

QZDASOINIT & QSQSRVR jobs: Monitoring and auditing techniques

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Agenda

- Monitoring and auditing definitions and examples
- QZDASOINIT & QSQSRVR job structure
- Challenges
- Monitoring & auditing
 - -iSeries Navigator
 - -IBM APIs, Commands, and Exit Points
 - -Centerfield Technology tools

Comparison of approaches based on different goals



Monitor and Audit definitions

Monitor

- -Permanent: Always on with low overhead (P-mon)
- -Temporary: Higher overhead, only on when required (T-mon)

Audit

- Recording selected data to permanent storage from
 P-mon sources
- Focus for this presentation will be on monitoring with the idea that Auditing is just captured information from monitored jobs



Monitoring categories





Why monitor or audit?

Monitoring

- -Diagnose functional problems when they occur
- -Identify and fix performance issues
- -Early warning when something is wrong
- Auditing
 - -Security
 - -Regulatory compliance
 - -Historical analysis



QZDASOINIT



iSeries

- * Java Toolbox JDBC driver
- ** Stored Procedures



QSQSRVR



iSeries

* Native JDBC driver

** CLI = Call Level Interface



Key challenges with Database Server jobs

- All of the issues with any job running SQL
 - -Unpredictable or slow performance
 - -High use of system resources
- All of the "delegation" issues which complicate diagnostics and auditing – lack of visibility
 - -Who requested the work?
 - -What if the user closes their window or application?
 - -Multiple submissions of work
 - "Connecting the Dots" which jobs relate to each other



Information of interest

- When did the QZDASOINIT or QSQSRVR job become "active" (out of Prestart wait)?
- Who is currently connected to the job and requesting work be done?
- How much CPU and I/O are the job consuming?
- What SQL statements have run and are running?
- Why is a particular SQL statement running so long and what can I do about it?
- Is the QSQSRVR or QZDASOINIT job still connected to a user?



iSeries Navigator



iSeries Navigator

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🤌 iSeries Navigator

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Add a connection

🖉 Install additional components

- Monitor system performance
- View system status

- View system operator messages
 View system values
 P Help for related tasks



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iSeries Navigator Pros

- + Price is right (but not free!)
- + Much improved over a few years ago
- + Works well with any type of job
- + Integrated with Visual Explain
- + Fairly good database monitor collection facility
- + Shows current user



iSeries Navigator Cons

- Good functions to monitor jobs but no audit capability
- Generic, limited support of server job information (missing many metrics)
- Lots of clicking to get to the data of interest
- Can be resource hungry (client and server)
- Still requires a fair amount of expertise to shoot DB performance problems and prioritize solutions
- Is not the strategic tool for IBM to manage the iSeries



IBM APIs, Commands, and Exit Points



APIs – Work Management

QUSRJOBI – Retrieve job information

- Information from WRKACTJOB + more
- -Active job SQL information
 - Current SQL
 - Open cursors & SQL statement names
 - Opens & pseudo open information
 - Server mode (QSQSRVR mode) information V5R4+
- Job notification exit point (QIBM_QWT_JOBNOTIFY)
 - Not useful for ODBC
 - -Partially useful for CLI



DB APIs & commands – Database management

- STRDBMON SQL trace & performance collector
 - Must be used with care & best with many filters (T-Mon category)
 - -Not a good auditing alternative due to the overhead
- Memory resident monitor
 - Start SQL database monitor QQQSSDBM
 - Lower overhead but not an auditing alternative because it is a summary not a detailed monitor
 - -Light-weight DB performance collection mechanism



DB APIs & commands – Database management

Exit points

- -ODBC init QIBM_QZDA_INIT
- -ODBC request QIBM_QZDA_SQL2
- -CLI connection QIBM_QSQ_CLI_CONNECT
- -Open database file exit point QIBM_QDB_OPEN
- –Query Governor exit point -QIBM_QQQ_QUERY_GOVR



API, Command, Exit point Pros

 Almost anything can be monitored and captured for QZDASOINIT and QSQSRVR jobs

- Job Metrics
- Connection information
- Individual requests
- Pinpoint solutions can be developed for almost any need.
- Functions can be used for not only monitoring and auditing purposes but for automated control.



