IBM iDoctor for IBM i Disk Watcher

IBM iDoctor for IBM i Development Team

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Abstract

Provides in-depth coverage of all major GUI functions for all components at 7.1, 7.2, 7.3 and 7.4. This document covers the Disk Watcher component.

Changes

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1 Overview

Disk Watcher provides the user with the ability to collect either a statistical summary of disk performance data or a trace of all disk I/O events that occur on a system. The trace mode is recommended as it provides more options for analyzing the data and determining potential disk problems.

The Disk Watcher GUI provides many graphs with drill downs for each mode of collection (statistical or trace). Using Disk Watcher, the user can take a trace and summarize the trace data into an interval size desired for the purpose of easily graphing the statistics at either or broad or detailed levels.

Data is collected in Disk Watcher using commands that are included with IBM i which are:

- ADDDWDFN Adds a Disk Watcher definition to the system
- STRDW Starts a Disk Watcher collection
- ENDDW Ends an active Disk Watcher collection

2 Starting Disk Watcher

Disk Watcher is a component of the iDoctor suite of tools. After launching iDoctor, the Disk Watcher 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 Disk Watcher component or select Disk Watcher and click the Launch button to continue

Use this access	interface to work with the IBM iDoctor for IBM codes to your system that were given to you	/l i components I by IBM servic	on your e to autho	system. You orize use to a	may also apply component.			
	Connected to system Idoc720 with user MC	CARGAR				С	hange U	Jser
~	Component list for system Idoc720:							
6	Component	Build Date	Expires	Status				^
	👪 Job Watcher	01/27/22	Never	Available				
	Collection Services Investigator	01/27/22	Never	Available				
	📾 Disk Watcher	01/27/22	Never	Available				
	🐻 Plan Cache Analyzer	01/27/22	Never	Available				
	Temp Storage Analyzer	01/27/22	Never	Available				
	nter PEX-Analyzer	01/27/22	Never	Available				
	😫 iDoctor FTP GUI	01/27/22		Available				
	Data Explorer	01/27/22		Available				
	Check for new server builds				Close window after clicking Launch		Launch	n
	To authorize use for a component, enter the	e access code	below:	System se	erial: 066445R Refresh			
	Access code:	Appl	у	Processo	P20		Close	

iDoctor Components Window

3 Disk Watcher Component View

The Disk Watcher folder contains a list of folders, each providing different features available. Collections can be displayed in various ways, either under the <u>Libraries</u> folder on a per library basis, or under the Monitors folders to show Disk Watcher collections under a monitor.

This also provides options for working with the Disk Watcher <u>Definitions</u> that exist on the system. These are used for defining the aspects for what data is collected. Several IBM-supplied definitions exist, or the user can make their own.

IBM i Connections Idoc	720: Disk Watcher - #1 🛛 🗙	
⊕	Folder Name	Description
	Libraries Definitions SQL tables Monitors General functions	Libraries containing Disk Watcher collections (filterable) Work with definitions used for creating collections Work with the SQL-based tables generated by iDoctor analysis processes (library filterable) Work with iDoctor monitors Work with Power performance data (non IBM i), jobs, disks, SQL functions and more.

Disk Watcher Component View

3.1 Root Folder Menu Options

The following Disk Watcher specific menu options are available by right clicking on the 'Disk Watcher' folder:



Disk Watcher Popup-Menu

Menu	Description
Find Collections	This option displays the Find Collections interface which provides the ability to look for collections matching user-defined characteristics. Example SQL statements are provided.
	The results of these queries are available under the General Functions -> Find collections results folder.
Filter Libraries	This option allows you to filter the libraries shown in the <u>Libraries</u> and <u>SQL Tables</u> folders 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 collections (and/or SQL tables).
Add Definition	This option displays the Add Disk Watcher Definition Wizard. The definition defines characteristics about the collection such as which data options to collect.
	Note: A definition is required when starting a collection.
Start Collection	This menu will open the Start Disk Watcher Wizard where the user can define and run a collection.
Start Monitor	This menu will open the <u>Start Monitor Wizard</u> for iDoctor where the user can start a Job Watcher, PEX Analyzer or Disk Watcher monitor. Monitors are designed to provide 24x7 collection of performance data.
Copy QSYS QAPYDW* files to	This option can be used to copy all QAPYDW* files from QSYS to the desired library.
library	This is an optional step that prepares a library for collecting performance data. It also allows the library to appear under the <u>Libraries</u> folder in Disk Watcher.
	Prepare library for performance data
	This will run CRTDUPOBJ on all QSYS QAPYDW* files into the desired library. Note: ANY EXISTING PERFORMANCE DATA IN THIS LIBRARY WILL BE DELETED!
	Mccargardw OK Cancel
	Prepare library for performance data window
	Note: The reason this exists, is in some situations where previous release DB files are used to collect performance data on the current release, then various problems will occur.
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.
<u>Set User-Defined</u> <u>Reports Database</u>	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)
Work with iDoctor scheduled jobs	This option is a shortcut to the General functions -> Work management -> Scheduled jobs folder. It shows all the iDoctor created scheduled jobs that exist on the current IBM i system.

Collections	The iDoctor collection database identifies all collections on the system and can be
database	used to facilitate the drill down from one component to another in some situations.
	It also is used to improve performance when browsing collections on the system.
Properties	Use this menu to display version information for the current component. The build
	level of the GUI is also displayed here.

4 Definitions

A Definitions folder is provided in Disk Watcher to allow the user to work with the Disk Watcher definitions that exist on the current system. An example of this interface is:

IBM i Connections Idoc	720: Disk Watcher - #1	X	
🖃 🌰 Disk Watcher	Definition	Description	Command
🕀 🛄 Libraries	MIN 🗎		ADDDWDFN DFN(MIN) TEXT(") COLITV(10) ASP(*ALL) DSKUNIT(*ALL) POOLID(*ALL) TYPE(*T
📩 Definitions	MYDWFULL	test for workshop	ADDDWDFN DFN(MYDWFULL) TEXT('test for workshop') COLITV(*DYN) ASP(*ALL) DSKUNITI
🗄 📙 SQL tables	📓 QFULL	All ASPs/disks/pools, dynamic intervals	ADDDWDFN DFN(QFULL) TEXT('All ASPs/disks/pools, dynamic intervals') COLITV(*DYN) ASP
- Monitors	🔄 🕅 QFULLO	All ASPs/disks/pools, dynamic intervals, All obj	ADDDWDFN DFN(QFULLO) TEXT('All ASPs/disks/pools, dynamic intervals, All obj') COLITV(*I
General functions	🗎 QFULL1MIN	All ASPs/disks/pools, 1 minute intervals	ADDDWDFN DFN(QFULL1MIN) TEXT('All ASPs/disks/pools, 1 minute intervals') COLITV(60) A
	🗎 🗎 QFULL1MINO	All ASPs/disks/pools, 1 minute intervals, All obj	ADDDWDFN DFN(QFULL1MINO) TEXT('All ASPs/disks/pools, 1 minute intervals, All obj') CO
	🗎 QSTATS	All ASPs/disks/pools, dynamic intervals	ADDDWDFN DFN(QSTATS) TEXT('All ASPs/disks/pools, dynamic intervals') COLITV(*DYN) AS
	🗟 QSTATS1MIN	All ASPs/disks/pools, 1 minute intervals	ADDDWDFN DFN(QSTATS1MIN) TEXT('All ASPs/disks/pools, 1 minute intervals') COLITV(60)
	🗎 QTRC	All ASPs/disks/pools, dynamic intervals	ADDDWDFN DFN(QTRC) TEXT('All ASPs/disks/pools, dynamic intervals') COLITV(*DYN) ASP(
	🗟 QTRCO	All ASPs/disks/pools, dynamic intervals, All obj	ADDDWDFN DFN(QTRCO) TEXT('All ASPs/disks/pools, dynamic intervals, All obj') COLITV(*D
	🗎 QTRC1MIN	All ASPs/disks/pools, 1 minute intervals	ADDDWDFN DFN(QTRC1MIN) TEXT('All ASPs/disks/pools, 1 minute intervals') COLITV(60) A:
	🗎 QTRC1MINO	All ASPs/disks/pools, 1 minute intervals, All obj	ADDDWDFN DFN(QTRC1MINO) TEXT('All ASPs/disks/pools, 1 minute intervals, All obj') COL
	B STATS		ADDDWDFN DFN(STATS)
	🗟 TESTME		ADDDWDFN DFN(TESTME)

Definitions Folder

Note: Right-clicking the Definitions folder provides an option to rebuild the IBM-supplied definitions which is sometimes needed if none of the Q* definition names appear.

The following options are available when right clicking on one or more definitions in the list:

Field	Description
Change Definition	Opens the Add Disk Watcher Definition Wizard and loads the selected definition into it so it can be changed.
	Note: This is only applicable to definitions that aren't named Q*.
Add Definition	Opens the Add Disk Watcher Definition Wizard in order to create a new definition.
Start Collection	Opens the Start Disk Watcher Collection Wizard using the selected definition.
Start New Monitor	Opens the Start iDoctor Monitor Wizard using the selected definition.
Delete	Removes the selected definitions from the system.
Properties	Displays the properties for the selected Disk Watcher definition.

