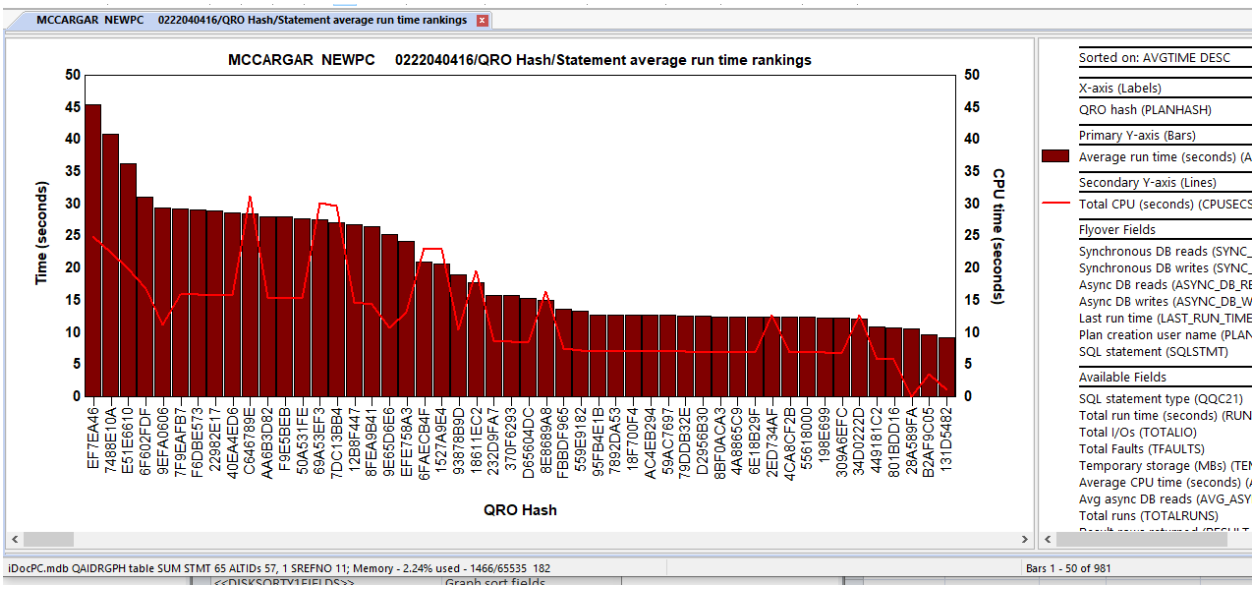
This graph indicates which QRO hash, SQL statement combinations had the highest **average result rows** per run.



QRO hash/Statement average result rows rankings

5.6.7 QRO Hash/Statement average run time rankings

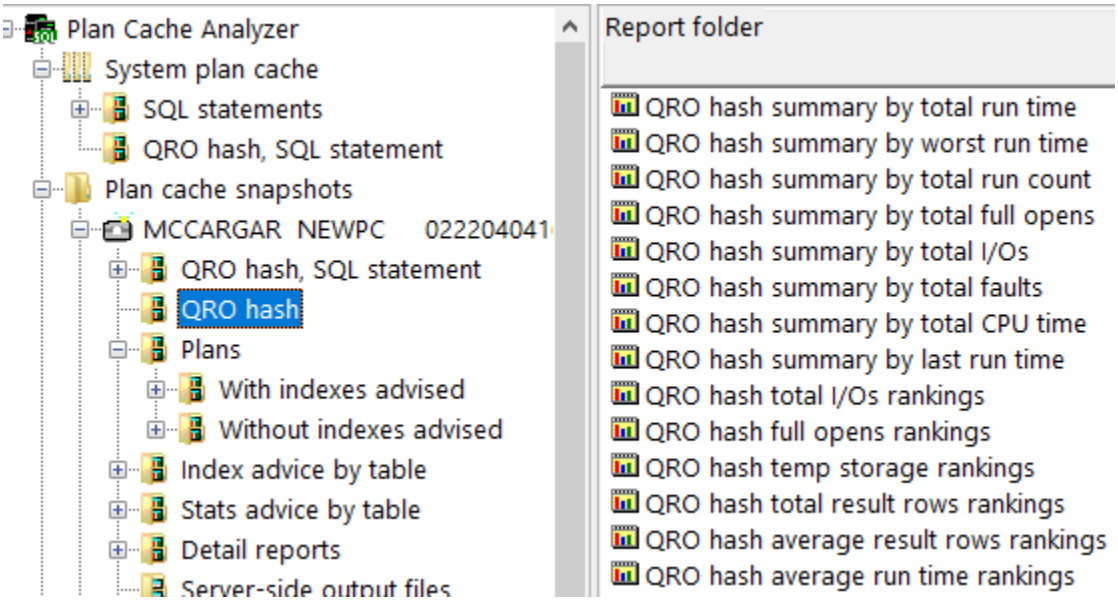
This graph indicates which QRO hash, SQL statement combinations had the highest **average run time** per run.



QRO hash/Statement average run time rankings

5.7 QRO hash

These graphs show various metrics in the snapshot sorted in several different ways. These graphs show 1 bar for each QRO hash.

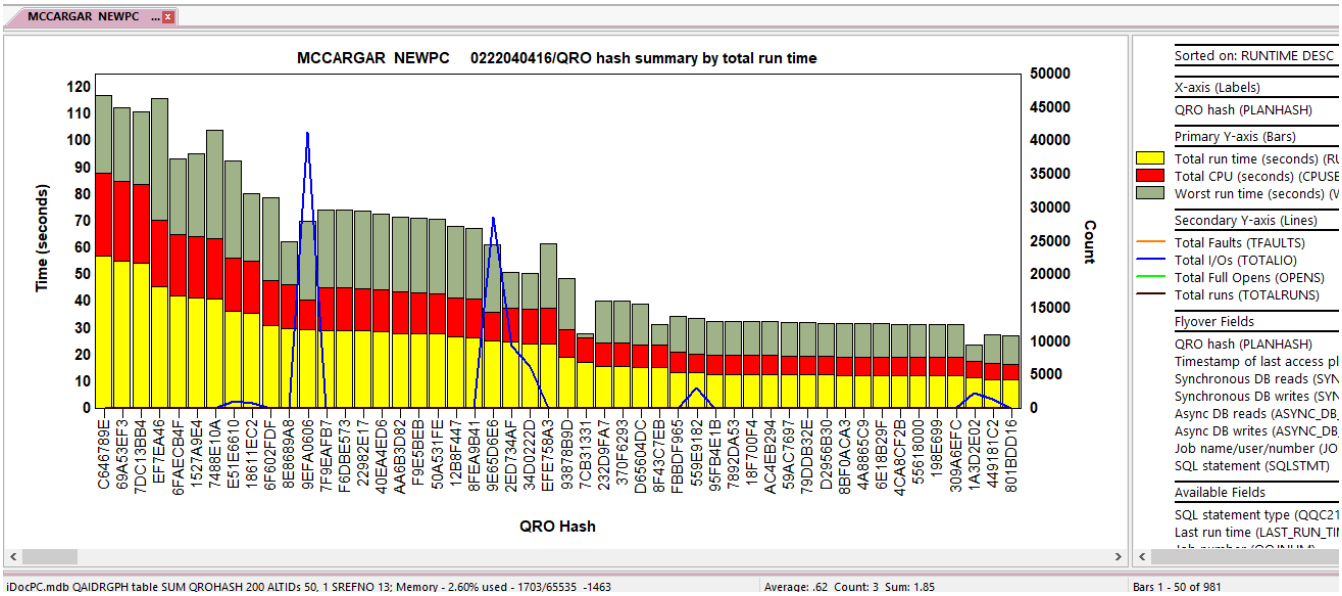


QRO hash folder

These graphs are identical to the QRO Hash, SQL Statement graphs except for these differences:

1. Data is grouped by QRO hash only.
2. If multiple SQL statements exist in a single QRO hash, then the SQL statement will not be listed in the flyover.