API, Command, Exit point Cons

- Fairly high degree of technical expertise required
- Some functions are dangerous to use without experience (like exit points)
- Some techniques can be highly invasive and cause performance issues
- Cost (time and resources) can be high to implement solutions

Centerfield Technology



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	025405	QSYS	QDBSRV05		*LOCAL		QSYS	*NONE	UPDATE QSYS2 /SYSIXADV SET LAST_ADVISED
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QYUSALRMD	0	0	0	0	0			
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9:09:42AM Operation ODBC 6147								
9-59-55AM Operation ODBC 6150								
Operation: CALL QSYS.QCMDEXC('QSYS/CHGIOB INQMSGRPV(*DFT)',0000000027,00000)								
9:59:55AM Operation ODBC 6147								
Operation: SELECT ORDINAL_POSITION, DATA_TYPE, TYPES CHEMA, TYPENAME, DB HTP AS IFIELD FROM QSYS2.SYSC OLUMNS, OSYS OADDENED WHERE TABLE NAME = 'CT' AND TABLE SCHEMA = 'MLH' AND SYSTEM COLUMN NAME = DENED AND								
SYSTEM_TABLE_SCHEMA = DBILB AND SYSTEM_TABLE_NAME = DBIFL ORDER BY ORDINAL_POSITION								
9:59:56AM Operation ODBC 6147								
Operation: SELECT * FROM MLH.CT								
9:99:99 AIM OPERATION ODBC 6150 Operation: CALL OS VS. OCMDEXC ("CHGLOB LOB(029072/OUSER/0ZD AS OINIT) INOMS (RPV(*DET %, 0000000051,00000)								
10:00:17AM Operation ODBC 6147								
Operation: CALL QIWS.QZD GDB PM(2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,								
10:00:17AM Operation ODBC 6150								
Operation: CALL QSYS.QCMDEXC ('CHKOBJ OBJQUSRSYS/QAUGDBPMD) OBJTYPE(*FILE)', 0000000044.00000)								
10:00:18AM Operation ODBC 6150	-							
	Þ							



Summary of techniques based on Specific Goals



	Goal	Navigator	API, CL, Exits	Centerfield
Ρ	Monitor QSQ* and QZDA* performance metrics	Yes - Management Central	Performance tools, QPMLPFRD api	Yes – including just for active jobs
e r	Alerts when performance metrics exceed limits	Yes – Management Central	QPMLPFRD api, Query Governor exit point (not 100%)	Audit logs can be used for notification via triggers
T O T M a	Collect SQL performance data based on user, job name, IP @ etc.	Yes	STRDBMON command	Yes – but can collect for multiple generic jobs, by subsystem, group profile, multiple IP @'s, scheduled time, etc. Safety net to prevent uncontrolled disk growth
n C	Collect SQL performance data based on QSQSRVR requester job	No	CLI exit point, QUSRJOBI API	Yes
e	Launch Visual Explain from job view	Yes	No – Technically there is a Visual Explain API but not for general use	Yes – both Centerfield and Navigator versions



	Goal	Navigator	API, CL, Exits	Centerfield
5	Monitor current users of QSQ* and QZDA* (active	Yes	QUSRJOBI api	Yes
	profile)			
N C N	Put SQL statements in joblog for diagnostics purposes	No	ODBC request exit point, Query Governor exit point (CLI), Open database file exit point	Yes – for QZDASOINIT jobs
:	ODBC flow information	No	ODBC request exit point	Yes
- - 1	QSQSRVR job use (requester job, i5/OS user profile and EP1/OW user profile)	No	CLI open exit point, QUSRJOBI information	Yes – special tool provided on request for EnterpriseOne or OneWorld accounts
9	Break ODBC into multiple subsystems	Partial – some gui some green-screen	No	See Centerfield website for directions



	Goal	Navigator	API, CL, Exits	Centerfield
A u d i t i g	Record all SQL statements executed	No	ODBC request exit point, Query Governor exit point (CLI)	Yes – for QZDASOINIT jobs
	Record connect and disconnect time	No	ODBC init exit point	Yes – for QZDASOINIT jobs
	Record connection rejections	No	ODBC init and/or request exit points	Yes – for QZDASOINIT jobs
	Job use and performance metrics for QZDASOINIT and QSQSRVR jobs	No	Performance tools, Performance collector APIs	Yes

Summary

- There are a variety of ways to gain greater insight into QZDASOINIT and QSZSRVR jobs
- None are really "free" your requirements, learning curve, and vendor support should dictate which options to use
- Each has strengths and weaknesses depending on your requirements and skill level

Contact Centerfield if you have unique needs or want to learn more!

For further information or help

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Thanks for Coming!