4.1 Add Disk Watcher Definition Wizard

Use this interface to create or change a user-defined Disk Watcher definition. This option is accessible by right clicking the Disk Watcher root folder and using the Add Definition... menu.

It can also be accessed using the Add Definition menu for a definition.

Add Disk Watcher Definition Wizard - Welcome



Add Disk Watcher Definition Wizard - Welcome

4.1.1 Basic Options

This interface allows the user to provide general information about the definition.

Add Disk Watcher Definition W	izard - Basic Options	×
	Specify the definition name and other optional parameters below. Using a dynamic collection interval is recommended for most users. Definition name: Description: Collection type Statistical - Disk statistics will be summarized into counts and times. Trace - Very detailed I/O information will be captured. Full - Both statistical and trace data are captured. Collection interval Opynamic Adjusted so the maximum data is captured each interval. Fixed Show advanced options 	
	< Back Next > Cance	el

Add Disk Watcher Definition Wizard - Basic Options

The following table describes some of the less obvious options on this screen:

Option	Description		
Definition name	The definition name will be added as a new member name in file QAPYDWDFN in QUSRSYS. This cannot start with Q when using this interface.		
Collection type	Statistical, Trace or Full (Both)		
Collection interval	Dynamic or Fixed. For easier graphing it is often wise to use Fixed at an interval duration like 1 second or 5 second intervals.		
	Dynamic can also be used, but in some cases may require use of variable-width bar mode to better understand the data.		

4.1.2 Advanced Options

These settings are rarely needed and only visible if the "Show advanced options" checkbox on the previous window is checked.

×

Add Disk Watcher Definition Wizard - Advanced Options

 At end of collection At end of interval - Necessary for re 	al-time analysis.
Collection file disk pool threshold	
Override (1 - 99)	percent
System disk pool threshold	
System Override (1 - 99)	percent

Add Disk Watcher Definition Wizard – Advanced Options

4.1.3 Disk Selection Options

This panel allows the definition to specify from which disk pools (ASPs), disk units or memory pools associated with disk I/Os should data be captured.

	Disk operations are captured by pool associated with them.	specifying the disk pool, units or memory	
	Disk pools		
	All		
	O System disk pool	Device description:	
	O Independent disk pool	Browse	
	◯ Selected	Browse None	
	Disk units		
	 All - Includes all units from 	m the selected pools above.	
	◯ Selected	Browse None	
	Memory pools		
	 All 		
	◯ Selected	Browse (1 - 64)	

Add Disk Watcher Definition Wizard – Disk Selection Options

4.1.4 Summary

The final screen of this interface will list all selections made and provide the remote command string that will be used to create the definition after pressing the Finish button.

Add Disk Watcher Definition Wizard - Summary

 \times

Definition creation settings You have selected to start a collection with the following options: Definition name: TEST2 Description: Collection type: Statistical Collection interval: 1 seconds Disk pools: System disk pool Disk units: All Memory pools: All Data availability: At end of collection Collection file disk pool threshold: System System disk pool threshold: System Remote Command String: QSYS/ADDDWDFN DFN(TEST2) TEXT(") TYPE("STATS) COLITV(1) ASP("SYS) DSKUNIT("ALL) POOLID("ALL) FRCRCD("CALC) TOASPTHLD("SYSTEM) SYSASPTHLD("SYSTEM)	~
< Back Finish	Cancel

Add Disk Watcher Definition Wizard - Summary

4.2 Properties

Double-clicking on a definition or using the Properties menu from the Disk Watcher Definitions View displays all the parameters that were used when creating the definition. An example of this interface is:

Disk Watcher Definition 'DSK1' Properties - Idoc540	x
Definition details:	
Definition name: DSK1 Description: Collection type: Statistical Collection interval: Dynamic Disk pools: All Disk units: 1 Memory pools: All Data availability: At end of collection Collection file disk pool threshold: 90 System disk pool threshold: 90	*
	+ F
Command string: Note: changes to the definition's command string are a QSYS/ADDDWDFN DFN(DSK1) TEXT(") TYPE(*STATS) COLITV(*DYN) ASP(*ALL) DSKUNIT(1) POOLID(*ALL) FRCRCD(*CALC) TOASPTHLD(90) SYSASPTHLD(90)	allowed.
0K <u>C</u> an	cel

Disk Watcher Definition Properties

Advanced users can change the command string that defines the definition if desired. If changes have been made to the command string, pressing the OK button will remove the existing definition from the system and replace it using the command string specified.

Note: IBM-supplied definitions cannot be changed.

5 Start Disk Watcher Wizard

Disk Watcher provides the capability to collect detailed information about all disk IOs occurring on the system.

This section covers the creation of a collection using the Start Disk Watcher Wizard. The Wizard is accessible via the Start Collection menu on the Disk Watcher or library folder icons. This Wizard guides the user step by step through the process of creating a collection. Each page is covered in detailed within the next sections.

Tip: If Disk Watcher data already exists in the library it must match the currently installed OS release of IBM i or you will be unable to collect more data in that library. You cannot combine data of different releases in the same library.

5.1 Welcome

The Welcome page in the Start Disk Watcher Wizard introduces the user to the wizard and offers information about what it will do.

Tip: Starting a collection requires a definition. Use the Add Disk Watcher Definition Wizard first if you do not wish to use the IBM-supplied definitions.

5.2 Definition Selection

This screen allows the user to specify the type of definition to use (IBM or user-defined) and select the definition name.

Start Disk Watcher Wizard - Defi	nition Selection			×
	Indicate below the defines all the para Definition type: O IBM-supplie Available definitions	definition to use when meters to use when da ed	starting the collection. The ata collection occurs. d	definition
	DefinitionDMINMYDWFULLSTATS*TESTTESTME*TEST2TEST3TEST4	Description test for workshop 'BLANK 'BLANK		
			< Back Next >	Cancel

Start Disk Watcher Wizard – Definition Selection

5.3 Basic Options

The Basic Options Page allows the user to specify the collection name, library, collection interval as well as scheduling options. The following is an example of this interface:

Start Disk Watcher Wizard - Basic Options	\times
Specify the library and collection name for the data to be created. The collection name will be used to generate a matching member name in the Disk Watcher files in the library specified. Collection name: Ibrary n	
< Back Next > Canc	el

Start Disk Watcher Wizard – Basic Options

5.4 Scheduling Options

This page allows the user to determine a specific date and time for the collection to begin collecting data. By clicking the checkbox, the user can optionally include a date/time to schedule the collection. This option will create a scheduled job on the system.

Use the iDoctor Scheduled Jobs window to check the status of scheduled iDoctor jobs on the system. Access that window by right clicking the Disk Watcher icon in the Disk Watcher component view.

Tip: To configure the default scheduled time (number of days and hours in advance) preference, see the <u>Preferences -> Scheduling</u> interface.

An example of this page of the Wizard is:

🗿 Schedule collection start time				×					
Use this interface to schedul	e an	action fo	or a la	tert	ime.				
Schedule the collection s	tart tii	me							
Note: Date and time value clock.	es ar	e based	l on th	e se	erver'	s clock	, not	your PC's	
Frequency:		Once						\sim	
Scheduled date:									
4		Decem	nber 20)18		×			
Sun 25 2 9 16 23 30	Mor 26 3 10 17 24 31	n Tue V 27 4 11 18 25 1 	Ved T 28 5 12 19 26 2 oday: 1	hu 29 6 13 20 27 3 2/3/	Fri 30 7 14 21 28 4 2018	Sat 1 15 22 29 5			
Current (system) time:	2:2	24:13 PN	1	* *	doc7	20			
Scheduled collection start time	2:1	5:06 PM	1	•			_		
						ок		Cance	I

Start Disk Watcher Wizard – Schedule Collection Start Time

5.5 Termination

The Termination Page allows the user to specify what conditions should cause the collection to end. Whichever option is satisfied first, will cause the collection to end immediately.

Start Disk Watcher Wizard - Termination				<
	Indicate below how the collection shou three of these options may be specified the specified criteria has been met. Options (select one or more) Maximum disk space to consum Maximum intervals to collect	Ild end. At least one and The collection will end 100	up to all when one of MB seconds	
				_
		< Back Next >	Cancel	

Start Disk Watcher Wizard – Termination

5.6 Summary

This page provides complete details about all selections made in the wizard. If anything listed doesn't look right, use the Back button to go back and make any changes necessary. After clicking 'Finish' a STRDW command will be issued to start the collection. This command is listed at the bottom this page and can be copied to a green screen session and modified if necessary.

After the collection is started will take several seconds before anything appears in the GUI while the collection is initialized. Use F5 to refresh the list of collection in the collection library to work with the new collection.