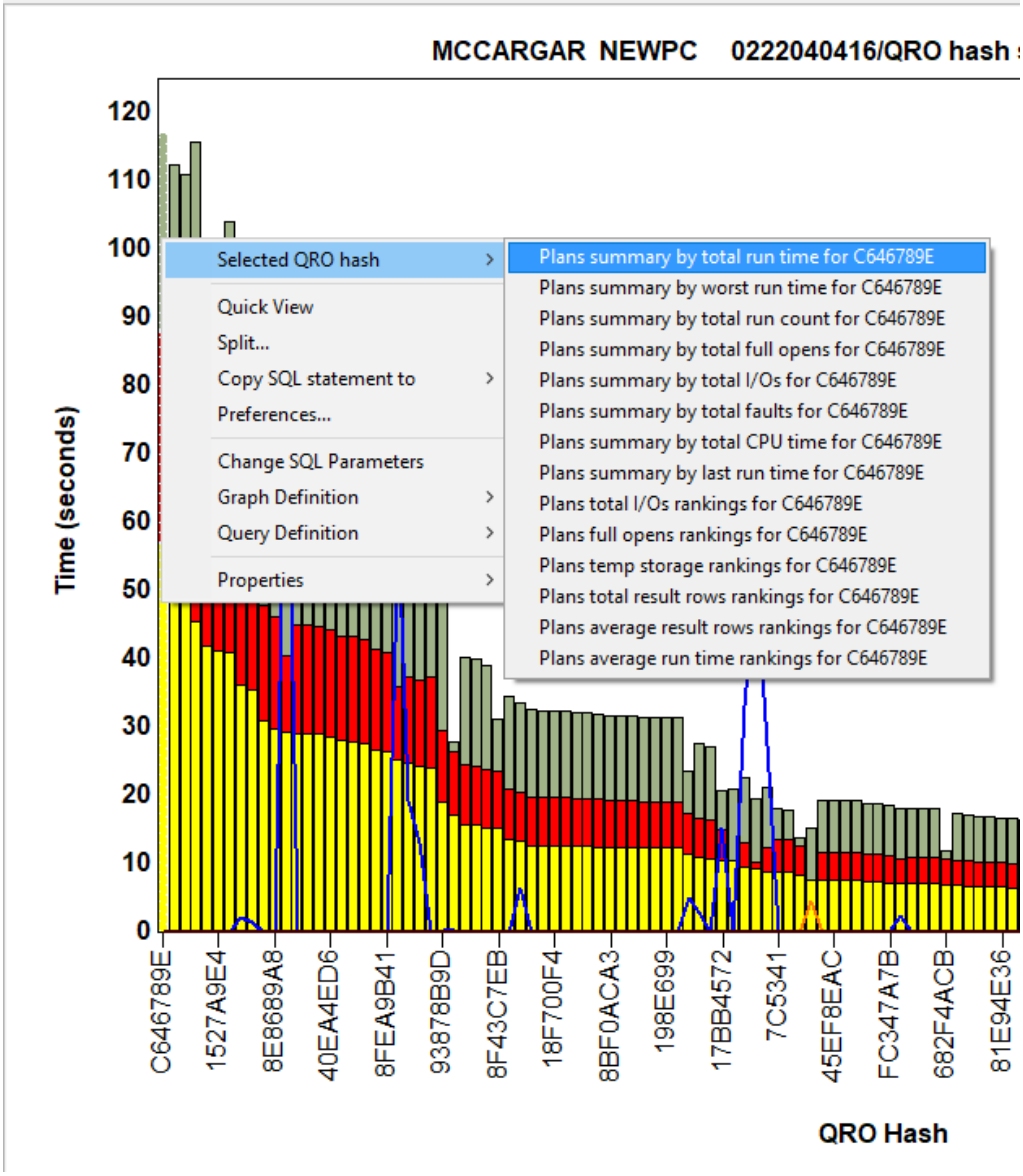
An example follows:



QRO hash summary by total run time

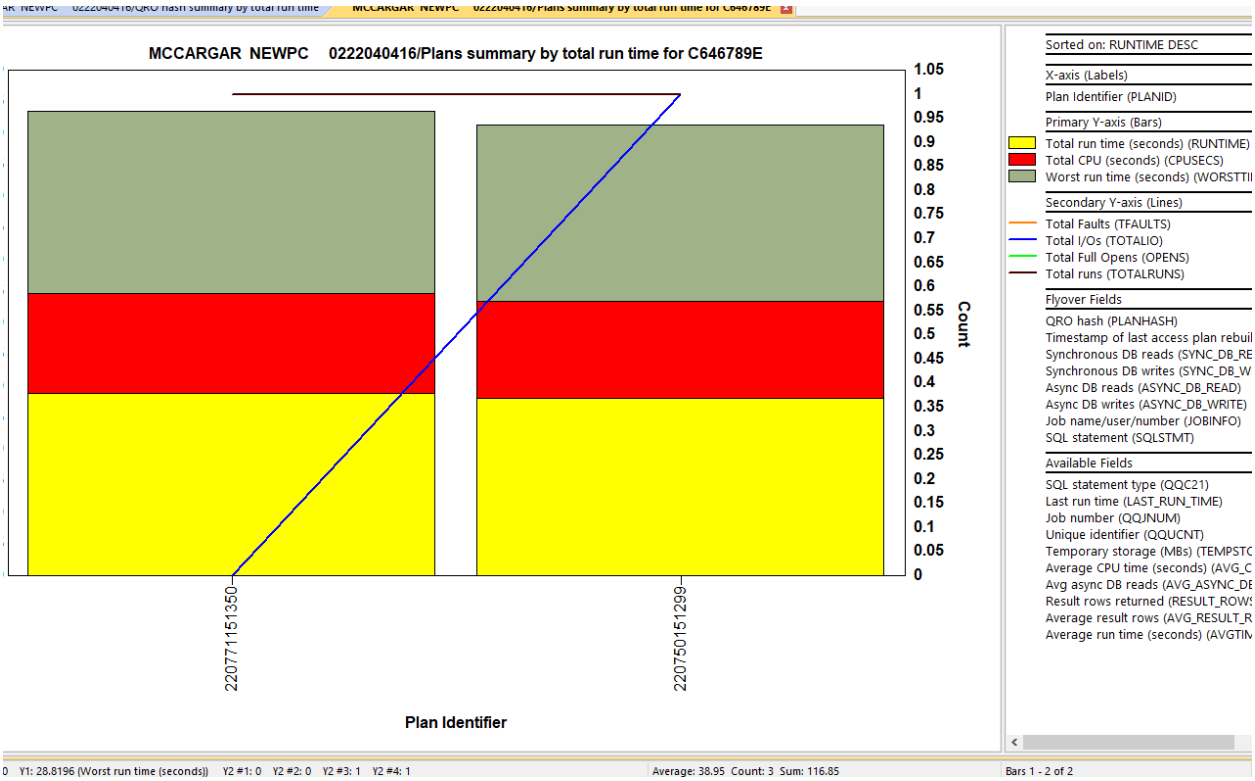
5.8 Selected QRO hash drill down

From any of the QRO hash and QRO, SQL statement graphs you can right-click the desired QRO hash and perform a drill down option to see the Plans associated with the selected QRO hash.



Selected QRO hash drill down options

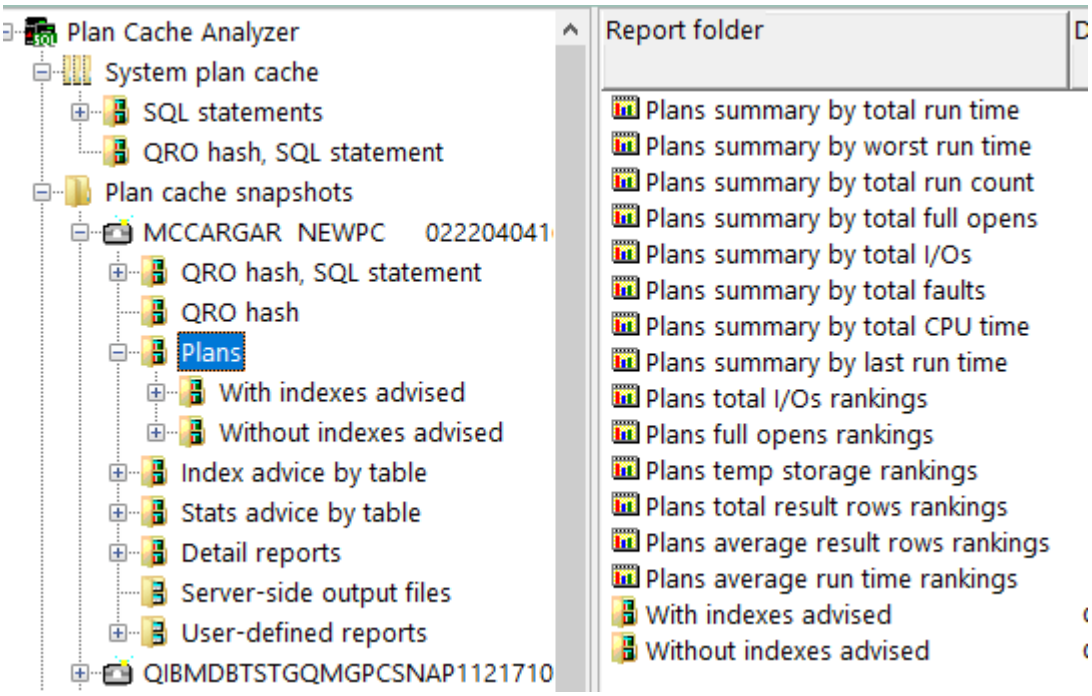
Opening one of these drill down options will open one of the Plan graphs but only for the selected QRO hash.