Start Disk Watcher Wizard - Sum	imary	×
	Click Finish to submit your request to start the Disk Watcher collection. Collection creation settings You have selected to start a collection with the following options: Definition name: QTRC Collection name: Automatically generate Library name: QDWDATA Description: All ASPs/disks/pools, dynamic intervals Collection interval: Dynamic Hardware resource file: Collect Termination options: Maximum intervals: 100 Remote Command String: QSYS/SBMJOB CMD(QSYS/STRDW DFN(QTRC) COL("GEN) LIB (QDWDATA) TEXT(All ASPs/disks/pools, dynamic intervals) RPLDTA ("YES) COLITV("DYN) HDWF("YES) ENDCCOL("NBRITV 100))) JOB (QPYDWCOL) JOBD(QIDRGUI/QIDRBCH) JOBQ(QGPL/QIDRJW) RTGDTA("JOBD) CNTRYID(US) CCSID(37) USER("CURRENT) ALWMLTTHD("JOBD) SPLFACN("CURRENT)	ns ^
	< Back Finish Ca	ancel

Start Disk Watcher Wizard – Finish

The following section lists the parameters available on this interface:

Option	Description				
Submit job options	This button allows you to change parameters on the SMBJOB command. For more information see the help text for the SBMJOB command on the IBM i.				
	Submit job (SBMJOB) options				
	This panel allows you to set commands created by this i	optional parameters for the SBMJOB nterface.	ОК		
	User:	*CURRENT ~	Cancel		
	Job description:	QIDRBCH			
	Library:	QIDRGUI			
	Job queue:	QIDRJW			
	Library:	QGPL			
	System library list:	*CURRENT ~			
	Current library:	*CURRENT ~			
	Initial library list	*CURRENT ~			
	Allow multiple threads:	*JOBD ~			
	Spooled file action:	*CURRENT ~			

6 Libraries Folder

This folder contains the libraries on the system that contain Disk Watcher data. Specifically, these are the libraries containing file QAPYDWRUNI. The list displays each library's name and description. By expanding a library in the tree, you will see the collections that exist within it.

IBM i Connections Idoci	720: Disk Watcher - #	1 🛛		
🖃 🌀 Disk Watcher	Library	Description	ASP	Owner
E Libraries	Name			
🗄 🖳 Dfldw1	Dfldw1		0	DFL
🐵 🐌 Mccargardw	Mccargardw		0	MCCARGAR
🕀 🕒 Mccargar3	Mccargar3		0	MCCARGAR
🗉 🔚 Mccdwtest	Mccdwtest	DW Education slides - DO NOT DELETE	0	MCCARGAR
	Mcc710		0	MCCARGAR
🗉 <u>]</u> Qdwdata	u Qdwdata		0	MCCARGAR
🗄 📑 SQL tables				
🗄 📑 Monitors				
General functions				

Libraries in the Disk Watcher Component View

For more information on this, visit the <u>Main Window PDF</u> documentation on the Libraries Folder and Library Folders.

6.1 Menu Options

The following menu options are available by right clicking on a library in the component view.

Menu Item	Description
Start Collection	This menu will open the Start Disk Watcher Wizard where the user can define and
	run a collection.

Additional menu options that are common to all library folders in iDoctor are discussed <u>Main Window PDF</u> documentation.

7 Monitors

Disk Watcher monitors allow for 24x7 collection of Disk Watcher data on a system. They run continuously storing only the most recent collections desired. Disk Watcher monitors will run until ended manually by the user. Monitors can be held and released if the user wishes to stop collecting data for now and then continue collection again later. Monitors can also be scheduled to start and end at the desired times.

Once a monitor has been started and ended, it must be restarted using the Restart Monitor option. You cannot use the Start New Monitor option to restart an existing monitor.

A Monitors folder is provided in Disk Watcher to allow the user to work with the monitors that exist on the current system. For more information about monitors, see the section on Monitors in the <u>Main Window</u> <u>PDF</u> documentation.

8 SQL Tables

This folder contains all the SQL tables that exist on the system generated by Disk Watcher analyses.

The folder exists in 3 places and each will filter the contents appropriately based on where it is located:

Location	Description
Under Disk Watcher	Entire system
Under a library	All collections in the library
Under a collection	Only this collection

For more information see the SQL Tables section in the <u>Main Window PDF</u> documentation.

9 Collections

Moving down the tree within each Library folder are one or more collections that have been created or are currently being created.

:Watcher - #1 🛛 🗙								
Collection	Using Collection	Status	Description	Ending	Туре	Partition	Last interval	Collection
	Summary			reason		collected	collected	size
						on VRM		(MB)
🖥 SQL tables								
📙 Q039111537	No	Ready		Interval limit	Statistical	7.2	100	.35
🔓 Q039111242	No	Ready		Interval limit	Statistical	7.2	10	.05
🔁 Q039110743	No	Ready		Interval limit	Full	7.2	100	1.28
🖻 Q039110448	No	ERROR - CRITICAL FILES MISSING: STAT		Interval limit	Statistical	7.2	100	.01
Q039110104	No	Ready		Ended by user	Statistical	7.2	8	.07
🕞 Q300162527	Yes	Ready	test for workshop	Ended by user	Full	7.2	6	.56
	Watcher - #1 3 ollection Q039111537 Q039111537 Q039110743 Q039110743 Q039110743 Q039110144 Q039110144 Q039110144	Watcher - #1 Image: Constraint of the system SQL tables Summary Q039111537 No Q039111242 No Q039110743 No Q039110743 No Q039110743 No Q039110743 No Q039110743 No Q039110745 Yes	Watcher - #1 Image: Status Ollection Using Collection Status SQL tables Summary Ready Q039111537 No Ready Q039111242 No Ready Q039110743 No Ready Q039110448 No ERROR - CRITICAL FILES MISSING: STAT Q0300162527 Yes Ready	Watcher - #1 Image: Status Description Sing Collection Status Description SQL tables - - Q039111537 No Ready Q039111242 No Ready Q039110743 No Ready Q039110448 No ERROR - CRITICAL FILES MISSING: STAT Q039110104 No Ready Q0300162527 Yes Ready	Watcher - #1 Image: Status summary Description Ending reason SQL tables	Watcher #1 Image: Status service of the service of	Watcher + #1 Image: Status summary Status summary Description Ending reason Type collected on VRM SQL tables - <	Watcher + #1 S Ollection Using Collection Summary Status Description Ending reason Type Partition collected on VRM Collected on VRM SQL tables Interval limit Statistical 7.2 100 Q039111242 No Ready Interval limit Statistical 7.2 100 Q039110743 No Ready Interval limit Statistical 7.2 100 Q039110448 No ERROR - CRITICAL FILES MISSING: STAT Interval limit Statistical 7.2 100 Q039110104 No Ready Ended by user Statistical 7.2 100 Q0391102527 Yes Ready Ended by user Full 7.2 8

Disk Watcher Collections in a Library

Some of the less obvious columns shown in a list of collections are described below:

Column	Description
Using Collection Summary	This column indicates if the Collection Summary analysis has been ran. This is required to produce trace-based graphs in Disk Watcher. It is only applicable to
	collections that contain Trace data (either Full or Trace.)
Status	This indicates what files are missing in most components. It is normal for some files to be missing in all components. Only if the status indicates: "ERROR – CRITICAL FILES MISSING", then will the collection be unusable.
	Place your mouse pointer over this column to get more information about the missing files and which reports they apply to.
	Note: Use the Refresh Status menu option on the collection to update the status if it is incorrect.
Ending reason	This field indicates what caused the collection to end. There are several possible reasons a collection may end as described below:
	Size limit – The collection exceeded the maximum disk space allowed as described in the definition.
	Interval limit – The collection stopped when the maximum intervals to collect was met.
	Time limit – The collection stopped when the maximum time limit to collect was met.
	ASP limit – The system ASP limit as defined in SLIC service tools has been exceeded causing the collection to end
	Ended by user – Disk Watcher detected that the user ended the collection manually.
Туре	The type of collection created. The valid types are:
	Full – includes both Trace and Statistical data
	Statistical – does not include information about all I/Os, only higher-level summary data.
	Trace – includes information about each I/O that occurred and optionally the
	causing program, object or memory pool.

9.1 Menu Options

The table below outlines the different types of operations that may be performed by right clicking on a collection within Disk Watcher.

	Explore Refresh Status	
	Analyses	>
	Statistical	>
	Trace	>
	Record Quick View	
	Generate Reports	
	Change Description	
	Copy URL	
	Сору	
	Delete	
-	Rename	
_	Save	
1	Transfer to	>
s	Stop	
	Properties	

Collection popup-menu

Menu Item	Description
Explore	Show the contents of the collection.
Refresh Status	In some situations, the Status column may indicate files are missing incorrectly. This option is used to refresh the collections cache for the selected collection(s) to be sure that the files are truly missing.
	This also can be used in cases where report folders are missing.
Analyses -> Run Trace Summary	Use this option to kick off the required analysis for Trace-based collections.
Statistical	Provides several graphs over the statistical data generated by Disk Watcher
Trace	Provides several graphs over the trace data generated by Disk Watcher. Note: This option is only available if trace data has been collected and the collection has been summarized.
Record Quick View	Lists the information about the selected collection(s) vertically in a new window.
Generate Reports	This option can be used to build a report of the desired set of Disk Watcher 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.
Copy URL	Creates a link to the component, library and collection that can be accessed later, or sent to another user.
Сору	Copies one or more collections to another library. Selecting multiples is only available from the list side of the component view.
Delete	Deletes a collection. Select multiple collections in order to delete more than one at a time. Selecting multiples is only available from the list side of the component view.
Save	Saves the selected collections to a save file on the system. The save file will be added to the list under the Saved collections folder.
Transfer to	FTP one or more collections to another system. Selecting multiples is only available from the list side of the component view.
Stop	Stops an active collection.
Properties	Use this menu to display the property pages for the collection. The property pages provide quick access to additional summary information about the collection.

Most of these options are discussed in more detail in the Main Window PDF documentation.

9.2 Stop

An active collection can be stopped by using the Stop menu found by right clicking on a collection within the Disk Watcher component view. This action will issue the ENDDW command which by default will take 30 seconds to end the collection.

9.3 Properties

This section covers the property pages for a collection. Access the property pages by right clicking on a collection and choosing the Properties menu.

9.3.1 General

The General property page provides basic information about the collection such as when it was created.

Disk Watcher Collection	Q0 X IBM i Connections	Idoc720: Disk Watcher - #1	
General Creation settings	System		
Collection: Library: Description:	Q039110743 Qdwdata		
Type: Status:	Full		
Job running collection: Summary:	Qpydwcol/Mccargar/185366		
Total time: Total initialization tim Start time: End time:	00-00.01.44.025000 e 00-00.00.0000000 2022-02-08-11.07.43.912000 2022-02-08-11.09.27.937000	Refresh	
Collection size: Starting interval: Ending interval: Total intervals: Analysis flags:	1.28 megabytes 1 100 100 11111111		
Сору	Copy URL	ОК	Cancel

Collection Properties - General

The following information is displayed on the General property page:

Option	Field Description
Collection	Name of the collection. This matches the member name used in the QAPYDW* files on the server in the library specified.
Library	Library the collection resides in.
Description	Description of the collection.
Туре	The type of collection indicating the type(s) of data captured: Statistical, Trace or Full (which is both Statistical and Trace)
Status	The status of the collection. This could indicate if the job running the collection failed or that the collection is ready for analysis.
Job running collection	Displays the name of the job that created or is currently creating the collection. If the job log is available a button will be shown to display it.

Option	Field Description
Total time	Displays the total run time of the collection in timestamp format.
Total initialization	Displays the estimated initialization time for the collection in timestamp format. This
time	is an estimate of the amount of time it took between the collection being started and
	the 1st interval of data being collected
Start time	The time the collection was started.
End time	The time the collection ended (if it has ended).
Collection size	The total size of the collection. This number does not include any summary files
	generated.
Starting interval	The 1st interval number detected in the collection.
Ending interval	The last interval number detected in the collection.
Total intervals	The total number of intervals found in the collection.
Analysis flags	This is for IBM/debug use.

9.3.2 Creation Settings

The Creation settings property page provides details about the parameters that were used when creating the collection.

Disk Watcher Collection 'Q0 IBM i Connections Idoc720: Disk Watcher - #1	
General Creation settings System	
The collection was created using the following parameters:	
STRDW Command String:	^
QSYS/STRDW DFN(TEST3) COL("GEN) LIB(QDWDATA) TEXT(") RPLDTA("YES) COLITV(1) ENDCOL(("NBRITV 100)) HDWF("YES)	
ADDDWDFN Command String:	
QSYS/ADDDWDFN DFN(TEST3) TEXT(") COLITV(*DYN) ASP(*SYS) DSKUNIT(*ALL) POOLID (*ALL) TYPE(*ALL) OBJINF(*ALL) COLCOND(*NONE) COLRNG(*NONE) FRCRCD(*CALC) TOASPTHLD(*SYSTEM) SYSASPTHLD(*SYSTEM)	
Copy UKL OK C	ancel

Collection Properties – Creation Settings

The information shown on this window contains 2 command strings used to create this collection. 1 command string for STRDW and the other for ADDDWDFN.

9.3.3 System

The system property page displays details about the system the collection was created on. This information includes the type, model, operating system VRM and the number of processors.

Disk Watcher Collection 'Q0 🛛	IBM i Connections	Idoc720: Disk Watcher - #1
eneral Creation settings System		
System information at the time of coll	ection:	
Description	Value	
System name	IDOC720	
Operating system VRM	V7R2M0	
System serial number	06-6445R	
System type	8231	
System model	E2B	
Number of physical process	ors 16	
Number of virtual processo	rs 8	
Copy Copy I	JRL	OK Cance

Collection Properties – System

10 Analyses

The available Analyses in Disk Watcher and what they provide is described in this section.

All analyses are written as SQL stored procedures and are initiated from the Analyses menu after selecting one or more collections and right-clicking. Each analysis has a 'fast path' option that allows it to be ran without visiting the Analyze Collection window.

10.1 Analyze Collection Window

The Analyze Collection window presents the user with a list of available analyses that can be ran over the currently selected collection(s). It is opened using the Analyses -> Analyze Collection... menu.

Analyze Collection(s)							\times
This interface allows you to select which an Additional reports will be provided after per	alysis f forming	unctions should t g this option.	oe perforn	ned for the selected	collect	tion(s).	
Analyses available:				Clear	Tog	jgle Sele	cted
Description	Used by	Program	Run All Default				
Change sensitive user data		QIDRDWXRF1					
Restore sensitive user data		QIDRDWXRF2					
Trace summary		QIDRDWSUM1	1				
Submit this request to a batch job instead	d of usir	ng a QZDASOINI	T job.				
Always run analyses in a batch job				ОК		Cance	I

Disk Watcher Analyze Collection(s) Window

Each available analysis is presented to the user on this screen.

The controls on this interface and what they do is described in more detail in the <u>Job Watcher</u> <u>documentation</u>.

10.2 Change/Restore sensitive user data

These options are used to hide or replace potentially sensitive data in Disk Watcher. It will update the following things in the Disk Watcher files:

- 1) User programs names and library names
- 2) User module names
- 3) User program/module procedure names
- 4) System name and system serial number
- 5) User job names, current user profiles and wait object names.

Note: This data is changed but not lost, it can be restored again using the Restore sensitive user data analysis. This will update the Disk Watcher files changed back to their original values.

10.2.1 SQL Tables Generated

The list of SQL tables generated by the analysis is shown below:

Table description	SQL table
PGM cross reference file	DWXRFPGMR_ <mbr></mbr>
RUNI cross reference file	DWXRFRUNI_ <mbr></mbr>
JOB cross reference file	DWXRFJOB_ <mbr></mbr>
OBJ cross reference file	DWXRFOBJ_ <mbr></mbr>

10.3 Trace Summary

The Trace Summary analysis summarizes the disk IOs into 1 second intervals in order to make the graphing done in iDoctor more feasible.

Note: This analysis is required in order for the Trace menu and graphs to appear.

10.3.1 SQL Tables Generated

The list of SQL tables generated by the analysis are shown below:

Table description	SQL table
Trace 1 second intervals	QAIDRDWINTI_ <mbr></mbr>
Trace statistics	QAIDRDWTSUM_ <mbr></mbr>
Summarized by interval,	QAIDRDWTSUM2_ <mbr></mbr>
ASP	

11 Columns

This section covers the various columns that appear in Disk Watcher and a brief description of what they mean. These metrics appear in all types of reports available which are discussed in the later sections.

These are derived using SQL statements from the <u>QAPYDW* files that exist in the IBM i</u>.

Column	Description	Comments
RDRATE	Reads per second	Disk read operations per second
WRTRATE	Writes per second	Disk write operations per second
OTHRATE	Other I/Os per second	Disk operations other than reads + writes per second. These types of operations are documented in the TCIOFUNCTN column <u>here</u> and would include any operations except 16, 20, 32 and 36.
		Note: These are extremely rare to see in normal performance data and almost always never visible on graphs. For that reason, the rest of the "Other" metrics are not listed here.
RDAVGRSP	Average read response time (ms)	Read time divided by number of reads This includes deferred queue wait times.
RDAVGSRVRSP	Average read service time (ms)	Read time divided by number of reads This excludes deferred queue wait times.
WRTAVGRSP	Average write response time (ms)	Write time divided by number of writes This includes deferred queue wait times.
WRTAVGSRVRSP	Average write service time (ms)	Write time divided by number of writes This excludes deferred queue wait times.
AVGKBPERRD	Average read size (kilobytes)	This is the average size of each read operation.
AVGKBPERWRT	Average write size (kilobytes)	This is the average size of each write operation.
RMBPERSEC	Reads per second (megabytes)	In the QAPYDWSTAT file this is the 13 STRDPCnn (read page count) columns added together multiplied by 4.
WMBPERSEC	Writes per second (megabytes)	In the QAPYDWSTAT file this is the 13 STWRTPCnn (write page count) columns added together multiplied by 4.

RDTIME_nn	Reads total response time (seconds)	These columns show the total read time + total deferred queue read time added together for the average response time range indicated in the description.
WRTTIME_nn	Writes total response time (seconds)	These columns show the total write time + total deferred queue write time added together for the average response time range indicated in the description.
RDSRVTIME_nn	Reads service time (seconds)	These columns show the read time (excluding deferred time) for the average response time range indicated in the description.
WRTSRVTIME_nn	Writes service time (seconds)	These columns show the write time (excluding deferred time) for the average response time range indicated in the description.