Plans summary by total run time for C646789E

5.9 Plans

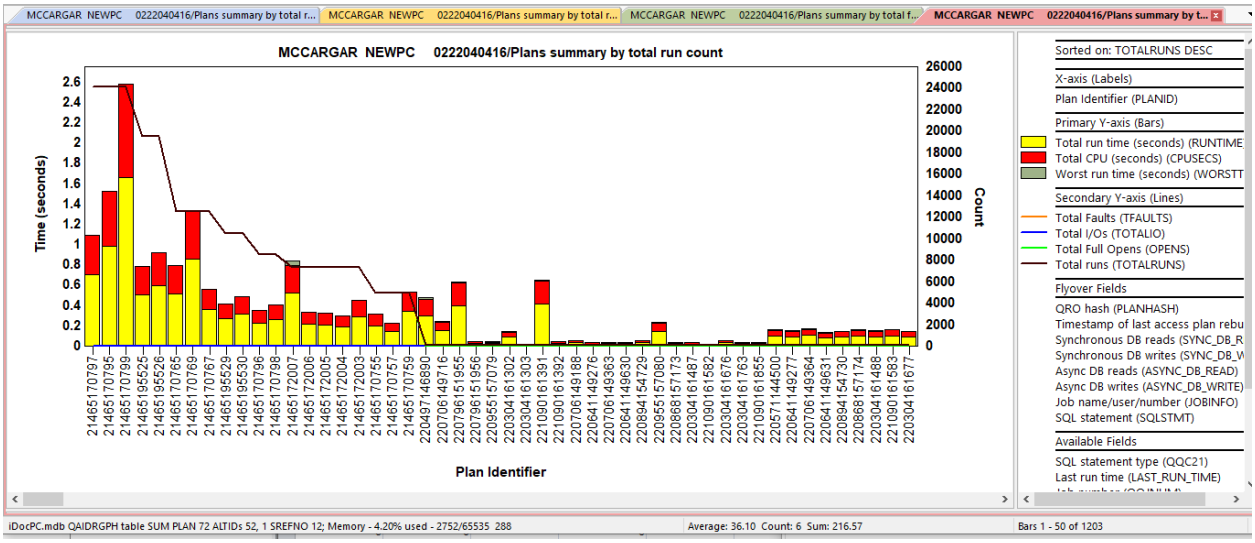
These graphs show various metrics in the snapshot sorted in several different ways. These graphs show 1 bar for each Plan ID. Additional subfolder options exist to show plans with or without indexes advised.



Plans folder

These graphs are identical to the QRO Hash, SQL Statement graphs except the data is grouped by Plan ID which is shown on the X-axis label instead of QRO hash.

An example follows:



Plans summary by total run count

5.10 Index advice by table

These graphs show tables with indexes advised. The same various metrics shown in the previous graphs are available here.

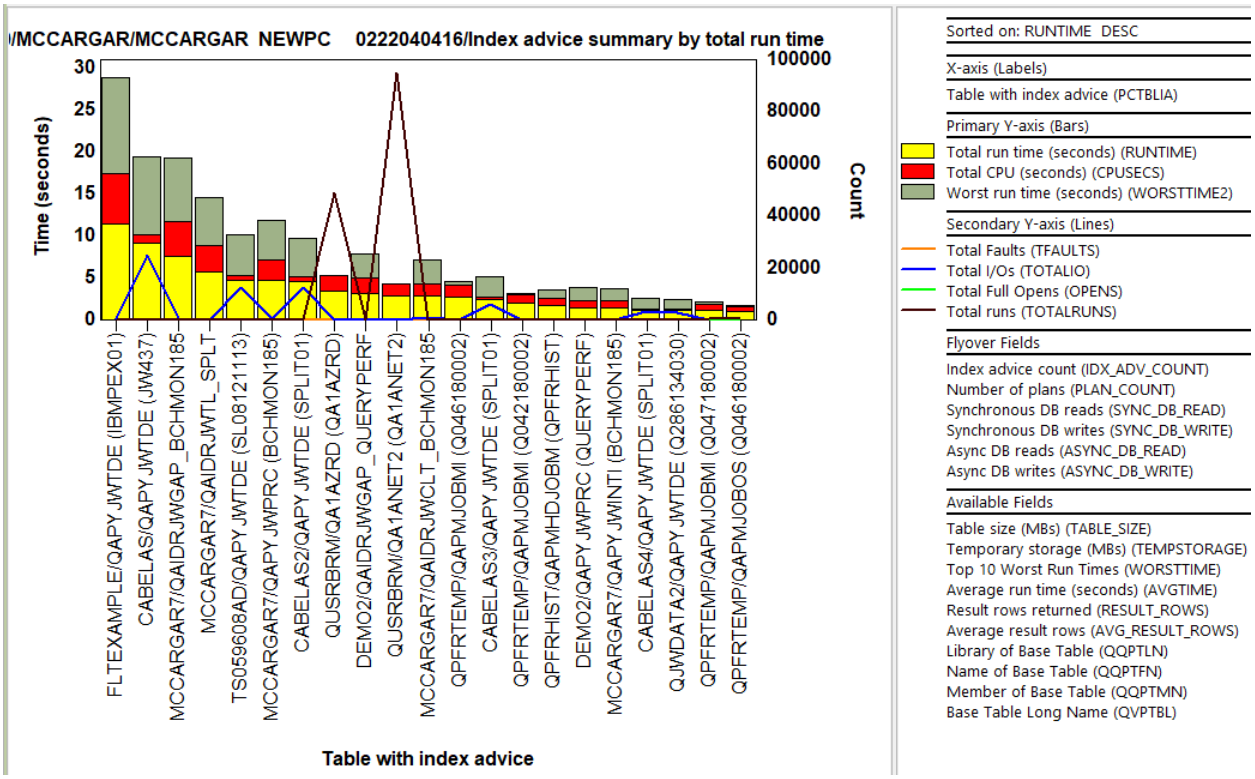
Tip: These graphs show 1 bar for each library, file and member. You can right-click and drill down from these graphs to see the various plans but filtered for only a single table.

Index advice by table folder

Note: Index advice table size rankings only includes tables that have table scan records in the plan cache snapshot and not all tables with indexes advised.

These graphs are identical to the QRO Hash, SQL Statement graphs except the data is grouped by library, file, member and the table information which is shown on the X-axis label instead of QRO hash.

An example follows:

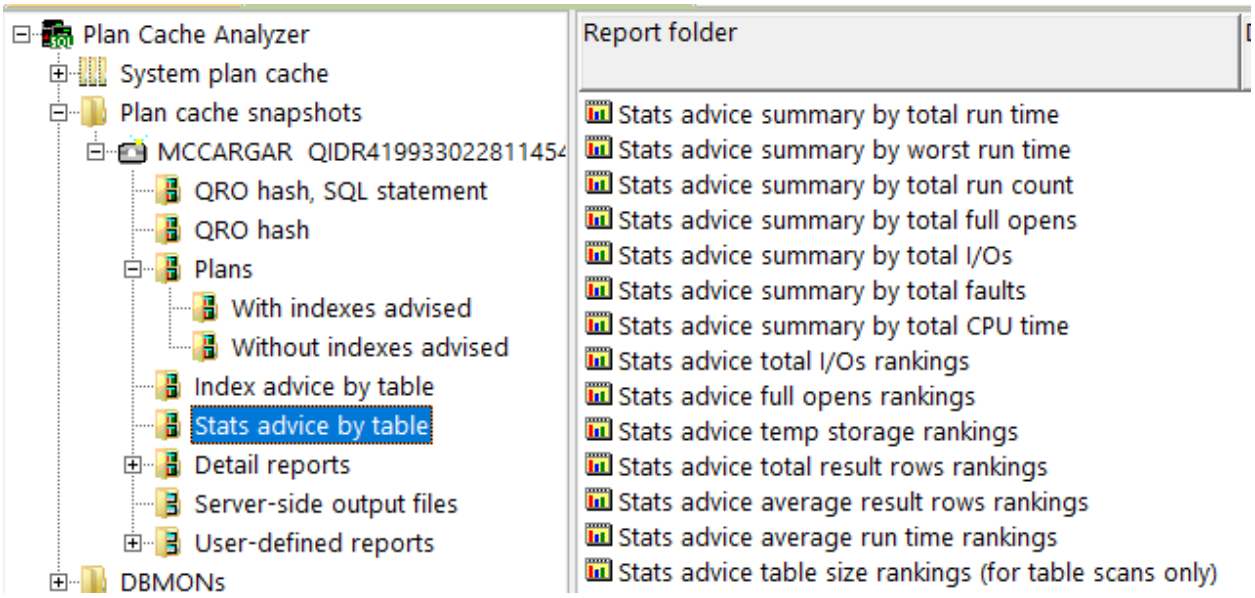


Index advice summary by total run time

5.11 Stats advice by table

These graphs show tables where stats creation is advised. The same various metrics shown in the previous graphs are available here.