TOTRD_nn	Reads (thousands)	This is total reads for the average response time range indicated in the description.
TOTWRT_nn	Writes (thousands)	This is total writes for the average response time range indicated in the description.
RDSRVTIME_nn	Reads service time (seconds)	These columns show the read time (excluding deferred time) for the average response time range indicated in the description.
WRTSRVTIME_nn	Writes service time (seconds)	These columns show the write time (excluding deferred time) for the average response time range indicated in the description.
RDRATE_nn	Reads per second	This is reads per second for the average response time range indicated in the description.
WRTRATE_nn	Writes per second	This is writes per second for the average response time range indicated in the description.

TOTREADMB	Total reads (megabytes)	This is the total size of all reads.
TOTWRTMB	Total writes (megabytes)	This is the total size of all writes.
RDSRVTIME_nn	Reads service time (seconds)	These columns show the read time (excluding deferred time) for the average response time range indicated in the description.
WRTSRVTIME_nn	Writes service time (seconds)	These columns show the write time (excluding deferred time) for the average response time range indicated in the description.
DQRATIO	DQ time ratio	This is deferred queue time / service time. This metric appears under the advanced graphs.
DQWRTRATIO	DQ write time ratio	This is deferred queue write times / service write times. This metric appears under the advanced graphs.
DQRDRATIO	DQ read time ratio	This is deferred queue read times / service times. This metric appears under the advanced graphs.

12 Situation – I/Os were missed

In any overview or selection over time graph you may possibly see a red background color. This indicates a time where I/Os were missed and not captured by the STRDW command.

This is likely a time where Disk Watcher itself was overwhelmed and could not capture all data.

An example of this follows:



[Interval] end time (Collected interval size)

I/Os were Missed Situation Flyover
13 Statistical graphs

There are 12 statistical graphs in Disk Watcher, and these can appear in any of the 3 common formats: Overview, Rankings or Selection over time. Additional graphs are also available under Statistical -> Advanced.

These graphs are built using the statistical data captured by Disk Watcher in file QAPYDWSTAT.

Typically, users start with the desired Overview graph, then select time periods and drill-down into rankings. From rankings, a user will drill down again into selection over time or use the Detail reports menu for additional options.

Tip: The most used graphs are listed first in this list.

If you need help with definitions of specific metrics, see the previous section or contact iDoctor support.

The Statistical folder contains the following:



Disk Watcher - Statistical folder

13.1 Statistical reads and writes rates for ASP <<DSASP>>

This graph displays **I/O rates per second** with average response times and service times on the secondary Y-axis.



13.2 Statistical read/write size averages for ASP <<DSASP>>

This graph displays **average I/O sizes (in kilobytes)** with average response times and service times on the secondary Y-axis.



13.3 Statistical read/write size rates for ASP <<DSASP>>

This graph displays the **total I/O size for all operations occurring per second** with average response times and service times on the secondary Y-axis.



13.4 Statistical read/write categorized total response times for ASP <<DSASP>>

This graph displays the **total I/O times** for each of reads, writes and others with average response times and service times on the secondary Y-axis. These metrics are grouped into 6 average response time buckets for each I/O type with their ranges indicated on the description for each.



13.5 Statistical read/write categorized total service times for ASP <<DSASP>>

This graph displays the **total service times** for each of reads, writes and others with average response times and service times on the secondary Y-axis. These metrics are grouped into 6 average response time buckets for each I/O type with their ranges indicated on the description for each.



13.6 Statistical read/write categorized totals for ASP <<DSASP>>

This graph displays the **total operations** for each of reads, writes and others with average response times and service times on the secondary Y-axis. These metrics are grouped into 6 average response time buckets for each I/O type with their ranges indicated on the description for each.



13.7 Statistical read/write categorized rates for ASP <<DSASP>>

This graph displays the **I/Os per second** for each of reads, writes and others with average response times and service times on the secondary Y-axis. These metrics are grouped into 6 average response time buckets for each I/O type with their ranges indicated on the description for each.



13.8 Statistical read/write size totals for ASP << DSASP>>

This graph displays the **total I/O size for each of reads**, writes and others with average response times and service times on the secondary Y-axis.



13.9 Statistical read/write totals for ASP <<DSASP>>

This graph displays I/O totals with average response times and service times on the secondary Y-axis.



13.10 Statistical read/write rates with average sizes for ASP <<DSASP>>

This graph displays I/O rates per second with average I/O sizes on the secondary Y-axis.



13.11 Statistical categorized totals for ASP <<DSASP>>

This graph combines all 3 I/O types together and shows **total I/Os** with average response times and service times on the secondary Y-axis. These metrics are grouped into 6 average response time buckets



13.12 Statistical categorized rates for ASP << DSASP>>

This graph combines all 3 I/O types together and shows **I/Os per second** with average response times and service times on the secondary Y-axis. These metrics are grouped into 6 average response time buckets



13.13 Rankings graphs

The same set of overview graphs also exist as rankings graphs. For statistical data, the following disk groupings are available:

by disk path by disk unit by io processor by asp by io adapter

Disk groupings

Access to these can be done either using the appropriate Rankings graph options at the collection-level or via a drill down from an Overview graph.

The typical method to drill down into rankings is to select a time period and right-click as follows:



Drilling down into Statistical reads and writes rankings

IBM iDoctor for IBM i



Statistical reads and writes rates by disk path

Rankings graphs by default are viewed with horizontal bars. But the user may press the toggle graph format toolbar button to easily switch these to vertical bars if desired. This will allow for the secondary Y-axis to become visible.



Further drill-downs to selection over time graphs are available using a right-click on the desired grouping:

Drilling down to Selection over time graph

13.14 Selection over time graphs

The same set of overview graphs also exist as selection over time graphs. These are only accessible as a drill-down from rankings graphs.

These graphs are almost always identical to the overview graphs, except they are filtered on whatever selection has been made.



An example follows below:

Statistical reads and writes rates for Disk Path DMP010

13.15 Advanced

This folder contains graphs rarely needed and intended for more advanced users or IBM support.

Advanced statistical read/write categorized total response times for ASP <<DSASP>> Advanced statistical read/write categorized total service times for ASP <<DSASP>> Advanced statistical read/write categorized totals for ASP <<DSASP>> Advanced statistical read/write categorized rates for ASP <<DSASP>> Advanced statistical read/write categorized rates for ASP <<DSASP>>

Advanced statistical categorized totals for ASP <<DSASP>>

Advanced statistical categorized rates for ASP <<DSASP>>

Statistical deferred queue time ratio totals for ASP <<DSASP>>

🚾 Statistical deferred queue time ratio reads and writes for ASP <<DSASP>>

Statistical -> Advanced folder

These are like the graphs previously described except the categorized graphs show 13 buckets per I/O type instead of 6.

An example follows below:



Advanced statistical read/write categorized total response times for ASP 1

13.15.1 Statistical deferred queue time ratio totals for ASP 1

This graph displays the ratio of deferred queue time / service time as well as response and service times on the secondary Y-axis.



13.15.2 Statistical deferred queue time ratio reads and writes for ASP <<DSASP>>

This is like the previous graph but breaks out the reads, writes and others into separate buckets.



14 Trace graphs

There are 12 trace graphs in Disk Watcher, and these can appear in any of the 3 common formats: Overview, Rankings or Selection over time. Additional graphs are also available under Trace -> Advanced.

These graphs are built using the trace data captured by Disk Watcher in file QAPYDWTRC. Additional SQL tables are built after running the Trace Summary analysis which is required for these graphs to appear.

Typically, users start with the desired Overview graph, then select time periods and drill-down into rankings. From rankings, a user will drill down again into selection over time or use the Detail reports menu for additional options.

Tip: The most used graphs are listed first in this list.

If you need help with definitions of specific metrics, see the previous section or contact iDoctor support.

The Trace folder contains the following:

Connections Idoc720: Disk Wate	her	- #1 🗴
Dfldw1	^	Report folder
- Mccargardw		
Mccargar3		Reads and writes rates for ASP < <dsasp>></dsasp>
Mccdwtest		Read/write size averages for ASP < <dsasp>></dsasp>
🗄 📲 SQL tables		Read/write size rates for ASP < <dsasp>></dsasp>
		Read/write categorized total response times for ASP < <dsasp>></dsasp>
H Mintro		Read/write categorized total service times for ASP < <dsasp>></dsasp>
		Read/write categorized totals for ASP < <dsasp>></dsasp>
Etateonly		Read/write categorized rates for ASP < <dsasp>></dsasp>
		Read/write size totals for ASP < <dsasp>></dsasp>
E G080190506		Read/write totals for ASP < <dsasp>></dsasp>
🗉 📙 SQL tables		Read/write rates with average sizes for ASP < <dsasp>></dsasp>
🗄 📲 Statistical		Categorized totals for ASP < <dsasp>></dsasp>
🗄 📲 Trace		Categorized rates for ASP < <dsasp>></dsasp>
📲 Server-side output file	5	Reads and writes rates rankings
🗄 📑 User-defined reports		Read/write size averages rankings
		Read/write size rates rankings
Odwdata		Read/write categorized total response times rankings
Definitions		Read/write categorized total service times rankings
SOL tables		Read/write categorized totals rankings
Monitors		Read/write categorized rates rankings
General functions		Read/write totals rankings
		Bead/write rates with average sizes rankings
		Categorized totals rankings
Power		Categorized rates rankings
Db2 for i		Advanced
Find collections results	\mathbf{v}	
Disk Watcher – Trace folder		

14.1 Reads and writes rates for ASP << DSASP>>

This graph displays **I/O rates per second** with average response times and service times on the secondary Y-axis.