Tip: These graphs show 1 bar for each library, file and member. You can right-click and drill down to see the columns where stats are advised in the selected table.

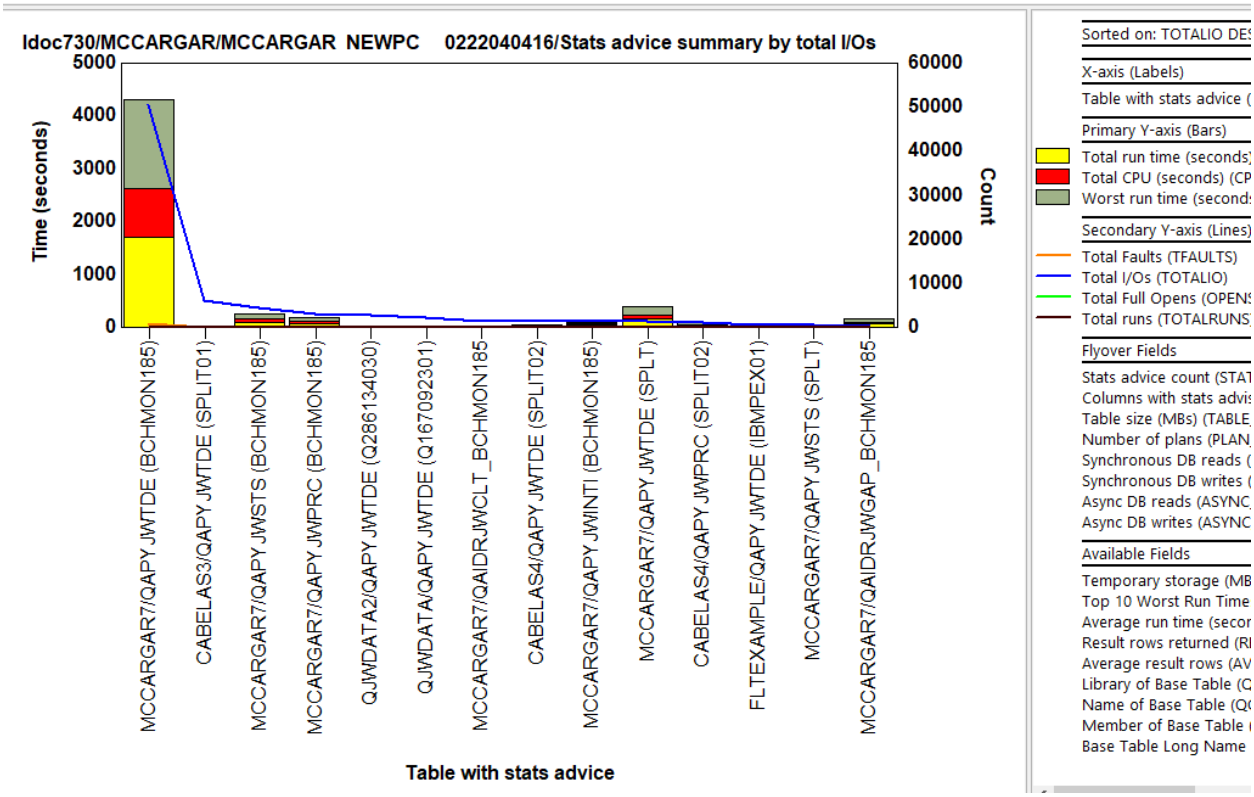


Stats advice by table folder

Note: Stats advice table size rankings only includes tables that have table scan records in the plan cache snapshot and not all tables with stats advised.

These graphs are identical to the QRO Hash, SQL Statement graphs except the data is grouped by library, file, member and the table information which is shown on the X-axis label instead of QRO hash.

An example follows:

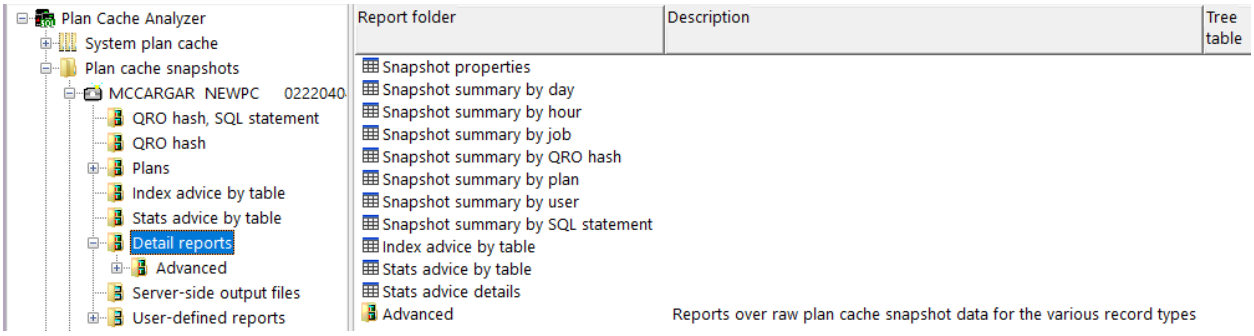


Stats advice summary by total I/Os

5.12 Detail reports

This folder contains several table views designed for advanced users.

Tip: The Detail reports -> Advanced subfolder contains the same SQL statements documented on IBM.com for the various database monitor views.



Detail reports folder

5.12.1 Snapshot properties

This report shows the Snapshot properties in a table view.

Idoc730/MCCARGAR/MCCARGAR NEWPC 0222040416/Snapshot properties - #1

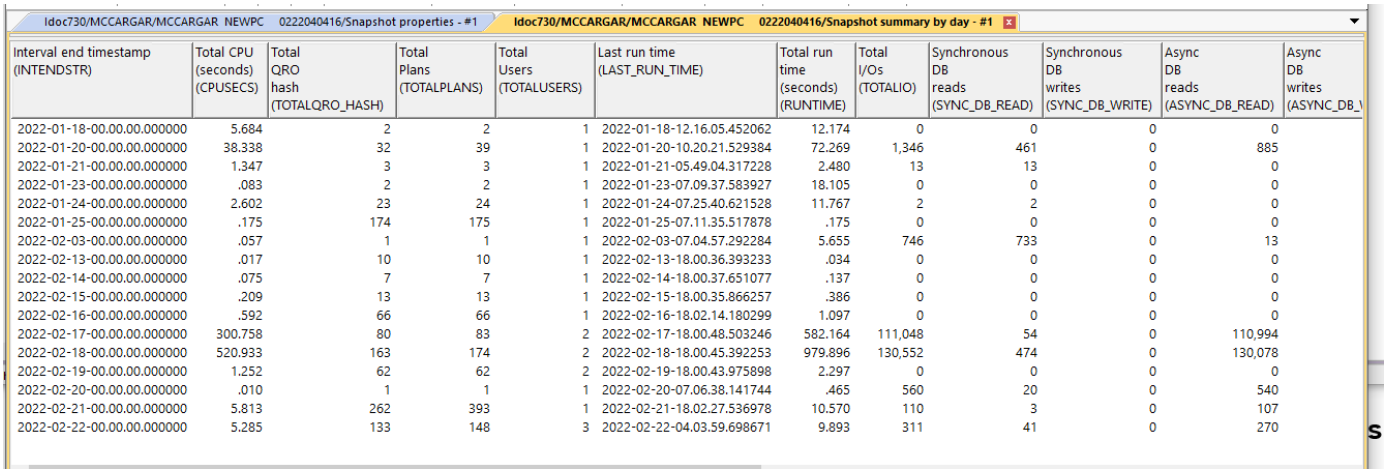
Description (DESC)	Value (VAL)
Plan cache creation time	2022-02-22-04.04.16.924678
System	IDOC730
Relational DB name	*LOCAL
VRM	V7R3M0
Group PTF	SF99703 27
STRDBMON or Filter criteria	RE
Monitored Job Type	P
Start time	2022-01-18-12.05.30.494933
End time	2022-02-22-04.04.37.724490
Currently Active Queries	50
Queries Run	1387301
Full Opens	649082
Full Optimizations	162664
Optimizations with Valid Plans	37357
AQP Interrogations	120
AQP Plans Replaced	0
Psuedo Open Queries Hard Closed	1712
Plans in Cache	1228
Plan Cache Size	499 MB
Plan Cache Size Threshold	512 MB
Plans Built	162664
Times Plans Used from Cache	486419
Temp Indexes Created	2289
Current Temp Indexes	13
Temp Objects Size	15742 MB
Plan Cache No Matches	162664

Snapshot properties

5.12.2 Snapshot summary by day

This report summarizes the statistics found in the snapshot **by day** since the plan cache was last cleared.

Note: This report and the next 6 reports are experimental. Graphs may be added for these in the future, if there is a demand for it.