14.2 Read/write size averages for ASP <<DSASP>>

This graph displays **average I/O sizes (in kilobytes)** with average response times and service times on the secondary Y-axis.



14.3 Read/write size rates for ASP <<DSASP>>

This graph displays the **total I/O size for all operations occurring per second** with average response times and service times on the secondary Y-axis.



14.4 Read/write categorized total response times for ASP <<DSASP>>

This graph displays the **total I/O times** for each of reads, writes and others with average response times and service times on the secondary Y-axis. These metrics are grouped into 6 average response time buckets for each I/O type with their ranges indicated on the description for each.



14.5 Read/write categorized total service times for ASP <<DSASP>>

This graph displays the **total service times** for each of reads, writes and others with average response times and service times on the secondary Y-axis. These metrics are grouped into 6 average response time buckets for each I/O type with their ranges indicated on the description for each.



14.6 Read/write categorized totals for ASP << DSASP>>

This graph displays the **total operations** for each of reads, writes and others with average response times and service times on the secondary Y-axis. These metrics are grouped into 6 average response time buckets for each I/O type with their ranges indicated on the description for each.



14.7 Read/write categorized rates for ASP <<DSASP>>

This graph displays the **I/Os per second** for each of reads, writes and others with average response times and service times on the secondary Y-axis. These metrics are grouped into 6 average response time buckets for each I/O type with their ranges indicated on the description for each.



14.8 Read/write size totals for ASP <<DSASP>>

This graph displays the **total I/O size for each of reads, writes and others** with average response times and service times on the secondary Y-axis.



14.9 Read/write totals for ASP << DSASP>>

This graph displays **I/O totals** with average response times and service times on the secondary Y-axis.



14.10 Read/write rates with average sizes for ASP <<DSASP>>

This graph displays I/O rates per second with average I/O sizes on the secondary Y-axis.



14.11 Categorized totals for ASP <<DSASP>>

This graph combines all 3 I/O types together and shows **total I/Os** with average response times and service times on the secondary Y-axis. These metrics are grouped into 6 average response time buckets



14.12 Categorized rates for ASP << DSASP>>

This graph combines all 3 I/O types together and shows **I/Os per second** with average response times and service times on the secondary Y-axis. These metrics are grouped into 6 average response time buckets



14.13 Rankings graphs

The same set of overview graphs also exist as rankings graphs. For trace data, the following disk groupings are available:

by generic object by disk path ASP <<DSASP>> by disk unit by io processor by asp by object by program by program - procedure by thread by ifs path by object context by current user by io adapter by disk serial number by disk type by lun id-unit by lun id-unit-path by Iss id by thread || object by thread || program by thread || unit by thread || unit || object by generic job by generic job || object by generic job || program by generic job || unit by generic job || unit || object by generic job || unit || object || program by object type by segment type Disk groupings

Note: The options here will vary based on what types of additional data were collected.

Access to these can be done either using the appropriate Rankings graph options at the collection-level or via a drill down from an Overview graph.

The typical method to drill down into rankings is to select a time period and right-click as follows:



Drilling down into Categorized rates by generic object



Categorized rates by generic object

Rankings graphs by default are viewed with horizontal bars. But the user may press the toggle graph format toolbar button to easily switch these to vertical bars if desired. This will allow for the secondary Y-axis to become visible.

Further drill-downs to selection over time graphs are available using a right-click on the desired grouping:



Drilling down to Selection over time graph

14.14 Selection over time graphs

The same set of overview graphs also exist as selection over time graphs. These are only accessible as a drill-down from rankings graphs.

These graphs are almost always identical to the overview graphs, except they are filtered on whatever selection has been made.

An example follows below:



Reads and writes rates for Generic object DB ENGI*

14.15 Advanced

This folder contains graphs rarely needed and intended for more advanced users or IBM support.

Advanced read/write categorized total response times for ASP <<DSASP>>

- Advanced read/write categorized total service times for ASP <<DSASP>>
- Advanced read/write categorized totals for ASP <<DSASP>>

Advanced read/write categorized rates for ASP <<DSASP>>

Advanced categorized totals for ASP <<DSASP>>

Advanced categorized rates for ASP <<DSASP>>

Deferred queue time ratio totals for ASP <<DSASP>>

Deferred queue time ratio reads and writes for ASP <<DSASP>>

Trace -> Advanced folder

These are like the graphs previously described except the categorized graphs show 13 buckets per I/O instead of 6.

An example follows below:



Advanced read/write categorized total response times for ASP 1

15 Detail reports

These reports are drill-down options from either the statistical or trace graphs. They show tables and report more detailed information about the disk I/Os occurring for the time period or selected job/object of interest.

An example of the Detail reports menu follows:



An example follows:

(1		1	4		4				4	
Total	Average write	Average write	Average read	Average read	Total	Total	Total	TRTDENAME	TRCURRUSER	Object name	PRMPGMNAME	PRMODNA
I/Os	response	service	response	service	writes	reads	other	(TRTDENAME)	(TRCURRUSER)	(OROBJNAME)	(PRMPGMNAME)	(PRMODN.
(TOTCNT)	time (ms)	time (ms)	time (ms)	time (ms)	(WRTCNT)	(RDCNT)	I/Os					
	(WRTAVGRSP)	(WRTAVGSRVRSP)	(RDAVGRSP)	(RDAVGSRVRSP)			(OTHCNT)					
11816	2.5627	2.5495	0	0	11,816	0	0	QZDASOINIT / QUSER / 982051	MCCARGAR			
3634	5.0794	5.0449	0	0	3,634	0	0	QDBSRVXR2 / QSYS / 952266	QSYS	QDBJNC0006		#journal
1792	5.2232	5.2232	0	0	1,792	0	0	QPADEV0003 / MCCARGAR / 982058	MCCARGAR			
1185	5.2502	5.2502	0	0	1,185	0	0	QPADEV0001 / MCCARGAR / 981615	MCCARGAR			
912	4.8931	4.8766	0	0	912	0	0	QPADEV0001 / MCCARGAR / 981615	MCCARGAR			SmASDPa
722	3.4532	3.4531	0	0	722	0	0	QPADEV0001 / MCCARGAR / 981615	MCCARGAR	MCCARGAR8		IxRadix3F
720	3.8870	3.8841	0	0	720	0	0	QDBSRVXR / QSYS / 952262	QSYS	QDBJXQ0001		#journal
701	5.6327	5.6177	0	0	701	0	0	QPADEV0003 / MCCARGAR / 982058	MCCARGAR			SmASDPa
648	42.3747	29.2072	0	0	648	0	0	QPADEV0001 / MCCARGAR / 981615	MCCARGAR	MCCARGAR		IxRadix4F
587	52.2425	42.0335	0	0	587	0	0	SMPOL001	SLIC	DB ENGINE DATA		SmMainSt
581	52.8281	41.8175	0	0	581	0	0	SMPOL001	SLIC	QAPYDWTRC PRD141213B		SmMainSt
541	4.0953	4.0952	0	0	541	0	0	QPADEV0001 / MCCARGAR / 981615	MCCARGAR	MCCARGAR8		IxRadix4F
488	4.5660	4.5660	0	0	488	0	0	QPADEV0003 / MCCARGAR / 982058	MCCARGAR	QIDRDATA		IxRadix4F
462	2.8929	2.8925	0	0	462	0	0	QZDASOINIT / QUSER / 982051	MCCARGAR			SmASDPa
403	70.6479	53.8401	0	0	403	0	0	SMPOL001	SLIC	MWS CREATED BLOCK		SmMainSt
368	78.9301	62.1348	0	0	368	0	0	SMPOL001	SLIC	MWS AREA DATA SID		SmMainSt
361	3.7813	3.7077	0	0	361	0	0	MNTASK	SLIC	MCCARGAR8		#mncol
361	3.4311	3.4272	0	0	361	0	0	QPADEV0001 / MCCARGAR / 981615	MCCARGAR	MCCARGAR8		#mncol
361	3.6027	3.6026	0	0	361	0	0	MNTASK	SLIC	MCCARGAR8		IxRadix3F(
347	3.9643	3.9643	0	0	347	0	0	QDBSRVXR2 / QSYS / 952266	QSYS	QDBJXQ0001		#journal
337	3.7884	3.7091	0	0	337	0	0	QPADEV0001 / MCCARGAR / 981615	MCCARGAR	MCCARGAR		IxResilienc
311	3.9453	3.9453	0	0	311	0	0	QDBSRVXR / QSYS / 952262	QSYS	QDBJXQ0001		JoTransier
281	4.1291	4.1282	0	0	281	0	0	QPADEV0001 / MCCARGAR / 981615	MCCARGAR	QDBSHR		IxResilienc
270	33.4887	23.0708	0	0	270	0	0	QPADEV0003 / MCCARGAR / 982058	MCCARGAR	MCCARGAR		IxRadix4F(
256	4.4232	4.4212	0	0	256	0	0	QPADEV0003 / MCCARGAR / 982058	MCCARGAR	QDBSHR		IxResilienc
256	4.5222	4.5222	0	0	256	0	0	QPADEV0003 / MCCARGAR / 982058	MCCARGAR	MCCARGAR		IxResilienc
232	4.2051	4.1883	0	0	232	0	0	QPADEV0001 / MCCARGAR / 981615	MCCARGAR	QDBJXQ0001		#journal
224	0	0	10.7935	10.7935	0	224	0	QPADEV0001 / MCCARGAR / 981615	MCCARGAR			setspacep
217	3.6426	3.6296	0	0	217	0	0	OPADEV0001 / MCCARGAR / 981615	MCCARGAR	ODBJXO0001		IoTransier
<												

iDocDW.mdb OAIDRSOL table DTL TROVER 1

Average: 562.56 Count: 2 Sum: 1.125.11

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Jobs, objects and programs causing I/Os