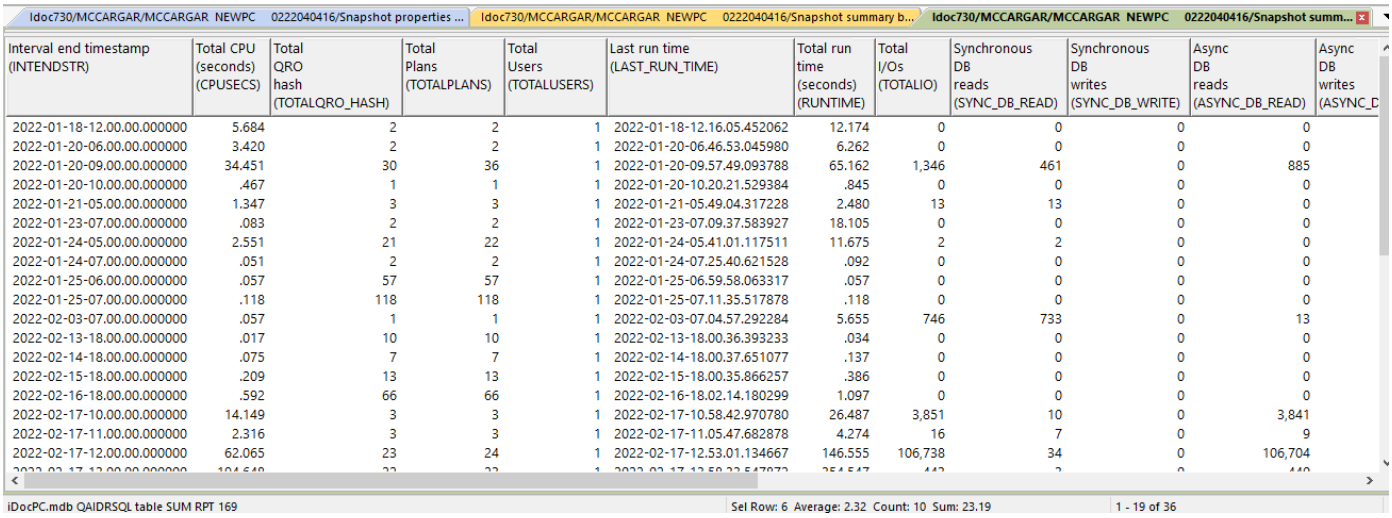
Idoc730/MCCARGAR/MCCARGAR NEWPC 0222040416/Snapshot properties - #1 | Idoc730/MCCARGAR/MCCARGAR NEWPC 0222040416/Snapshot summary by day - #1

Interval end timestamp (INTENDSTR)	Total CPU (seconds) (CPUSECS)	Total QRO hash (TOTALQRO_HASH)	Total Plans (TOTALPLANS)	Total Users (TOTALUSERS)	Last run time (LAST_RUN_TIME)	Total run time (seconds) (RUNTIME)	Total I/Os (TOTALIO)	Synchronous DB reads (SYNC_DB_READ)	Synchronous DB writes (SYNC_DB_WRITE)	Async DB reads (ASYNC_DB_READ)	Async DB writes (ASYNC_DB_\
2022-01-18-00.00.00.000000	5.684	2	2	1	2022-01-18-12.16.05.452062	12.174	0	0	0	0	
2022-01-20-00.00.00.000000	38.338	32	39	1	2022-01-20-10.20.21.529384	72.269	1,346	461	0	885	
2022-01-21-00.00.00.000000	1.347	3	3	1	2022-01-21-05.49.04.317228	2.480	13	13	0	0	
2022-01-23-00.00.00.000000	.083	2	2	1	2022-01-23-07.09.37.583927	18.105	0	0	0	0	
2022-01-24-00.00.00.000000	2.602	23	24	1	2022-01-24-07.25.40.621528	11.767	2	2	0	0	
2022-01-25-00.00.00.000000	.175	174	175	1	2022-01-25-07.11.35.517878	.175	0	0	0	0	
2022-02-03-00.00.00.000000	.057	1	1	1	2022-02-03-07.04.57.292284	5.655	746	733	0	13	
2022-02-13-00.00.00.000000	.017	10	10	1	2022-02-13-18.00.36.393233	.034	0	0	0	0	
2022-02-14-00.00.00.000000	.075	7	7	1	2022-02-14-18.00.37.651077	.137	0	0	0	0	
2022-02-15-00.00.00.000000	.209	13	13	1	2022-02-15-18.00.35.866257	.386	0	0	0	0	
2022-02-16-00.00.00.000000	.592	66	66	1	2022-02-16-18.02.14.180299	1.097	0	0	0	0	
2022-02-17-00.00.00.000000	300.758	80	83	2	2022-02-17-18.00.48.503246	582.164	111,048	54	0	110,994	
2022-02-18-00.00.00.000000	520.933	163	174	2	2022-02-18-18.00.45.392253	979.896	130,552	474	0	130,078	
2022-02-19-00.00.00.000000	1.252	62	62	2	2022-02-19-18.00.43.975898	2.297	0	0	0	0	
2022-02-20-00.00.00.000000	.010	1	1	1	2022-02-20-07.06.38.141744	.465	560	20	0	540	
2022-02-21-00.00.00.000000	5.813	262	393	1	2022-02-21-18.02.27.536978	10.570	110	3	0	107	
2022-02-22-00.00.00.000000	5.285	133	148	3	2022-02-22-04.03.59.698671	9.893	311	41	0	270	

Snapshot summary by day

5.12.3 Snapshot summary by hour

This report is the same as the previous one but with **1 hour groupings** instead.



Idoc730/MCCARGAR/MCCARGAR NEWPC 0222040416/Snapshot properties ... | Idoc730/MCCARGAR/MCCARGAR NEWPC 0222040416/Snapshot summary b... | Idoc730/MCCARGAR/MCCARGAR NEWPC 0222040416/Snapshot summ...

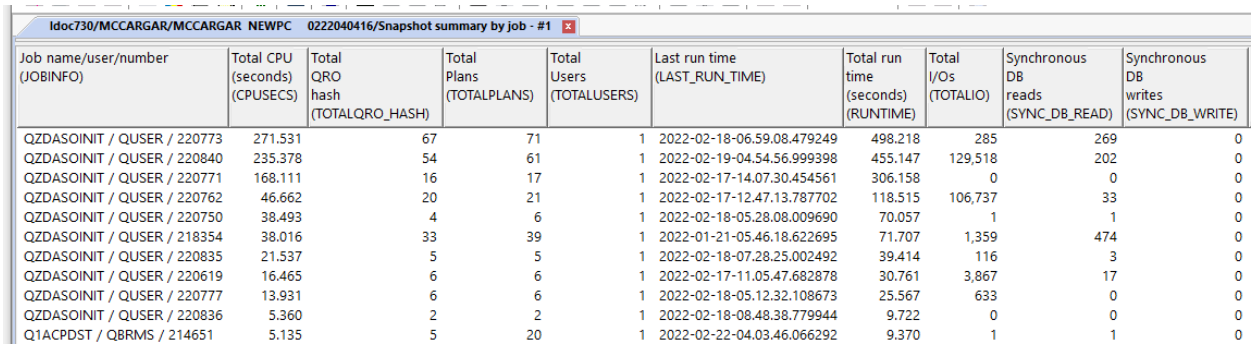
Interval end timestamp (INTENDSTR)	Total CPU (seconds) (CPUSECS)	Total QRO hash (TOTALQRO_HASH)	Total Plans (TOTALPLANS)	Total Users (TOTALUSERS)	Last run time (LAST_RUN_TIME)	Total run time (seconds) (RUNTIME)	Total I/Os (TOTALIO)	Synchronous DB reads (SYNC_DB_READ)	Synchronous DB writes (SYNC_DB_WRITE)	Async DB reads (ASYNC_DB_READ)	Async DB writes (ASYNC_D
2022-01-18-12.00.00.000000	5.684	2	2	1	2022-01-18-12.16.05.452062	12.174	0	0	0	0	
2022-01-20-06.00.00.000000	3.420	2	2	1	2022-01-20-06.46.53.045980	6.262	0	0	0	0	
2022-01-20-09.00.00.000000	34.451	30	36	1	2022-01-20-09.57.49.093788	65.162	1,346	461	0	885	
2022-01-20-10.00.00.000000	.467	1	1	1	2022-01-20-10.20.21.529384	.845	0	0	0	0	
2022-01-21-05.00.00.000000	1.347	3	3	1	2022-01-21-05.49.04.317228	2.480	13	13	0	0	
2022-01-23-07.00.00.000000	.083	2	2	1	2022-01-23-07.09.37.583927	18.105	0	0	0	0	
2022-01-24-05.00.00.000000	2.551	21	22	1	2022-01-24-05.41.01.117511	11.675	2	2	0	0	
2022-01-24-07.00.00.000000	.051	2	2	1	2022-01-24-07.25.40.621528	.092	0	0	0	0	
2022-01-25-06.00.00.000000	.057	57	57	1	2022-01-25-06.59.58.063317	.057	0	0	0	0	
2022-01-25-07.00.00.000000	.118	118	118	1	2022-01-25-07.11.35.517878	.118	0	0	0	0	
2022-02-03-07.00.00.000000	.057	1	1	1	2022-02-03-07.04.57.292284	5.655	746	733	0	13	
2022-02-13-18.00.00.000000	.017	10	10	1	2022-02-13-18.00.36.393233	.034	0	0	0	0	
2022-02-14-18.00.00.000000	.075	7	7	1	2022-02-14-18.00.37.651077	.137	0	0	0	0	
2022-02-15-18.00.00.000000	.209	13	13	1	2022-02-15-18.00.35.866257	.386	0	0	0	0	
2022-02-16-18.00.00.000000	.592	66	66	1	2022-02-16-18.02.14.180299	1.097	0	0	0	0	
2022-02-17-10.00.00.000000	14.149	3	3	1	2022-02-17-10.58.42.970780	26.487	3,851	10	0	3,841	
2022-02-17-11.00.00.000000	2.316	3	3	1	2022-02-17-11.05.47.682878	4.274	16	7	0	9	
2022-02-17-12.00.00.000000	62.065	23	24	1	2022-02-17-12.53.01.134667	146.555	106,738	34	0	106,704	