16 Disk Watcher Commands

This section describes green screen commands and functionality related to Disk Watcher in the OS and included with iDoctor.

16.1 IBM i Disk Watcher Commands

At 6.1 and higher the Disk Watcher commands were added to IBM i. The following commands are part of the Disk Watcher support included in library QSYS:

16.1.1 ADDDWDFN

Adds a Disk Watcher definition to the system. http://www-01.ibm.com/support/knowledgecenter/ssw_ibm_i_74/cl/adddwdfn.htm

16.1.2 STRDW

Starts a Disk Watcher collection http://www-01.ibm.com/support/knowledgecenter/ssw_ibm_i_74/cl/strdw.htm

16.1.3 RMVDWDFN

Deletes a Disk Watcher definition. http://www-01.ibm.com/support/knowledgecenter/ssw_ibm_i_74/cl/rmvdwdfn.htm

16.1.4 ENDDW

Ends a Disk Watcher collection. http://www-01.ibm.com/support/knowledgecenter/ssw_ibm_i_74/cl/enddw.htm

16.1.5 CPYPFRCOL

Copy a collection to another location. http://www-01.ibm.com/support/knowledgecenter/ssw_ibm_i_74/cl/cpypfrcol.htm

16.1.6 CVTPFRCOL

This command will convert a collection created at a previous release to the current release. At 6.1 this command only supports Collection Services collections. At 7.1 and higher it also supports Disk Watcher, Job Watcher and PEX.

Note: Using this command is NOT recommended if planning to use the data with iDoctor. iDoctor will handle your data regardless of the release it was created on (7.1 and higher) http://www-01.ibm.com/support/knowledgecenter/ssw_ibm_i_74/cl/cvtpfrcol.htm

16.1.7 DLTPFRCOL

Deletes one or more collections (either PEX, CS, DW, JW, etc) Note: This will NOT delete iDoctor created SQL tables, so it not recommended. Use the QIDRWCH/DLTDWCOL instead. http://www-01.ibm.com/support/knowledgecenter/ssw_ibm_i_74/cl/dltpfrcol.htm

16.1.8 SAVPFRCOL

Saves one or more collections to a SAVF (either PEX, CS, DW, JW, etc) http://www-01.ibm.com/support/knowledgecenter/ssw_ibm_i_74/cl/savpfrcol.htm

16.1.9 RSTPFRCOL

Restore one or more collections from a SAVF (either PEX, CS, DW, JW, etc) <u>http://www-01.ibm.com/support/knowledgecenter/ssw_ibm_i_74/cl/rstpfrcol.htm</u>

16.2 iDoctor Disk Watcher Commands

The following commands are included with Disk Watcher in library QIDRWCH.

16.2.1 CPYDWCOL

This command is used to copy a Disk Watcher collection. This action will copy every member matching the collection name from the "from" library to the "to" library. If desired the collection can be renamed by setting the TOCOL parameter with a new name.

Copy a Disk Watcher Collection	n (CPYDWCOL)
Type choices, press Enter.	
From Collection Name MYCOL Library MYLIB	Name Name
To Collection Name NEWCOL Library NEWLIB	Name Name
Record format check <u>N</u>	Υ, Ν

Note: CPYPFRCOL can also perform this action, but this command is still provided to avoid possible problems where CPYPFRCOL will not allow a collection to be copied based on VRM differences of the database files.

Note: This command will NOT copy the iDoctor created SQL Tables produced by iDoctor analyses.

Keyword	Description	Choices
FROMCOL	From collection name	Name
FROMLIB	From library name	Name
TOCOL	To collection name	Name
TOLIB	To library name	Name
FMTOPT	Record format check This option allows the Disk Watcher collection to be copied even if the files in the 'To' library do not match the files in the 'From' library. - If the value is 'N' then CPYF will use FMTOPT(*NOCHK) - If the value is 'Y' then CPYF will use FMTOPT(*MAP *DROP)	<u>N</u> , Y

16.2.2 DLTDWCOL

This command is used to delete a Disk Watcher collection from a user's library on a system. This action will remove the member matching the collection name from every QAPYDW* file found in the library specified.

This command also removes all iDoctor created <u>SQL Tables</u> associated with this collection.

D	elete	a	Disk	Watcher	Coln	(DLTDWCOL)
Type choices, press En	ter.					
Collection name Library				MYCOL MYLIB		Name Name

Keyword	Description	Choices
WCHNAME	Collection name	Name
LIB	library name	Name

16.2.3 DLTDWMON

This command is used to delete a Disk Watcher monitor and all collections it contains on the current system. If the monitor is still running, the monitor will first be ended using the ENDDWMON command.

Delete a Disk Watcher Monitor	(DLTDWMON)
Type choices, press Enter.	
Monitor name MYMON	Name

The record in file QUSRSYS/QAIDRDWM2 that identifies the existence of this monitor will also be removed by this command.

Keyword	Description	Choices
MONITOR	Monitor name	Name

16.2.4 ENDDWMON

This command is used to end the job running a Disk Watcher monitor and any jobs currently running collections within the monitor.

End a Disk Watcher	Monitor (ENDDWMON)
Type choices, press Enter.	
Monitor nameMYMONEnding optionRun default analyses	NCharacter value EDXIMMED, *DELAYED XYES, *NO

The **Ending option** parameter can be used to delay ending the monitor until the currently collection's normal duration completes.

Keyword	Description	Choices
MONITOR	Monitor name	Character value
COLLIB	Ending option This parameter determines if the monitor and any active collection jobs should end immediately or after the currently running collection completes. Use the *DELAYED option to indicate the monitor should remain active	*IMMED, *DELAYED
	and then end once the current collection completes.	
DFNNAME	Run default analyses This option, if set to *YES, will automatically run the Trace summary analysis on any collections that contain trace data after each collection completes. In some cases, this can be resource intensive.	*YES, *NO

16.2.5 HLDDWMON

This command is used to hold a Disk Watcher monitor. A held monitor will not delete any old collections or create any new collections until it is released using the RLSDWMON command.

	Hold a	Disk	Watcher	Monitor	(HLDDWMON)
Type choices, press	Enter.				
Monitor name					Name

Keyword	Description	Choices
MONITOR	Monitor name	Name

16.2.6 RLSDWMON

This command is used to release a monitor that is currently in a held state. Once released the monitor will continue to create new collections and delete old collections normally.

	Release	a	Disk	Watcher	Monitor	(RLSDWMON)
Type choices, pres	s Enter.					
Monitor name						lame

Keyword	Description	Choices
MONITOR	Monitor name	Name
	If the monitor specified is not already held, the command will do nothing.	

16.2.7 STRDWMON

This command is used to start or restart a Disk Watcher monitor. Use DLTDWMON to delete an existing monitor.

Note: This command should be submitted to batch using the SBMJOB command and not be ran interactively.

Start a Disk W	Jatcher Monitor	(STRDWMON)
Type choices, press Enter.		
Monitor name	3 60 4096 *N0 *SAME	Name Name, *SAME Name, *SAME 2-999, *SAME 1-1440, *SAME *YES, *NO
Hold date	*NONE *NONE *NONE *NONE *NONE *NONE	Date, *CURRENT, *NONE *NONE, *ALL, *MON, *TUE Time, *NONE Date, *CURRENT, *NONE *NONE, *ALL, *MON, *TUE Time, *NONE Date, *CURRENT, *NONE
F3=Exit F4=Prompt F5=Refresh	F12=Cancel	F13=How to use this display

A monitor is a set of collections that continuously collect data over a system overwriting the oldest collection when it creates a new collection.

Monitors are built from a Disk Watcher definition which are stored in file QUSRSYS/QAPYDWDFN. A definition is a ADDDWDFN command string that indicates the parameters the monitor should use in its collections. Definitions can be created using the iDoctor client or by using the ADDDWDFN command.