iDocPC.mdb QAIDRSQL table SUM RPT 169 | Sel Row: 6 Average: 2.32 Count: 10 Sum: 23.19 | 1 - 19 of 36

Snapshot summary by hour

5.12.4 Snapshot summary by job

This report summarizes the statistics found in the snapshot by **job.**



Idoc730/MCCARGAR/MCCARGAR NEWPC 0222040416/Snapshot summary by job - #1

Job name/user/number (JOBINFO)	Total CPU (seconds) (CPUSECS)	Total QRO hash (TOTALQRO_HASH)	Total Plans (TOTALPLANS)	Total Users (TOTALUSERS)	Last run time (LAST_RUN_TIME)	Total run time (seconds) (RUNTIME)	Total I/Os (TOTALIO)	Synchronous DB reads (SYNC_DB_READ)	Synchronous DB writes (SYNC_DB_WRITE)
QZDASOINIT / QUSER / 220773	271.531	67	71	1	2022-02-18-06.59.08.479249	498.218	285	269	0
QZDASOINIT / QUSER / 220840	235.378	54	61	1	2022-02-19-04.54.56.999398	455.147	129,518	202	0
QZDASOINIT / QUSER / 220771	168.111	16	17	1	2022-02-17-14.07.30.454561	306.158	0	0	0
QZDASOINIT / QUSER / 220762	46.662	20	21	1	2022-02-17-12.47.13.787702	118.515	106,737	33	0
QZDASOINIT / QUSER / 220750	38.493	4	6	1	2022-02-18-05.28.08.009690	70.057	1	1	0
QZDASOINIT / QUSER / 218354	38.016	33	39	1	2022-01-21-05.46.18.622695	71.707	1,359	474	0
QZDASOINIT / QUSER / 220835	21.537	5	5	1	2022-02-18-07.28.25.002492	39.414	116	3	0
QZDASOINIT / QUSER / 220619	16.465	6	6	1	2022-02-17-11.05.47.682878	30.761	3,867	17	0
QZDASOINIT / QUSER / 220777	13.931	6	6	1	2022-02-18-05.12.32.108673	25.567	633	0	0
QZDASOINIT / QUSER / 220836	5.360	2	2	1	2022-02-18-08.48.38.779944	9.722	0	0	0
Q1ACPDST / QBRMS / 214651	5.135	5	20	1	2022-02-22-04.03.46.066292	9.370	1	1	0

Snapshot summary by job

5.12.5 Snapshot summary by QRO hash

This report summarizes the statistics found in the snapshot by **QRO hash.**

Idoc730/MCCARGAR/MCCARGAR NEWPC 0222040416/Snapshot summary by job - #1 | Idoc730/MCCARGAR/MCCARGAR NEWPC 0222040416/Snapshot summary by QRO hash

QRO hash (PLANHASH)	Total CPU (seconds) (CPUSECS)	Total Jobs (TOTALJOBS)	Total Plans (TOTALPLANS)	Total Users (TOTALUSERS)	Last run time (LAST_RUN_TIME)	Total run time (seconds) (RUNTIME)	Total I/Os (TOTALIO)	Synchronous DB reads (SYNC_DB_READ)	Synchronous DB writes (SYNC_DB_WRITE)
C646789E	31.209	2	2	1	2022-02-17-13.14.25.749903	56.819	1	1	0
69A53EF3	30.102	1	1	1	2022-02-17-13.29.57.001955	54.874	0	0	0
7DC13BB4	29.695	1	2	1	2022-02-17-13.26.29.360210	54.101	0	0	0
EF7EA46	24.909	1	1	1	2022-02-18-05.11.16.858259	45.433	0	0	0
6FAECB4F	23.005	1	1	1	2022-02-17-13.11.24.856866	41.862	0	0	0
1527A9E4	22.872	1	2	1	2022-02-18-09.53.35.271807	41.211	0	0	0
7488E10A	22.422	1	1	1	2022-02-17-14.23.27.903473	40.859	0	0	0
E51E6610	19.847	1	1	1	2022-02-17-12.45.47.201453	36.288	1,060	23	0

Snapshot summary by QRO hash

5.12.6 Snapshot summary by plan

This report summarizes the statistics found in the snapshot by **plan ID.**

Idoc730/MCCARGAR/MCCARGAR NEWPC 0222040416/Snapshot summ... | Idoc730/MCCARGAR/MCCARGAR NEWPC 0222040416/Snapshot summ... | Idoc7

Plan Identifier (PLANID)	Total CPU (seconds) (CPUSECS)	Last run time (LAST_RUN_TIME)	Total run time (seconds) (RUNTIME)	Total I/Os (TOTALIO)	Synchronous DB reads (SYNC_DB_READ)	Synchronous DB writes (SYNC_DB_WRITE)	Async DB reads (ASYNC_DB_READ)
220771151392	30.102	2022-02-17-13.29.57.001955	54.874	0	0	0	0
220773153279	24.909	2022-02-18-05.11.16.858259	45.433	0	0	0	0
220750151296	23.005	2022-02-17-13.11.24.856866	41.862	0	0	0	0
220773151533	22.422	2022-02-17-14.23.27.903473	40.859	0	0	0	0
220762151251	19.847	2022-02-17-12.45.47.201453	36.288	1,060	23	0	1,037
220840153864	17.205	2022-02-18-09.43.39.634520	31.018	0	0	0	0

Snapshot summary by plan

5.12.7 Snapshot summary by user

This report summarizes the statistics found in the snapshot by plan creation **user name.**

Idoc730/MCCARGAR/MCCARGAR NEWPC 0222040... | Idoc730/MCCARGAR/MCCARGAR NEWPC 0222040... | Idoc730/MCCARGAR/MCCARGAR NEWPC 0222040...

Plan creation user name (PLANUSER)	Total CPU (seconds) (CPUSECS)	Total Jobs (TOTALJOBS)	Total QRO hash (TOTALQRO_HASH)	Total Plans (TOTALPLANS)	Last run time (LAST_RUN_TIME)	Total run time (seconds) (RUNTIME)	Total I/Os (TOTALIO)	Synchronous DB reads (SYNC_DB_READ)
MCCARGAR	869.312	22	428	453	2022-02-22-03.57.13.861747	1,683.923	244,267	1,757
QSYS	8.783	14	548	730	2022-02-22-04.03.59.698671	16.271	420	43
QBRMS	5.135	1	5	20	2022-02-22-04.03.46.066292	9.370	1	1

Snapshot summary by user

5.12.8 Snapshot summary by SQL statement

This report summarizes the statistics found in the snapshot by **SQL statement.**

Idoc730/MCCARGAR/MCCARGAR NEWP... | Idoc730/MCCARGAR/MCCARGAR NEWP... | Idoc730/MCCARGAR/MCCARGAR NEWP... | Idoc730/MCCARGAR/MCCARGAR NEWP... | Idoc730/MCCARGAR/MCCARGA

SQL statement (SQLSTMT)	Total CPU (seconds) (CPUSECS)	Total Jobs (TOTALJOBS)	Total QRO hash (TOTALQRO_HASH)	Total Plans (TOTALPLANS
WITH TIMES AS (SELECT ? AS LIBNAME, ? AS MBRNAME, A.* FROM QTEMP/qapyjwinti_MCCARGAR7_BCHMON185 A), INTI A...	91.160	1	4	
WITH TIMES AS (SELECT ? AS LIBNAME, ? AS MBRNAME, A.* FROM QTEMP/qapyjwinti_MCCARGAR7_BCHMON185 A), INTI A...	54.214	2	2	
WITH TIMES AS (SELECT ? AS LIBNAME, ? AS MBRNAME, A.* FROM QTEMP/qapyjwinti_MCCARGAR7_BCHMON185 A), INTI A...	31.054	1	2	
WITH TIMES AS (SELECT ? AS LIBNAME, ? AS MBRNAME, A.* FROM QTEMP/qapyjwinti_MCCARGAR7_BCHMON185 A), INTI A...	29.868	1	2	
WITH TIMES AS (SELECT ? AS LIBNAME, ? AS MBRNAME, A.* FROM QTEMP/qapyjwinti_MCCARGAR_ALL A), INTI AS (select A....	26.584	2	13	1

Snapshot summary by SQL statement

5.12.9 Index advice by table

This report summarizes the statistics in the snapshot for tables with index advice.