The maximum historical collections parameter (COLNS) determines how many collections should be saved at one time.

A record in file QUSRSYS/QAIDRDWM2 that identifies the existence and status of the monitor is created and updated by this command.

Keyword	Description	Choices
MONITOR	Monitor name	Name
COLLIB	Monitor library name	Name. *SAME
DENNAME	Definition name	Name, *SAME
COLNS	Maximum historical collections	2-999. *SAME
	This is the maximum number of collections that should exist in the	
	library. It does not count/include the currently running collection.	
STRGAP	Collection duration (in minutes)	1-1440, *SAME
	This value is how much time should elapse between each collection	
	being submitted.	
MAXSIZE	Collection maximum size (megabytes)	Character value,
	This value indicates the maximum amount of data that each collection	(10 digits or less)
	should contain.	
	Note: If this value is reached before the collection duration elapses, then	
	NO data will be captured until the next collection in the monitor starts.	
RUNSUM	Run default analyses	*YES, *NO
	This option, if set to *YES, will automatically run the Trace summary	
	analysis on any collections that contain trace data after each collection	
теут	completes. In some cases, this can be resource intensive.	
HLDDATE	Hold date	Date,
	Specifies the date on which the monitor is to be held.	*NONE
	Held dow	NONE *ALL
ILDDA I	Flow way	
	Note: The HI DDATE and HI DDAY parameters are mutually exclusive.	*MON
		*TUF
		*WFD
		*THU
		*FRI
		*SAT
		*SUN
HLDTIME	Hold time	Time,
	Specifies the time of day to hold the monitor.	*NONE
RLSDATE	Release date	Date,
	Specifies the date on which the monitor is to be released.	*CURRENT,
	Note: The RLSDATE and RLSDAY parameters are mutually exclusive.	*NONE
RLSDAY	Release day	*ALL
	Specifies the day of the week on which the monitor is released.	*NONE
	Note: The RLSDATE and RLSDAY parameters are mutually exclusive.	*MON
		^IUE
		*VVED
		*EDI
		ΓΠΙ *9ΛΤ
		*SUN
RI STIME	Release time	Time
	Specifies the time of day to release the monitor	*NONE
ENDDATE	End date	Date
	Specifies the date on which the monitor is to be ended.	*CURRENT.
		*NONE
ENDTIME	End time	Time.
	Specifies the time of day to end the monitor.	*NONE
OVRLAP	This value is no longer used.	1-600, *SAME

17 IBM i Disk Watcher Files

For more information on this topic please visit the IBM Knowledge Center link below: <u>http://www-01.ibm.com/support/knowledgecenter/ssw_ibm_i_74/rzahx/rzahxdwdatafiles.htm</u>

18 iDoctor Disk Watcher Files

This section discusses the iDoctor created SQL tables and physical files related to the Disk Watcher component.

18.1 QAIDRDWM2

This physical file exists in QUSRSYS and contains just a single member. It is used to keep track of the Disk Watcher monitors that exist on a system and is shipped in the QIDRWCH library.

Column	Description	Attribute
MONITOR	Monitor name	C (7)
LIB	Monitor library	C (10)
DFNNAME	Definition name	C (10)
COLNS	Number of collections	B (4)
	This is the maximum number of collections that should exist in the library. It does not count/include the currently running collection.	
STRGAP	Collection duration (in minutes)	B (4)
	This value is how much time should elapse between each collection being submitted.	
STATUS	Status (of the monitor)	C (1)
	Possible values:	
	'A' – Active	
	'E' – Ended (not active)	
	(H' - Held	
STARTTIME	Start time	Timestamp
COLLJOB	Monitor job	C (28)
	The name of job that ran or is currently running the monitor.	
DESC	Description	C (50)
ACTIVEIDX	Active collection index This value from 001 to 999 indicates the current or last collection running. That collection name will be the monitor name with this value concatenated to it.	C (3)
STROVRLAP	This value is obsolete and no longer used.	B (4)
MAXSIZE	Collection maximum size (megabytes) This value indicates the maximum amount of data that each collection should contain.	C (10)
	Note: If this value is reached before the collection duration elapses, then NO data will be captured until the next collection in the monitor starts.	
RES1	Reserved field #1	C (10)
RES2	Reserved field #1	C (10)

Note: This file won't exist if a Disk Watcher monitor has never been created.

18.2 QAIDRDWINTI_<MBR>

This SQL table is created by the Trace summary analysis and acts as a basic time summary of the trace data into 1 second intervals. It is used for in most trace-based graphs in Disk Watcher.

Note: Time periods where no data was collected are also included in this file for ease of graphing the data.

Column	Description	Attribute
INTERVAL	Interval number	D (15,0)
TOTIOS	Total I/Os	B (4)
RISTARTTOD	End of interval time of day	Timestamp
	I his is the time that the collection interval began ending.	
MINIO	First I/O usecs since collection start	B (8)
	Within the 1 second interval time period, this is exact time that the 1 st I/O	
	occurred since the collection started in microseconds.	
MAXIO	Last I/O usecs since collection start	B (8)
	Within the 1 second interval time period, this is exact time that the final	
	I/O occurred since the collection started in microseconds.	
STDATAMISS	This is used to indicate if any I/Os were NOT captured by Disk Watcher	B (4)
	in this interval. It will be set to '1' if data was not collected that should	
	have been.	

18.3 QAIDRDWTSUM_<MBR>

This SQL table is created by the Trace summary analysis and acts as a detailed summary of the trace data into 1 second intervals. It is used for the trace-based rankings and selection over time graphs.

This file contains 1 record per disk path (with I/Os captured) per 1 second interval per object segment, pgm/procedure, and taskcount.

13 I/O time buckets are used in this table which have field names numbered 1-13. These I/O time duration buckets are hard coded as the following:

Bucket	Description
1	< 100 microseconds
2	100 – 199 microseconds
3	200 – 399 microseconds
4	400 – 799 microseconds
5	800 – 1599 microseconds
6	1.6 – < 3.2 milliseconds
7	3.2 – < 6.4 milliseconds
8	6.4 – < 12.8 milliseconds
9	12.8 – < 25.6 milliseconds
10	25.6 – < 51.2 milliseconds
11	51.2 – < 102.4 milliseconds
12	102.4 – 204.8 milliseconds
13	>204.8 milliseconds

Column	Description	Attribute
INTERVAL	Interval number	B (8)
DEVRNAME	Disk path	C (10)
STASPNUM	ASP number	B (4)
STUNITNUM	Disk unit number	B (4)
TCSEGKEY	Segment key This is the identifier in column SEGKEY in file QAPYDWOBJR (object resolution data) that identifies the object or segment associated with these I/O operations.	H (8)
TCPROCKEY	Program or procedure key This is the identifier in column PROCKEY in file QAPYDWPGMR (program/procedure resolution data) that identifies the program or procedure associated with these I/O operations.	H (8)
TCTASKCNT	Task count This is the identifier in column TSKCNT in file QAPYDWTDER (TDE resolution data) that uniquely identifies the job/thread or system task associated with these I/O operations.	B (8)
TOTCNT	Total I/Os	B (4)
TOTTIME	Total I/O time (usecs) Note: This time includes the deferred queue time if any.	B (8)
DQTOTTIME	Total deferred queue time (usecs) The total time operations spent waiting on the deferred I/O queue (in microseconds).	B (8)
TOTPCNT	Total page counts This is the number of pages in all I/O requests.	B (8)
WRTCNT	Total writes	B (4)
WRTTIME	Total write time (usecs)	B (8)
DQWRTTIME	Total deferred queue write time (usecs)	B (8)
WRTPCNT	Total write page counts	B (8)

RDCNT	Total reads	B (4)
RDTIME	Total read time (usecs)	B (8)
DQRDTIME	Total deferred queue read time (usecs)	B (8)
RDPCNT	Total read page counts	B (8)
OTHCNT	Total other I/Os	B (4)
OTHTIME	Total other time (usecs)	B (8)
DQOTHTIME	Total deferred queue other I/O time (usecs)	B (8)
OTHPCNT	Total other I/O page counts	B (8)

STWRTTOT1-13	Total write time (usecs)	B (8)
STWRTDQ1-13	Total write deferred queue time (usecs)	B (8)
STWRTC1-13	Total writes	B (4)
STWRTPC1-13	Total write page counts	B (8)

STRDTOT1-13	Total read time (usecs)	B (8)
STRDDQ1-13	Total read deferred queue time (usecs)	B (8)
STRDC1-13	Total reads	B (4)
STRDPC1-13	Total read page counts	B (8)
STOTHTOT1-13	Total other I/O time (usecs)	B (8)
--------------	---	-------
STOTHDQ1-13	Total other I/O deferred queue time (usecs)	B (8)
STOTHC1-13	Total others I/Os	B (4)
STOTHPC1-13	Total other I/O page counts	B (8)

18.4 QAIDRDWTSUM2_<MBR>

This SQL table is created by the Trace summary analysis and acts as a summary of the trace data into 1 second intervals. It is used in the Trace overview graphs in Disk Watcher.

This file contains 1 record per ASP (with I/Os occurring) and 1 second interval.

See the previous section for more information about the columns defined in this file.