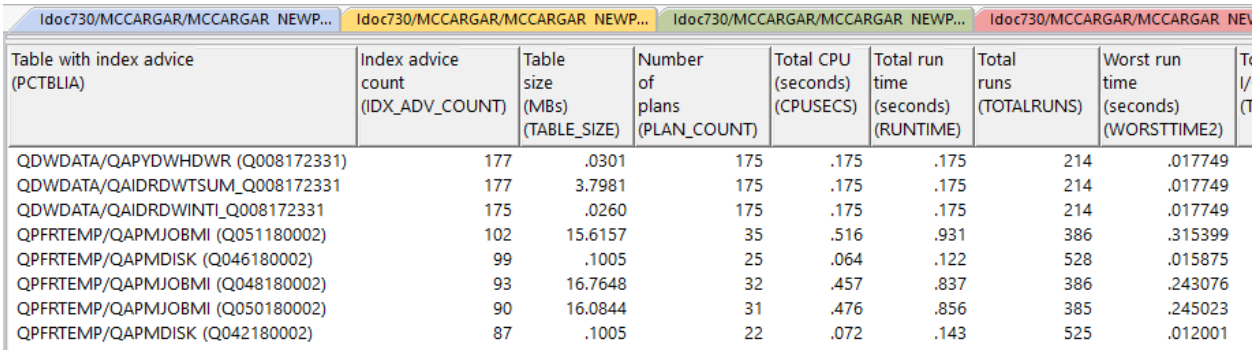
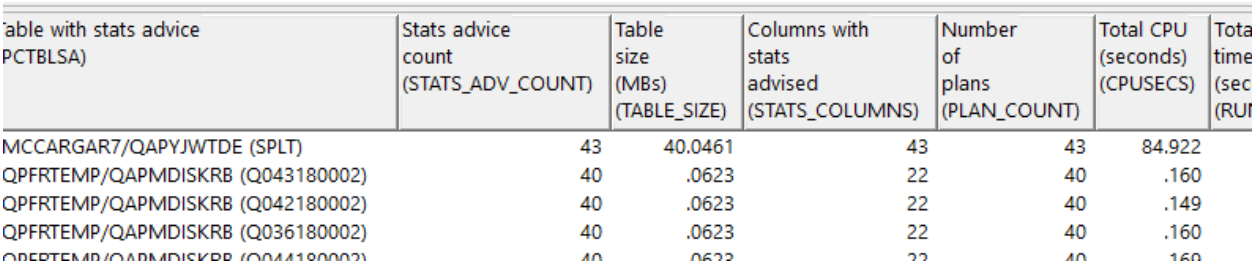


Table with index advice (PCTBLIA)	Index advice count (IDX_ADV_COUNT)	Table size (MBs) (TABLE_SIZE)	Number of plans (PLAN_COUNT)	Total CPU (seconds) (CPUSECS)	Total run time (seconds) (RUNTIME)	Total runs (TOTALRUNS)	Worst run time (seconds) (WORSTTIME2)	T I/ (T
QDWDATA/QAPYDWHDWR (Q008172331)	177	.0301	175	.175	.175	214	.017749	
QDWDATA/QAIDRDWTSUM_Q008172331	177	3.7981	175	.175	.175	214	.017749	
QDWDATA/QAIDRDWINTI_Q008172331	175	.0260	175	.175	.175	214	.017749	
QPFRTEMP/QAPMJOBMI (Q051180002)	102	15.6157	35	.516	.931	386	.315399	
QPFRTEMP/QAPMDISK (Q046180002)	99	.1005	25	.064	.122	528	.015875	
QPFRTEMP/QAPMJOBMI (Q048180002)	93	16.7648	32	.457	.837	386	.243076	
QPFRTEMP/QAPMJOBMI (Q050180002)	90	16.0844	31	.476	.856	385	.245023	
QPFRTEMP/QAPMDISK (Q042180002)	87	.1005	22	.072	.143	525	.012001	

Index advice by table

5.12.10 Stats advice by table

This report summarizes the statistics in the snapshot for tables with stats advice.

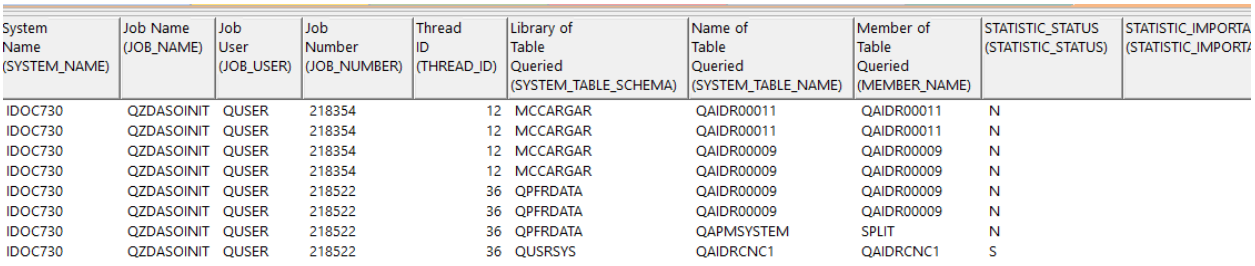


able with stats advice PCTBLSA)	Stats advice count (STATS_ADV_COUNT)	Table size (MBs) (TABLE_SIZE)	Columns with stats advised (STATS_COLUMNS)	Number of plans (PLAN_COUNT)	Total CPU (seconds) (CPUSECS)	Tota time (sec (RUI
MCCARGAR7/QAPYJWTDE (SPLT)	43	40.0461	43	43	84.922	
QPFRTEMP/QAPMDISKRB (Q043180002)	40	.0623	22	40	.160	
QPFRTEMP/QAPMDISKRB (Q042180002)	40	.0623	22	40	.149	
QPFRTEMP/QAPMDISKRB (Q036180002)	40	.0623	22	40	.160	
QPFRTEMP/QAPMDISKRB (Q044180002)	40	.0623	22	40	.160	

Stats advice by table

5.12.11 Stats advice details

This report provides more details about tables with stats advice.

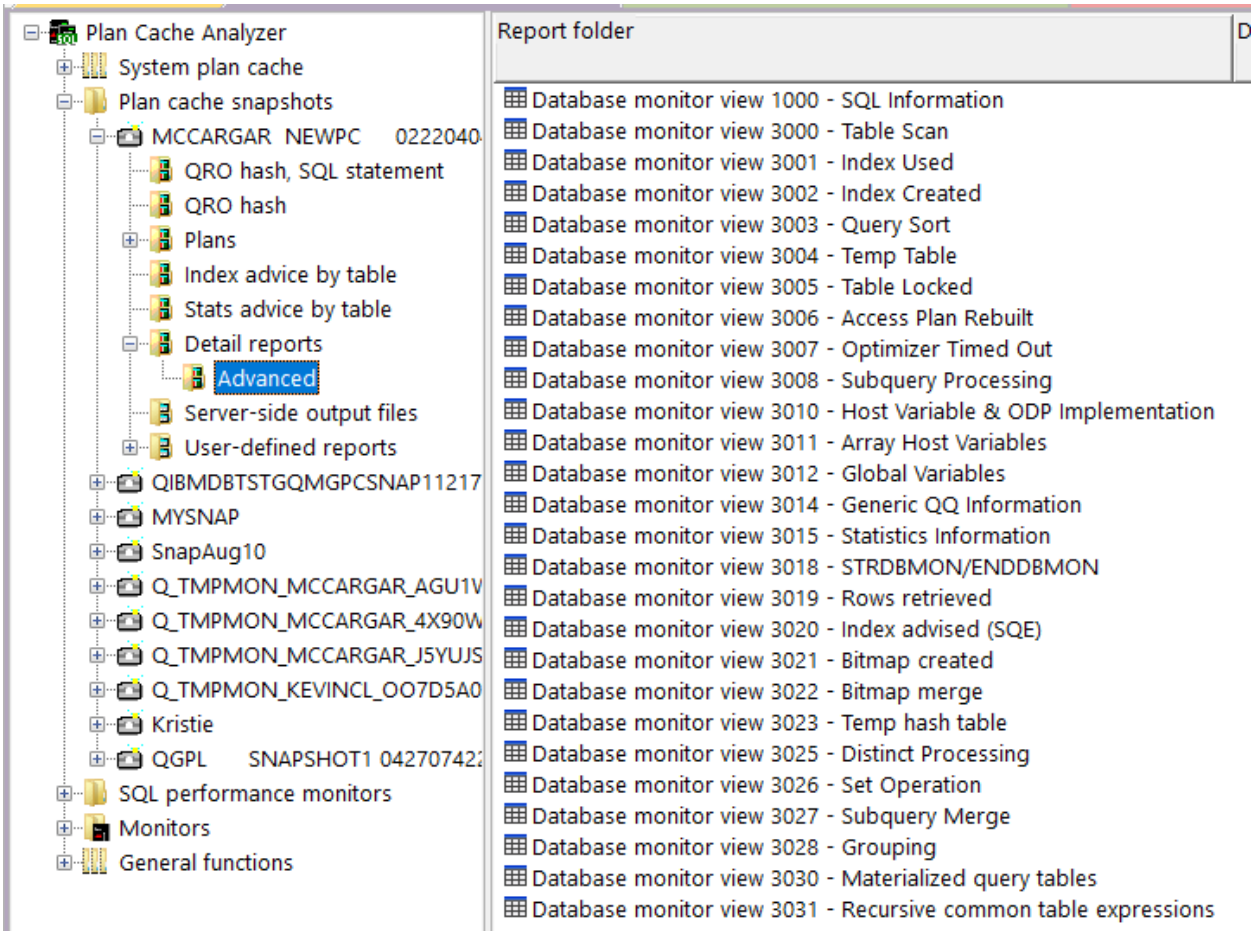


System Name (SYSTEM_NAME)	Job Name (JOB_NAME)	Job User (JOB_USER)	Job Number (JOB_NUMBER)	Thread ID (THREAD_ID)	Library of Table Queried (SYSTEM_TABLE_SCHEMA)	Name of Table Queried (SYSTEM_TABLE_NAME)	Member of Table Queried (MEMBER_NAME)	STATISTIC_STATUS (STATISTIC_STATUS)	STATISTIC_IMPORTA (STATISTIC_IMPORT
IDOC730	QZDASOINIT	QUSER	218354	12	MCCARGAR	QAIDR00011	QAIDR00011	N	
IDOC730	QZDASOINIT	QUSER	218354	12	MCCARGAR	QAIDR00011	QAIDR00011	N	
IDOC730	QZDASOINIT	QUSER	218354	12	MCCARGAR	QAIDR00009	QAIDR00009	N	
IDOC730	QZDASOINIT	QUSER	218354	12	MCCARGAR	QAIDR00009	QAIDR00009	N	
IDOC730	QZDASOINIT	QUSER	218522	36	QPFRDATA	QAIDR00009	QAIDR00009	N	
IDOC730	QZDASOINIT	QUSER	218522	36	QPFRDATA	QAIDR00009	QAIDR00009	N	
IDOC730	QZDASOINIT	QUSER	218522	36	QPFRDATA	QAPMSYSTEM	SPLIT	N	
IDOC730	QZDASOINIT	QUSER	218522	36	QUSRSYS	QAIDRCNC1	QAIDRCNC1	S	

Stats advice by table

5.12.12 Advanced

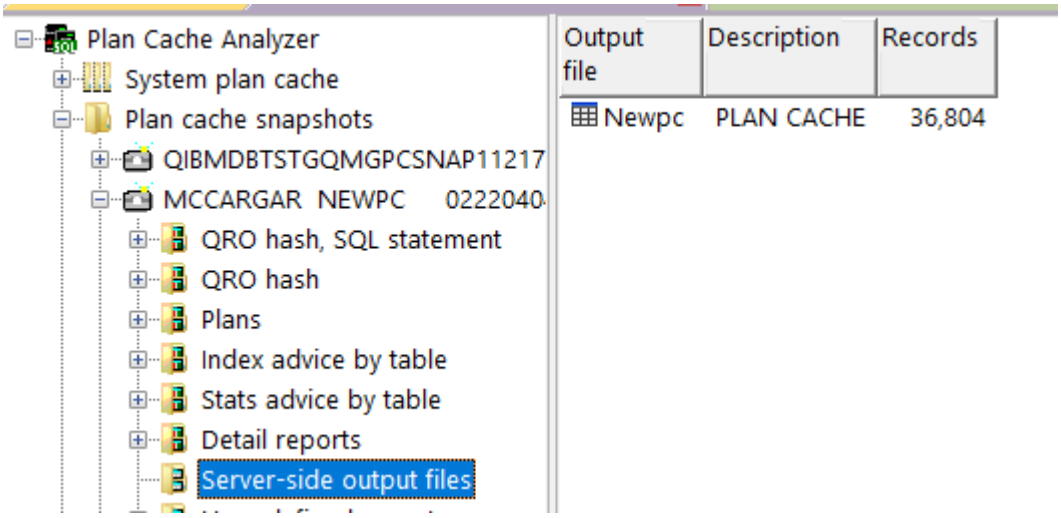
The advanced subfolder provides many database monitor views over the snapshot data. These are copy/pasted SQL statements from the IBM i documentation and applied to the current snapshot.



Detail reports -> Advanced

5.13 Server-side output files

This folder contains access to the raw data behind the plan cache snapshot in table form.



Server-side output files folder

Idoc730/MCCARGAR... Idoc730/MCCARGAR... Idoc730/MCCARGAR... Idoc730/MCCARGAR... Idoc730/MCCARGAR... Idoc730/MCCARGAR... Idoc730/MCCARGAR... Idoc730/MCCARGAR... Idoc730

Record ID (QQRID)	Created Time (QQTIME)	Join Column (QQJFLD)		Relational Database Name (QQRDBN)	System Name (QQSYS)	Job name (QQJOB)	Job user (QQUSER)	Job number (QQJNUM)	Unique identifier (QQUCNT)	User Defined Column (QQUDEF)	Statement Number (QQSTN)
3018	2022-02-22-04.04.16.924678	IDOC730 QZDASOINITQUSER	221119	*LOCAL	IDOC730	QZDASOINIT	QUSER	221119	0		
3010	2022-01-18-12.05.30.494933	IDOC730 QZDASOINITQUSER	2169...	F007B660	IDOC730	QZDASOINIT	QUSER	216934	69,068		
1000	2022-01-18-12.05.30.494933	IDOC730 QZDASOINITQUSER	2169...	F007B660	IDOC730	QZDASOINIT	QUSER	216934	69,068		69,068
5005	2022-01-18-12.05.30.494933	IDOC730 QZDASOINITQUSER	2169...	F007B660	IDOC730	QZDASOINIT	QUSER	216934	69,068		
3006	2022-01-18-12.05.30.494933	IDOC730 QZDASOINITQUSER	2169...	F007B660	IDOC730	QZDASOINIT	QUSER	216934	69,068		
3000	2022-01-18-12.05.30.494933	IDOC730 QZDASOINITQUSER	2169...	F007B660	IDOC730	QZDASOINIT	QUSER	216934	69,068		
3003	2022-01-18-12.05.30.494933	IDOC730 QZDASOINITQUSER	2169...	F007B660	IDOC730	QZDASOINIT	QUSER	216934	69,068		
3004	2022-01-18-12.05.30.494933	IDOC730 QZDASOINITQUSER	2169...	F007B660	IDOC730	QZDASOINIT	QUSER	216934	69,068		
3014	2022-01-18-12.05.30.494933	IDOC730 QZDASOINITQUSER	2169...	F007B660	IDOC730	QZDASOINIT	QUSER	216934	69,068		
5002	2022-01-18-12.05.30.494933	IDOC730 QZDASOINITQUSER	2169...	F007B660	IDOC730	QZDASOINIT	QUSER	216934	69,068		
3019	2022-01-18-12.05.30.494933	IDOC730 QZDASOINITQUSER	2169...	F007B660	IDOC730	QZDASOINIT	QUSER	216934	69,068		
3010	2022-01-18-12.16.05.452062	IDOC730 QZDASOINITQUSER	2169...	F007B660	IDOC730	QZDASOINIT	QUSER	216976	69,081		

Plan cache snapshot table

6 Library QPLANCACHE

Library **QPLANCACHE** contains several now obsolete programs and commands which likely will be removed from a future version of iDoctor.

This library originally included commands and programs related to Plan Cache dumps which are no longer used and have been replaced with Plan Cache snapshots.

7 OS Support for the SQL Plan Cache

Stored procedures are available to create SQL Plan Cache Snapshots or work with the output. Some of these are used under the covers by Plan Cache Analyzer.

For more information on using these yourself, visit the section called Accessing the SQL plan cache with SQL stored procedures in the IBM i Documentation.